NAVFAC SOUTHEAST

FIRE PROTECTION SPECIFICATIONS

SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

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STENNIS, MS 39529

FIRE PROTECTION SUBMITTAL

REVISION 2
SEPTEMBER 14, 2009

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FIRE PROTECTION/ SPRINKLER SYSTEMS
OPERATIONS BUILDING 2440/2441
BOAT STORAGE BUILDING 2442

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FIRE PROTECTION/ SPRINKLER SYSTEMS
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SECTION 1

SPRINKLERS

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Series TY-FRB — 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers Quick Response, Standard Coverage

General Description

The Tyco® Series TY-FRB, 2.8, 4.2, 5.6, and 8.0 K-factor, Upright and Pendent Sprinklers described in this data sheet are quick response - standard coverage, decorative 3 mm glass bulb type spray sprinklers designed for use in light or ordinary hazard, commercial occupancies such as banks, hotels, shopping malls, etc.

The recessed version of the Series TY-FRB Pendent Sprinkler, where applicable, is intended for use in areas with a finished ceiling. It uses either a two-piece Style 10 (1/2 inch NPT) or Style 40 (3/4 inch NPT) Recessed Escutcheon with 1/2 inch (12,7 mm) of recessed adjustment or up to 3/4 inch (19,1 mm) of total adjustment from the flush pendent position, or a two-piece Style 20 (1/2 inch NPT) or Style 30 (3/4 inch NPT) Recessed Escutcheon with 1/4 inch (6,4 mm) of recessed adjustment or up to 1/2 inch (12,7 mm) of total adjustment from the flush pendent position. The adjustment provided by the Recessed Escutcheon reduces the accuracy to which the fixed pipe drops to the sprinklers must be cut.

Corrosion resistant coatings, where applicable, are utilized to extend the life of copper alloy sprinklers beyond that which would otherwise be obtained when exposed to corrosive atmospheres. Although corrosion resistant coated sprinklers have passed the standard corrosion tests of the applicable approval agencies, the testing is not representative of all possible corrosive atmospheres. Consequently, it is recommended that the end user be consulted with respect to the suitability of these coatings for any given corrosive environment. The effects of ambient temperature, concentration of chemicals, and gas/chemical velocity, should be considered, as a minimum, along with the corrosive nature of the chemical to which the sprinklers will be exposed.

An intermediate level versions of the Series TY-FRB Pendent Sprinklers are detailed in Technical Data Sheet TFP356, and Sprinkler Guards are detailed in Technical Data Sheet TFP780

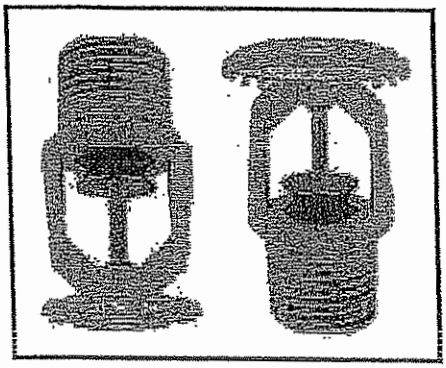
WARNINGS

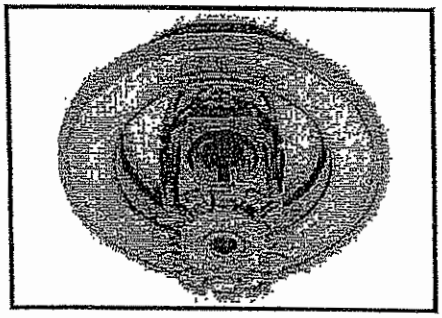
The Series TY-FRB Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

IMPORTANT

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.





Model/Sprinkler Identification Numbers

TY1131 -	Upright	2.8K, 1/2"NPT
TY1231 -	Pendent	2.8K, 1/2"NPT
TY2131 -	Upright	4.2K, 1/2"NPT
TY2231 -	Pendent	4.2K, 1/2"NPT
TY3131 -	Upright	5.6K, 1/2"NPT
TY3231 -	Pendent	5.6K, 1/2"NPT
TY4131 -	Upright	8.0K, 3/4"NPT
TY4231 -	Pendent	8.0K, 3/4"NPT
TY4831 -	Upright	8.0K, 1/2"NPT
TY4931 -	Pendent	8.0K, 1/2"NPT

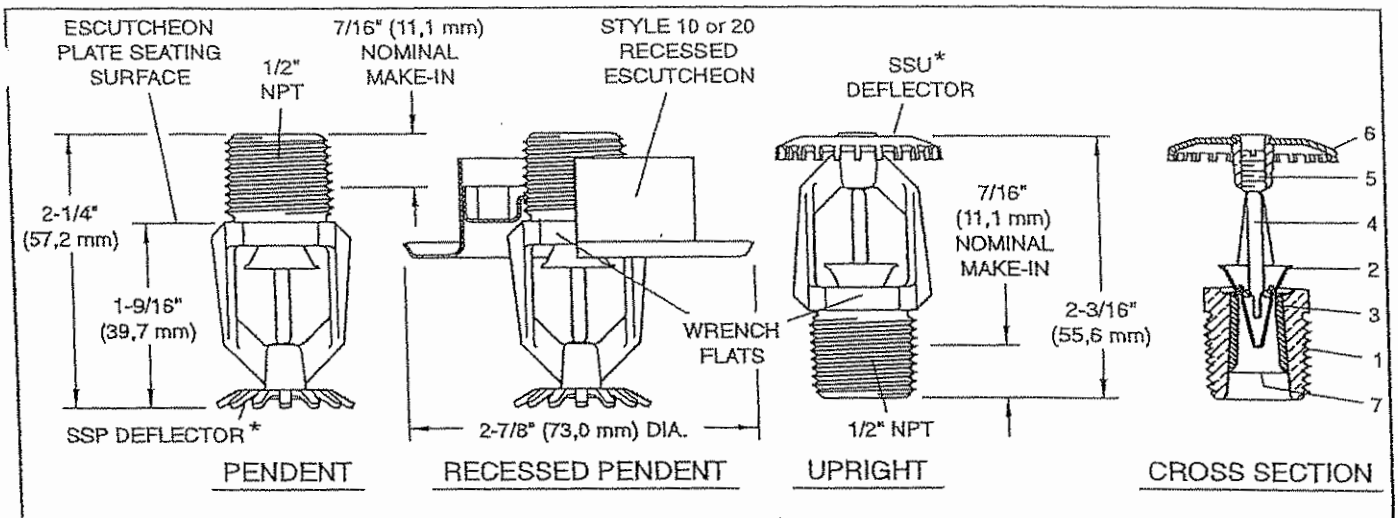


FIGURE 1
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY1131) AND PENDENT (TY1231) SPRINKLERS
2.8 K-FACTOR, 1/2 INCH NPT

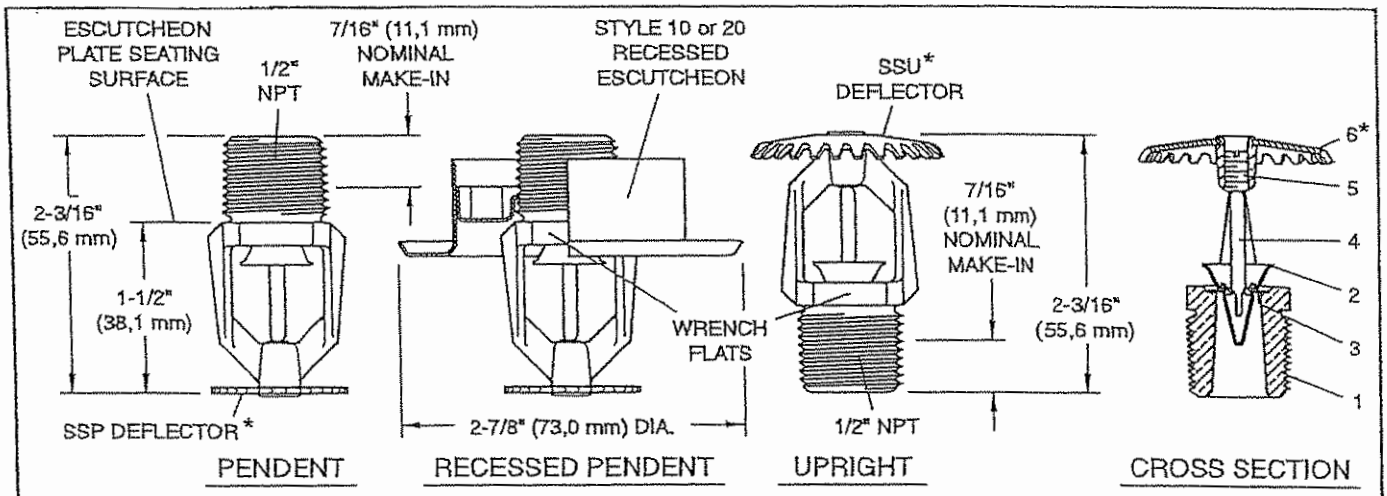


FIGURE 2
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY2131) AND PENDENT (TY2231) SPRINKLERS
4.2 K-FACTOR, 1/2 INCH NPT

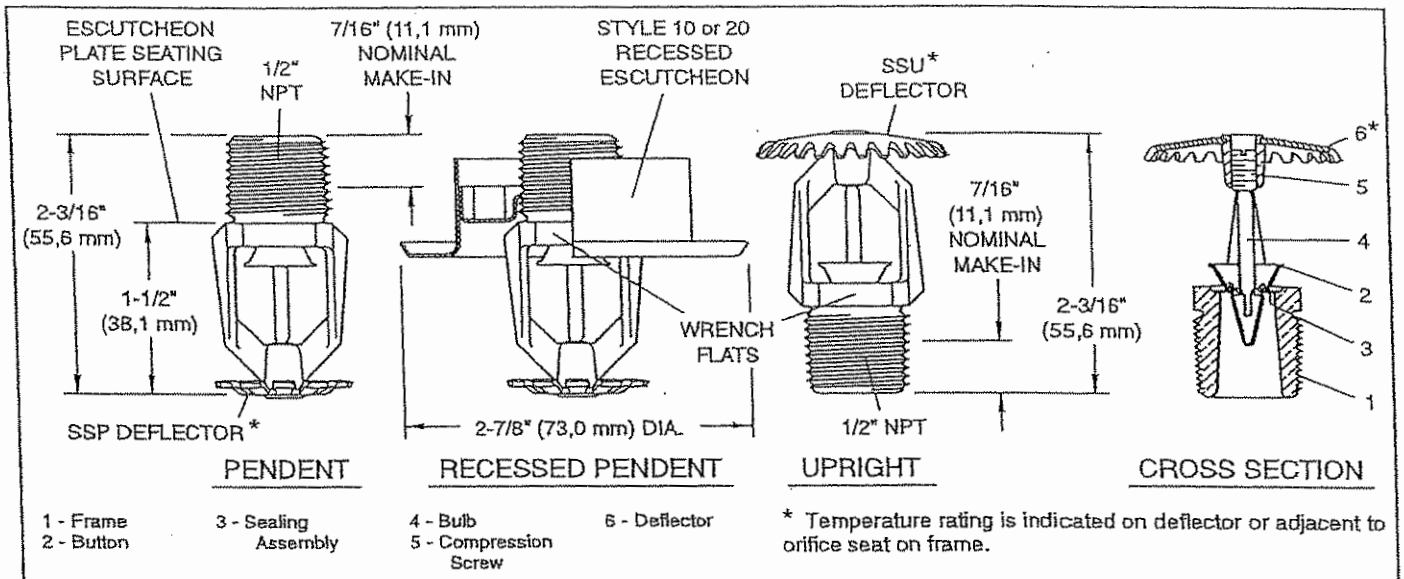


FIGURE 3
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY3131) AND PENDENT (TY3231) SPRINKLERS
5.6 K-FACTOR, 1/2 INCH NPT

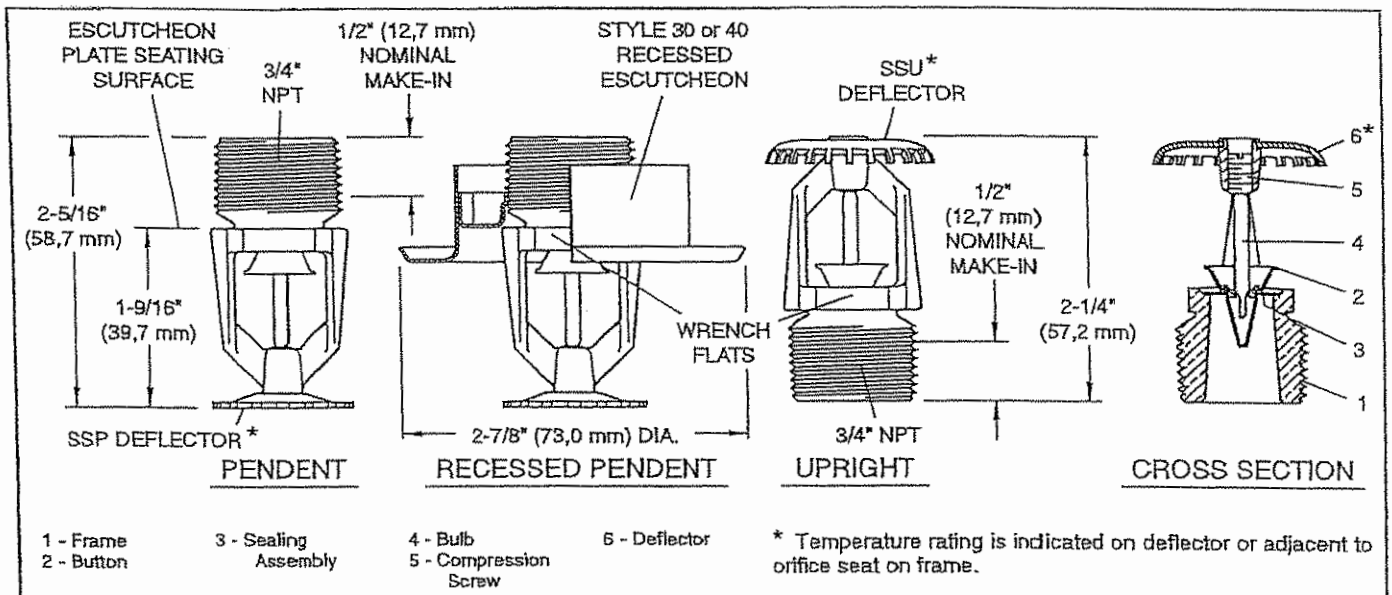
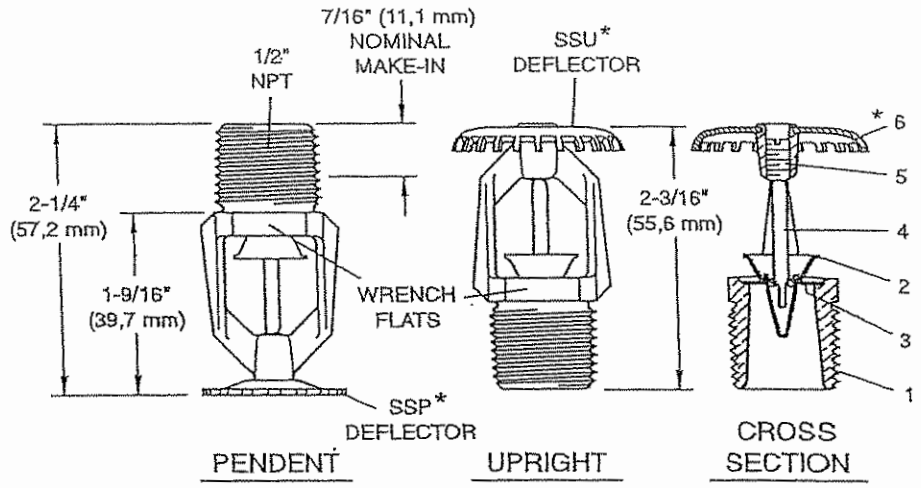


FIGURE 4
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY4131) AND PENDENT (TY4231) SPRINKLERS
8.0 K-FACTOR, 3/4 INCH NPT



1 - Frame
2 - Button
3 - Sealing Assembly
4 - Bulb
5 - Compression Screw
6 - Deflector

* Temperature rating is indicated on deflector or adjacent to orifice seat on frame.

FIGURE 5
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY4831) AND PENDENT (TY4931) SPRINKLERS
8.0 K-FACTOR, 1/2 INCH NPT

Technical Data

Approvals
UL and C-UL Listed.
FM, LPCB, and NYC Approved.
(Refer to Table A and B for complete approval information including corrosion resistant status.)

Maximum Working Pressure
Refer to Table C.

Discharge Coefficient
K = 2.8 GPM/psi$^{1/2}$ (40,3 LPM/bar$^{1/2}$)
K = 4.2 GPM/psi$^{1/2}$ (60,5 LPM/bar$^{1/2}$)
K = 5.6 GPM/psi$^{1/2}$ (80,6 LPM/bar$^{1/2}$)
K = 8.0 GPM/psi$^{1/2}$ (115,2 LPM/bar$^{1/2}$)

Temperature Ratings
Refer to Table A and B

Finishes
Sprinkler: Refer to Table A and B.
Recessed Escutcheon: White Coated, Chrome Plated, or Brass Plated.

Physical Characteristics

Frame	Bronze
Button	Brass/Copper
Sealing Assembly	Beryllium Nickel w/Teflon†
Bulb	Glass
Compression Screw	Bronze
Deflector	Copper/Bronze
Bushing (K=2.8)	Bronze

Operation

The glass Bulb contains a fluid which expands when exposed to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass Bulb, allowing the sprinkler to activate and water to flow.

Design Criteria

The Series TY-FRB Pendent and Upright Sprinklers are intended for fire protection systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency (e.g., UL Listing is based on the requirements of NFPA 13, and FM Approval is based on the requirements of FM's Loss Prevention Data Sheets). Only the Style 10, 20, 30, or 40 Recessed Escutcheon, as applicable, is to be used for recessed pendent installations.

K	TYPE	TEMP.	BULB LIQUID	SPRINKLER FINISH (See Note 7) NATURAL BRASS	CHROME PLATED	WHITE*** POLYESTER
2.8 1/2" NPT	PENDENT (TY1231) and UPRIGHT (TY1131)	135°F/57°C	Orange	1, 2, 3, 5		
		155°F/68°C	Red			
		175°F/79°C	Yellow			
		200°F/93°C	Green			
		286°F/141°C	Blue			
	RECESSED PENDENT (TY1231)* Figure 6	135°F/57°C	Orange	1, 2, 5		
		155°F/68°C	Red			
		175°F/79°C	Yellow			
		200°F/93°C	Green			
	RECESSED PENDENT (TY1231)** Figure 7	135°F/57°C	Orange			
		155°F/68°C	Red			
		175°F/79°C	Yellow			
		200°F/93°C	Green			
4.2 1/2" NPT	PENDENT (TY2231) and UPRIGHT (TY2131)	135°F/57°C	Orange	1, 2		
		155°F/68°C	Red			
		175°F/79°C	Yellow			
		200°F/93°C	Green			
		286°F/141°C	Blue			
	RECESSED PENDENT (TY2231)* Figure 8	135°F/57°C	Orange			
		155°F/68°C	Red			
		175°F/79°C	Yellow			
		200°F/93°C	Green			
	RECESSED PENDENT (TY2231)** Figure 9	135°F/57°C	Orange			
		155°F/68°C	Red			
		175°F/79°C	Yellow			
		200°F/93°C	Green			

NOTES:
1. Listed by Underwriters Laboratories, Inc. (UL) as Quick Response Sprinklers.
2. Listed by Underwriters Laboratories, Inc. for use in Canada (C-UL) as Quick Response Sprinklers.
3. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers.
5. Approved by the City of New York under MEA 354-01-E.
7. Where Polyester Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed as Corrosion Resistant Sprinklers.
* Installed with Style 10 (1/2" NPT) or Style 40 (3/4" NPT) 3/4" Total Adjustment Recessed Escutcheon, as applicable.
** Installed with Style 20 (1/2" NPT) or Style 30 (3/4" NPT) 1/2" Total Adjustment Recessed Escutcheon, as applicable.
*** Frame and Deflector only. Listings and approvals apply to color (Special Order).
N/A: Not Available

TABLE A
LABORATORY LISTINGS AND APPROVALS
2.8 AND 4.2 K-FACTOR SPRINKLERS

K	TYPE	TEMP.	BULB LIQUID	SPRINKLER FINISH (See Note 8) NATURAL BRASS	CHROME PLATED	WHITE*** POLYESTER	LEAD COATED
5.6 1/2" NPT	PENDENT (TY3231) and UPRIGHT (TY3131)	135°F/57°C	Orange	1, 2, 3, 4, 5, 6, 7			1, 2, 3, 5
		155°F/68°C	Red				
		175°F/79°C	Yellow				
		200°F/93°C	Green				
		286°F/141°C	Blue				
	RECESSED PENDENT (TY3231)* Figure 10	135°F/57°C	Orange	1, 2, 4, 5			N/A
		155°F/68°C	Red				
		175°F/79°C	Yellow				
		200°F/93°C	Green				
	RECESSED PENDENT (TY3231)** Figure 11	135°F/57°C	Orange	1, 2, 3, 4, 5			N/A
		155°F/68°C	Red				
		175°F/79°C	Yellow				
		200°F/93°C	Green				
8.0 3/4" NPT	PENDENT (TY4231) and UPRIGHT (TY4131)	135°F/57°C	Orange	1, 2, 3, 4, 5, 6, 7			1, 2, 5
		155°F/68°C	Red				
		175°F/79°C	Yellow				
		200°F/93°C	Green				
		286°F/141°C	Blue				
	RECESSED PENDENT (TY4231)* Figure 12	135°F/57°C	Green	1, 2, 4, 5			N/A
		155°F/68°C	Orange				
		175°F/79°C	Red				
		200°F/93°C	Yellow				
	RECESSED PENDENT (TY4231)** Figure 13	135°F/57°C	Orange	1, 2, 3, 4, 5			N/A
		155°F/68°C	Red				
		175°F/79°C	Yellow				
		200°F/93°C	Green				
8.0 1/2" NPT	PENDENT (TY4931) and UPRIGHT (TY4831)	135°F/57°C	Orange	1, 2, 4, 5, 6			1, 2, 5
		155°F/68°C	Red				
		175°F/79°C	Yellow				
		200°F/93°C	Green				
		286°F/141°C	Blue				

NOTES:
1. Listed by Underwriters Laboratories, Inc. (UL) as Quick Response Sprinklers.
2. Listed by Underwriters Laboratories, Inc. for use in Canada (C-UL) as Quick Response Sprinklers.
3. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers.
4. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 007k/04) as Quick Response Sprinklers; however, the LPCB does not rate the thermal sensitivity of recessed sprinklers.
5. Approved by the City of New York under MEA 354-01-E.
6. VdS Approved (For details contact Tyco Fire & Building Products, Enschede, Netherlands, Tel. 31-53-428-4444/Fax 31-53-428-3377).
7. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 094a/06) as Quick Response Sprinklers.
8. Where Polyester Coated and Lead Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed as Corrosion Resistant Sprinklers. Where Lead Coated Sprinklers are noted to be FM Approved, the sprinklers are FM Approved as a Corrosion Resistant Sprinklers.

* Installed with Style 10 (1/2" NPT) or Style 40 (3/4" NPT) 3/4" Total Adjustment Recessed Escutcheon, as applicable.
** Installed with Style 20 (1/2" NPT) or Style 30 (3/4" NPT) 1/2" Total Adjustment Recessed Escutcheon, as applicable.
*** Frame and Deflector only. Listings and approvals apply to color (Special Order).
N/A: Not Available

TABLE B
LABORATORY LISTINGS AND APPROVALS
5.6 AND 8.0 K-FACTOR SPRINKLERS

K	TYPE	SPRINKLER FINISH			
		NATURAL BRASS	CHROME PLATED	WHITE POLYESTER	LEAD COATED
2.8 1/2" NPT	PENDENT (TY3231) and UPRIGHT (TY3131)	175 PSI (12,1 BAR)			N/A
	RECESSED PENDENT (TY323)				
4.2 3/4" NPT	PENDENT (TY4231) and UPRIGHT (TY4131)	175 PSI (12,1 BAR)			N/A
	RECESSED PENDENT (TY4231)				
5.6 1/2" NPT	PENDENT (TY3231) and UPRIGHT (TY3131)	250 PSI (17,2 BAR) OR 175 PSI (12,1 BAR) (SEE NOTE 1)			175 PSI (12,1 BAR)
	RECESSED PENDENT (TY3231)				N/A
8.0 3/4" NPT	PENDENT (TY4231) and UPRIGHT (TY4131)	175 PSI (12,1 BAR)			175 PSI (12,1 BAR)
	RECESSED PENDENT (TY4231)				N/A
8.0 1/2" NPT	PENDENT (TY4931) and UPRIGHT (TY4831)	175 PSI (12,1 BAR)			175 PSI (12,1 BAR)

NOTES:
1. The maximum working pressure of 250 psi (17,2 bar) only applies to the Listing by Underwriters Laboratories Inc. (UL); the Listing by Underwriters Laboratories, Inc. for use in Canada (C-UL); and , the Approval by the City of New York.

TABLE C, MAXIMUM WORKING PRESSURE

Installation

The Series TY-FRB Sprinklers must be installed in accordance with the following instructions:

NOTES

Do not install any bulb type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 inch (1,6 mm) for the 135°F/57°C to 3/32 inch (2,4 mm) for the 286°F/141°C temperature ratings.

A leak tight 1/2 inch NPT sprinkler joint should be obtained with a torque of 7 to 14 ft.lbs. (9,5 to 19,0 Nm). A maximum of 21 ft. lbs. (28,5 Nm) of torque may be used to install sprinklers with 1/2 NPT connections. A leak tight 3/4 inch NPT sprinkler joint should be obtained with a torque of 10 to 20 ft.lbs. (13,4 to 26,8 Nm). A maximum of 30 ft.lbs. (40,7 Nm) of torque is to be used to install sprinklers with 3/4 NPT connections. Higher levels of torque may distort the sprinkler inlet and cause leakage or impairment of the sprinkler.

Do not attempt to make-up for insufficient adjustment in the escutcheon plate by under- or over-tightening the sprinkler. Readjust the position of the sprinkler fitting to suit.

The **Series TY-FRB Pendent and Upright Sprinklers** must be installed in accordance with the following instructions.

Step 1. Pendent sprinklers are to be installed in the pendent position, and upright sprinklers are to be installed in the upright position.

Step 2. With pipe thread sealant applied to the pipe threads, hand tighten the sprinkler into the sprinkler fitting.

Step 3. Tighten the sprinkler into the sprinkler fitting using only the W-Type 6 Sprinkler Wrench (Ref. Figure 14). With reference to Figures 1, 2, 3, 4, and 5, the W-Type 6 Sprinkler Wrench is to be applied to the sprinkler wrench flats.

The **Series TY-FRB Recessed Pendent Sprinklers** must be installed in accordance with the following instructions.

Step A. After installing the Style 10, 20, 30, or 40 Mounting Plate, as applicable, over the sprinkler threads and with pipe thread sealant applied to the pipe threads, hand tighten the sprinkler into the sprinkler fitting.

Step B. Tighten the sprinkler into the sprinkler fitting using only the W-Type 7 Recessed Sprinkler Wrench (Ref. Figure 15). With reference to Figure 1, 2, 3, and 4, the W-Type 7 Recessed

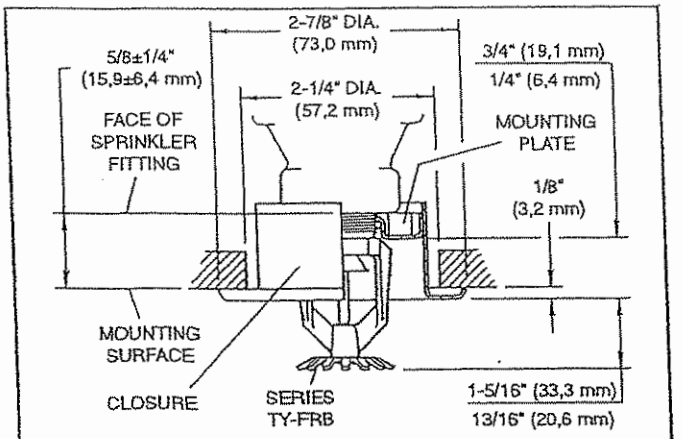


FIGURE 6
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
2.8 K-FACTOR, 1/2 INCH NPT

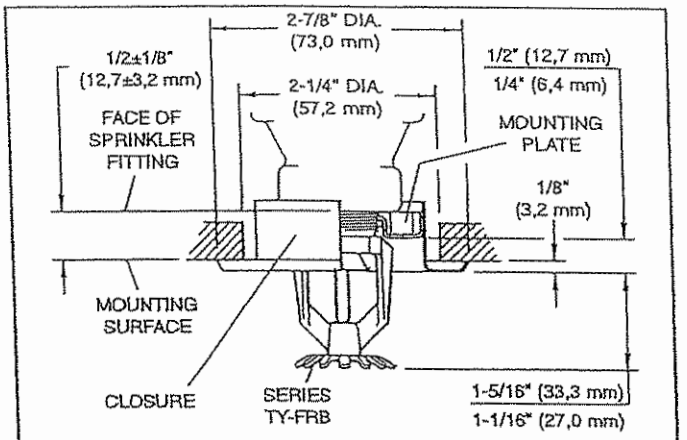


FIGURE 7
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
2.8 K-FACTOR, 1/2 INCH NPT

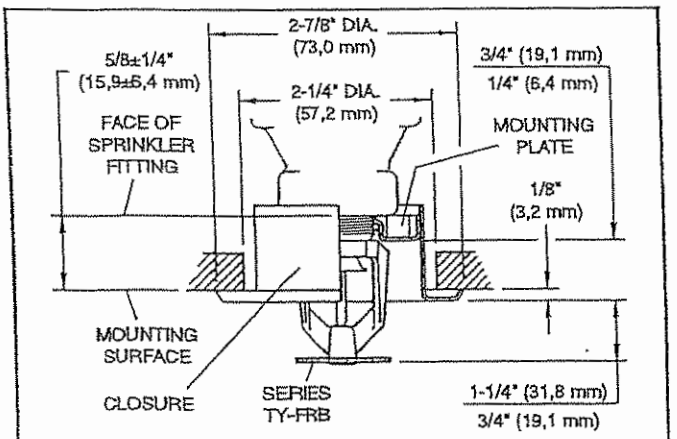


FIGURE 8
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
4.2 K-FACTOR, 1/2 INCH NPT

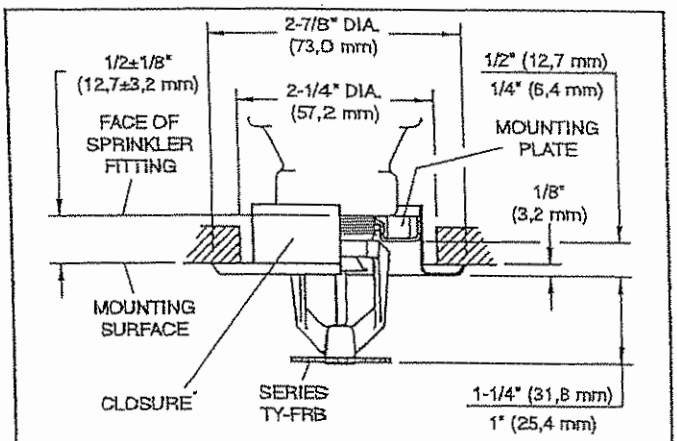


FIGURE 9
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
4.2 K-FACTOR, 1/2 INCH NPT

Sprinkler Wrench is to be applied to the sprinkler wrench flats.

Step C. After the ceiling has been installed or the finish coat has been applied, slide on the Style 10, 20, 30, or 40 Closure over the Series TY-FRB Sprinkler and push the Closure over the Mounting Plate until its flange comes in contact with the ceiling.

Care and Maintenance

The Series TY-FRB Sprinklers must be maintained and serviced in accordance with the following instructions:

NOTES

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, permission to shut down the affected fire protection system must be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

The owner must assure that the sprinklers are not used for hanging of any objects; otherwise, non-operation in the event of a fire or inadvertent operation may result.

Absence of an escutcheon, which is used to cover a clearance hole, may delay the time to sprinkler operation in a fire situation.

Sprinklers that are found to be leaking or exhibiting visible signs of corrosion must be replaced.

Automatic sprinklers must never be painted, plated, coated or otherwise altered after leaving the factory. Modified sprinklers must be replaced. Sprinklers that have been exposed to corrosive products of combustion, but have not operated, should be replaced if they cannot be completely cleaned by wiping the sprinkler with a cloth or by brushing it with a soft bristle brush.

Care must be exercised to avoid damage to the sprinklers - before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced.. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. (Ref. Installation Section).

Frequent visual inspections are recommended to be initially performed for corrosion resistant coated sprinklers, after the installation has been com-

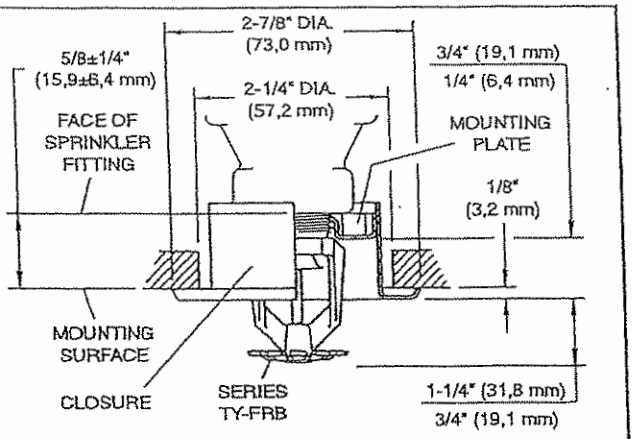


FIGURE 10
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 INCH NPT

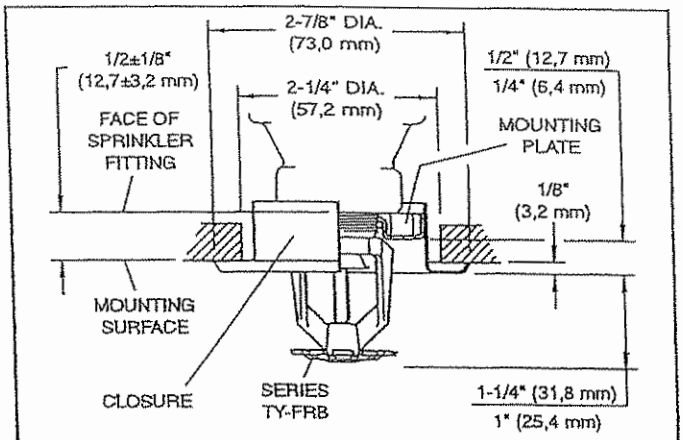


FIGURE 11
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 INCH NPT

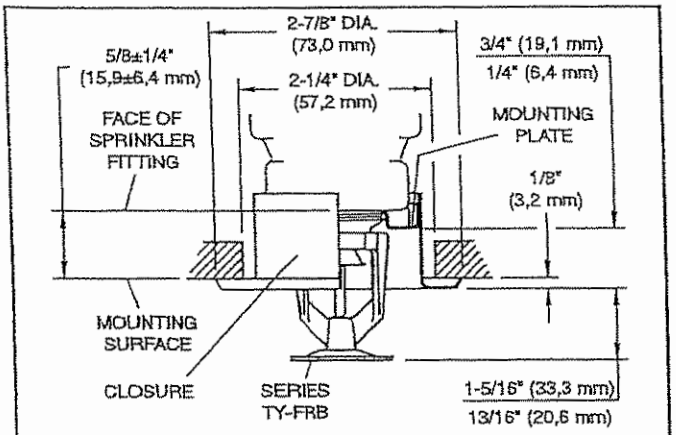


FIGURE 12
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 40 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 INCH NPT

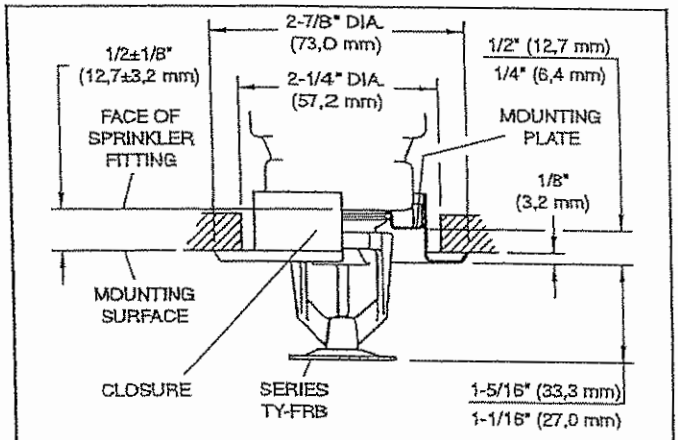


FIGURE 13
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 30 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 INCH NPT

pleted, to verify the integrity of the corrosion resistant coating. Thereafter, annual inspections per NFPA 25 should suffice; however, instead of inspecting from the floor level, a random sampling of close-up visual inspections should be made, so as to better determine the exact sprinkler condition and the long term integrity of the corrosion resistant coating, as it may be affected by the corrosive conditions present.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any other authorities having jurisdiction. The installing contractor or sprinkler manufacturer should be contacted relative to any questions.

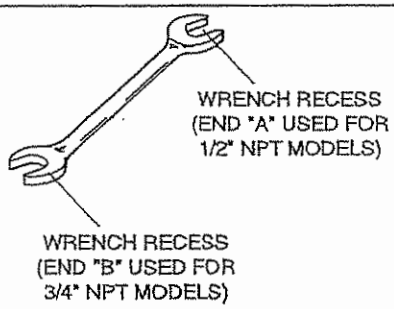


FIGURE 14
W-TYPE 6 SPRINKLER
WRENCH

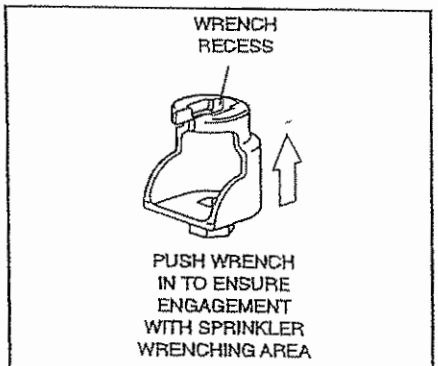


FIGURE 15
W-TYPE 7 RECESSED
SPRINKLER WRENCH

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

P/N 57 — XXX — X — XXX

		MODEL/SIN
330	2.8K UPRIGHT (1/2"NPT)	TY1131
331	2.8K PENDENT (1/2"NPT)	TY1231
340	4.2K UPRIGHT (1/2"NPT)	TY2131
341	4.2K PENDENT (1/2"NPT)	TY2231
370	5.6K UPRIGHT (1/2"NPT)	TY3131
371	5.6K PENDENT (1/2"NPT)	TY3231
390	8.0K UPRIGHT (3/4"NPT)	TY4131
391	8.0K PENDENT (3/4"NPT)	TY4231
360	8.0K UPRIGHT (1/2"NPT)	TY4831*
361	8.0K PENDENT (1/2"NPT)	TY4931*

	SPRINKLER
1	NATURAL BRASS
4	WHITE POLYESTER
3	WHITE (RAL9010)*
9	CHROME PLATED
7	LEAD COATED

	TEMPERATURE RATING
135	135°F/57°C
155	155°F/68°C
175	175°F/79°C
200	200°F/93°C
286	286°F/141°C

* Eastern Hemisphere sales only.

TABLE D
PART NUMBER SELECTION
SERIES TY-FRB PENDENT AND UPRIGHT SPRINKLERS

Limited Warranty

Products manufactured by Tyco Fire & Building Products (TFBP) are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by TFBP. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFBP or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by TFBP to be defective shall be either repaired or replaced, at TFBP's sole option. TFBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFBP shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFBP be liable, in contract, tort, strict liability or under any other legal theory, for incidental, indirect, special or consequential damages, including but not limited to labor charges, regardless of whether TFBP was informed about the possibility of such damages, and in no event shall TFBP's liability exceed an amount equal to the sales price.

The foregoing warranty is made in lieu of any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

This limited warranty sets forth the exclusive remedy for claims based on failure of or defect in products, materials or components, whether the claim is made in contract, tort, strict liability or any other legal theory.

This warranty will apply to the full extent permitted by law. The invalidity, in whole or part, of any portion of this warranty will not affect the remainder.

Ordering Procedure

When placing an order, indicate the full product name. Refer to the Price List for complete listing of Part Numbers.

Contact your local distributor for availability.

Sprinkler Assemblies with NPT Thread Connections:
Specify: (Specify Model/SIN), Quick Response, (specify K-factor), (specify temperature rating), Series TY-FRB (specify Pendent or Upright) Sprinkler with (specify type of finish or coating), P/N (specify from Table D).

Recessed Escutcheon:
Specify: Style (10, 20, 30, or 40) Recessed Escutcheon with (specify*) finish, P/N (specify*).

* Refer to Technical Data Sheet TFP770.

Sprinkler Wrench:
Specify: W-Type 6 Sprinkler Wrench, P/N 56-000-6-387.

Specify: W-Type 7 Sprinkler Wrench, P/N 56-850-4-001.

tyco / Fire & Building Products

Technical Services: Tel: (800) 381-9312 / Fax: (800) 791-5500

Model G1 & G4 Sprinkler Guards
Model G1/S1 & G4/S3 Guards with Shields
Series TY-B, TY-FRB, TY-L, and TY-FRL Sprinklers

General Description

The Model G1 & G4 Sprinkler Guards (Ref. Figure 1) are designed for use with specific types of Series TY-B, TY-FRB, TY-L, and TY-FRL Sprinklers that may be located in areas that make them susceptible to mechanical or physical damage. Table A provides compatibility details.

The Model G1/S1 & G4/S3 Sprinkler Guards with Shields (Ref. Figure 2), in addition to providing protection from mechanical or physical damage, shields the sprinkler from water spray of higher elevation sprinklers (e.g., rack storage sprinkler installations). When the G1/S1 and G4/S3 are used with the Series TY-B, TY-FRB, TYL, and TY-FRL Sprinklers shown in Table A, the assemblies form Upright Intermediate Level Sprinklers intended for use in fire sprinkler systems designed in accordance with the standard installation rules recognized by the applicable Listing agency (i.e., UL Listing is based on NFPA requirements).

The G1 and G4 are a redesignation for the Gem F938 & F937, and the G1/S1 & G4/S3 are a redesignation for the Gem F938/Q-76 and F937/Q-75.

WARNINGS

The Model G1 & G4 Sprinkler Guards and G1/S1 & G4/S3 Sprinkler Guards with Shields described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the integrity of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or manufacturer should be contacted relative to any questions.

Technical Data

Approvals
UL and C-UL Listed. FM Approved. (Refer to Table A)

Finishes
Red Painted and Zinc Chromate

Physical Characteristics
Welded assembly fabricated from carbon steel

Design Criteria

In accordance with the requirements of the NFPA, sprinkler guards shall be listed. Guards are only listed for use with specified sprinklers; therefore, the G1, G4, G1/S1, and G4/S3 must only be used with the Series TY-B, TY-FRB, TY-L, and TY-FRL Sprinklers shown in Table A.

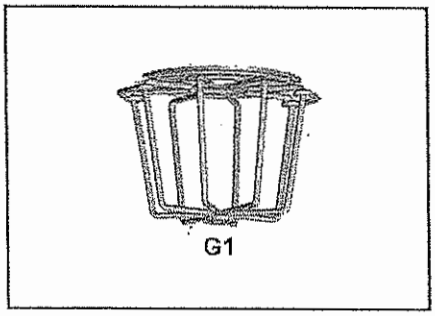
Installation

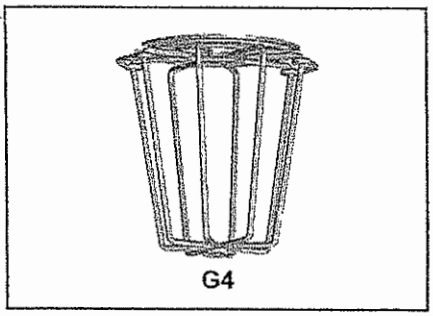
The Models G1, G4, G1/S1, and G4/S3 are to be installed as follows:

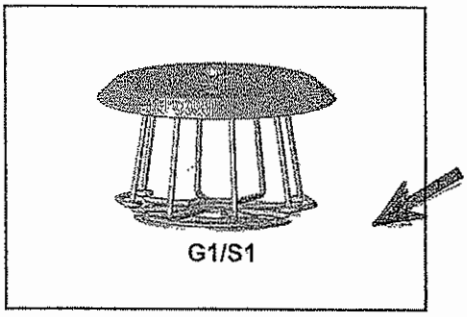
Step 1. The G1, G4, G1/S1, or G4/S3 is to be mounted on the sprinkler after the sprinkler has been installed in accordance with its applicable technical data sheet.

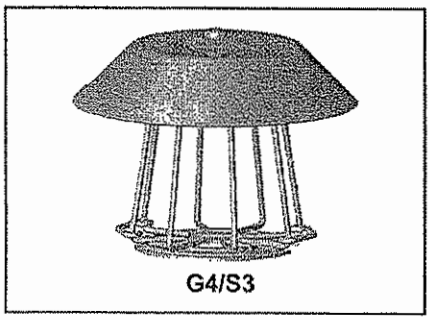
Step 2. With the Clips loose, first spread the two halves of the Sprinkler Guard just enough to pass by the sprinkler deflector from the side. Then, once again spread the two halves of the Sprinkler Guard just enough to pass over the sprinkler **"thread relief"** or **"wrenching area"**, as applicable, portion of the sprinkler. (Refer to Table A, as well as Figures 1 and 2.)

Step 3. With the Sprinkler Guard positioned on the **"thread relief"** or **"wrenching area"** portion of the sprinkler, as applicable, engage the Clips and then slide the Clips until they


G1


G4


G1/S1


G4/S3

SERIES SPRINKLER	TFP SIN	GEM SIN	STAR SIN	SPRINKLER TYPE	SPRINKLER K-FACTOR	MOUNTING LOCATION	GUARD MODEL (APPROVALS)	GUARD WITH SHIELD MODEL (APPROVALS)
TY-B	TY1151	G7530	–	Upright	2.8	Thread Relief	G1 (1)	N/A
	TY1251	G7531	–	Pendent	2.8	Thread Relief	G1 (1)	N/A
	TY3151	G7570	–	Upright	5.6	Thread Relief	G1 (1, 2)	G1/S1 (1)
	TY3251	G7571	–	Pendent	5.6	Thread Relief	G1 (1, 2)	N/A
	TY4851	G7560	–	Upright	8.0 (1/2" NPT)	Thread Relief	G1 (1, 2)	N/A
	TY4951	G7561	–	Pendent	8.0 (1/2" NPT)	Thread Relief	G1 (1, 2)	N/A
	TY4151	G7590	–	Upright	8.0 (3/4" NPT)	Thread Relief	G1 (1, 2)	G1/S1 (1)
	TY4251	G7591	–	Pendent	8.0 (3/4" NPT)	Thread Relief	G1 (1, 2)	N/A
	TY3351	G7578	–	HSW	5.6	Thread Relief	G4 (1)	N/A
	TY3451	G7575	–	VSW	5.6	Thread Relief	G4 (1)	N/A
TY-FRB	TY1131	G7330	–	Upright	2.8	Thread Relief	G1 (1)	N/A
	TY1231	G7331	–	Pendent	2.8	Thread Relief	G1 (1)	N/A
	TY3131	G7370	–	Upright	5.6	Thread Relief	G1 (1, 2)	G1/S1 (1)
	TY3231	G7371	–	Pendent	5.6	Thread Relief	G1 (1, 2)	N/A
	TY4131	G7390	–	Upright	8.0 (3/4" NPT)	Thread Relief	G1 (1, 2)	G1/S1 (1)
	TY4231	G7391	–	Pendent	8.0 (3/4" NPT)	Thread Relief	G1 (1)	N/A
	TY3331	G7378	–	HSW	5.6	Thread Relief	G4 (1)	N/A
	TY3431	G7375	–	VSW	5.6	Thread Relief	G4 (1)	N/A
TY-L	TY3111	G3111	S1800	Upright	5.6	Wrench Area	G1 (2) & G4 (1)	G4/S3 (1)
	TY3211	G3112	S1801	Pendent	5.6	Wrench Area	G1 (2) & G4 (1)	N/A
	TY3311	G3113	S1803	HSW	5.6	Wrench Area	–	N/A
	TY4811	–	S1805	Upright	8.0 (1/2" NPT)	Wrench Area	G4 (1, 2)	G4/S3 (1)
	TY4911	–	S1806	Pendent	8.0 (1/2" NPT)	Wrench Area	G4 (1)	N/A
	TY4111	G3101	S1810	Upright	8.0 (3/4" NPT)	Wrench Area	G4 (1, 2)	G4/S3 (1)
	TY4211	G3102	S1811	Pendent	8.0 (3/4" NPT)	Wrench Area	G4 (1)	N/A
TY-FRL	TY1121	G8973	S1879	Upright	2.8	Wrench Area	G4 (1)	N/A
	TY1221	G8971	S1880	Pendent	2.8	Wrench Area	G4 (1)	N/A
	TY3121	G8974	S1864	Upright	5.6	Wrench Area	G4 (1, 2)	G4/S3 (1)
	TY3221	G8972	S1865	Pendent	5.6	Wrench Area	G4 (1)	N/A
	TY3321	G8946	S1878	HSW	5.6	Wrench Area	G4 (1)	N/A
	TY4121	G8174	S1866	Upright	8.0 (3/4" NPT)	Wrench Area	G4 (1, 2)	G4/S3 (1)
	TY4221	G8172	S1867	Pendent	8.0 (3/4" NPT)	Wrench Area	G4 (1)	N/A

APPROVALS & NOTES:

1. Listed by Underwriters Laboratories Inc.
2. Approved by Factory Mutual Research Corporation.

N/A Not Applicable for noted sprinkler.

– No SIN, Listing or Approval

TABLE A — LABORATORY LISTINGS AND APPROVALS

seat against the Base to complete the installation as shown in Figures 1 and 2.

To help assist with the sliding of the Clips the Guard Installation Tool may be used as shown in Figure 3. In addition, pliers can be used to facilitate the final seating of the Clips.

NOTES

The Clips must seat against the Base in order to be considered fully seated and in order to complete the installation.

The G1,G4, G1/S1, and G4/S3 may be located in any position relative to the sprinkler frame arms.

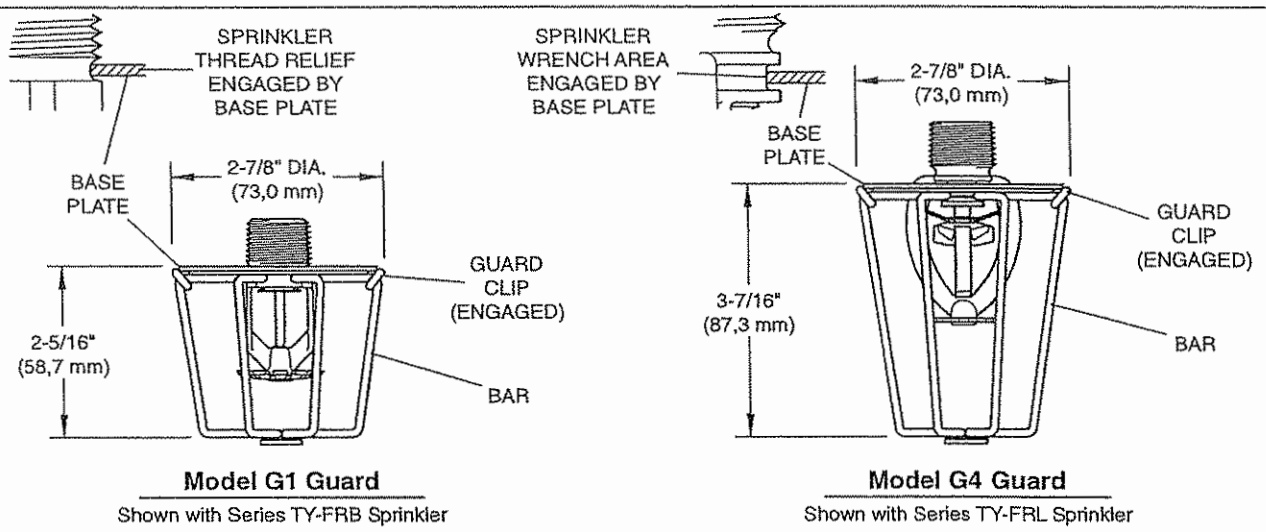


FIGURE 1
MODEL G1 AND G4 SPRINKLER GUARDS — DIMENSIONS

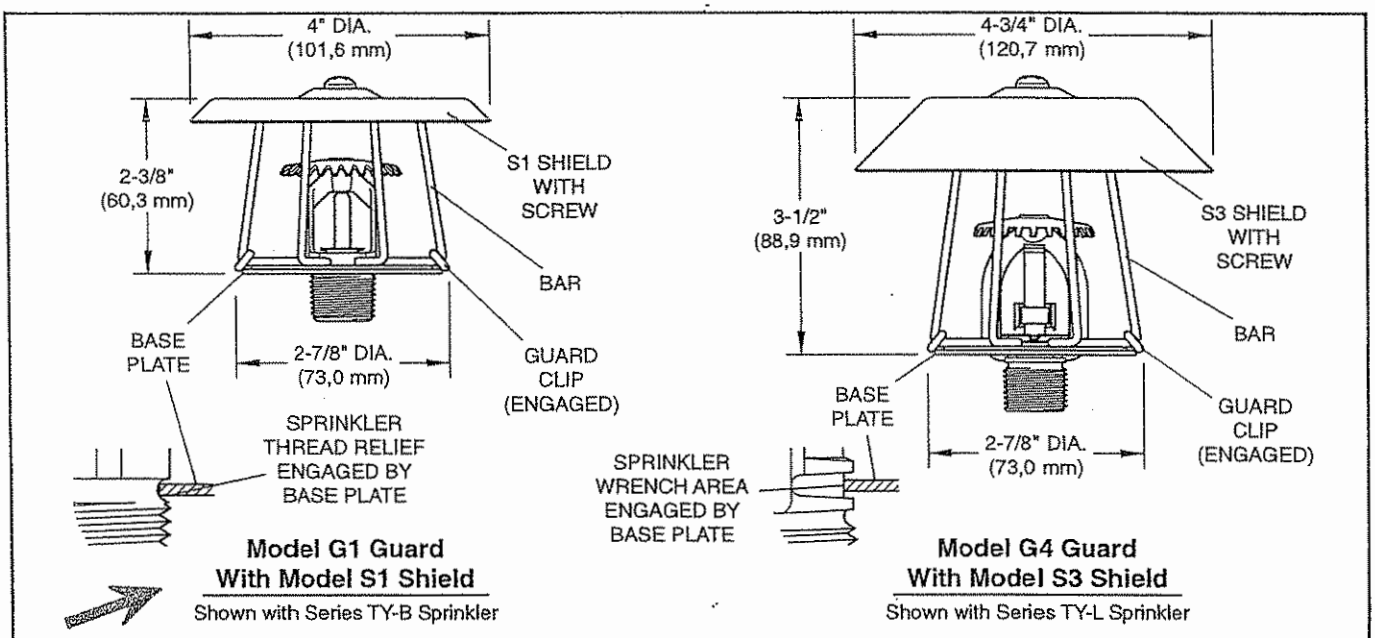


FIGURE 2
MODEL G1/S1 AND G4/S3 SPRINKLER GUARDS WITH SHIELDS — DIMENSIONS

Care and Maintenance

The Models G1, G4, G1/S1, and G4/S3 do not require any regularly scheduled maintenance; however, proper installation of the Sprinkler Guards should be verified during the annual visual inspection of the sprinklers.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any other authorities having jurisdiction. The installing contractor or sprinkler manufacturer should be contacted relative to any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service.

Limited Warranty

Products manufactured by Tyco Fire Products are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by Tyco Fire Products. No warranty is given for products or

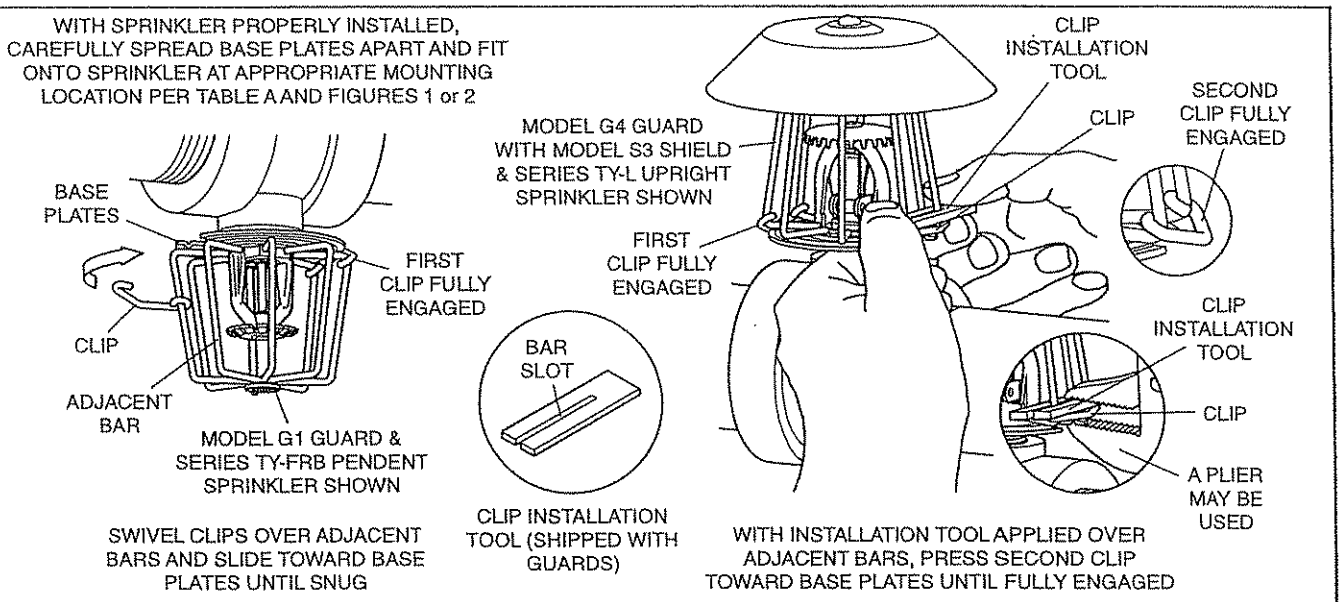


FIGURE 3
INSTALLATION PROCEDURE

components manufactured by companies not affiliated by ownership with Tyco Fire Products or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by Tyco Fire Products to be defective shall be either repaired or replaced, at Tyco Fire Products' sole option. Tyco Fire Products neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. Tyco Fire Products shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

IN NO EVENT SHALL TYCO FIRE PRODUCTS BE LIABLE, IN CONTRACT, TORT, STRICT LIABILITY OR UNDER ANY OTHER LEGAL THEORY, FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LABOR CHARGES, REGARDLESS OF WHETHER TYCO FIRE PRODUCTS WAS INFORMED ABOUT THE POSSIBILITY OF SUCH DAMAGES, AND IN NO EVENT SHALL TYCO FIRE PRODUCTS' LIABILITY EXCEED AN AMOUNT EQUAL TO THE SALES PRICE.

THE FOREGOING WARRANTY IS MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Ordering Procedure

Contact your local distributor for availability.

G1 Sprinkler Guard:
Specify: Model G1 Sprinkler Guard having a (specify) finish, P/N (specify).

Red Painted ..... P/N 56-938-1-001
Zinc Chromate ..... P/N 56-938-9-001

G4 Sprinkler Guard:
Specify: Model G4 Sprinkler Guard having a (specify) finish, P/N (specify).

Red Painted ..... P/N 56-937-1-001
Zinc Chromate ..... P/N 56-937-9-001

G1/S1 Guard with Shield:
Specify: Model G1/S1 Sprinkler Guard with Shield having a (specify) finish, P/N (specify).

Red Painted ..... P/N 56-938-1-066
Zinc Chromate ..... P/N 56-938-9-066

G4/S3 Guard with Shield:
Specify: Model G4/S3 Sprinkler Guard with Shield having a (specify) finish, P/N (specify).

Red Painted ..... P/N 56-937-1-066
Zinc Chromate ..... P/N 56-937-9-066

Additonal* Clip Installation Tool:
Specify: Clip Installation Tool for G1 & G4 Sprinkler Guards, P/N (56-000-8-597).

* The Clip Installation Tool is included with orders in original cartons.

tyco / Fire & Security / SimplexGrinnell

STENNIS RIVERINE & COMBATANT TRAINING FACILITY
STENNIS SPACE CENTER
STENNIS, MS 39529

FIRE PROTECTION/ SPRINKLER SYSTEMS
OPERATIONS BUILDING 2440/2441
BOAT STORAGE BUILDING 2442

SECTION 2

VALVES & DEVICES

SIMPLEXGRINNELL
5800 JEFFERSON HWY., SUITE A
HARAHAN, LA 70123
PHONE: 504-736-0104
FAX: 504-736-9292

Reliable®

Model G
2½" (65mm), 3" (80mm), 4" (100mm) & 6" (150mm) Right-Check™ Riser Valves

Bulletin 806 Rev.H

Features

1. Grooved end connections.
2. Compact, lightweight design.
3. Non-slamming, spring loaded clapper to minimize water hammer.
4. Approved for horizontal and vertical installation.
5. Stream-lined body design provides very low friction loss.
6. Elastomer faced clapper provides leak-free, non-sticking sealing.

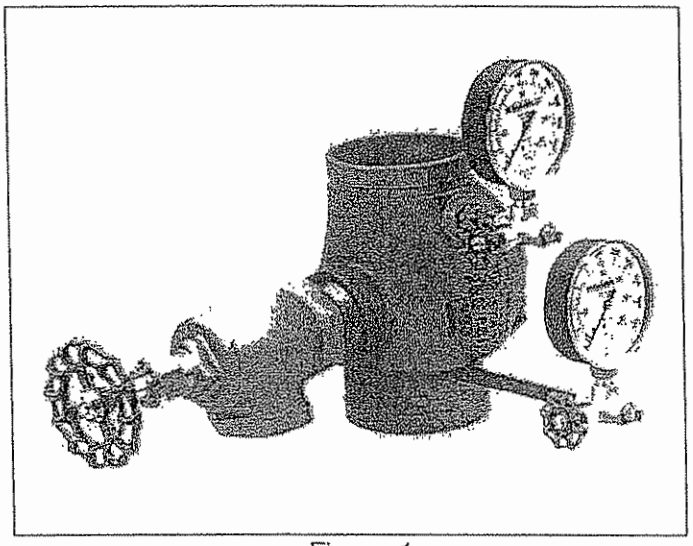


Figure 1

Reliable Model G Riser Right–Check™ Valves are intended for installation in wet pipe fire protection system risers and preaction systems using supervisory air as low as 1 psi (0,07 bar). The Riser Valve and Trim Kit (Figure 1) with a water flow detector can provide an electric alarm, and is a cost effective alternative to an alarm valve in installations not requiring a mechanical alarm.

Riser Valves are factory tapped for 1¼" (or 2") NPT and ½" NPT system connections and for ¼" NPT supply connection (Ref. Figure 3).

Grooved end connections provide fast and easy installation using listed or approved mechanical grooved couplings. Rigid style grooved couplings can be used for positive clamping to resist flexural and torsional loads.

Riser Right–Check™ Valves and associated riser equipment should periodically be given a thorough inspection and test. NFPA 25 provides minimum maintenance requirements. Check valves should be inspected and operated at least annually. Parts should be replaced as required.

When Model G Riser Valves are installed vertically, the direction of the flow arrow must point upward. For horizontal installations, the hinge pin must be located at the top. In preaction systems, the valves must be installed vertically.

Valve Description

1. Rated working pressure - 250 psi (17,2 bar).
2. Factory hydrostatic test pressure - 500 psi (34,5 bar).
3. Friction loss, expressed in equivalent length of Sch. 40 pipe with C = 120 (based on Hazen-Williams formula) and a flowing velocity of 15 ft/s (4.6 m/s), is:
   2½" (65mm) - 7 ft. (2.1m) 4" (100mm) - 10 ft. (3.0m)
   3" (80mm) - 7 ft. (2.1m) 6" (150mm) - 16 ft. (4.9m)
   See Bulletin 807 for Pressure Drop (psi) vs. Flow Rate (gpm) data chart.
4. Standard grooved end dimensions per ANSI/AWWA C606.

2-1/2" (65mm) Valve:				
A=7.12" (181mm)	B=4.81" (122mm)	C=3.88" (98mm)	D=11.38" (289mm)	E=3.01" (76mm)
3" (80mm) Valve:				
A=7.62" (194mm)	B=5.06" (129mm)	C=4.00" (102mm)	D=11.62" (295mm)	E=3.56" (90mm)
4" (100mm) Valve:				
A=8.44" (214mm)	B=6.19" (157mm)	C=4.00" (152mm)	D=13.56" (344mm)	E=4.12" (105mm)
6" (150mm) Valve:				
A=10.25" (260mm)	B=7.06" (179mm)	C=5.12" (130mm)	D=14.44" (367mm)	E=5.40" (137mm)

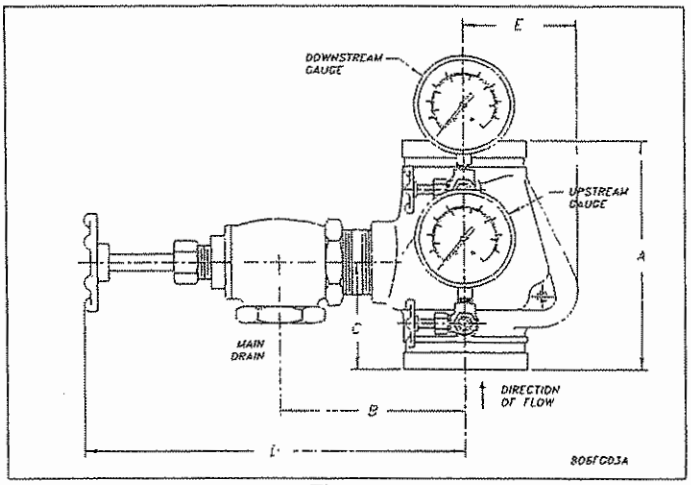


Figure 2

6. Shipping weight (including Trim Kit):
   2½" (65mm) - 14 lbs. (6.4 kg)
   3" (80mm) - 15 lbs. (6.8 kg)
   4" (100mm) - 24 lbs. (11.0 kg)
   6" (150mm) - 45 lbs. (20.4 kg)

Refer to figure 3.

Item No.	Part Name	Material	Quantity	Part Number			
				2½" (65mm)	3" (80mm)	4" (100mm)	6" (150mm)
1*	Valve Body	Gray Iron, ASTM-A48 Class 30A	1	91005002	91005003	91005004	91005006
2*	Seat	Bronze C83600 or C93200, ASTM-B505	1	96020200	96020300	96020400	96020600
3	Clapper	Stainless Steel 304, ASTM-A240	1	91816112	91816113	91816114	91816116
4	Facing Seal **	EPDM Rubber	1	95520200	95520300	95520400	95520600
5	Clamping Ring	Stainless Steel 304, ASTM-A240	1	95290300	95290300	95290400	95290600
6	Gasket **	EPDM Rubber	1	93720302	93720302	93720604	93720604
7	Spring	Stainless Steel 302, ASTM-A313	1	96400300	96400300	96400400	96400600
8	Hinge Pin	Stainless Steel 303, ASTM-A582	1	95000280	95000300	95006824	95000600
9	Bolt	Stainless Steel 304, ASTM-F593	1	91090300	91090300	91090400	91090600
10	Locknut **	Stainless Steel 303, ASTM-F594	1	94911420	94911420	94913816	94913816
11	Plug, ½"NPT	Steel	1	—	—	—	—
**	Replacement Seal Kit		1	6888040025	6888040030	6888040040	6888040060
	Body - Seat Sub - Assembly		1	91005202	91005203	91005204	91005206

* Not field replaceable.

Trim Kit Description

Main Drain:

- 1¼" (32mm) angle valve and close nipple, 2½" and 3" (65mm and 80mm) sizes.
- 2" (50mm) angle valve and close nipple, 4" and 6" (100mm and 150mm) sizes.

Upstream and Downstream Side (all sizes):

- 300 psi (20,7 bar) water pressure gauge (2 req'd.).
- ¼" (6mm) 3-way globe valve (2 req'd).
- ¼" x 5" (6mm x 127mm) nipple (upstream only).
- ¼" x 1½" (6mm x 38mm) nipple (downstream only).
- ¼" (6mm) plug (2 req'd).

Approvals

1. Listed by Underwriters Laboratories, Inc.
2. Listed by Underwriters Laboratories of Canada.
3. Approved by Factory Mutual Research Corp.
4. NYC MEA 258-93E.

Valve Disassembly (Refer to figure 3)

1. Close the main water supply valve and drain the system.
2. Remove the check valve from the piping system.
3. Inspect the Seat (2) for any cuts, scrapes and dents. Replace the valve if any damage is found.
4. To replace the Facing Seal (4), remove the Clapper (3), unscrew the Locknut (10) and remove the retention Bolt (9).

Valve Reassembly (Refer to figure 3)

1. Thoroughly clean the Clapper (3). Insert the retention Bolt (9) with a new Gasket (6).
2. Place the new Facing Seal (4) and the Clamping Ring (5) against the Clapper (3). Tighten the new Locknut (10) to 21 in. lbs. (2.3 N·m) torque in 2½" (65mm) and 3" (80mm) sizes and to 52 in. Lbs. (5.7 N·m) in 4" (100mm) and 6" (150mm) sizes.

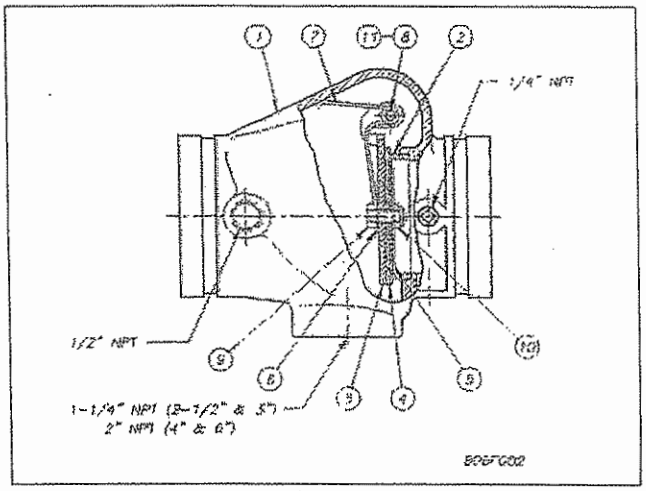


Figure 3

3. Insert the clapper assembly into the valve through the downstream opening. Reinsert the Hinge Pin (8) while holding the coils of the properly oriented Spring (7) in place. Install the Hinge Pin Plug (11).
4. Reinstall the check valve in the system.
5. Place the system back in service.

Ordering Information

Specify:

1. Model G Riser Valve.
2. Size.
3. Riser Trim Kit (ordered separately), specify valve size.

Contact the installing contractor or Reliable if any difficulties are experienced. Should replacement parts be needed, use only genuine Reliable parts.

Reliable®

The Reliable Automatic Sprinkler Co., Inc.
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EG. Printed in USA 03/09 P/N 9999970070

Reliable®

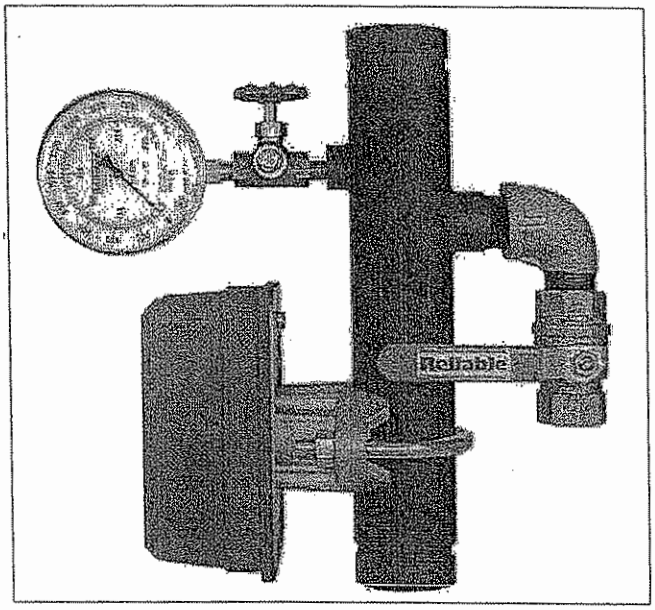
Model CR Commercial Riser

Riser Manifold for Commercial Applications

Bulletin 615 Rev.C

Available Sizes/Pressure Ratings:

4"(100mm), 6"(150mm), and 8"(200mm) Grooved - 300 psi (20,7 bar) Working Pressure



Features

1. Cast stainless steel body construction for threaded manifolds.
2. Painted, cast ductile iron body construction for grooved manifolds.
3. Brass and galvanized Trim.
4. Factory assembled and pressure tested.
5. Available with TestANDrain® Valve in various orifice sizes.
6. Optional Pressure Relief Valve Kit available for all sizes.
7. Same end-to-end dimensions for the 4"(100mm) through 8"(200mm) grooved sizes.
8. Approved for installation in horizontal or vertical positions.
9. Built in drain port allows hydrostatic testing without draining the system.
10. ¼" three-way valve allows for easy testing and replacing of pressure gauge.
11. Dedicated UL Listed, ULC Listed and FM Approved Waterflow Detector assures optimum sensitivity. See Table 3 for triggering flow rates.

Product Description

The Model CR Commercial Riser comes factory assembled with the necessary accessories for a cost effective, yet complete riser assembly. These assemblies are UL Listed and FM Approved as a unit.

Cast-on lettering on the manifold identifies manifold pipe size, flow direction, gauge and drain outlets, and UL Listing and FM Approval markings.

The Model CR Commercial Riser is available in four configurations (see Figures 1 and 2):

- Basic Trim

  Commercial riser manifold assembly includes a cULus Listed pressure gauge, a ¼" three-way valve, a drain (ball) valve, and a dedicated waterflow detector containing two sets of SPDT (Form C) contacts, having an electrical rating of 10A @ 125/250 VAC/2.5 A @ 24 VDC. (8" only: 15A @ 125/250 VAC/2.0 A @ 24 VDC). See Table 3 for triggering flow rates.

- Basic Trim with Pressure Relief Kit

  Commercial riser manifold assembly includes a cULus Listed pressure gauge, a ¼" three-way valve, a drain (ball) valve, and a dedicated waterflow detector containing two sets of SPDT (Form C) contacts, having an electrical rating of 10A @ 125/250 VAC/2.5 A @ 24 VDC. (8" only: 15A @ 125/250 VAC/2.0 A @ 24 VDC). See Table 3 for triggering flow rates. The non-adjustable Pressure Relief Kit will maintain system pressures below 175 psi (12,1 bar).

- Basic Trim with TestANDrain® Valve

  Commercial riser manifold assembly includes a cULus Listed pressure gauge, a ¼" three-way valve, a TestANDrain® Valve, and a dedicated waterflow detector containing two sets of SPDT (Form C) contacts, having an electrical rating of 10A @ 125/250 VAC/2.5 A @ 24 VDC. (8" only: 15A @ 125/250 VAC/2.0 A @ 24 VDC). See Table 3 for triggering flow rates. The available test orifice sizes inside the TestANDrain® Valve are (choose one):

  - 7/16"(11mm)(not FM Approved)
  - 1/2"(15mm)
  - 17/32 (20mm)
  - ELO
  - ESFR

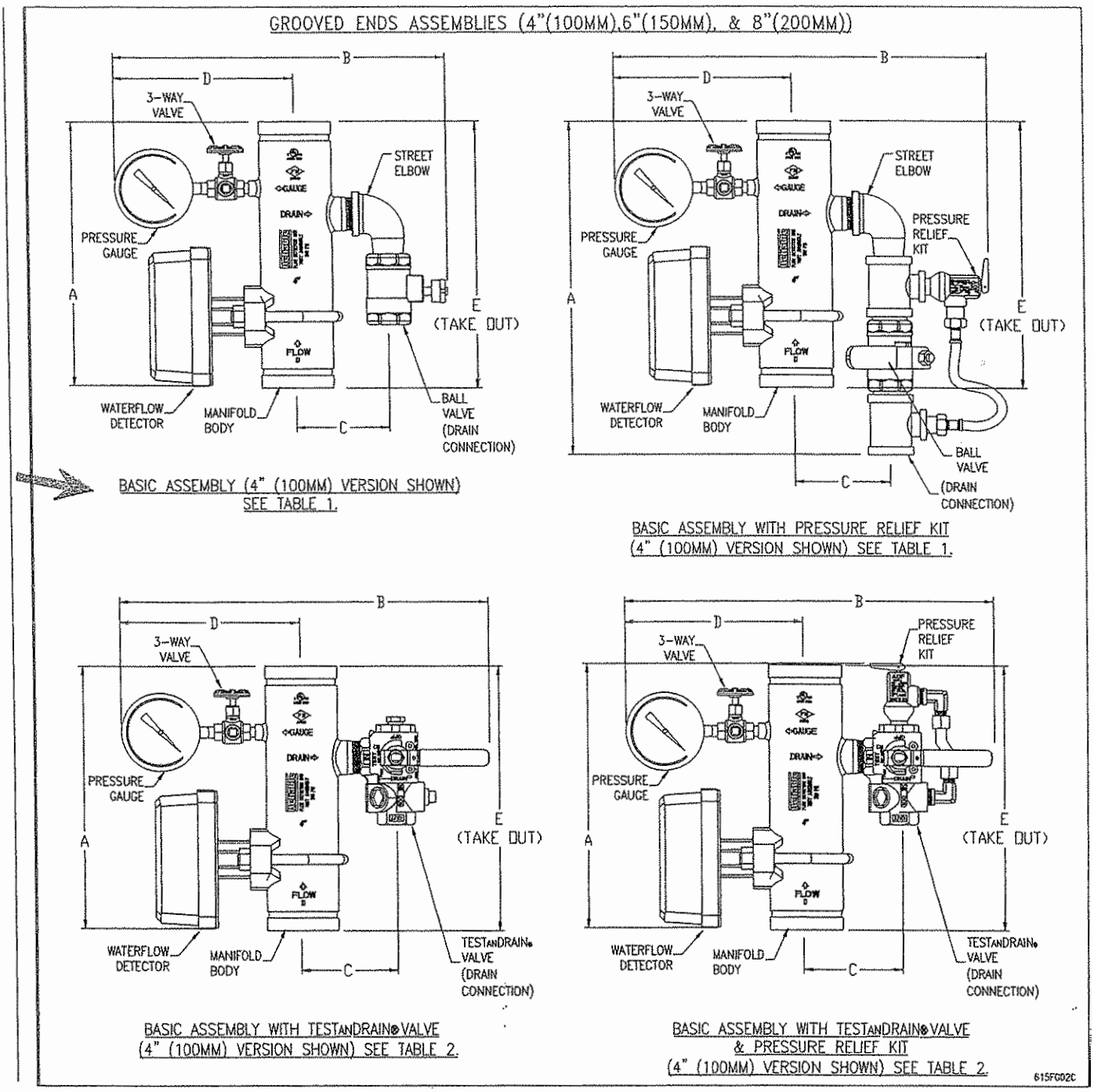

GROOVED ENDS ASSEMBLIES (4"(100MM),6"(150MM), & 8"(200MM))
B
D
3-WAY VALVE
STREET ELBOW
GAUGE
DRAIN
PRESSURE GAUGE
A
E
(TAKE OUT)
FLOW
WATERFLOW DETECTOR
MANIFOLD BODY
C
BALL VALVE (DRAIN CONNECTION)
BASIC ASSEMBLY (4" (100MM) VERSION SHOWN) SEE TABLE 1.
PRESSURE RELIEF KIT
BASIC ASSEMBLY WITH PRESSURE RELIEF KIT (4" (100MM) VERSION SHOWN) SEE TABLE 1.
TESTANDRAIN® VALVE (DRAIN CONNECTION)
BASIC ASSEMBLY WITH TESTANDRAIN® VALVE (4" (100MM) VERSION SHOWN) SEE TABLE 2.
BASIC ASSEMBLY WITH TESTANDRAIN® VALVE & PRESSURE RELIEF KIT (4" (100MM) VERSION SHOWN) SEE TABLE 2.
615FG02C

Figure 1

Table 1

		Dimensions & Weights											
		Basic Assembly						*Basic Assembly with Pressure Relief Kit*					
	Manifold Pipe Size in (mm)	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E in (mm)	Weight lbs (kg)	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E in (mm)	Weight lbs (kg)
Grooved Ends (See Fig. 1)	4 (100)	12.5 (318)	18 (457)	5.25 (133)	9 (229)	13 (330)	21.3 (9.7)	16.75 (425)	18.5 (470)	6 (152)	9 (229)	13 (330)	26.7 (12)
	6 (150)	12.5 (318)	20 (508)	6.25 (159)	10 (254)	13 (330)	26.3 (12)	16.75 (425)	20.5 (521)	7 (178)	10 (254)	13 (330)	31.8 (14.4)
	8 (200)	12.5 (318)	22 (559)	7.25 (184)	11 (280)	13 (330)	31 (14.1)	16.75 (425)	22.5 (572)	8 (203)	11 (280)	13 (330)	36.5 (16.6)

Table 2

		Dimensions & Weights											
		Basic Assembly with TestANDrain® Valve						*Basic Assembly with TestANDrain® Valve & Pressure Relief Kit*					
	Manifold Pipe Size in (mm)	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E in (mm)	Weight lbs (kg)	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E in (mm)	Weight lbs (kg)
Grooved Ends (See Fig. 1)	4 (100)	12.5 (318)	23.5 (597)	6 (152)	9 (229)	13 (330)	25.6 (11.6)	12.5 (318)	23.5 (597)	6 (152)	9 (229)	13 (330)	26 (11.8)
	6 (150)	12.5 (318)	25.5 (648)	7 (178)	10 (254)	13 (330)	30 (13.6)	12.5 (318)	25.5 (648)	7 (178)	10 (254)	13 (330)	31 (14.1)
	8 (200)	12.5 (318)	27.5 (699)	8 (203)	11 (280)	13 (330)	35.3 (16)	12.5 (318)	27.5 (699)	8 (203)	11 (280)	13 (330)	36.3 (16.5)

- Basic Trim with TestANDrain® Valve & Pressure Relief Kit

  Commercial riser manifold assembly includes a cULus Listed pressure gauge, a ¼" three-way valve, a TestANDrain® Valve, and a dedicated waterflow detector containing two sets of SPDT (Form C) contacts, having an electrical rating of 10A @ 125/250 VAC/2.5 A @ 24 VDC. (8" only: 15A @ 125/250 VAC/2.0 A @ 24 VDC). See Table 3 for triggering flow rates. The non-adjustable Pressure Relief Kit will maintain system pressures below 175 psi (12,1 bar). The available test orifice sizes inside the TestANDrain® Valve are (choose one):
  - 7/16"(11mm)(not FM Approved)
  - 1/2"(15mm)
  - 17/32 (20mm)
  - ELO
  - ESFR.

Installation

1. Attach the pressure gauge as shown in Figures 1-4.
2. Install the manifold with the flow arrow pointing towards the SYSTEM side using threaded fittings or grooved pipe couplings.
3. Connect the appropriately sized drain line. Ensure that the drain valve is in the CLOSED position.
4. Place the sprinkler system in service.
5. Installation must comply with NFPA 13, Section 8.16.4.2

Caution:

Automatic sprinkler systems having non-fire protection connection (permitting continual water flow) require dielectric fittings, according to NFPA 13 sect. 4-6, when dissimilar metal piping materials are joined.

Note:

Use a non-hardening pipe joint compound, or teflon tape. Follow the manufacturer's instructions when using grooved pipe couplings.

Listings and Approvals

1. Listed by Underwriters' Laboratories Inc. and UL certified for Canada (cULus).
2. Factory Mutual Approved.
3. NYC MEA 258-93-E

Engineering Specification

[Model CR Commercial Riser Assembly] shall be [cULus Listed] [Factory Mutual (FM) Approved] for horizontal or vertical installation as a one-piece, fabricated assembled unit. The [Model CR Commercial Riser Assembly] shall consist of a (choose one):

- 4" (100 mm) cast, non-welded, ductile iron body with grooved end connections
- 6" (150 mm) cast, non-welded ductile iron body with grooved end connections
- 8" (200 mm) cast, non-welded, ductile iron body with grooved end connections

having all brass and galvanized trim. The manifold piping shall clearly identify the manifold's pipe size, flow direction, cULus Listing/FM Approval, drain, and gauge outlets. A built-in drain port shall be available to permit hydrostatic testing without draining the system. This drain port shall be sized per the following:

- 4"(100mm), 6"(150mm), and 8"(200mm) sizes

End-to-end dimensions shall be the same for the 4"(100mm) through 8"(200mm) grooved sizes. Assembly shall have a working pressure rating of [300 psi (20,7 bar) (for 4" through 8" grooved manifold assemblies)].

Table 3

Manifold Sizes	Triggering Flow Rate - GPM (LPM)
4"(100mm), 6"(150mm), 8"(200mm)	4 (15) to 10 (38)

Ordering Information:

Model CR Commercial Riser Assembly Part Number Code Key

4G **6G** **8G**	–	**B** **T716**** **T12** **T1732** **TELO** **TESFR***	–	**0** **1** **2** **3**
4G = 4" (100 mm) Grooved Ends Assembly 6G = 6" (150mm) Grooved Ends Assembly 8G = 8" (200 mm) Grooved Ends Assembly		B = Basic Assembly T716 = w/ 7/16" (11 mm) Orif. TestAnDrain Valve T12 = w/ 1/2" (15 mm) Orif. TestAnDrain Valve T1732 = w/ 17/32" (20 mm) Orif. TestAnDrain Valve TELO = w/ ELO Orif. TESFR = w/ ESFR Orif. ** 7/16" (11 mm) orifice is not FM Approved		0 = Assembly without Pressure Relief Kit Water Detector UL & FM 1 = Assembly with Pressure Relief Kit Water Detector UL & FM 2 = Assembly without Pressure Relief Kit Water Detector ULC 3 = Assembly with Pressure Relief Kit Water Detector ULC

Example #1: 6G – 1732 – 0

(6"(150mm) Model CR Commercial Riser Assembly with grooved ends, basic trim with TestAnDrain® Valve having a 17/32" diameter test orifice, without a Pressure Relief Kit)

Notes:

1. All Model CR Commercial Riser Assemblies come with a 300 psi (20,7 bar) UL Listed and FM Approved pressure gauge for 175 psi (12,1 bar) applications. If the Model CR Commercial Riser Assembly is to be installed in a 300 psi (20,7 bar) application, please purchase a 600 psi (41,4 bar) (P/N 98248005) pressure gauge. This gauge may or may not be UL Listed and/or FM Approved at the time of purchase.
2. If required, Pressure Relief Kits may also be installed in the field. Please contact Reliable's Customer Service Department for details.

The equipment presented in this bulletin is to be installed in accordance with the latest pertinent Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances whenever applicable.

Products manufactured and distributed by Reliable have been protecting life and property for over 80 years, and are installed and serviced by the most highly qualified and reputable sprinkler contractors located throughout the United States, Canada and foreign countries.

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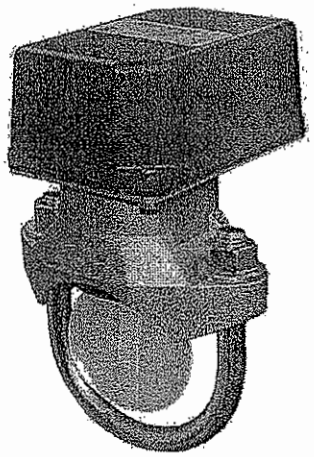
VSR
VANE TYPE WATERFLOW ALARM SWITCH WITH RETARD



UL, CUL and CSFM Listed, FM Approved, LPCB Approved, For CE Marked (EN12259-5) / VdS Approved model use VSR-EU

Service Pressure: 450 PSI (31 BAR) - UL

Flow Sensitivity Range for Signal:
4-10 GPM (15-38 LPM) - UL

Maximum Surge: 18 FPS (5.5 m/s)

Contact Ratings: Two sets of SPDT (Form C)
10.0 Amps at 125/250VAC
2.0 Amps at 30VDC Resistive
10 mAmps min. at 24VDC

Conduit Entrances: Two knockouts provided for 1/2" conduit. Individual switch compartments suitable for dissimilar voltages.

Environmental Specifications:
- NEMA 4/IP54 Rated Enclosure suitable for indoor or outdoor use with factory installed gasket and die-cast housing when used with appropriate conduit fitting.
- Temperature Range: 40°F - 120°F, (4.5°C - 49°C) - UL
- Non-corrosive sleeve factory installed in saddle.

Service Use:

Automatic Sprinkler	NFPA-13
One or two family dwelling	NFPA-13D
Residential occupancy up to four stories	NFPA-13R
National Fire Alarm Code	NFPA-72

Optional: Cover Tamper Switch Kit, stock no. 0090148

Replaceable Components: Retard/Switch Assembly, stock no. 1029030

⚠ WARNING

- Installation must be performed by qualified personnel and in accordance with all national and local codes and ordinances.
- Shock hazard. Disconnect power source before servicing. Serious injury or death could result.
- Risk of explosion. Not for use in hazardous locations. Serious injury or death could result.

General Information

The Model VSR is a vane type waterflow switch for use on wet sprinkler systems. It is UL Listed and FM Approved for use on steel pipe; schedules 10 through 40, sizes 2" thru 8" (50 mm thru 200 mm). LPC approved sizes are 2" thru 8" (50 mm thru 200 mm). See Ordering Information chart.

The VSR may also be used as a sectional waterflow detector on large systems.

The VSR contains two single pole, double throw, snap action switches and an adjustable, instantly recycling pneumatic retard. The switches are actuated when a flow of 10 GPM (38 LPM) or more occurs downstream of the device. The flow condition must exist for a period of time necessary to overcome the selected retard period.

Enclosure

The VSR switches and retard device are enclosed in a general purpose, die-cast housing. The cover is held in place with two tamper resistant screws which require a special key for removal. A field installable cover tamper switch is available as an option which may be used to indicate unauthorized removal of the cover. See bulletin number 5401103 for installation instructions of this switch.

Installation (See Fig. 1)

These devices may be mounted on horizontal or vertical pipe. On horizontal pipe they should be installed on the top side of the pipe where they will be accessible. The device should not be installed within 6" (15 cm) of a fitting which changes the direction of the waterflow or within 24" (60 cm) of a valve or drain.

Note: Do not leave cover off for an extended period of time.

Drain the system and drill a hole in the pipe using a hole saw in a slow speed drill. (see Fig. 1)

Clean the inside pipe of all growth or other material for a distance equal to the pipe diameter on either side of the hole.

Roll the vane so that it may be inserted into the hole; do not bend or crease it. Insert the vane so that the arrow on the saddle points in the direction of the waterflow. Install the saddle strap and tighten nuts alternately to required torque. (see Fig. 1). The vane must not rub the inside of the pipe or bind in any way.

Specifications subject to change without notice.

Ordering Information			
Nominal Pipe Size		Model	Part Number
2"	DN50	VSR-2	1144402
2 1/2"	DN65	VSR-2 1/2	1144425
3"	DN80	VSR-3	1144403
3 1/2"	-	VSR-3 1/2	1144435
4"	DN100	VSR-4	1144404
5"	-	VSR-5	1144405
6"	DN150	VSR-6	1144406
8"	DN200	VSR-8	1144408

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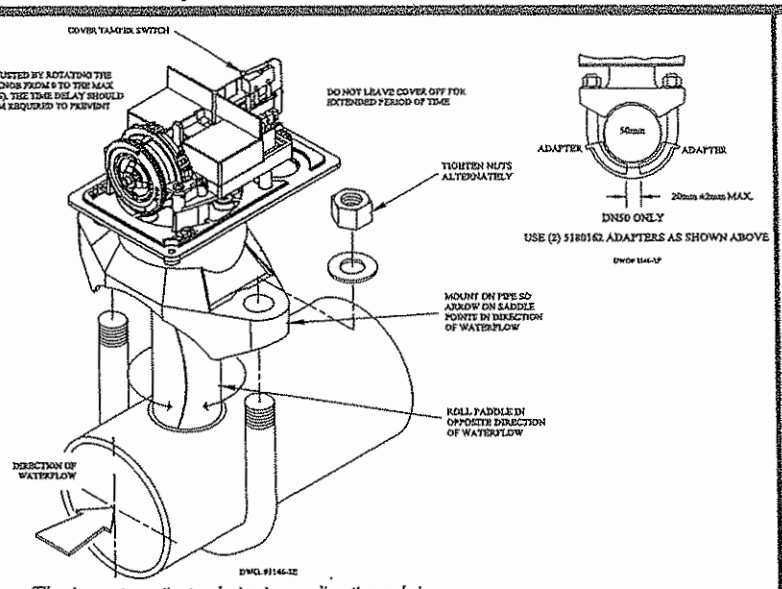
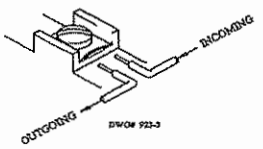
VSR
VANE TYPE WATERFLOW ALARM SWITCH WITH RETARD

Fig. 1



(Flowing water activates device in one direction only.)

Fig. 2 Switch Terminal Connections Clamping Plate Terminal



⚠ WARNING

An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire become dislodged from under the terminal. Failure to sever the wire may render the device inoperable risking severe property damage and loss of life.

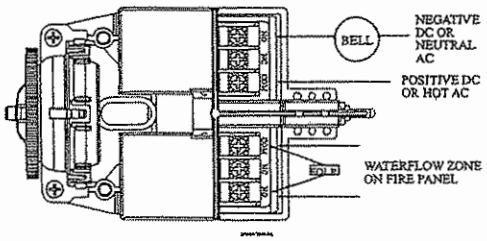
⚠ CAUTION

Waterflow switches that are monitoring wet pipe sprinkler systems shall not be used as the sole initiating device to discharge AFFF, deluge, or chemical suppression systems. Waterflow switches used for this application may result in unintended discharges caused by surges, trapped air, or short retard times.

Installation Requirements

Model	Nominal Pipe Size		Nominal Pipe O.D.		Hole Size		U-Bolt Nuts Torque	
	inch	mm	inch	mm	inch	mm	ft-lb	n-m
VSR-2	2	DN50	2.375	60.3	1.25 + .125/-.062	33.0 ± 2.0	20	27
VSR-2 1/2	2 1/2		2.875	73.0				
VSR-2 1/2	2 1/2	DN65	3.000	76.1				
VSR-3	3	DN80	3.500	88.9	2.00 ± .125	50.8 ± 2.0		
VSR-3 1/2	3 1/2		4.000	101.6				
VSR-4	4	DN100	4.500	114.3				
VSR-5	5		5.563	141.3				
VSR-6	6	DN150	6.625	168.3				
VSR-8	8	DN200	8.625	219.1				

Fig. 3 Typical Electrical Connections



Notes:

1. The Model VSR has two switches, one can be used to operate a central station, proprietary or remote signaling unit, while the other contact is used to operate a local audible or visual annunciator.
2. A condition of LPC Approval of this product is that the electrical entry must be sealed to exclude moisture.
3. For supervised circuits see "Switch Terminal Connections" drawing and caution note (Fig. 2).

Fig. 4

Break out thin section of cover when wiring both switches from one conduit entrance.

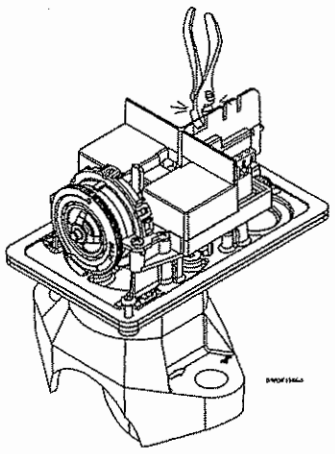
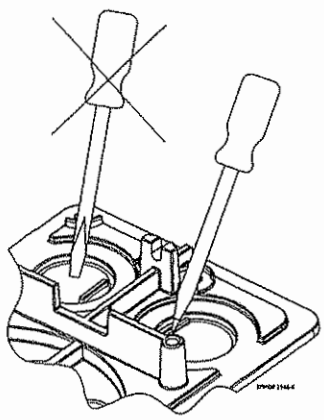


Fig. 5

To remove knockouts: Place screwdriver at inside edge of knockouts, not in the center.



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VSR
VANE TYPE WATERFLOW ALARM SWITCH WITH RETARD

Compatible Pipe												
Model	Nominal Pipe Size		Nominal Pipe O.D.		Pipe Wall Thickness							
					Schedule 10 (UL)		Schedule 40 (UL)		BS-1387 (LPC)		DN (VDS)	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
VSR-2	2	DN50	2.375	60.3	0.109	2.77	0.154	3.91	0.142	3.6	0.091	2.3
VSR-2 1/2	2 1/2		2.875	73.0	0.120	3.05	0.203	5.16				
VSR-2 1/2		DN65	3.000	76.1					0.142	3.6	0.102	2.6
VSR-3	3	DN80	3.500	88.9	0.120	3.05	0.216	5.49	0.157	4.0	0.114	2.9
VSR-3 1/2	3 1/2		4.000	101.6	0.120	3.05	0.226	5.74				
VSR-4	4	DN100	4.500	114.3	0.120	3.05	0.237	6.02	0.177	4.5	0.126	3.2
VSR-5	5		5.563	141.3	0.134	3.40	0.258	6.55				
VSR-6	6	DN150	6.625	168.3	0.134	3.40	0.280	7.11	0.197	5.0	0.157	4.0
VSR-8	8	DN200	8.625	219.1	0.148	3.76	0.322	8.18	0.248	6.3	0.177	4.5

Note: For copper or plastic pipe use Model VSR-CF.

Testing

The frequency of inspection and testing for the Model VSR and its associated protective monitoring system should be in accordance with applicable NFPA Codes and Standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently).

If provided, the inspector's test valve, that is usually located at the end of the most remote branch line, should always be used for test purposes. If there are no provisions for testing the operation of the flow detection device on the system, application of the VSR is not recommended or advisable. A minimum flow of 10 GPM (38 LPM) is required to activate this device.

Maintenance

Inspect detectors monthly for leaks. If leaks are found, replace the detector. The VSR waterflow switch should provide years of trouble-free service. The retard and switch assembly are easily field replaceable. In the unlikely event that either component does not perform properly, please order replacement retard switch assembly stock #1029030. There is no maintenance required, only periodic testing and inspection.

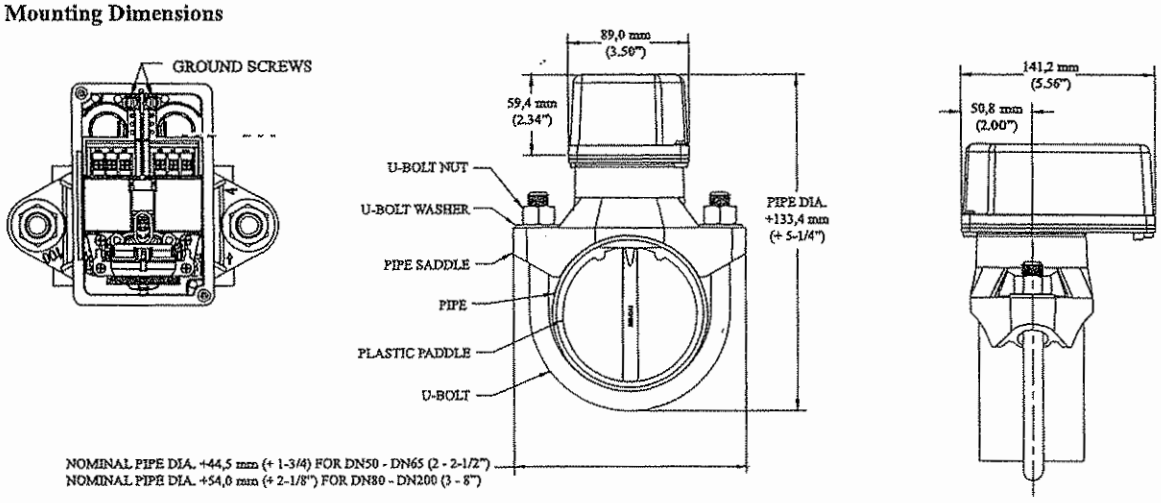
Removal

- To prevent accidental water damage, all control valves should be shut tight and the system completely drained before waterflow detectors are removed or replaced.
- Turn off electrical power to the detector, then disconnect wiring.
- Loosen nuts and remove U-bolts.
- Gently lift the saddle far enough to get your fingers under it. With your fingers, roll the vane so it will fit through the hole while continuing to lift the waterflow detector saddle.
- Lift detector clear of pipe.

Important Notice

Please advise the person responsible for testing of the fire protection system that this system must be tested in accordance with the testing instructions.

Mounting Dimensions



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Model BFV-N Butterfly Valve Grooved End 2-1/2 Inch - 10 Inch (DN65 - DN250)

General Description

The Model BFV-N Grooved End Butterfly Valves (Ref. Figure 1) are indicating type valves designed for use in fire protection systems where a visual indication is required as to whether the valve is open or closed. They are used, for example, as system, sectional, and pump water control valves. They have cut groove inlet and outlet connections that are suitable for use with grooved end pipe couplings that are listed and approved for fire protection systems.

For applications requiring supervision of the open position of the valve, the Gear Operators for the Model BFV-N Butterfly Valves are provided with two sets of factory installed internal switches each having SPDT contacts. The supervisory switches transfer their electrical contacts when there is movement from the valve's normal open position during the first two revolutions of the handwheel.

WARNINGS

The Model BFV-N Grooved End Butterfly Valves described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Technical Data

Model
BFV-N

Sizes: ANSI Inches / DN
2-1/2 (DN65), 3 (DN80), 4 (DN100), 5 (DN125), 6 (DN150), 8 (DN200), 10 (DN250)

Approvals
The 2-1/2 through 10 inch (DN65 - DN250) Model BFV-N Grooved End Butterfly Valves are UL and C-UL Listed and FM Approved.

In addition, the Model BFV-N Grooved End Butterfly Valves are listed by the California State Fire Marshall under Listing No. 7770-1670:100.

All laboratory listings and approvals are for indoor and outdoor use.

Maximum Working Pressure
- 2-1/2 - 8 Inch (DN65 - DN200): 300 psi (20,7) bar
- 10 Inch (DN250): 175 psi (12,0 bar)

Materials of Construction:

Body
Ductile iron conforming to ASTM A-395

Body Coating
Polyamide

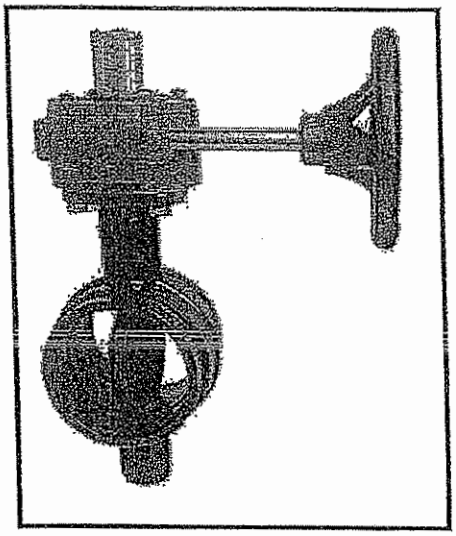
Disc
Ductile iron conforming to ASTM A-395

Disc Seal
Grade EPDM "E" encapsulated rubber conforming to ASTM D-2000

Upper & Lower Stem
Type 416 Stainless Steel conforming to ASTM 582

Lower Plug
PVC

Operator
Gear operator with iron housing



Friction Loss
The approximate friction loss, based on the Hazen Williams formula and expressed in equivalent length of pipe with C= 120, is as follows. The data is based on friction loss information collected at a typical flow rate of 15 feet per second.

- 6.9 feet of 2-1/2 inch Sch. 40 pipe for the 2-1/2 inch valve.
- 8.7 feet of 3 inch Sch. 40 pipe for the 3 inch valve.
- 4.5 feet of 4 inch Sch. 40 pipe for the 4 inch valve.
- 6.6 feet of 5 inch Sch. 40 pipe for the 5 inch valve.
- 11.1 feet of 6 inch Sch. 40 pipe for the 6 inch valve.
- 10.2 feet of 8 inch Sch. 30 pipe for the 8 inch valve.
- 12.1 feet of 10 inch Sch. 30 pipe for the 10 inch valve.

Nominal Valve Sizes	Pipe O.D.	Nominal Installation Dimensions in Inches and (mm)								Weight
		A	B	C	D	E	F	G	H	lbs. (kg)
2-1/2" DN65	2.88 (73,0)	3.85 (98,0)	11.71 (297,4)	3.25 (83,0)	5.43 (137,9)	6.00 (152,4)	7.81 (198,4)	2.50 (63,5)	0	22 (10,0)
3" DN80	3.50 (88,9)	3.85 (98,0)	12.25 (311,1)	3.54 (90,0)	5.68 (144,2)	6.00 (152,4)	7.81 (198,4)	2.50 (63,5)	0	23 (10,4)
4" DN100	4.50 (114,3)	4.56 (116,0)	13.95 (354,3)	4.35 (110,0)	6.58 (167,1)	6.00 (152,4)	7.81 (198,4)	2.50 (63,5)	0	28 (12,7)
5" DN125	5.56 (141,3)	5.86 (149,0)	14.93 (379,2)	4.84 (123,0)	7.07 (179,6)	6.00 (152,4)	7.81 (198,4)	2.50 (63,5)	0	31 (14,1)
6" DN150	6.63 (168,3)	5.86 (149,0)	17.31 (439,7)	5.93 (151,0)	8.35 (212,0)	6.00 (152,4)	7.81 (198,4)	2.50 (63,5)	0.67 (17,0)	41 (18,6)
8" DN200	8.63 (219,1)	5.26 (134,0)	19.20 (487,7)	6.87 (174,0)	9.29 (236,0)	6.00 (152,4)	7.81 (198,4)	2.50 (63,5)	5.86 (148,8)	53 (24,1)
10" DN250	10.75 (273,1)	6.29 (160,0)	25.11 (637,8)	9.17 (233,0)	11.50 (292,1)	9.00 (228,6)	7.68 (195,1)	3.00 (76,2)	7.41 (188,2)	88 (40,0)

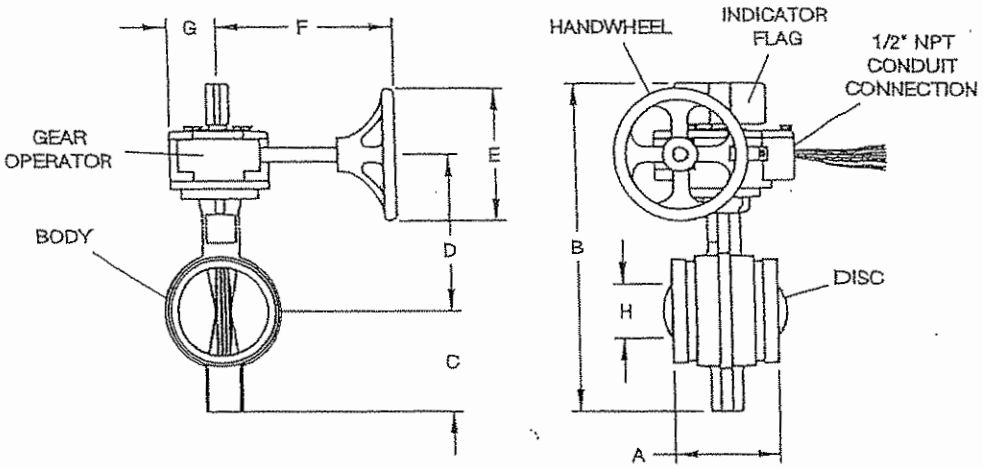


FIGURE 1
MODEL BFV-N GROOVED END BUTTERFLY VALVE
– NOMINAL DIMENSIONS –

Installation

The Model BFV-N Grooved End Butterfly Valves may be installed with flow in either direction and can be positioned either horizontally or vertically.

The grooved end pipe couplings used with the Model BFV-N must be listed or approved for fire protection service and installed in accordance with the manufacturers instructions.

The Model BFV-N Butterfly Valve may be installed with any schedule of pressure class of pipe or tubing that is listed or approved for fire protection.

As applicable, refer to Figure 2 for the internal switch wiring diagram.

Conduit and electrical connections are to be made in accordance with the authority having jurisdiction and/or the National Electrical Code. With reference to Figure 2, the "supervisory switch" is intended for connection to the supervisory circuit of a fire alarm control panel in accordance with NFPA 72. The "auxiliary switch" is intended for the unsupervised connection to auxiliary equipment in accordance with NFPA 70, National Electric Code.

NOTE

For outdoor applications with internal supervisory switches, it is recommended that wiring connections be made at a temperature above 15°F (-9°C), in order to insure sufficient flexibility of the wire lead insulation.

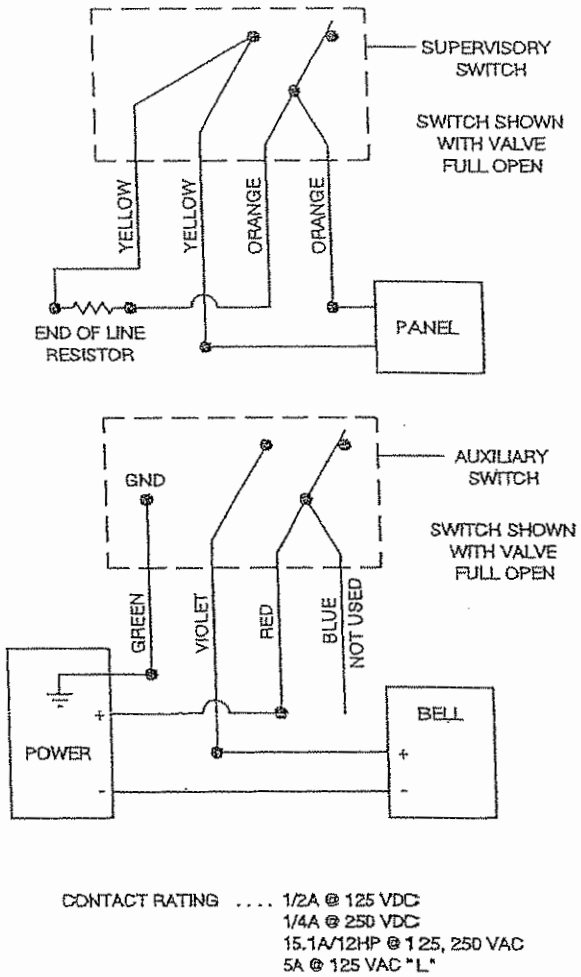


FIGURE 2
MODEL BFV-N BUTTERFLY VALVE
– INTERNAL SWITCH WIRING DIAGRAM –

Care and Maintenance

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in accordance with the applicable standards of the National Fire Protection Association (e.g., NFPA25), in addition to the standards of any authority having jurisdiction. The installing contractor or product manufacturer should be contacted relative to any questions. Any impairment must be immediately corrected.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified inspection service.

NOTE

Before closing a fire protection system control valve for maintenance or inspection work on either the valve or fire protection system which it controls, permission to shut down the affected fire protection systems must be obtained from the proper authorities and all personnel who may be affected by this decision must be notified.

Limited Warranty

Products manufactured by Tyco Fire & Building Products (TFBP) are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by TFBP. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFBP or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by TFBP to be defective shall be either repaired or replaced, at TFBP's sole option. TFBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFBP shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFBP be liable, in contract, tort, strict liability or under any other legal theory, for incidental, indirect, special or consequential damages, including but not limited to labor charges, regardless of whether TFBP was informed about the possibility of such damages, and in no event shall TFBP's liability exceed an amount equal to the sales price.

The foregoing warranty is made in lieu of any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

This limited warranty sets forth the exclusive remedy for claims based on failure of or defect in products, materials or components, whether the claim is made in contract, tort, strict liability or any other legal theory.

This warranty will apply to the full extent permitted by law. The invalidity, in whole or part, of any portion of this warranty will not affect the remainder.

Ordering Procedure

Grooved End Butterfly Valves:
Specify: (specify inch size) Model BFV-N Grooved End Butterfly Valve with internal supervisory switches, P/N (specify).

Valve Size	Valve Part Number
2-1/2	59-300-F-025N
3	59-300-F-030N
4	59-300-F-040N
5	59-300-F-050N
6	59-300-F-060N
8	59-300-F-080N
10	59-300-F-010N

Reliable®

Model G 2½", 3", 4" & 6" (65mm, 80mm, 100mm, 150mm) Swing Check Valves

Bulletin 807 Rev.G

The Right–Check™

Features

1. Grooved end connections.
2. Compact, lightweight design.
3. Non–slamming, spring loaded clapper to minimize water hammer.
4. Approved for horizontal and vertical installation.
5. Streamlined body design provides very low friction loss.
6. Elastomer faced clapper provides leak–free, non–sticking sealing.

General

Reliable Model G Swing Check Valves are multiple purpose valves performing regular check valve duties with very low friction loss. All four sizes are approved for use in fire protection systems. Typical applications include connections between public water supplies and private fire systems, at the discharge from fire pumps, at gravity tank connections and at fire department pumper connections.

The 4" (80mm) Model G Check Valve is provided with a ½" NPT (R½) supply side connection (Item 12, Fig.2). This supply side connection is optional for all other valve sizes and must be specified.

Grooved end connections provide fast and easy installation using listed or approved mechanical grooved couplings. Rigid style grooved couplings can be used for positive clamping to resist flexural and torsional loads.

Right–Check™ valves and associated equipment should periodically be given a thorough inspection and test. NFPA 25 provides minimum maintenance requirements. Check valves should be inspected and operated at least annually. Parts should be replaced as required.

When Model G Swing Check Valves are installed vertically, the direction of the flow arrow must point upward. For horizontal installations, the hinge pin must be located at the top.

Valve Description

1. Rated working pressure 250 psi (17,25 bar).
2. Factory hydrostatic test pressure 500 psi (34,5 bar).

Note: 1 bar=100 kPa

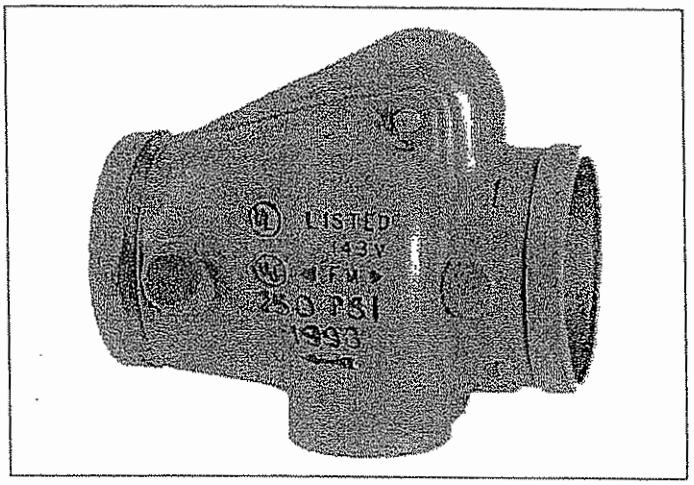
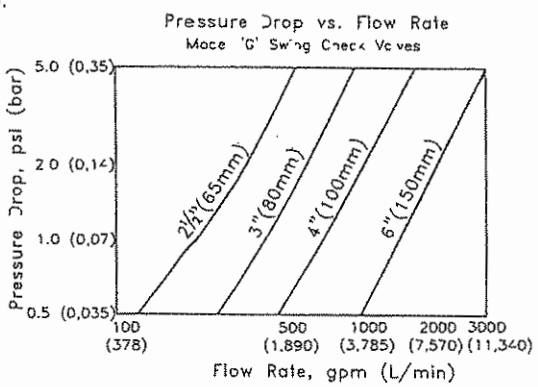


Figure 1

3. Friction loss, expressed in equivalent length of Sch. 40 pipe with C = 120 (based on Hazen and Williams formula):
   - 2½" – 7 ft. (65mm - 231cm)
   - 3" – 7 ft. (80mm - 213cm)
   - 4" – 10 ft. (100mm - 305cm)
   - 6" – 16 ft. (150mm - 488cm)
4. Standard grooved end dimensions per ANSI/AWWA C606.



Technical Data

Valve Size	Face–to–Face Dimensions	Shipping weight
2½" (65mm)	7.03" (178mm)	9 lbs. (4kg)
3" (80mm)	7.62" (193mm)	11 lbs. (5kg)
4" (100mm)	8.44 (214mm)	17 lbs. (7.7kg)
6" (150mm)	10.25 (260mm)	38 lbs. (17.25kg)

Approvals

1. Listed by Underwriters Laboratories, Inc.
2. Underwriters Laboratories certified for Canada.
3. Approved by Factory Mutual Research Corp.*
4. NYC MEA 258-93-E.

* FM Approved both a "Single" check valve and "Anti-Water Hammer" check valve.

The Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York 10523

Parts List - Refer to Figure 2

Item No.	Part Name	Material	Quantity	Part Number			
				2½" (65mm)	3" (80mm)	4" (100mm)	6" (150mm)
1*	Valve Body	Gray Iron, ASTM–A48 Class 30A	1	91005022	91005023	91005024	91005026
2*	Seat	Bronze C83600 or C93200, ASTM–B505	1	96020200	96020300	96020400	96020600
3	Clapper	Stainless Steel 304, ASTM–A240	1	91816112	91816113	91816114	91816116
4	Facing Seal **	EPDM Rubber	1	95520200	95520300	95520400	95520600
5	Clamping Ring	Stainless Steel 304, ASTM–A240	1	95290300	95290300	95290400	95290600
6	Gasket **	EPDM Rubber	1	93720604	93720604	93720604	93720604
7	Spring	Stainless Steel 302, ASTM–A313	1	96400300	96400300	96400400	96400600
8	Hinge Pin	Stainless Steel 303, ASTM–A582	1	95000280	95000300	95006824	95000600
9	Bolt	Stainless Steel 304, ASTM–F593	1	91090600	91090600	91090600	91090600
10	Locknut **	Stainless Steel 303, ASTM–F594	1	94913816	94913816	94913816	94913816
11	Plug, ⅛" NPT	Steel	1	95201800	95201800	95201800	95201800
12	Plug, ½" NPT	Steel	1	Optional	Optional	98604402	Optional
** Replacement Seal Kit			1	6888040025	6888040030	6888040040	6888040060

*Not field replaceable.

Valve Disassembly

1. Close the main water supply valve and drain the system.
2. Remove the check valve from the piping system.
3. Inspect the Seat (2) for any cuts, scrapes and dents. Replace the valve if any damage is found.
4. To replace the Facing Seal (4), remove the Clapper (3), unscrew the Locknut (10) and remove the Retention Bolt (9).

Valve Reassembly

1. Thoroughly clean the Clapper (3). Insert the Retention Bolt (9) with a new Gasket (6).
2. Place the new Facing Seal (4) and the Clamping Ring (5) against the Clapper (3). Tighten the new Locknut (10) to 21 in.-lbs. (2.37Nm) torque in 2½" (63mm) and 3" (76mm) sizes and to 52 in.-lbs. (5.87Nm) in 4" (101mm) and 6" (152mm) sizes.
3. Insert the clapper assembly into the valve through the downstream opening. Reinsert the Hinge Pin (8) while holding the coils of the properly oriented Spring (7) in place. Install the hinge pin Plug (11).
4. Reinstall the check valve in the system.
5. Place the system back in service.

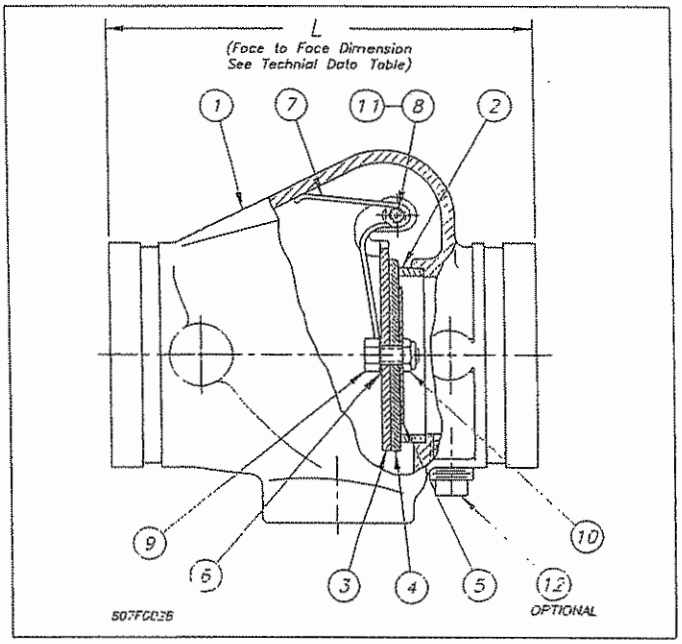


Figure 2

Ordering Information

Specify:
1. Model G Right–Check™ Valve.
2. Size.
3. ½" NPT (R½) optional supply side connection for valve sizes other than 4" (100mm).

Contact the installing contractor or Reliable if any difficulties are experienced. Should replacement parts be needed, use only genuine Reliable parts.

Manufactured by

Reliable®

The Reliable Automatic Sprinkler Co., Inc.

(800) 431–1588 Sales Offices
(800) 848–6051 Sales Fax
(914) 829-2042 Corporate Offices
www.reliablesprinkler.com Internet Address

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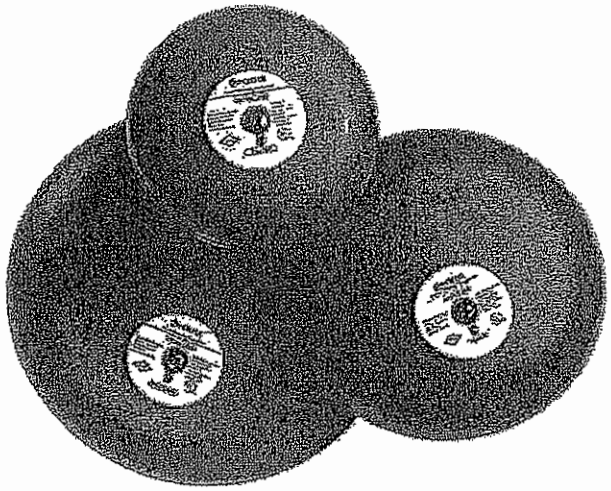
Revision lines indicate updated or new data.

EG. Printed in U.S.A. 11/07 P/N9999970071

POTTER
The Symbol of Protection

BELLS
PBA-AC & MBA-DC



UL, ULC, and FM Approved

Sizes Available: 6" (150mm), 8" (200mm) and 10" (250mm)

Voltages Available: 24VAC
120VAC
12VDC (10.2 to 15.6) Polarized
24VDC (20.4 to 31.2) Polarized

Service Use: Fire Alarm
General Signaling
Burglar Alarm

Environment: Indoor or outdoor use (See Note 1)
-40° to 150°F (-40° to 66°C)
(Outdoor use requires weatherproof backbox.)

Termination: AC Bells - 4 No. 18 AWG stranded wires
DC Bells - Terminal strip

Finish: Red powder coating

Optional: Model BBK-1 weatherproof backbox
Model BBX-1 deep weatherproof backbox

These vibrating type bells are designed for use as fire, burglar or general signaling devices. They have low power consumption and high decibel ratings. The unit mounts on a standard 4" (101mm) square electrical box for indoor use or on a model BBK-1 weatherproof backbox for outdoor applications. Weatherproof backbox model BBK-1, Stock No. 1500001.

ALL DC BELLS ARE POLARIZED AND HAVE BUILT-IN TRANSIENT PROTECTION:

Size inches (mm)	Voltage	Model Number	Stock Number	Current (Max.)	Typical dB at 10 ft. (3m) (2)	Minimum dB at 10 ft. (3m) (1)
6 (150)	12VDC	MBA126	1750070	.12A	85	76
8 (200)	12VDC	MBA128	1750080	.12A	90	77
10 (250)	12VDC	MBA1210	1750060	.12A	92	78
6 (150)	24VDC	MBA246	1750100	.06A	87	77
8 (200)	24VDC	MBA248	1750110	.06A	91	79
10 (250)	24VDC	MBA2410	1750090	.06A	94	80
6 (150)	24VAC	PBA246	1806024	.17A	91	78
8 (200)	24VAC	PBA248	1808024	.17A	94	77
10 (250)	24VAC	PBA2410	1810024	.17A	94	78
6 (150)	120VAC	PBA1206	1806120	.05A	92	83
8 (200)	120VAC	PBA1208	1808120	.05A	99	84
10 (250)	120VAC	PBA12010	1810120	.05A	99	86

Notes:

1. Minimum dB ratings are calculated from integrated sound pressure measurements made at Underwriters Laboratories as specified in UL Standard 464. UL temperature range is -30° to 150°F (-34° to 66°C).
2. Typical dB ratings are calculated from measurements made with a conventional sound level meter and are indicative of output levels in an actual installation.

DIMENSIONS
INCHES (mm).

FIG. 1 BELLS

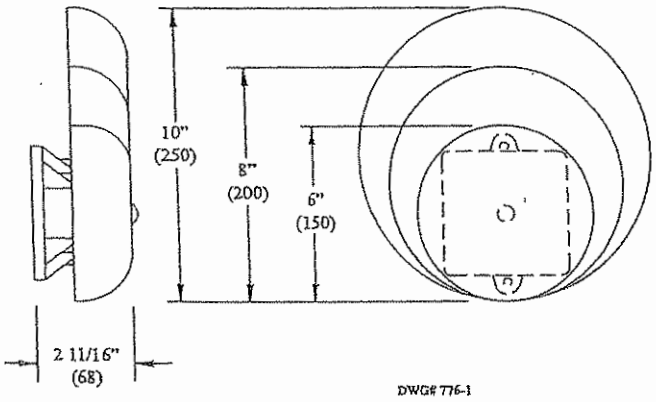


FIG. 2 WEATHERPROOF BACKBOX
BOX HAS ONE THREADED 1/2" CONDUIT ENTRANCE

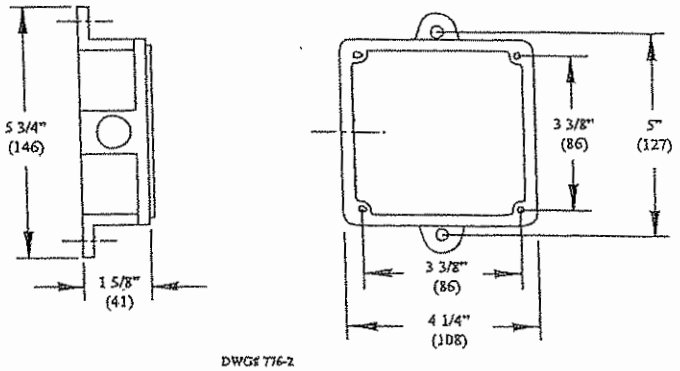
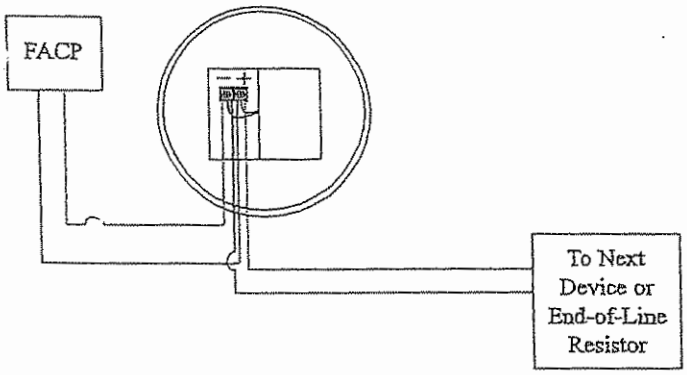
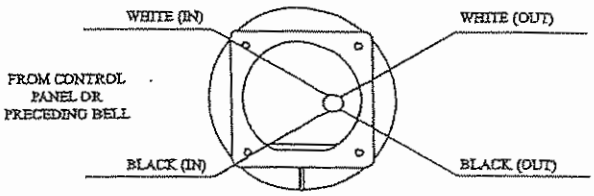


FIG. 3 WIRING (REAR VIEW)



A.C. BELLS



CAUTION:
WHEN ELECTRICAL SUPERVISION IS REQUIRED USE IN AND OUT LEADS AS SHOWN.

NOTES:

1. WHEN USING AC BELLS, TERMINATE EACH EXTRA WIRE SEPARATELY AFTER LAST BELL.
2. END-OF-LINE RESISTOR IS NOT REQUIRED ON AC BELLS.

DWG# 776-3

INSTALLATION

1. The bell shall be installed in accordance with NFPA 13, 72, or local AHJ. The top of the device shall be no less than 90" AFF and not less than 6" below the ceiling.
2. Remove the gong.
3. Connect wiring (see Fig. 3).
4. Mount bell mechanism to backbox (bell mechanism must be mounted with the striker pointing down).
5. Reinstall the gong (be sure that the gong positioning pin, in the mechanism housing, is in the hole in the gong).
6. Test all bells for proper operation and observe that they can be heard where required (bells must be heard in all areas as designated by the authority having jurisdiction).

GUARDIAN
FIRE EQUIPMENT, INC.
MIAMI, FL
Ph. 800.327.6584 • Fax 800.827.3869

DETAIL AND SUBMITTAL SHEET

6100 Series - Projecting Fire Dept. Inlet Connections

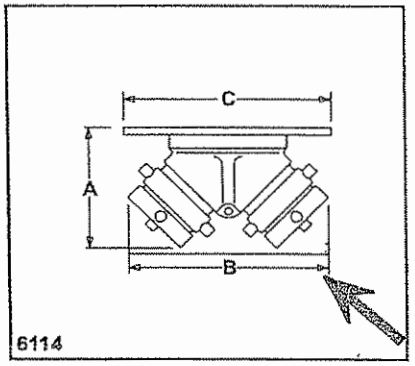
Project/Location: _____ **Date:** _____

Architect/Engineer: _____ **Qty:** _____

Contractor: _____

☑ *Appropriate Selection*

Used as auxiliary connections through which the fire department can pump water to supplement existing water supplies. Provides 250 GPM flow (minimum), per 2½" inlet.



6114

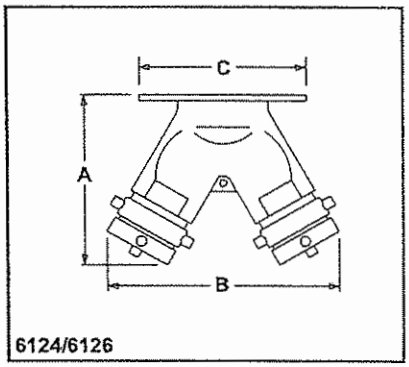
Two and three-way - inlet connections feature clappered brass bodies (straight pattern), with female hose thread swivel inlets and female NPT outlets.

Standard components, all connections:
Plugs with chains and identification plate. Cast brass construction, standard.

Two and Three-Way Connections					
Model No.	Size	Clappers	A	B	C
☑ 6114	4" x 2½" x 2½"	1	5⅞"	8⅛"	10"
☐ 6124	4" x 2½" x 2½"	2	7⅝"	10½"	10"
☐ 6126	6" x 2½" x 2½"	2	8"	10½"	11¼"
☐ 6136	6" x 2½" x 2½" x 2½"	3	11¼"	13¾"	11¼"

Indentification Plate Lettering

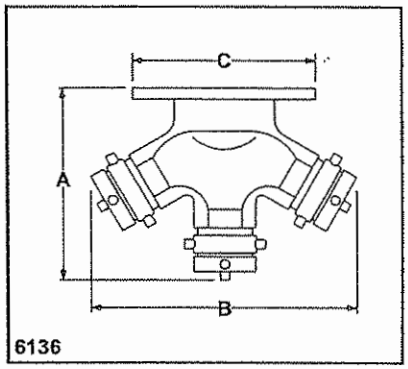
☑ AUTO SPKR ☐ AUTO SPKR & STANDPIPE
☐ STANDPIPE ☐ DRY STANDPIPE



6124/6126

Optional Finish: ☑ -B Polished Brass
☐ -C Rough Chrome Plated
☐ -D Polished Chrome Plated

Threads:
☑ NST
☐ Other _____



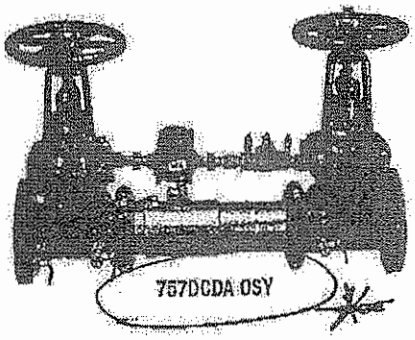
6136

Contact factory for current listings and approvals

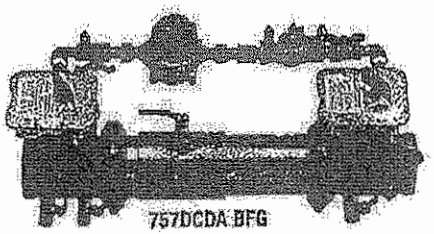
Series 757DCDA, 757NDCDA

Double Check Detector Assemblies

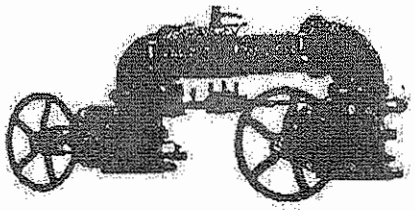
Sizes: 2½" – 10" (65 – 250mm)



757DCDA OSY



757DCDA BFG



757NDCDA OSY

Series 757DCDA, 757NDCDA Double Check Detector Assemblies are used to prevent backflow of pollutants that are objectionable but not toxic, from entering the potable water supply system. This Series can be applied, where approved by the local authority having jurisdiction, on non-health hazard installations. The 757DCDA, 757NDCDA may be installed under continuous pressure service and may be subjected to backpressure. The 757DCDA, 757NDCDA are used primarily on fire line sprinkler systems when it is necessary to monitor unauthorized use of water.

Features

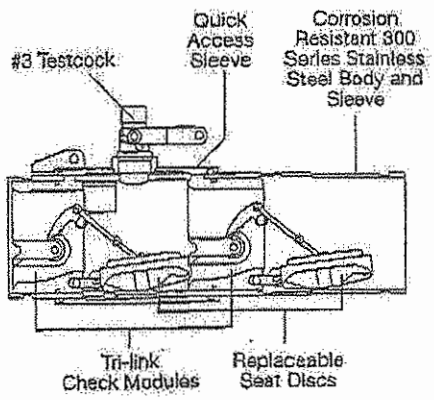
- Extremely compact design
- 70% lighter than traditional designs
- Groove fittings allow integral pipeline adjustment
- Patented tri-link checks provide lowest pressure loss
- Unmatched ease of serviceability
- Available with grooved butterfly valve shutoffs
- May be used for horizontal, vertical or N pattern installations
- Replaceable check disc rubber

Materials

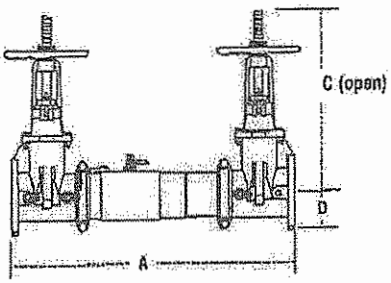
- Housing & Sleeve: 304 (Schedule 40) Stainless Steel
- Elastomers: EPDM, Silicone and Buna-N
- Tri-link Checks: Noryl®, Stainless Steel
- Check Discs: Reversible Silicone or EPDM
- Test Cocks: Bronze Body Nickel Plated
- Pins & Fasteners: 300 Series Stainless Steel
- Springs: Stainless Steel

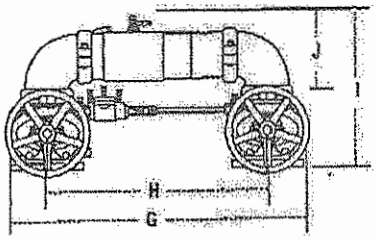
Pressure-Temperature

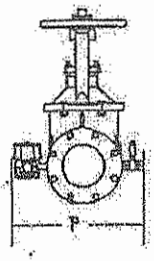
Temperature Range: 33°F – 110°F (5°C – 43°C)
Maximum Working Pressure: 175psi (12.06 bar)



Dimensions – Weights

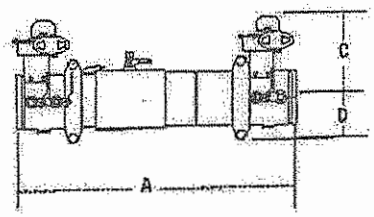


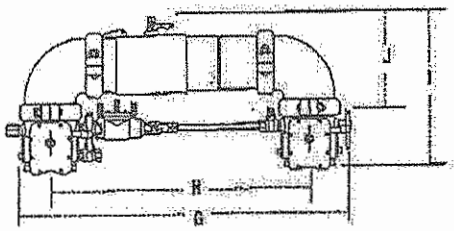


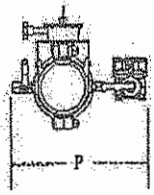


757DCDA 757NDCDA

		A		C (OSY)		D		G		H		I		J		P		757DCDA		757NDCDA	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kgs.	lbs.	kgs.
2½	65	31	787	16⅜	416	3½	89	29⅛	738	22	559	15½	393	8¹³⁄₁₆	223	13³⁄₁₆	335	139	63	147	67
3	80	31¹¹⁄₁₆	805	18⅞	479	3¹¹⁄₁₆	94	30⅛	768	22¾	578	17⅛	435	9⅜	233	14½	368	159	72	172	78
4	100	33⅝	856	22¾	578	4	102	33	838	24	610	18½	470	9¹⁵⁄₁₆	252	15⁷⁄₁₆	366	176	79	198	90
6	150	43½	1105	30⅛	765	5½	140	44¾	1137	33¾	857	23⅜	589	13⅛	332	19	483	309	140	350	159
8	200	50	1270	37¼	959	6¹⁵⁄₁₆	176	54¾	1375	40⅝	1032	27⅛	697	15¾	399	21⅛	538	494	224	569	258
10	250	57½	1460	45¾	1162	8³⁄₁₆	208	66	1676	50	1270	32½	826	17⁷⁄₁₆	440	24	610	795	361	965	438







757DCDA BFG, 757NDCDA BFG

		A		C		D		G		H		I		J		P		757DCDABFG		757NDCDA BFG	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kgs.	lbs.	kgs.
2½	65	28	711	8	203	3½	89	29⅛	768	22	559	14¹⁵⁄₁₆	379	8¹⁵⁄₁₆	223	13³⁄₁₆	330	70	32	78	35
3	80	28½	724	8⅛	211	3¹¹⁄₁₆	94	30¹⁵⁄₁₆	779	22¾	578	15⁷⁄₁₆	392	9⅜	233	13½	343	68	31	81	37
4	100	29⅛	741	8¹⁵⁄₁₆	227	3¹¹⁄₁₆	94	31¹⁵⁄₁₆	811	24	610	16¼	412	9¹⁵⁄₁₆	252	14	356	75	34	96	44
6	150	36½	927	10	254	5	127	43⅜	1097	33¾	857	19¹¹⁄₁₆	500	13⅛	332	14½	368	131	59	171	78
8	200	43	1092	12¼	311	6½	165	51⅛	1297	40⅝	1032	23⅜	592	15¾	399	18³⁄₁₆	462	275	125	351	159

Models

Suffix
OSY - UL/FM outside stem and yoke resilient seated gate valves
*OSY FxG - flanged inlet gate connection and grooved outlet gate connection
*OSY GxF - grooved inlet gate connection and flanged outlet gate connection
*OSY GxG - grooved inlet gate connection and grooved outlet gate connection
BFG - UL/FM grooved gear operated butterfly valves with tamper switch for sizes 2½" – 8"
Available with grooved NRS gate valves - consult factory*
Post indicator plate and operating nut available - consult factory*
*Consult factory for dimensions

Approvals

1048 (BFG & OSY only) B64.5

IMPORTANT: Inquire with governing authorities for local installation requirements

tyco / Fire & Security / SimplexGrinnell

STENNIS RIVERINE & COMBATANT TRAINING FACILITY
STENNIS SPACE CENTER
STENNIS, MS 39529

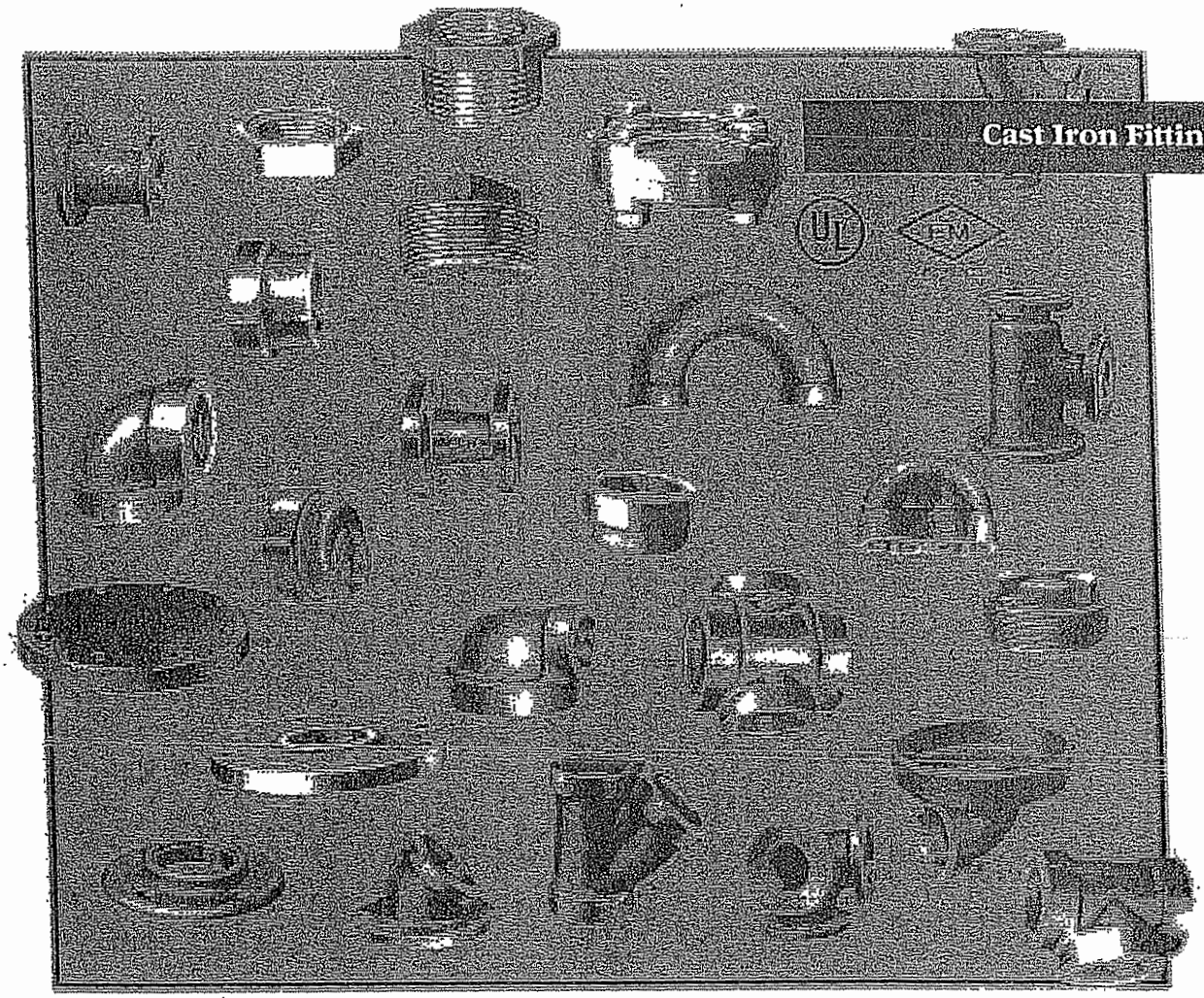
FIRE PROTECTION/ SPRINKLER SYSTEMS
OPERATIONS BUILDING 2440/2441
BOAT STORAGE BUILDING 2442

SECTION 3

FITTINGS

SIMPLEXGRINNELL
5800 JEFFERSON HWY., SUITE A
HARAHAN, LA 70123
PHONE: 504-736-0104
FAX: 504-736-9292

Cast Iron Fittings



Anvil standard and extra heavy cast iron threaded fittings are manufactured in accordance with ASME-B16.4 (except plugs and bushings, ASME B16.14). Dimensions also conform to Federal Specifications, WW-P-501 (except plugs and bushings WW-P-471).

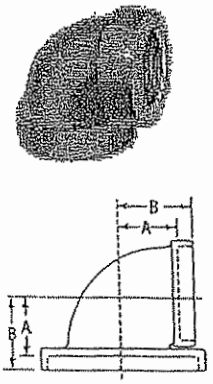
Anvil standard and extra heavy fittings in this section, sizes ¼ NPS - 12NPS *(8 - 300 DN)*, are included in the "List of Inspected Fire Protection Equipment and Materials" issued by the Underwriters' Laboratories, Inc.

Cast Iron Threaded Fittings
Pressure - Temperature Ratings

Temperature		Pressure			
		Class 125		Class 250	
(°F)	*(°C)*	psi	*bar*	psi	*bar*
-20° to 150°	-28.9 to 65.6	175	12.1	400	27.6
200°	93.3	165	11.4	370	25.5
250°	121.1	150	10.3	340	23.4
300°	148.9	140	9.7	310	21.4
350°	176.7	125	8.6	300	20.7
400°	204.4	–	–	250	17.2

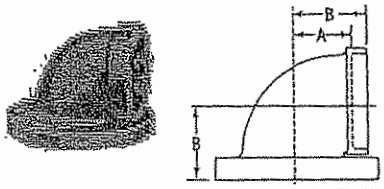
Cast Iron Threaded Fittings
Class 125, (Standard)

90° Elbow Straight Figure 351



Size		A		B		Weight			
						black		galv.	
NPS	DN	in	mm	in	mm	lbs	kg	lbs	kg
¼	8	⅛	13	13/16	22	0.16	0.07	0.17	0.08
⅜	10	9/16	14	15/16	24	0.25	0.11	0.26	0.12
½	15	11/16	17	1⅛	29	0.40	0.18	0.41	0.19
¾	20	13/16	22	1 5/16	33	0.60	0.27	0.61	0.28
1	25	15/16	24	1½	38	0.92	0.42	0.95	0.43
1¼	32	1⅛	29	1¾	44	1.4	0.65	1.5	0.66
1½	40	1 5/16	33	1 15/16	49	2.0	0.88	2.0	0.91
2	50	1 9/16	40	2¼	57	3.1	1.4	3.2	1.5
2½	65	1 13/16	47	2 11/16	68	4.9	2.2	5.1	2.3
3	80	2 3/16	56	3⅛	79	7.2	3.3	7.4	3.4
4	100	2 11/16	68	3 13/16	98	12	5.5	13	5.7
5	125	3 5/16	84	4½	114	21	10	—	—
6	150	3⅞	98	5⅛	130	31	14	33	15
8	200	5 3/16	132	6 9/16	167	65	29	67	30

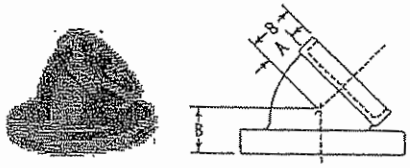
90° Elbow Flanged and Threaded Figure 371



Size		A		B		Weight black	
NPS	DN	in	mm	in	mm	lbs	kg
2½	65	1 13/16	47	2 11/16	68	10	4.6
3	80	2 3/16	56	3⅛	79	13	6.0
4	100	2 11/16	68	3 13/16	98	22	10
5	125	3 5/16	84	4½	114	28	13
6	150	3⅞	98	5⅛	130	41	18
8	200	5 3/16	132	6 9/16	167	80	36

*Nominal Pipe Sizes of 4" *(100 DN)* and larger have two holes tapped for stud or tap bolts.

45° Elbow Flanged and Threaded Figure 372



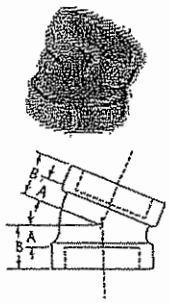
Size		A		B		Weight black	
NPS	DN	in	mm	in	mm	lbs	kg
4	100	1 5/16	40	2⅝	67	20	9.0
6	150	2 3/16	56	3 7/16	87	35	16
8	200	2⅞	73	4¼	108	64	29

Note: See page PF-75 for pressure-temperature ratings.

Cast Iron Threaded Fittings
Class 125, (Standard)

ANVIL INTERNATIONAL, INC.

22 ½° Elbow
Figure 356A

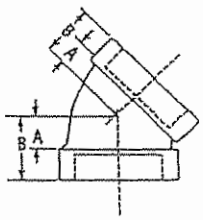


Size		A		B		Weight black	
NPS	DN	in	mm	in	mm	lbs	kg
¾	20	⅜	10	⅞	22	0.52	0.24
1	25	7/16	11	1	25	0.80	0.36
1¼	32	½	13	1⅛	29	1.4	0.64
1½	40	⅝	16	1¼	32	1.6	0.74
2	50	¾	19	1 7/16	37	2.5	1.1
2½	65	¾	19	1⅝	41	4.0	1.8

Galvanized Not Steel

Note: See page PF-75 for pressure-temperature ratings.

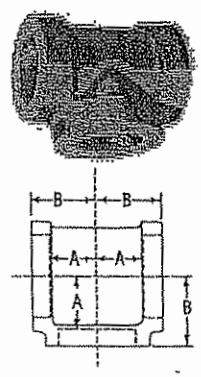
45° Elbow
Figure 356



Size		A		B		Weight black		Weight galv.	
NPS	Dn	in	mm	in	mm	lbs	kg	lbs	kg
¼	8	7/16	11	¾	19	0.16	0.07	0.17	0.08
⅜	10	7/16	11	13/16	22	0.23	0.10	—	—
½	15	7/16	11	⅞	22	0.37	0.17	0.38	0.17
¾	20	½	13	1	25	0.55	0.25	0.56	0.25
1*	25	9/16	14	1¼	29	0.83	0.38	0.88	0.40
1¼	32	⅝	16	1¼	32	1.3	0.60	1.4	0.62
1½	40	13/16	22	1 7/16	37	1.8	0.81	1.8	0.83
2	50	1	25	1 11/16	43	2.9	1.3	3.0	1.3
2½	65	1 1/16	27	1 15/16	49	4.3	1.9	4.3	2.0
3	80	1 3/16	30	2 3/16	56	6.4	2.9	6.7	3.0
3½	90	1⅜	35	2⅜	60	8.4	3.8	—	—
4	100	1 5/16	40	2⅝	67	11	4.8	11	5.1
5	125	1⅞	48	3 1/16	78	17	7.7	17	7.9
6	150	2 3/16	56	3 7/16	87	26	12	26	12
8	200	2⅞	73	4¼	108	50	23	52	24

* 1 NPS *(25 DN)* size available in 1 NPS x ½ NPS *(25 x 15 DN)* reducing size, black or galvanized.

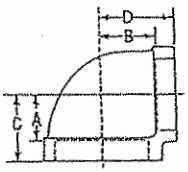
Straight Tee
Figure 358



Size		A		B		Weight black		Weight galv.	
NPS	Dn	in	mm	in	mm	lbs	kg	lbs	kg
¼	8	½	13	13/16	22	0.22	0.10	0.23	0.10
⅜	10	⅝	16	1	25	0.35	0.16	0.36	0.16
½	15	11/16	17	1⅛	29	0.56	0.25	0.58	0.26
¾	20	13/16	22	1 5/16	33	0.84	0.38	0.85	0.39
1	25	15/16	24	1½	38	1.3	0.57	1.3	0.59
1¼	32	1⅛	29	1¾	44	2.0	0.9	2.1	0.9
1½	40	1 5/16	33	1 15/16	49	2.7	1.2	2.7	1.2
2	50	1 9/16	40	2¼	57	4.2	1.9	4.3	2.0
2½	65	1 13/16	47	2 11/16	68	6.7	3.0	6.8	3.1
3	80	2 3/16	56	3⅛	79	10.0	4.5	10	4.6
3½	90	2 7/16	62	3 7/16	87	13	6.0	14	6.3
4	100	2 11/16	68	3¾	95	16	7.4	17	7.7
5	125	3 5/16	84	4½	114	27	12	28	13
6	150	3⅞	98	5⅛	130	41	19	41	19
8	200	5 3/16	132	6 5/16	167	79	36	81	37

Cast Iron Threaded Fittings
Class 125, (Standard)

90° Reducing Elbow - Figure 352



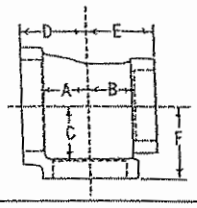
Size				A		B		C		D		Weight black	
NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	lbs	kg
½	15	¼	8	5/16	16	3/4	19	1 1/16	27	1 1/16	27	0.40	0.18
		⅜	10	5/16	16	11/16	17	1 1/16	27	1 1/16	27	0.34	0.15
¾	20	½	15	11/16	17	13/16	22	1¼	32	1¼	32	0.51	0.23
1	25	½	15	11/16	17	15/16	24	1⅜	35	1⅜	35	0.67	0.30
		¾	20	13/16	22	15/16	24	1 7/16	37	1 7/16	37	0.76	0.34
1¼	32	½	15	11/16	17	1 1/16	27	1½	38	1½	38	1.1	0.49
		¾	20	13/16	22	1⅛	29	1⅝	41	1⅝	41	1.0	0.46
		1	25	15/16	24	1⅛	29	1 11/16	43	1 11/16	43	1.2	0.55
1½	40	½	15	¾	19	1¼	32	1⅝	41	1⅝	41	1.5	0.69
		¾	20	⅞	22	1 5/16	33	1 13/16	47	1 13/16	47	1.6	0.70
		1	25	1	25	1¼	32	1 13/16	47	1 13/16	47	1.4	0.65
		1¼	32	1 3/16	30	1¼	32	1⅞	48	1⅞	48	1.7	0.79
2	50	½	15	1 3/16	30	1 7/16	37	1¾	35	1⅜	35	2.2	1.0
		¾	20	1 5/16	33	1½	38	2	51	2	51	2.2	1.0
		1	25	1 1/16	27	1 7/16	37	2	51	2	51	2.1	0.9
		1¼	32	1 3/16	30	1 7/16	37	2 1/16	52	2 1/16	52	2.3	1.1
		1½	40	1 5/16	33	1½	38	2⅛	54	2⅛	54	2.6	1.2
2½	65	1	25	1	25	1¾	44	2 5/16	59	2 5/16	59	2.9	1.3
		1¼	32	1 3/16	30	1¾	44	2⅜	60	2⅜	60	3.4	1.5
		1½	40	1 5/16	33	1 13/16	47	2 1/16	62	2 1/16	62	3.7	1.7
		2	50	1 9/16	40	1⅞	48	2 3/16	65	2 3/16	65	4.0	1.8
3	80	1¼	32	1⅝	41	2 5/16	59	2 15/16	75	2 15/16	75	6.0	2.7
		1½	40	1⅝	41	2 5/16	59	2 15/16	75	2 15/16	75	5.7	2.6
		2	50	1⅝	41	2¼	57	2 15/16	75	2 15/16	75	5.7	2.6
		2½	65	1⅞	48	2 3/16	56	3 1/16	78	3 1/16	78	6.4	2.9
3½	90	3	80	2 3/16	56	2 7/16	62	3⅜	86	3⅜	86	8.9	4.1
4	100	2	50	2 3/16	56	2 15/16	75	3⅝	92	3⅝	92	12	5.4
		2½	65	2 3/16	56	2¾	70	3⅝	92	3⅝	92	11	5.1
		3	80	2 3/16	56	2 11/16	68	3⅝	92	3⅝	92	11	4.8
		3½	90	2 7/16	62	2 11/16	68	3 11/16	94	3 11/16	94	12	5.4
5	125	2½	65	2 13/16	73	3½	89	4⅜	111	4⅜	111	20	9.0
		3	80	2 13/16	73	3 7/16	87	4⅜	111	4⅜	111	19	8.6
		4	100	2 13/16	73	3 5/16	84	4⅜	111	4⅜	111	16	7.5
6	150	3	80	2 5/16	59	3 13/16	98	4 13/16	124	4 13/16	124	19	8.8
		4	100	2 13/16	73	3⅞	98	4 15/16	125	4 15/16	125	24	11
		5	125	3⅜	86	3 13/16	98	5	127	5	127	27	12
8	200	6	150	4 3/16	106	5⅛	130	6⅜	162	6⅜	162	51	23

Note: See page PF-75 for pressure-temperature ratings.

Cast Iron Threaded Fittings
Class 125, (Standard)

ANVIL INTERNATIONAL, INC.

Reducing Tee
Figure 359



Reducing Tee: Figure 359																					
Size						A		B		C		D		E		F		Wt.			
																		black		galv.	
NPS	Dn	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lns	kg	lbs	kg
½	15	½	15	¼	8	11/16	17	11/16	17	13/16	22	1 1/8	29	1 1/8	29	1 1/8	29	0.57	0.26	–	–
				⅜	10	11/16	17	11/16	17	¾	19	1 1/8	29	1 1/8	29	1 1/8	29	0.57	0.26	–	–
				¾	20	13/16	22	13/16	22	11/16	17	1 1/4	32	1 1/4	32	1 3/16	22	0.68	0.31	–	–
				1	25	1	25	1	25	13/16	22	1 7/16	37	1 7/16	37	1 3/8	35	1.00	0.45	–	–
¾	20	¼	8	¾	20	13/16	22	15/16	24	13/16	22	15/16	24	1 1/4	32	15/16	24	0.79	0.36	–	–
		½	15	½	15	11/16	17	11/16	17	13/16	22	13/16	22	1 1/8	29	1 1/4	32	0.64	0.29	–	–
				¼	20	13/16	22	13/16	22	13/16	22	15/16	24	1 1/4	32	15/16	24	0.75	0.34	–	–
		¾	20	⅛	8	9/16	14	9/16	14	7/8	22	11/16	17	11/16	17	13/16	22	0.62	0.28	–	–
				⅜	10	11/16	17	11/16	17	15/16	24	13/16	22	13/16	22	1 1/4	32	0.75	0.34	–	–
				½	15	11/16	17	11/16	17	13/16	22	13/16	22	13/16	22	1 1/4	32	0.76	0.34	–	–
				1	25	15/16	24	15/16	24	13/16	22	1 7/16	37	1 1/16	37	1 3/8	35	0.99	0.45	–	–
1	25	¼	8	1	25	15/16	24	15/16	24	15/16	24	1 ½	38	1 1/4	32	1 ½	38	1.1	0.49	–	–
		½	15	½	15	11/16	17	¾	19	15/16	24	1 1/4	32	13/16	22	1 3/8	35	0.90	0.41	–	–
				¾	20	13/16	22	13/16	22	15/16	24	1 3/8	35	1 1/4	32	1 7/16	37	0.91	0.41	–	–
				1	25	15/16	24	15/16	24	15/16	24	1 ½	38	1 3/8	35	1 ½	38	1.1	0.49	–	–
		¾	20	½	15	11/16	17	11/16	17	15/16	24	1 1/4	32	13/16	22	1 3/8	35	0.89	0.40	–	–
				¾	20	13/16	22	13/16	22	15/16	24	1 3/8	35	15/16	24	1 7/16	37	1.00	0.45	–	–
				1	25	15/16	24	15/16	24	15/16	24	1 ½	38	1 7/16	37	1 ½	38	1.1	0.51	–	–
		1	25	¼	8	11/16	17	11/16	17	1 1/8	29	1 1/8	29	1 1/4	32	1 3/8	35	1.0	0.46	–	–
				½	15	11/16	17	11/16	17	15/16	24	1 1/4	32	1 1/4	32	1 3/8	35	1.0	0.46	1.0	0.47
				¾	20	13/16	22	13/16	22	15/16	24	1 3/8	35	1 3/8	35	1 7/16	37	1.1	0.50	–	–
				1 ¼	32	1 1/8	29	1 1/8	29	15/16	24	1 11/16	43	1 11/16	43	1 9/16	40	1.5	0.68	–	–
				1 ½	40	1 1/4	32	1 1/4	32	1	25	1 13/16	47	1 13/16	47	1 5/8	41	1.8	0.83	–	–
1 ¼	32	½	15	½	15	13/16	22	13/16	22	1 1/8	29	1 7/16	37	15/16	24	1 5/8	41	1.00	0.45	–	–
				1	25	15/16	24	15/16	24	1 1/8	29	1 9/16	40	1 3/8	35	1 11/16	43	1.4	0.63	–	–
				1 ¼	32	1 1/8	29	1 1/8	29	1 1/8	29	1 3/4	44	1 9/16	40	1 3/4	44	1.6	0.74	–	–
		¾	20	¾	20	13/16	22	13/16	22	1 1/8	29	1 7/16	37	15/16	24	1 5/8	41	1.3	0.58	–	–
				1	25	15/16	24	15/16	24	1 1/8	29	1 9/16	40	1 7/16	37	1 11/16	43	1.4	0.65	–	–
				1 ¼	32	1 1/8	29	1 1/8	29	1 1/8	29	1 3/4	44	1 5/8	41	1 3/4	44	1.7	0.78	–	–
		1	25	½	15	11/16	17	11/16	17	1 1/8	29	15/16	24	1 1/4	32	1 9/16	40	1.3	0.58	1.3	0.59
				¾	20	13/16	22	13/16	22	1 1/8	29	1 7/16	37	1 3/8	35	1 5/8	41	1.4	0.62	–	–
				1	25	15/16	24	15/16	24	1 1/8	29	1 9/16	40	1 9/16	40	1 11/16	43	1.5	0.69	1.6	0.71
				1 ¼	32	1 1/8	29	1 1/8	29	1 1/8	29	1 3/4	44	1 11/16	43	1 3/4	44	1.8	0.81	–	–
				1 ½	40	1 1/4	32	1 1/8	32	13/16	22	1 7/8	48	1 13/16	47	1 13/16	47	2.1	0.9	–	–
				2	50	1 7/16	37	1 7/16	37	13/16	22	2 1/16	52	2	51	1 7/8	48	2.7	1.2	–	–
		1 ¼	32	½	15	11/16	17	11/16	17	1 1/8	29	15/16	24	15/16	24	1 9/16	40	1.5	0.67	–	–
				¾	20	13/16	22	13/16	22	1 1/8	29	1 7/16	37	1 7/16	37	1 5/8	41	1.6	0.71	–	–
				1	25	15/16	24	15/16	24	1 1/8	29	1 9/16	40	1 9/16	40	1 11/16	43	1.7	0.78	–	–
				1 ½	40	1 1/4	32	1 1/4	32	13/16	22	1 7/8	48	1 7/8	48	1 13/16	47	2.3	1.0	–	–
				2	50	1 7/16	37	1 7/16	37	13/16	22	2 1/16	52	2 1/16	52	1 7/8	48	2.8	1.3	–	–

See additional sizes on following page.

Note: See page PF-75 for pressure-temperature ratings.

Cast Iron Threaded Fittings
Class 125, (Standard)

ANVIL INTERNATIONAL, INC.

Reducing Tee: Figure 359

Size						A		B		C		D		E		F		Wt. black		Wt. galv.	
NPS	Dn	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg	lbs	kg
1½	40	½	15	1¼	32	13/16	22	1⅛	29	1¼	32	1 13/16	47	1 9/16	40	1⅞	48	1.9	0.88	–	–
				1½	40	15/16	24	1¼	32	15/16	24	1 15/16	49	1 11/16	43	1 15/16	49	2.1	1.0	–	–
		¾	20	1½	40	15/16	24	1¼	32	15/16	24	1 15/16	49	1¾	44	1 15/16	49	2.2	1.0	–	–
		1	25	½	15	13/16	22	¾	19	1¼	32	1 7/16	37	15/16	24	1 11/16	43	1.8	0.79	–	–
				¾	20	⅞	22	13/16	22	1¼	32	1½	38	1⅜	35	1¾	44	1.7	0.77	–	–
				1	25	1	25	15/16	24	1¼	32	1⅝	41	1½	38	1 13/16	47	1.7	0.78	–	–
				1¼	32	13/16	22	1⅛	29	1¼	32	1 13/16	47	1 11/16	43	1⅞	48	2.1	0.9	–	–
				1½	40	15/16	24	1¼	32	15/16	24	1 15/16	49	1 13/16	47	1 15/16	49	2.3	1.0	–	–
				2	50	1½	38	1 7/16	37	15/16	24	2¼	54	2	51	2	51	2.9	1.3	–	–
		1¼	32	½	15	13/16	22	11/16	17	1¼	32	1 7/16	37	15/16	24	1 11/16	43	1.7	0.76	1.7	0.78
				¾	20	⅞	22	13/16	22	1¼	32	1½	38	1 7/16	37	1¾	44	1.8	0.81	–	–
				1	25	1	25	15/16	24	1¼	32	1⅝	41	1⅝	40	1 13/16	47	2.0	0.89	2.0	0.9
				1¼	32	13/16	22	1⅛	29	1¼	32	1 13/16	47	1¾	44	1⅞	48	2.3	1.0	–	–
				1½	40	15/16	24	1¼	32	15/16	24	1 15/16	49	1⅞	48	1 15/16	49	2.5	1.1	–	–
				2	50	1½	38	1 7/16	37	15/16	24	2¼	54	2 1/16	52	2	51	3.1	1.4	–	–
		1½	40	½	15	13/16	22	13/16	22	1¼	32	1 7/16	37	1 7/16	37	1 11/16	43	1.8	0.83	–	–
				¾	20	⅞	22	⅞	22	1¼	32	1½	38	1½	38	1¾	44	2.0	0.88	–	–
				1	25	1	25	1	25	1¼	32	1⅝	41	1⅝	41	1 13/16	47	2.1	1.0	2.2	1.0
				1¼	32	15/16	22	13/16	22	1¼	32	1 13/16	47	1 13/16	47	1⅞	48	2.4	1.1	–	–
				2	50	1½	38	1½	38	15/16	24	2¼	54	2⅛	54	2	51	3.2	1.5	–	–
				2½	65	1 13/16	47	1 13/16	47	15/16	24	2 7/16	62	2 7/16	62	2 5/16	56	4.2	1.9	–	–
2	2	½	15	1½	40	15/16	24	1⅜	35	1½	38	2	51	1 13/16	47	2⅛	54	3.0	1.3	–	–
				2	50	1 9/16	40	1 7/16	37	1 9/16	40	2¼	57	1⅞	48	2¼	57	3.3	1.5	–	–
		¾	20	1¼	32	13/16	22	1⅛	29	1 7/16	37	1⅞	48	1¾	44	2 1/16	52	2.5	1.1	–	–
				1½	40	15/16	24	15/16	24	1½	38	2	51	1 13/16	47	2⅛	54	3.4	1.5	–	–
				2	50	1 9/16	40	1 7/16	37	1 9/16	40	2¼	57	1 15/16	49	2¼	57	3.3	1.5	–	–
		1	25	1	25	11/16	17	11/16	17	1 7/16	37	1¾	44	1⅝	41	2	51	2.7	1.2	–	–
				1¼	32	13/16	22	1⅛	29	1½	38	1⅞	48	1¾	44	2 1/16	52	2.9	1.3	–	–
				1½	40	15/16	24	1¼	32	1½	38	2	51	1 13/16	47	2⅛	54	2.9	1.3	–	–
				2	50	1 9/16	40	1 7/16	37	1 9/16	40	2¼	57	2	51	2¼	57	3.5	1.6	–	–
				2½	65	1⅞	48	1 13/16	47	1 9/16	40	2 9/16	65	2⅝	60	2 7/16	62	4.9	2.2	–	–
		1¼	32	½	15	11/16	17	1	25	1 7/16	37	1¾	44	1⅝	41	2	51	2.5	1.1	–	–
				¾	20	⅞	22	⅞	22	1 7/16	37	1 5/16	40	1½	38	1 15/16	49	2.5	1.1	–	–
				1	25	11/16	17	1	25	1 7/16	37	1¾	44	1⅝	41	2	51	2.7	1.2	–	–
				1¼	32	13/16	22	1⅛	29	1 7/16	37	1⅞	48	1¾	44	2 1/16	52	2.9	1.3	–	–
				1½	40	15/16	24	1¼	32	1½	38	2	51	1⅞	48	2⅛	54	3.1	1.4	–	–
				2	50	1 9/16	40	1 7/16	37	1 9/16	40	2¼	57	2 1/16	52	2¼	57	3.7	1.7	–	–
				2½	65	1⅞	48	1¾	44	1 9/16	40	2 9/16	65	2¾	60	2 7/16	62	4.5	2.1	–	–
		1½	40	½	15	13/16	22	13/16	22	1 5/16	37	1½	38	1 7/16	37	1⅞	48	2.3	1.1	2.4	1.1
				¾	20	⅞	22	⅞	22	1 7/16	37	1 5/16	40	1½	38	1 15/16	49	2.5	1.1	–	–
				1	25	11/16	17	1	25	1 7/16	37	1¾	44	1⅝	41	2	51	2.7	1.2	–	–
				1¼	32	13/16	22	13/16	22	1 7/16	37	1⅞	48	1 13/16	47	2 1/16	52	3.0	1.4	–	–
				1½	40	15/16	24	15/16	24	1½	38	2	51	1 15/16	49	2⅛	54	3.2	1.5	–	–
				2	50	1 9/16	40	1½	38	1 9/16	40	2¼	57	2⅛	54	2¼	57	3.7	1.7	–	–
				2½	65	1⅞	48	1 15/16	49	1 9/16	40	2 9/16	65	2 9/16	65	2 7/16	62	5.5	2.5	–	–
		2	50	½	15	13/16	22	13/16	22	1 7/16	37	1½	38	1½	38	1⅞	48	2.7	1.2	2.8	1.3
				¾	20	⅞	22	⅞	22	1 7/16	37	1 5/16	40	1 5/16	40	1 15/16	49	2.9	1.3	–	–
				1	25	11/16	17	11/16	17	1 7/16	37	1¾	44	1¾	44	2	51	3.0	1.4	3.1	1.4
				1¼	32	13/16	22	13/16	22	1 7/16	37	1⅞	48	1⅞	48	2 1/16	52	3.4	1.5	–	–
				1½	40	15/16	24	15/16	24	1½	38	2	51	2	51	2⅛	54	3.6	1.6	3.7	1.7
				2½	65	1⅞	48	1⅞	48	1 9/16	40	2 9/16	65	2 9/16	65	2 7/16	62	5.2	2.3	5.4	2.4
				4	100	3	76	3	76	2 1/16	62	3 11/16	94	3 11/16	94	3½	89	16	7.3	–	–

See additional sizes on previous and following page. Note: See page PF-75 for pressure-temperature ratings.

Cast Iron Threaded Fittings
Class 125, (Standard)

ANVIL INTERNATIONAL, INC.

Reducing Tee: Figure 359

Size						A		B		C		D		E		F		Wt. black		Wt. galv.	
NPS	Dn	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lns	kg	lbs	kg
2½	65	½	15	2	50	1 5/16	40	1 11/16	43	1 7/8	48	2 7/16	62	2 1/8	54	2 9/16	65	5.3	2.4	–	–
				2½	65	1 13/16	47	1 13/16	47	1 13/16	47	2 11/16	68	2 1/4	57	2 11/16	68	5.2	2.4	–	–
		¾	20	2½	65	1 13/16	47	1 3/4	44	1 13/16	47	2 11/16	68	2 1/4	57	2 11/16	68	5.1	2.3	–	–
		1	25	2	50	1 9/16	40	1 9/16	40	1 7/8	48	2 7/16	62	2 1/8	54	2 9/16	65	5.0	2.3	–	–
				2½	65	1 13/16	47	1 3/4	44	1 13/16	47	2 11/16	68	2 5/16	59	2 11/16	68	5.4	2.4	–	–
		1¼	32	1½	40	15/16	24	15/16	24	1 13/16	47	2 3/16	56	1 15/16	49	2 7/16	62	4.3	1.9	–	–
				2	50	1 9/16	40	1 1/2	38	1 7/8	48	2 7/16	62	2 1/8	54	2 9/16	65	5.0	2.2	–	–
				2½	65	1 13/16	47	1 3/4	44	1 13/16	47	2 11/16	68	2 3/8	60	2 11/16	68	5.4	2.4	–	–
		1½	40	1½	40	15/16	24	15/16	24	1 13/16	47	2 3/16	56	1 15/16	49	2 7/16	62	4.2	1.9	–	–
				2	50	1 9/16	40	1 1/2	38	1 7/8	48	2 7/16	62	2 1/8	54	2 9/16	65	4.8	2.2	–	–
				2½	65	1 13/16	47	1 13/16	47	1 13/16	47	2 11/16	68	2 7/16	62	2 13/16	68	5.8	2.6	–	–
		2	50	½	15	¾	19	13/16	22	1 3/4	44	1 11/16	43	1 1/2	38	2 3/16	56	3.6	1.6	–	–
				¾	20	7/8	22	7/8	22	1 3/4	44	1 3/4	44	1 9/16	40	2 1/4	57	3.6	1.6	–	–
				1	25	1	25	1 1/16	17	1 3/4	44	1 15/16	49	1 3/4	44	2 5/16	59	3.9	1.8	–	–
				1¼	32	13/16	22	13/16	22	1 3/4	44	2 1/16	52	1 7/8	48	2 3/8	60	4.3	1.9	–	–
				1½	40	15/16	24	15/16	24	1 13/16	47	2 3/16	56	2	51	2 7/16	62	4.4	2.0	–	–
				2	50	1 9/16	40	1 9/16	40	1 7/8	48	2 7/16	62	2 1/4	57	2 9/16	65	5.2	2.3	–	–
				2½	65	1 13/16	47	1 7/8	48	1 13/16	47	2 11/16	68	2 5/16	65	2 11/16	68	6.0	2.7	–	–
		2½	65	½	15	¾	19	¾	19	1 3/4	44	1 11/16	43	1 11/16	43	2 3/16	56	4.0	1.8	–	–
				¾	20	1	22	7/8	22	1 3/4	44	1 3/4	44	1 3/4	44	2 1/4	57	4.3	1.9	–	–
				1	25	1	25	1	25	1 3/4	44	1 15/16	49	1 15/16	49	2 5/16	59	4.5	2.0	–	–
				1¼	32	13/16	22	13/16	22	1 3/4	44	2 1/16	52	2 1/16	52	2 3/4	60	4.8	2.2	–	–
				1½	40	15/16	24	15/16	24	1 13/16	47	2 3/16	56	2 3/16	56	2 7/16	62	5.1	2.3	–	–
				2	50	1 9/16	40	1 9/16	40	1 7/8	48	2 7/16	62	2 7/16	62	2 9/16	65	5.9	2.7	6.0	2.7
				4	100	2 3/4	70	2 13/16	73	2 7/16	62	3 11/16	94	3 11/16	94	3½	89	14	6.4	–	–
3	80	½	15	3	80	2 1/8	54	2 1/4	57	2 1/8	54	3 1/2	79	2 11/16	68	3 1/8	79	7.6	3.4	–	–
		¾	20	3	80	2 1/8	54	2 1/8	54	2 1/8	54	3 1/8	79	2 11/16	68	3 1/8	79	8.3	3.7	–	–
		1	25	3	80	2 1/8	54	2 1/8	54	2 1/8	54	3 1/8	79	2 11/16	68	3 1/8	79	8.3	3.8	–	–
		1¼	32	3	80	2 1/8	54	2 1/8	54	2 1/8	54	3 1/8	79	2 13/16	73	3 1/8	79	8.5	3.8	–	–
		1½	40	2½	65	1 7/8	48	1 7/8	48	2 1/8	54	2 13/16	73	2 5/16	65	3 1/16	78	7.7	3.5	–	–
		1½	40	3	80	2 1/8	54	2 3/16	56	2 1/8	54	3 1/8	79	2 13/16	73	3 1/8	79	8.1	3.7	–	–
		2	50	1½	40	1 3/8	35	1 1/2	38	2 3/16	56	2 5/16	59	2 3/16	56	2 13/16	73	6.8	3.1	–	–
				2	50	1 9/16	40	1 9/16	40	2 3/16	56	2 5/16	65	2 1/4	57	2 15/16	75	7.3	3.3	–	–
				2½	65	1 7/8	48	1 15/16	49	2 1/8	54	2 13/16	73	2 5/16	65	3 1/16	78	7.1	3.2	–	–
				3	80	2 1/8	54	2 3/16	56	2 1/8	54	3 1/8	79	2 15/16	75	3 1/8	79	8.8	4.0	–	–
		2½	65	1	25	1	25	15/16	24	2 1/8	54	2 1/16	52	1 15/16	49	2 11/16	68	5.5	2.5	–	–
				1¼	32	1 1/4	32	13/16	22	2 1/8	54	2 3/16	56	2 1/16	52	2 3/4	70	5.9	2.7	–	–
				1½	40	1 3/8	35	15/16	24	2 3/16	56	2 5/16	59	2 3/16	56	2 13/16	73	6.2	2.8	6.3	2.9
				2	50	1 9/16	40	1 1/2	38	2 3/16	56	2 9/16	65	2 1/16	62	2 15/16	75	6.8	3.1	–	–
				2½	65	1 7/8	48	1 13/16	47	2 1/2	64	2 13/16	73	2 11/16	68	3 1/16	78	7.7	3.5	–	–
				3	80	2 1/8	54	2 1/8	54	2 1/8	54	3 1/8	79	3 1/16	78	3 1/8	79	9.1	4.1	–	–
		3	80	½	15	15/16	24	15/16	24	2 3/16	56	1 7/8	48	1 7/8	48	2 5/8	67	6.1	2.8	6.2	2.8
				¾	20	15/16	24	15/16	24	2 1/8	54	1 7/8	48	1 7/8	48	2 5/8	67	6.1	2.7	6.2	2.8
				1	25	1	25	1	25	2 1/8	54	2 1/16	52	2 1/16	52	2 11/16	68	6.3	2.8	6.5	3.0
				1¼	32	1 1/4	32	1 1/4	32	2 1/8	54	2 3/16	56	2 3/16	56	2 3/4	70	6.8	3.1	–	–
				1½	40	1 3/8	35	1 3/8	35	2 3/16	56	2 5/16	59	2 5/16	59	2 15/16	75	7.1	3.2	7.3	3.3
				2	50	1 9/16	40	1 9/16	40	2 3/16	56	2 9/16	65	2 9/16	65	2 1/4	73	7.8	3.5	7.8	3.6
				2½	65	1 7/8	48	1 7/8	48	2 1/2	64	2 13/16	73	2 13/16	73	3 1/16	78	8.9	4.0	9.0	4.1
				3½	90	2 3/8	60	2 3/8	60	2 3/16	56	3 3/8	86	3 3/8	86	3 3/16	81	11	5.0	–	–
				4	100	2 11/16	68	2 11/16	68	2 7/16	62	3 11/16	94	3 11/16	94	3½	89	13	5.8	–	–
				5	125	3 3/8	86	3 5/16	84	2 9/16	65	4 5/16	110	4 5/16	110	3 3/4	95	20	9	–	–

See additional sizes on previous and following page. Note: See page PF-75 for pressure-temperature ratings.

Cast Iron Threaded Fittings
Class 125, (Standard)

Reducing Tee: Figure 359

Size						A		B		C		D		E		F		Wt. black		Wt. galv.	
NPS	Dn	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lns	kg	lbs	kg
3½	90	1¼	32	3	80	2 3/16	56	2½	64	2 3/8	60	3 3/16	81	3⅛	79	3 3/8	86	13	5.7	–	–
		2	50	3½	90	2 7/16	62	2 7/16	62	2 7/16	62	3 7/16	87	3 5/16	84	3 7/16	87	13	5.9	–	–
		2½	65	2½	65	1 15/16	49	1 15/16	49	2⅜	60	2⅞	73	2 13/16	73	3 5/16	84	11	4.8	–	–
				3	80	2 3/16	56	2 1/16	52	2⅜	60	3 3/16	81	3	76	3 5/16	84	12	5.3	–	–
				3½	90	2 7/16	62	2⅜	60	2 7/16	62	3 7/16	87	3 5/16	84	3 7/16	87	13	5.7	–	–
				4	100	2 11/16	68	2⅝	67	2½	64	3 11/16	94	3 11/16	94	3½	89	15	6.9	–	–
		3	80	1½	40	1⅜	35	1⅜	35	2 7/16	62	2⅜	60	2 5/16	59	3 1/16	78	8.3	3.8	–	–
				2	50	1⅝	41	1 9/16	40	2 7/16	62	2⅝	67	2 9/16	65	3 3/16	81	8.7	3.9	–	–
				2½	65	1 15/16	49	1⅞	48	2⅜	60	2⅞	73	2 13/16	73	3 5/16	84	10.0	4.5	–	–
				3	80	2 3/16	56	2¼	54	2⅜	60	3 3/16	81	3⅛	79	3⅜	86	11	5.1	–	–
				3½	90	2 7/16	62	2⅜	60	2 7/16	62	3 7/16	87	3 7/16	87	3 7/16	87	14	6.3	–	–
				4	100	2 11/16	68	2 11/16	68	2½	64	3 11/16	94	3 11/16	94	3½	89	15	6.9	–	–
				5	125	3 5/16	84	3 5/16	84	2 9/16	65	4 5/16	110	4 5/16	110	3¾	95	20	9	–	–
		3½	90	1	25	1 1/16	17	1 1/16	17	2⅜	60	2⅛	54	2⅛	54	2 15/16	75	8.0	3.6	–	–
				1¼	32	1¼	32	1¼	32	2⅜	60	2¼	57	2¼	57	3	76	8.6	3.9	–	–
				1½	40	1⅜	35	1⅜	35	2 7/16	62	2⅜	60	2⅜	60	3 1/16	78	8.9	4.0	–	–
				2	50	1⅝	41	1⅝	41	2 7/16	62	2⅝	67	2⅝	67	3 3/16	81	9.9	4.5	–	–
				2½	65	1 15/16	49	1 15/16	49	2⅜	60	2⅞	73	2⅞	73	3 5/16	84	11	5.0	–	–
				3	80	2 3/16	56	2 3/16	56	2⅜	60	3 3/16	81	3 5/16	81	3⅜	86	12	5.4	–	–
				4	100	2 11/16	68	2 11/16	68	2½	64	3 11/16	94	3 11/16	94	3½	89	14	6.5	–	–
				5	125	3 5/16	84	3 5/16	84	2 9/16	65	4 5/16	110	4 5/16	110	3¾	95	20	8.9	–	–

See additional sizes on previous and following page. Note: See page PF-75 for pressure-temperature ratings.

Cast Iron Threaded Fittings
Class 125, (Standard)

ANVIL INTERNATIONAL, INC.

Reducing Tee: Figure 359

Size						A		B		C		D		E		F		Wt. black		Wt. galv.	
NPS	Dn	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lns	kg	lbs	kg
4	100	¾	20	4	100	2¾	70	3	76	2¾	70	3¾	95	3½	89	3¾	95	13	6.0	–	–
		1	25	4	100	2¾	70	2 15/16	75	2¾	70	3¾	95	3½	89	3¾	95	14	6.1	–	–
		1¼	32	4	100	2¾	70	2⅞	73	2¾	70	3¾	95	3½	89	3¾	95	14	6.5	–	–
		1½	40	4	100	2¾	70	2⅞	73	2¾	70	3¾	95	3½	89	3¾	95	13	6.1	–	–
		2	50	2	50	1 11/16	43	1⅞	48	2¾	70	2 11/16	68	2 9/16	65	3½	89	11	5.1	–	–
				2½	65	1⅞	48	1⅞	48	2⅝	67	2 15/16	75	2 13/16	73	3 9/16	90	12	5.3	–	–
				3	80	2¼	57	2 1/16	62	2 11/16	68	3¼	83	3⅛	79	3⅝	92	13	6.1	–	–
				4	100	2¾	70	2¾	70	2¾	70	3¾	95	3½	89	3¾	95	13	6.0	–	–
		2½	65	2½	65	1¾	48	1 15/16	47	2⅝	67	2 15/16	75	2 13/16	73	3 9/16	90	12	5.3	–	–
				3	80	2¼	57	2⅛	54	2 11/16	68	3¼	83	3⅛	79	3⅝	92	13	5.9	–	–
				4	100	2¾	70	2¾	70	2¾	70	3¾	95	3⅝	92	3⅝	95	16	7.1	–	–
				5	125	3⅜	86	3½	89	2 13/16	73	4⅜	111	4⅜	111	4	102	22	10	–	–
		3	80	1¼	32	15/16	24	15/16	24	2⅝	67	2 5/16	59	2¼	57	3 5/16	84	9.7	4.4	–	–
				1½	40	1 1/16	37	1 1/16	37	2 11/16	68	2⅜	62	2⅜	60	3 5/16	84	10	4.6	–	–
				2	50	1 11/16	43	1 9/16	40	2¾	70	2 11/16	68	2 9/16	65	3½	89	10	4.6	11	4.8
				2½	65	1⅞	48	1⅞	48	2⅝	67	2 15/16	75	2 13/16	73	3 9/16	90	11	5.1	–	–
				3	80	2¼	57	2⅛	54	2 11/16	68	3¼	83	3⅛	79	3⅝	92	13	5.7	–	–
				4	100	2¾	70	2 11/16	68	2¾	70	3¾	95	3⅝	92	3¾	95	15	6.8	–	–
		3½	90	1½	40	1 1/16	37	1⅜	35	2 11/16	68	2 1/16	62	2⅜	60	3 5/16	84	10	4.6	–	–
				2	50	1 1/16	17	1⅝	41	2¾	70	2 11/16	68	2⅝	67	3½	89	11	4.9	–	–
				2½	65	2	51	1 15/16	49	2⅝	67	3	76	2⅞	73	3 9/16	90	12	5.4	–	–
				3	80	2¼	57	2 3/16	56	2 11/16	68	3¼	83	3¼	83	3⅝	92	15	6.6	–	–
				3½	90	2½	64	2 1/16	62	2 11/16	68	3½	89	3 7/16	87	3 11/16	94	14	6.5	–	–
				4	100	2¾	70	2 11/16	68	2¾	70	3¾	95	3¾	95	3¾	95	17	7.8	–	–
				5	125	3⅜	86	3 5/16	84	2 13/16	73	4⅜	111	4⅜	111	4	102	21	9	–	–
		4	100	¾	20	1¼	32	1¼	32	2 13/16	73	2 5/16	59	2 5/16	59	3 5/16	84	11	4.8	–	–
				1	25	13/16	22	13/16	22	2¾	70	2 5/16	59	2 5/16	59	3 5/16	84	10	4.7	11	4.9
				1¼	32	15/16	24	15/16	24	2⅝	67	2 5/16	59	2 5/16	59	3 5/16	84	10	4.7	11	4.8
				1½	40	1 1/16	37	1 3/16	37	2 11/16	68	2 1/16	62	2 3/16	62	3 5/16	84	11	4.9	11	5.1
				2	50	1 11/16	43	1 11/16	43	2¾	70	2 11/16	68	2 11/16	68	3½	89	12	5.3	12	5.3
				2½	65	2	51	2	51	2⅝	67	2 15/16	75	2 15/16	75	3 9/16	90	13	5.8	13	5.9
				3	80	2¼	57	2¼	57	2 11/16	68	3¼	83	3¼	83	3⅝	92	14	6.4	15	6.7
				5	125	3⅜	86	3⅜	86	2 13/16	73	4⅜	111	4⅜	111	4	102	21	9	–	–
				6	150	3¼	98	3⅞	98	2⅞	73	4 15/16	125	4 15/16	125	4 1/16	103	26	12	–	–
5	125	2	50	5	125	3 5/16	84	3 9/16	90	3 5/16	84	4½	114	4¼	108	4½	114	22	10	–	–
		2½	65	5	125	3 5/16	84	3¾	86	3 5/16	84	4½	114	4¼	108	4½	114	22	10	–	–
		3	80	4	100	2 3/16	56	2 3/16	56	3⅜	86	4	102	3¾	95	4⅜	111	24	11	–	–
				6	150	3 13/16	97	4 1/16	103	3⅜	86	5	127	5	127	4⅝	117	31	14	–	–
		3½	90	3	80	2 5/16	59	2½	64	3¼	83	3½	89	3½	89	4¼	108	23	11	–	–
				4	100	2 13/16	71	2 11/16	68	3⅜	86	4	102	3¾	95	4⅜	111	23	10	–	–
				6	150	3 13/16	97	4	102	3⅜	86	5	127	5	127	4⅝	117	29	13	–	–
		4	100	2½	65	2 1/16	52	2	51	3 1/16	81	3 1/16	81	3 1/16	81	4¼	108	22	10	–	–
				3	80	2 5/16	59	2 7/16	62	3¼	83	3½	89	3½	89	4¼	108	24	11	–	–
				4	100	2 13/16	71	2¾	70	3⅜	86	4	102	3¾	95	4⅜	111	21	9	–	–
				5	125	3 5/16	84	3⅜	86	3 5/16	84	4½	114	4⅜	111	4½	114	26	12	–	–
				6	150	3 13/16	97	3⅜	98	3⅜	86	5	127	5	127	4⅝	117	34	15	–	–
		5	125	1½	40	1 9/16	40	1 9/16	40	3 5/16	84	2 11/16	68	2 11/16	68	4	102	16	7.4	–	–
				2	50	1¾	44	1¾	44	3 7/16	87	2 15/16	75	2 15/16	75	4⅛	105	17	7.9	–	–
				2½	65	2 1/16	52	2 1/16	52	3⅜	86	3 3/16	81	3 3/16	81	4¼	108	19	8.5	–	–
				3	80	2 5/16	59	2 5/16	59	3¼	83	3½	89	3½	89	4¼	108	20	9.1	–	–
				4	100	2 13/16	71	2 13/16	71	3⅜	86	4	102	4	102	4⅜	111	24	11	–	–
				6	150	3 13/16	97	3 13/16	97	3⅜	86	5	127	5	127	4⅝	117	33	15	–	–
				8	200	5 3/16	132	5 3/16	132	4 3/16	106	6⅜	162	6⅜	162	5 9/16	141	68	31	–	–

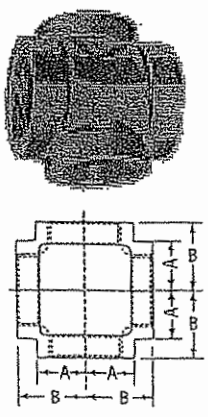
See additional sizes on previous and following page. Note: See page PF-75 for pressure-temperature ratings.

Cast Iron Threaded Fittings
Class 125, (Standard)

Reducing Tee: Figure 359

Size						A		B		C		D		E		F		Wt. black		Wt. galv.	
NPS	Dn	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lns	kg	lbs	kg
6	150	1½	40	6	150	3⅞	98	4 1/16	103	3⅞	98	5⅛	130	4 11/16	119	5⅛	130	35	16	–	–
		2	50	6	150	3⅞	98	4	102	3⅞	98	5⅛	130	4 11/16	119	5⅛	130	35	16	–	–
		2½	65	6	150	3⅞	98	3 13/16	97	3⅞	98	5⅛	130	4 11/16	119	5⅛	130	35	16	–	–
		3	80	4	100	2 13/16	71	3	76	3⅞	98	4 1/16	103	4	102	4 15/16	125	32	15	–	–
		3½	90	6	150	3⅞	98	3⅞	98	3⅞	98	5⅛	130	4 15/16	125	5⅛	130	35	16	–	–
		4	100	3	80	2 5/16	59	2½	64	3⅞	98	3 9/16	90	3 9/16	90	4 13/16	122	32	14	–	–
				4	100	2⅞	73	2 15/16	75	3⅞	98	4 1/16	103	4	102	4 15/16	125	30	14	–	–
				6	150	3⅞	98	3⅞	98	3⅞	98	5⅛	130	4 15/16	125	5⅛	130	34	16	–	–
		5	125	1½	40	1⅝	41	1 9/16	40	3⅞	98	2¾	70	2¾	70	4½	114	26	12	–	–
				3½	90	2⅝	67	2 9/16	65	3 13/16	97	3⅞	98	3¾	95	4⅞	124	30	14	–	–
				6	150	3⅞	98	3 15/16	100	3⅞	98	5⅛	130	5⅛	130	5⅛	130	43	20	–	–
				8	200	5⅛	130	5 3/16	132	4 3/16	106	6⅝	162	6⅜	162	5 9/16	141	66	30	–	–
		6	150	1¼	32	1⅜	35	1⅜	35	3 13/16	97	2⅝	67	2⅝	67	4 7/16	113	22	10	–	–
				2	50	1 13/16	46	1 13/16	46	3⅞	98	3	76	3	76	4⅝	117	25	11	–	–
				2½	65	2	51	2	51	3 13/16	97	3¼	83	3¼	83	4¾	121	26	12	27	12
				3	80	2¾	60	2¾	60	3 13/16	97	3 9/16	90	3 9/16	90	4 13/16	122	27	12	29	13
				4	100	2⅞	73	2⅞	73	3⅞	98	4 1/16	103	4 1/16	103	4 15/16	125	32	15	34	15
				5	125	3⅜	86	3½	86	3 13/16	97	4⅝	117	4⅝	117	5	127	37	17	–	–
				8	200	5⅛	130	5½	130	4 3/16	106	6⅜	162	6⅜	162	5 9/16	141	58	26	–	–
8	200	2	50	8	200	5 3/16	132	5⅛	149	5 3/16	132	6 9/16	167	6 9/16	167	6 9/16	167	64	29	–	–
		4	100	8	200	5 3/16	132	5½	140	5 3/16	132	6 9/16	167	6 9/16	167	6 9/16	167	67	30	–	–
		5	125	5	125	4 9/16	106	4⅜	111	5 3/16	132	5 9/16	141	5 9/16	141	6⅜	162	78	35	–	–
		6	150	5	125	4 9/16	106	4 5/16	110	5 3/16	132	5 9/16	141	5 9/16	141	6¾	162	77	35	–	–
				6	150	4 9/16	106	4 5/16	110	5⅛	130	5 9/16	141	5 9/16	141	6⅜	162	74	33	–	–
				8	200	5 3/16	132	5⅛	130	5 3/16	132	6 9/16	167	6 9/16	167	6 9/16	167	92	42	–	–
		8	200	2	50	2 1/16	52	2 1/16	52	5⅛	130	3 7/16	87	3 7/16	87	5¾	149	44	20	–	–
				2½	65	2 5/16	59	2 5/16	59	5 1/16	129	3 11/16	94	3 11/16	94	6	152	45	21	–	–
				3	80	3⅛	79	3⅛	79	5⅛	130	4½	114	4½	114	6⅛	156	55	25	–	–
				3½	90	3⅛	79	3⅛	79	5⅛	130	4½	114	4½	114	6⅛	156	54	25	–	–
				4	100	3⅛	79	3⅛	79	5⅛	130	4½	114	4½	114	6⅛	156	54	24	–	–
				5	125	4 9/16	106	4 3/16	106	5 3/16	132	5 9/16	141	5 9/16	141	6⅜	162	68	31	–	–
				6	150	4 9/16	106	4 3/16	106	5⅛	130	5 9/16	141	5 9/16	141	6⅜	162	66	30	–	–

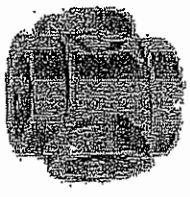
See additional sizes on previous page. Note: See page PF-75 for pressure-temperature ratings.

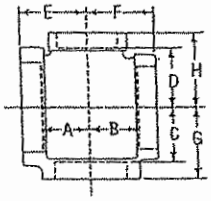
Straight Cross Figure 360	Size		A		B		Weight black	
	NPS	Dn	in	mm	in	mm	lbs	kg
	½	15	13/16	22	9/16	14	2.8	1.3
	¾	20	1 5/16	33	13/16	22	1.0	0.47
	1	25	1½	38	15/16	24	1.6	0.72
	1¼	32	1¾	44	1⅛	29	2.4	1.1
	1½	40	1 15/16	49	1 5/16	33	3.2	1.5
	2	50	2¼	57	1 9/16	40	5.1	2.3
	2½	65	2 11/16	68	1 13/16	47	8.1	3.7
	3	80	3⅛	79	2 3/16	56	12	5.4
	4	100	3 13/16	98	2¾	70	20	8.9
	5	125	4½	114	3 5/16	84	31	14
	6	150	5⅛	130	3⅞	98	48	22

Cast Iron Threaded Fittings
Class 125, (Standard)

ANVIL INTERNATIONAL, INC.

Reducing Cross
Figure 361





2 NPS
3 NPS — 2½ NPS
1¼ NPS

Read as:
3 x 2½ x 2 x 1¼

50 DN
80 DN — 65 DN
32 DN

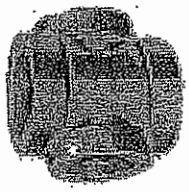
Read as:
80 x 65 x 50 x 32

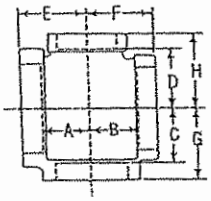
Size								A		B		C		D		E, F		G, H		Weight	
NPS	DN	NPS	DN	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg
1	25	1	25	¾	20	¾	20	13/16	22	13/16	22	15/16	24	15/16	24	1⅜	35	1 1/16	37	1.3	0.59
1¼	32	1¼	32	1	25	1	25	15/16	24	15/16	24	1⅛	29	1⅛	29	1 9/16	40	1 11/16	43	2.0	0.9
1½	40	1	25	1	25	1	25	1	25	1⅛	29	1¼	32	1¼	32	1⅝	41	1 13/16	47	2.7	1.2
		1¼	32	1	25	1	25	1	25	1	25	1¼	32	1¼	32	1⅝	41	1 13/16	47	2.7	1.2
		1½	40	1	25	1	25	1	25	1	25	1¼	32	1¼	32	1⅝	41	1 13/16	47	2.5	1.1
				1¼	32	1	25	1⅛	29	1⅛	29	13/16	22	15/16	24	1 13/16	47	1⅞	48	3.9	1.8
						1¼	32	1⅛	29	1⅛	29	1⅜	35	1⅜	35	1 13/16	47	1⅞	48	4.0	1.8
2	50	1½	40	1	25	1	25	17/16	17	1⅛	29	1 1/16	37	1 1/16	37	1¾	44	2	51	3.6	1.6
				1¼	32	1	25	1⅛	29	13/16	22	1½	38	1 1/16	37	1⅞	48	2⅛	54	4.3	1.9
				1¼	32	1¼	32	13/16	22	13/16	22	1½	38	1½	38	1⅞	48	2 1/16	52	4.2	1.9
		2	50	1	25	1	25	17/16	17	13/16	17	1 1/16	37	1 1/16	37	1¾	44	2	51	3.2	1.5
				1¼	32	1¼	32	1⅛	29	1⅛	29	1 1/16	37	1 1/16	37	1⅞	48	2⅛	54	4.0	1.8
				1½	40	1½	40	1¼	32	1¼	32	1 1/16	37	1 1/16	37	2	51	2⅛	54	4.1	1.9
2½	65	1½	40	1¼	32	1¼	32	1⅛	29	13/16	22	1 13/16	47	1 13/16	47	2 1/16	52	2⅜	60	6.0	2.7
				1½	40	1	25	15/16	24	1 5/16	40	1⅞	48	1 13/16	47	2 5/16	56	2 1/16	62	6.5	3.0
		2	50	1	25	1	25	1	25	17/16	17	1 13/16	47	1 13/16	47	1 15/16	49	2 5/16	59	5.1	2.3
				1¼	32	1	25	1⅛	29	13/16	22	1 13/16	47	1 13/16	47	2 1/16	52	2⅜	60	5.9	2.7
						1¼	32	1⅛	29	13/16	22	1 13/16	47	1 13/16	47	2 1/16	52	2⅜	60	5.9	2.7
				1½	40	1½	40	1¼	32	15/16	24	1⅞	48	1⅞	48	2 5/16	56	2 1/16	62	6.1	2.8
				2	50	2	50	1½	38	1¾	44	1⅞	48	1⅞	48	2 1/16	62	2 5/16	65	7.2	3.3
		2½	65	1	25	1	25	1	25	1	25	1 13/16	47	1 13/16	47	1 15/16	49	2 5/16	59	5.1	2.3
				1¼	32	1	25	13/16	22	15/16	22	1¾	44	1 13/16	47	2 1/16	52	2⅜	60	5.4	2.4
						1¼	32	1⅛	29	1⅛	29	1 13/16	47	1 13/16	47	2 1/16	52	2⅜	60	5.3	2.4
				1½	40	1¼	32	1¼	32	1¼	32	1 13/16	47	1 13/16	47	2 1/16	56	2 1/16	62	5.6	2.5
						1½	40	1¼	32	1¼	32	1⅞	48	1⅞	48	2 5/16	56	2 1/16	62	5.7	2.6
				2	50	2	50	1 5/16	40	1 5/16	40	1 15/16	49	1 15/16	49	2 1/16	62	2 5/16	65	6.8	3.1
3	80	2½	65	1	25	1	25	17/16	17	1⅛	29	2⅛	54	2⅛	54	2 1/16	52	2 11/16	68	7.5	3.4
				1½	40	1½	40	1⅜	35	1 1/16	37	2 3/16	56	2 3/16	56	2 5/16	59	2 13/16	73	8.4	3.8
				2	50	2	50	1⅝	41	1 11/16	43	2¼	57	2¼	57	2 5/16	65	2 15/16	75	9.6	4.4
		3	80	1	25	1	25	17/16	17	17/16	17	2⅛	54	2⅛	54	2 1/16	52	2 11/16	68	6.7	3.0
				1¼	32	1¼	32	13/16	22	13/16	22	2⅛	54	2⅛	54	2 3/16	56	2¾	70	7.2	3.3
				1½	40	1¼	32	1⅜	35	1⅜	35	2 5/16	56	2 5/16	56	2 5/16	59	2 13/16	73	7.9	3.6
						1½	40	1⅜	35	1⅜	35	2 5/16	56	2 5/16	56	2 5/16	59	2 13/16	73	7.9	3.6
				2	50	1½	40	1⅝	41	1⅝	41	2 5/16	56	2 5/16	56	2 5/16	65	2 15/16	75	9.3	4.2
						2	50	1⅝	41	1⅝	41	2 5/16	56	2 5/16	56	2 5/16	65	2 15/16	75	8.8	4.0
				2½	65	2½	65	1⅞	48	1⅞	48	2 5/16	56	2 5/16	56	2 13/16	73	3 1/16	78	10.0	4.5
3½	90	3	80	1½	40	1½	40	1⅜	35	1 1/16	37	2 1/16	62	2 1/16	62	2⅜	60	3 1/16	78	10	4.7
				2½	65	2½	65	1⅞	48	1 5/16	49	2 1/16	62	2⅛	73	2⅞	73	3 5/16	84	13	5.9
		3½	90	1¼	32	1¼	32	1¼	32	1¼	32	2⅛	60	2⅛	60	2¼	57	3	76	9.1	4.1
				1½	40	1¼	32	1⅜	35	1⅜	35	2 1/16	62	2 1/16	62	2⅜	60	3 1/16	78	9.8	4.4
4	100	3	80	1½	40	1½	40	1⅜	35	1 1/16	37	2 11/16	68	2⅝	67	2 1/16	62	3 5/16	84	14	6.1
		3	80	2	50	2	50	1⅝	41	1 11/16	43	2 13/16	73	2 11/16	73	2 11/16	68	3½	89	14	6.1
		3½	90	1¼	32	1¼	32	1¼	32	15/16	24	2 11/16	68	2 11/16	68	2 5/16	59	3 5/16	84	11	5.2
		4	100	1	25	1	25	1¼	32	1¼	32	2¾	70	2¾	70	2 5/16	59	3 5/16	84	11	5.0
				1¼	32	1¼	32	1¼	32	1¼	32	2 11/16	68	2 11/16	68	2 5/16	59	3 5/16	84	11	4.9
				1½	40	1½	40	1⅜	35	1⅜	35	2 11/16	68	2 11/16	68	2 7/16	62	3 5/16	84	12	5.4
						1½	40	2	51	2	51	2⅛	73	2 11/16	68	2 15/16	75	3 5/16	90	14	6.5
				2½	65	2	50	1⅞	48	1⅞	48	2 11/16	68	2⅞	73	2 15/16	75	3 5/16	90	15	6.7
						2½	65	2	51	2	51	2 11/16	68	2 11/16	68	2 15/16	75	3 5/16	90	14	6.4
				3	80	3	80	2 5/16	56	2 5/16	56	2 11/16	68	2 11/16	68	3¼	83	3⅝	92	16	7.0
				3½	90	3½	90	2 11/16	68	2 11/16	68	2¾	70	2¾	70	3¾	95	3¾	95	21	10
				4	100	2	50	1 11/16	43	1 11/16	43	2 11/16	68	2 11/16	68	2¾	70	3 1/16	87	12	5.4

Note: See page PF-75 for pressure-temperature ratings. See additional sizes on following page.

Cast Iron Threaded Fittings
Class 125, (Standard)

Reducing Cross
Figure 361





2 NPS
3 NPS — 2½ NPS
1¼ NPS

Read as:
3 x 2½ x 2 x 1¼

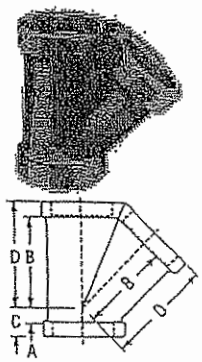
50 DN
80 DN — 65 DN
32 DN

Read as:
80 x 65 x 50 x 32

Size								A		B		C		D		E, F		G, H		Weight	
NPS	DN	NPS	DN	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg
5	125	4	100	1½	40	1½	40	1½	38	1⅝	41	3⅜	86	3⅜	86	2¹¹⁄₁₆	68	4	102	19	8.5
				2½	65	2	50	2	51	2⅛	54	3⁵⁄₁₆	84	3⁹⁄₁₆	90	3⅜	81	4¼	108	22	10
		5	125	2	50	2	50	1¾	44	1¾	44	3⅜	87	3⅜	87	2¹⁵⁄₁₆	75	4⅛	105	18	8.3
				3	80	3	80	2⁵⁄₁₆	59	2⁵⁄₁₆	59	3⁵⁄₁₆	84	3⁵⁄₁₆	84	3½	89	4⁵⁄₁₆	110	23	10
6	150	5	125	1½	40	1½	40	1½	38	1⁹⁄₁₆	40	3⅞	98	3⅞	98	2¾	70	4½	114	26	12
				2	50	2	50	1¾	44	1¹³⁄₁₆	47	3¹⁵⁄₁₆	100	3¹⁵⁄₁₆	100	3	76	4⅝	117	28	13
				3	80	3	80	2⁵⁄₁₆	59	2⅜	60	3⅞	98	3⅞	98	3⁵⁄₁₆	90	4¹³⁄₁₆	124	33	15
		6	150	1¼	32	1¼	32	1⅜	35	1⅜	35	3¹³⁄₁₆	98	3¹³⁄₁₆	98	2⅝	67	4⁷⁄₁₆	113	23	10
				2½	65	2½	65	2	51	2	51	3⅞	98	3⅞	98	3¼	83	4¾	121	26	12
				4	100	4	100	2¹³⁄₁₆	73	2¹³⁄₁₆	73	3⅞	98	3⅞	98	4⅛	103	4¹⁵⁄₁₆	125	33	15
				5	125	5	125	3⅜	86	3⅜	86	3¹³⁄₁₆	98	3¹³⁄₁₆	98	4⅝	117	5	127	39	18
8	200	8	200	4	100	4	100	3⅛	79	3⅛	79	5⅛	129	5⅛	129	4½	114	6⅛	156	56	25
				5	125	5	125	4⅜	106	4⅜	106	5⅜	132	5⅜	132	5⅝	141	6⅜	162	80	36

Note: See page PF-75 for pressure-temperature ratings. See additional sizes on previous page.

Lateral
Figure 373



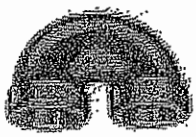
Size)		A		B		C		D		Weight black	
NPS	DN	in	mm	in	mm	in	mm	in	mm	lbs	kg
¾	20	¼	6	1¾	44	¾	19	2¼	57	1.00	0.45
1	25	⅜	5	2⅜	56	¾	19	2¾	70	1.6	0.73
1¼	32	⅜	10	2⅝	67	1	25	3¼	83	2.6	1.2
1½	40	7⁄16	11	3³⁄₁₆	81	1⁷⁄₁₆	27	3¹³⁄₁₆	98	3.6	1.6
2	50	⅜	14	3¹³⁄₁₆	98	1¼	32	4½	114	5.8	2.6
2½	65	⅝	16	4⅝	110	1½	38	5⅜	132	9.0	4.1
3	80	13⁄16	22	5³⁄₁₆	132	1¾	44	6⅛	156	14	6.1
4	100	1⅛	27	6⁹⁄₁₆	167	2⅛	54	7⅝	194	21	10

Note: See page PF-75 for pressure-temperature ratings.

Cast Iron Threaded Fittings
Class 125, (Standard)

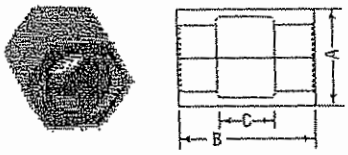
ANVIL INTERNATIONAL, INC.

Return Bends Close Pattern, R.H. Figure 375	Size		Center to Center		Weight black	
	NPS	DN	in	mm	lbs	kg
	½	15	1¼	32	0.65	0.29
	¾	20	1½	38	1.1	0.50
	1	25	1¾	44	1.7	0.78
	1¼	32	2¼	57	2.4	1.1
	1½	40	2½	64	3.5	1.6

Return Bends Open Figure 376	Size		Center to Center		Weight black	
	NPS	DN	in	mm	lbs	kg
	½	15	1½	38	—	—
	¾	20	1⅞	48	0.98	0.44
	1	25	2½	64	1.5	0.67
	1¼	32	3	76	2.4	1.1
	1½	40	3½	89	3.3	1.5

Special Wide Pattern Figure 377	Size		Center to Center		Weight			
					black		galv.	
	NPS	DN	in	mm	lbs	kg	lbs	kg
	1	25	4	102	2.2	1.0	•	•
	1¼	32	4	102	3.5	1.6	•	•
	1¼	32	6	152	3.7	1.7	•	•
	•Not stocked							

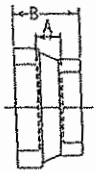
Note: See page PF-75 for pressure-temperature ratings.

Hex Coupling Figure 366	Size		Across Flats A		B		C		Weight black	
	NPS	DN	in	mm	in	mm	in	mm	lbs	kg
	1	25	1 15/16	49	1 11/16	43	5/16	14	0.82	0.37

Flange Union Gasket Type Figure 487	Size		Diam. of Flanges		No. of bolts	Weight			
						black		galv	
	NPS	DN	in	mm		lbs	kg	lbs	kg
Assembled with gaskets 	½	15	2 15/16	75	3	1.8	0.79	1.8	0.82
	¾	20	3	76	3	2.0	0.91	2.0	0.9
	1	25	3¼	83	3	2.3	1.0	2.3	1.0
	1¼	32	4 3/16	106	4	4.8	2.2	4.8	2.2
	1½	40	4⅜	111	4	5.0	2.3	5.1	2.3
	2	50	5	127	4	6.5	2.9	6.7	3.0
	2½	65	5⅝	143	4	8.5	3.9	8.7	3.9
	3	80	6⅜	162	4	11	5.0	11	5.1
	3½	90	6¾	175	4	13	5.8	13	5.9
	4	100	7 11/16	195	5	18	8.2	19	8.4
	5	125	8 15/16	227	5	22	10	23	10
	6	150	10¼	260	6	30	14	31	14
	8	200	12 15/16	329	8	51	23	53	24

Cast Iron Threaded Fittings
Class 125, (Standard)

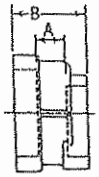
Concentric Reducers
Figure 367



Size				A		B		Weight black	
NPS	DN	NPS	DN	in	mm	in	mm	lbs	kg
¾	20	½	15	5/8	16	1 9/16	40	0.40	0.18
1	25	■ ½	■ 15	11/16	17	1 11/16	43	0.54	0.24
		■ ¾	■ 20	7/16	11	1½	38	0.63	0.29
1¼	32	½	15	9/16	14	1⅝	41	0.84	0.38
		¾	20	1	25	2⅛	54	1.1	0.49
		1	25	15/16	24	2⅛	54	1.1	0.49
1½	40	½	15	½	13	1⅝	41	1.00	0.45
		¾	20	½	13	1⅝	41	1.2	0.54
		1	25	½	13	1¾	44	1.5	0.68
		1¼	32	1	25	2¼	57	1.5	0.66
2	50	½	15	5/8	16	2	51	2.0	0.91
		¾	20	¾	19	2	51	1.9	0.86
		1	25	¾	19	2	51	1.8	0.83
		1¼	32	13/16	22	2⅛	54	1.8	0.81
		1½	40	⅞	22	2 3/16	56	2.0	0.90
2½	65	1½	40	¾	19	2	51	3.1	1.4
		2	50	1	25	2 9/16	65	3.0	1.4
3	80	¾	20	15/16	24	2½	64	4.3	2.0
		2	50	1 1/16	27	2¾	70	4.0	1.8
		2½	65	15/16	24	2 13/16	73	4.4	2.0
4	100	2	50	1 3/16	30	2 15/16	75	6.5	2.9
		2½	65	1 3/16	30	3⅛	79	7.8	3.5
		3	80	1 1/16	27	3⅛	79	7.0	3.2
5	125	4	100	1 1/16	27	3 5/16	84	10	4.8
6	150	4	100	1⅛	29	3 7/16	87	14	6.3
		5	125	1⅛	29	3 5/16	90	16	7.0
8	200	6	150	1¼	32	3⅜	98	29	13

■ hex end

Eccentric Reducer
Figure 368



Size				A		B *		Weight black		Weight galv.	
NPS	Dn	NPS	Dn	in	mm	in	mm	lbs	kg	lbs	kg
¾	20	½	15	5/16	14	1½	38	0.45	0.20	—	—
1	25	½	15	½	13	1 7/16	37	0.57	0.26	•	•
		¾	20	7/16	11	1½	38	0.61	0.28	—	—
1¼	32	½	15	9/16	14	1⅝	41	1.00	0.45	—	—
		¾	20	½	13	1⅝	41	0.90	0.41	—	—
			25	½	13	1 11/16	43	1.00	0.45	•	•
1½	40	½	15	11/16	17	1¾	44	1.1	0.50	—	—
		¾	20	5/16	14	1 11/16	43	1.2	0.53	—	—
		1	25	5/16	14	1¾	44	1.2	0.55	—	—
		1¼	32	5/8	16	1⅞	48	1.3	0.57	•	•
2	50	½	15	¾	19	1 15/16	49	1.8	0.82	—	—
		¾	20	¾	19	2	51	1.8	0.83	—	—
		1	25	11/16	17	2 1/16	52	1.9	0.84	—	—
		1¼	32	13/16	22	2⅛	54	1.9	0.85	—	—
		1½	40	⅞	22	2 3/16	56	1.9	0.88	•	•
2½	65	1	25	13/16	22	2¼	57	2.7	1.2	—	—
		1¼	32	⅞	22	2⅜	60	2.8	1.3	—	—
		1½	40	⅞	22	2⅜	60	2.9	1.3	—	—
		2	50	1	25	2 5/16	65	3.0	1.3	•	•
3	80	1	25	⅞	22	2 7/16	62	4.0	1.8	—	—
		1¼	32	15/16	24	2 5/16	65	3.8	1.7	—	—
		1½	40	15/16	24	2 5/16	65	4.2	1.9	—	—
		2	50	1 1/16	27	2¾	70	4.6	2.1	—	—
		2½	65	15/16	24	2 13/16	73	4.8	2.2	•	•
3½	90	2	50	1 1/16	27	2¾	70	5.2	2.4	—	—
		3	80	15/16	24	2 15/16	75	6.0	2.7	•	•
4	100	1	25	1 1/16	27	2 7/16	68	6.8	3.1	—	—
		1¼	32	1 1/16	27	2¾	70	6.6	3.0	—	—
		1½	40	1⅛	29	2 13/16	73	6.6	3.0	—	—
		2	50	1 3/16	30	2 15/16	75	6.9	3.1	—	—
		2½	65	1⅛	29	3 1/16	78	7.3	3.3	—	—
		3	80	1 1/16	27	3⅛	79	7.6	3.5	•	•
5	125	2½	65	1⅛	29	3 3/16	81	11	5.2	—	—
		3	80	1 1/16	27	3¼	83	11	5.2	—	—
		4	100	1 1/16	27	3 5/16	84	11	5.1	•	•
6	150	3	80	1 1/16	27	3 5/16	84	15	6.6	—	—
		4	100	1⅛	29	3 7/16	87	15	7.0	•	•
		5	125	1⅛	29	3 9/16	90	18	8.2	•	•
8	200	5	125	1 5/16	33	3¾	95	28	13	—	—
		6	150	1¼	32	3⅞	98	28	13	•	•

* Dimension "B" does not conform to ASME standard
• Not stocked

Note: See page PF-75 for pressure-temperature ratings.

Cast Iron Threaded Fittings
Class 125, (Standard)

ANVIL INTERNATIONAL, INC.

Hex Bushing
Figure 383

Size					Weight			
					black		galv.	
NPS	Dn	Hex	NPS	Dn	lbs	kg	lbs	kg
¼	8		⅛	6	0.02*	0.01*	0.02	0.01
⅜	10		⅛	6	0.05	0.02	0.05	0.02
			¼	8	0.04	0.02	0.04	0.02
½	15		⅛	6	0.06	0.03	0.06	0.03
			¼	8	0.07	0.03	0.07	0.03
			⅜	10	0.05	0.02	0.05	0.02
¾	20		⅛	6	0.09	0.04	0.09	0.04
			¼	8	0.10	0.05	0.11	0.05
			⅜	10	0.12	0.05	0.12	0.05
			½	15	0.10	0.05	0.11	0.05
1	25	■	⅛	6	0.21	0.09	0.22	0.10
		■	¼	8	0.19	0.08	0.19	0.09
		■	⅜	10	0.18	0.08	0.19	0.09
			½	15	0.21	0.10	0.22	0.10
			¾	20	0.17	0.08	0.17	0.08
1¼	32	■	¼	8	0.29	0.13	0.30	0.14
		■	⅜	10	0.29	0.13	0.29	0.13
		■	½	15	0.30	0.14	0.30	0.14
			¾	20	0.39	0.17	0.39	0.18
			1	25	0.30	0.13	0.30	0.14
1½	40		¼	8	0.47	0.21	0.49	0.22
		■	⅜	10	0.47	0.21	0.50	0.23
		■	½	15	0.42	0.19	0.47	0.21
		■	¾	20	0.47	0.21	0.50	0.23
			1	25	0.50	0.23	0.52	0.24
			1¼	32	0.33	0.15	0.33	0.15
2	50		¼	8	0.75	0.34	0.80	0.36
			⅜	10	0.75	0.34	0.78	0.35
		■	½	15	0.77	0.35	0.78	0.35
		■	¾	20	0.71	0.32	0.75	0.34
		■	1	25	0.73	0.33	0.76	0.34
		■	1¼	32	0.81	0.37	0.83	0.38
		■	1½	40	0.67	0.39	0.68	0.31
2½	65	■	½	15	1.3	0.58	—	—
		■	¾	20	1.3	0.57	1.3	0.59
		■	1	25	1.2	0.53	1.2	0.56
		■	1¼	32	1.2	0.56	1.3	0.57
		■	1½	40	1.3	0.59	1.3	0.61
			2	50	0.92	0.42	0.95	0.43

Continued to next column

Hex Bushing
Figure 383

Size					Weight			
					black		galv.	
NPS	Dn	Hex	NPS	Dn	lbs	kg	lbs	kg
3	80	■	½	15	1.9	0.88	2.0	0.9
		■	¾	20	1.9	0.87	2.0	0.88
		■	1	25	1.9	0.86	1.9	0.87
		■	1¼	32	1.8	0.80	1.8	0.82
		■	1½	40	1.8	0.81	1.8	0.83
			2	50	1.9	0.86	1.9	0.88
			2½	65	1.6	0.74	1.7	0.75
3½	90	■	1	25	2.6	1.2	2.6	1.2
		■	1¼	32	2.5	1.2	2.6	1.2
		■	1½	40	2.3	1.1	2.4	1.1
		■	2	50	2.4	1.1	2.5	1.1
			2½	65	2.6	1.2	2.6	1.2
			3	80	2.0	0.89	2.0	0.90
4	100	■	1	25	3.6	1.6	3.6	1.6
		■	1¼	32	3.5	1.6	3.6	1.6
		■	1½	40	3.4	1.6	3.5	1.6
		■	2	50	3.1	1.4	3.2	1.5
		■	2½	65	3.3	1.5	3.3	1.5
			3	80	3.1	1.4	3.2	1.5
			3½	90	2.5	1.1	2.6	1.2
5	125	■	2	50	5.1	2.3	5.2	2.4
		■	2½	65	4.9	2.2	5.1	2.3
		■	3	80	4.8	2.2	4.9	2.2
			3½	90	4.0	1.8	4.3	2.0
			4	100	3.9	1.8	4.1	1.9
6	150	■	2	50	8.0	3.6	8.3	3.8
		■	2½	65	7.7	3.5	7.8	3.5
		■	3	80	7.8	3.5	8.1	3.7
		■	3½	90	7.1	3.2	7.4	3.4
		■	4	100	6.8	3.1	7.1	3.2
			5	125	5.2	2.4	5.5	2.5
8	200	■	3	80	16	7.0	16	7.2
		■	4	100	14	6.3	15	6.8
		■	5	125	14	6.2	14	6.4
			6	150	13	6.0	14	6.1
10	250	■	4	100	28	12	—	—
		■	5	125	—	—	—	—
		■	6	150	25	11	—	—
			8	200	22	10	—	—
12	300		4	100	33	15	*	*
			10	250	33	15	33	15

•Not stocked
■ Inside hex
*P.O.A.

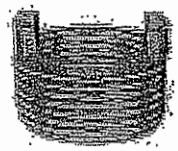
Note: Hexagon head or octagon head bushings 2½ NPS *(65 DN)* and smaller reducing one size may be made of malleable iron, ductile iron or steel. Other sizes may be made of cast iron, ductile iron, malleable iron or steel. Face bushings 2½ NPS *(65 DN)* and smaller may be made of malleable iron, ductile iron or steel. Face bushings 3NPS *(80 DN)* and larger reducing one size may be made of malleable iron, ductile iron or steel. Face bushings 3NPS *(80 DN)* and larger reducing two sizes or more may be made of cast or malleable iron, ductile iron, or steel.

According to specifications, hex bushings and cored plugs should be used with 150# malleable iron and 125# cast iron. Solid plugs and face bushings should be used with #250 and #300 fittings.

Note: See page PF-57 and page PF-75 for pressure-temperature ratings.
Pressure/temperature ratings vary with material

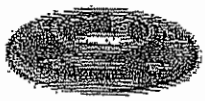
ANVIL INTERNATIONAL, INC.

Cast Iron Threaded Fittings
Class 125, (Standard)

Face Bushing Figure 385	Size				Weight			
					black		galv.	
	NPS	DN	NPS	DN	lbs	kg	lbs	kg
	¼	8	⅛	6	0.01*	0.00*	—	—
	⅜	10	¼	8	0.02*	0.01*	—	—
	½	15	¼	8	0.04*	0.02*	—	—
			⅜	10	0.03*	0.01*	—	—
	¾	20	⅜	10	0.07*	0.03*	0.07	0.03
			½	15	0.06	0.02	0.06	0.02
	1	25	½	15	0.12	0.05	0.13	0.06
			¾	20	0.08	0.04	0.09	0.04
	1¼	32	½	15	0.25*	0.11*	—	—
			¾	20	0.27*	0.12*	—	—
			1	25	0.16	0.07	0.17	0.07
	1½	40	½	15	0.32	0.15	0.33	0.15
			¾	20	0.39*	0.18*	0.40	0.18
			1	25	0.34	0.15	0.35	0.16
			1¼	32	0.15	0.07	0.15	0.07
	2	50	½	15	0.69*	0.32*	—	—
			1	25	0.53	0.24	0.54	0.24
			1¼	32	0.54	0.24	0.55	0.25
			1½	40	0.34	0.16	0.35	0.16
	2½	65	1¼	32	0.94*	0.42*	0.96*	0.44*
			1½	40	0.85*	0.39*	0.87*	0.39*
			2	50	0.62	0.28	0.62	0.28
	3	80	1¼	32	1.5	0.70	*	*
			1½	40	1.5	0.68	1.6	0.71
			2	50	1.3	0.60	1.4	0.63
			2½	65	0.97	0.44	1.0	0.46
	3½	90	2½	65	1.8	0.80	–	–

* POA

Locknut Figure 370	Size		Minimum Dimensions								Weight			
			A		B		C		D		black		galv.	
	NPS	DN	in	mm	in	mm	in	mm	in	mm	lbs	kg	lbs	kg
	2½	65	3.500	89	3.180	81	.590	15	.090	2	1.1	0.51	1.2	0.53
	3	80	4.270	108	3.840	98	.670	17	.090	2	1.6	0.73	1.7	0.77
	4	100	5.380	137	5.000	127	.800	20	.130	3	3.5	1.6	–	–

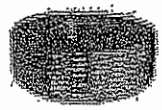
Floor Flange Bolt Holes Cored Figure 1006	Size		Diameter of Flange		No. of Holes	Diameter of Holes		Weight			
								black		galv.	
	NPS	DN	in	mm		in	mm	lbs	kg	lbs	kg
	¼	8	2 13/16	73	4	⅛	6	0.39	0.18	0.40	0.18
	⅜	10	3	76	4	¼	6	0.43	0.20	0.45	0.20
	½	15	3½	89	4	¼	6	0.73	0.33	0.74	0.34
	¾	20	3½	89	4	¼	6	0.80	0.36	0.81	0.37
	1	25	4	102	4	¼	6	1.1	0.51	1.1	0.52
	1¼	32	4	102	4	¼	6	1.1	0.52	1.1	0.52
	1½	40	4½	114	4	5/16	8	1.6	0.70	1.6	0.71
	2	50	5½	140	4	5/16	8	2.4	1.1	2.4	1.1

Note:See page PF-57 and page PF-75 for pressure-temperature ratings.

Cast Iron Threaded Fittings
Class 125, (Standard)

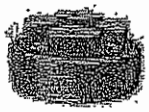
ANVIL INTERNATIONAL, INC.

Square Head Plugs (Cored) Figure 3870	Size		Weight			
			black		galv.	
	NPS	DN	lbs	kg	lbs	kg
	¾	20	0.13	0.06	0.14	0.06
	1	25	0.25	0.11	0.28	0.13
	1¼	32	0.39	0.18	0.41	0.18
	1½	40	0.50	0.23	0.52	0.23
	2	50	0.81	0.37	0.83	0.38
	2½	65	1.3	0.60	1.3	0.61
	3	80	1.9	0.85	1.9	0.87
	3½	90	2.5	1.1	2.6*	1.2*
	4	100	4.0	1.8	4.0	1.8

Countersunk Plugs Figure 390▲	Size		Weight			
			black		galv.	
	NPS	DN	lbs	kg	lbs	kg
	½	15	0.05	0.02	0.05	0.02
	¾	20	0.09	0.04	0.10*	0.05*
	1	25	0.20	0.09	0.20	0.09
	1¼	32	0.32	0.15	0.34	0.15
	1½	40	0.47	0.21	0.48	0.22
	2	50	0.84	0.38	1.3	0.59
	2½	65	1.4	0.64	2.0	0.91
	3	80	2.3	1.0	3.0	1.4
	3½	90	3.0	1.4	—	—
	4	100	3.8	1.7	3.9	1.8

Square Head Plugs (Solid) Figure 388	Size		Weight			
			black		galv.	
	NPS	DN	lbs	kg	lbs	kg
	½	15	0.10	0.05	0.10	0.05
	¾	20	0.17	0.08	0.18	0.08
	1	25	0.32	0.15	0.33	0.15
	1¼	32	0.53	0.24	0.55	0.25
	1½	40	0.76	0.34	0.77	0.35
	2	50	1.2	0.56	1.3	0.57
	2½	65	2.0	0.91	2.1	0.9
	3	80	3.2	1.4	3.3	1.5
	3½	90	4.4	2.0	•	•

Cap Figure 381	Size		Weight			
			black		galv.	
	NPS	DN	lbs	kg	lbs	kg
	2½	65	2.5	1.2	—	—
	3	80	4.1	1.9	—	—
	4	100	6.4	2.9	—	—
	5	125	11	4.9	—	—
	6	150	14	6.4	15	6.6
	8	200	27	12	28	13

Bar Plugs Cored Figure 389	Size		Weight			
			black		galv.	
	NPS	DN	lbs	kg	lbs	kg
	4	100	3.8	1.7	4.0	1.8
	5	125	6.5	2.9	6.8	3.1
	6	150	9.9	4.5	10	4.7
	8	200	20	9	21	10

Bar Plugs Solid Figure 380	Size		Weight			
			black		galv.	
	NPS	DN	lbs	kg	lbs	kg
	4	100	5.7	2.6	•	•
	5	125	9.6	4.4	•	•
	6	150	15	6.7	•	•
	8	200	•	•	•	•

◊ ⅛, ¼, ⅜ NPS *(6, 8 & 10 DN)* plugs furnished in steel

s ½ and ¾ NPS *(15 & 20 DN)* countersunk plugs furnished in malleable iron

• Not stocked

Note: See page PF-75 for pressure-temperature ratings.

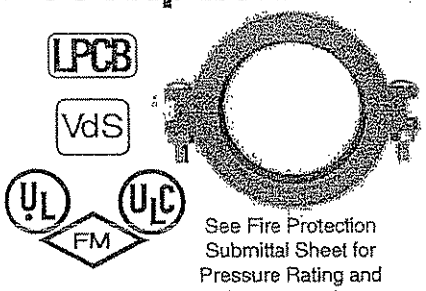
* POA.

tyco / Fire & Building Products

Technical Services: Tel: (800) 381-9312 / Fax: (800) 791-5500
www.tyco-fire.com

Grinnell Grooved Fire Protection Products
Figure 772
Rigid Coupling - Patented

General Description



See Fire Protection Submittal Sheet for Pressure Rating and Listing/Approval Information

The Figure 772 Rigid Coupling provides a rigid joint by firmly gripping along the circumference of the pipe grooves. Rigid couplings are preferred for dry pipe and freezer applications. Figure 772 Rigid Couplings are a proven dependable method of joining pipe and are an economical alternative to welding, threading or using flanges. It is capable of pressures up to 500 psig (3447 kPa) depending on pipe size and wall thickness when used in fire protection services.

Rigid Couplings are recommended for dry pipe and freezer applications.

WARNING

The Figure 772 Rigid Coupling described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. ***Failure to do so may impair the performance of this device.***

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Technical Data

Figure: 772
Sizes: 1¼" - 12"
Approvals: UL, FM, ULC, VdS, and LPCB; See Fire Protection Submittal Sheet for exact Listing / Approval information.
Housing: Ductile iron conforming to ASTM A-536, Grade 65-45-12
Protective Coatings:
- Non-lead orange paint
- Fire brigade red (optional) non-lead paint
- Hot dipped galvanized conforming to ASTM A-153

Bolt/Nuts: Track Head Bolts - conforming to ASTM A-183, Zinc Plated, (Min. Tensile = 110,000 psi/758,422 kPa)
Metric - conforming to ASTM F568M
Gasket: (specify when ordering)
- Grade "A" EPDMA violet color code ambient to +150°F (+66°C) for fire protection systems. Not recommended for hot water systems.
- Tri-seal (Grade "E" EPDM), green color code for use in dry pipe or freezer systems.
- Prelubricated (Grade "A" EPDMA)

(See Data Sheet TFP1895 for aid in selecting proper gasket)

Ordering Procedure

When placing an order, indicate the full product name. Please specify the quantity, figure number, type of gasket, Grade "A" EPDMA, Prelubricated (Grade "A" EPDMA) or Grade "E" EPDM Tri-Seal, and size.

Grinnell Grooved Piping Products, valves, accessories and other products are available throughout the U.S., Canada, and internationally, through a network of distribution centers. You may write directly or call 215-362-0700 for the distributor nearest you.

Care and Maintenance

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in accordance with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any authority having jurisdiction. The installing contractor or product manufacturer should be contacted relative to any questions. Any impairment must be immediately corrected. It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service.

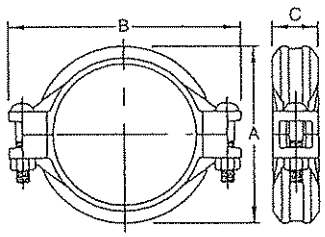
Limited Warranty

Products manufactured by Tyco Fire Products are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by Tyco Fire Products. No warranty is given for products or components manufactured by companies not affiliated by ownership with Tyco Fire Products or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association (NFPA), and/or the standards of any other Authorities Having Jurisdiction. Materials found by Tyco Fire Products to be defective shall be either repaired or replaced, at Tyco Fire Products' sole option. Tyco Fire Products neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. Tyco Fire Products shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

IN NO EVENT SHALL TYCO FIRE PRODUCTS BE LIABLE, IN CONTRACT, TORT, STRICT LIABILITY OR UNDER ANY OTHER LEGAL THEORY, FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LABOR CHARGES, REGARDLESS OF WHETHER TYCO FIRE PRODUCTS WAS INFORMED ABOUT THE POSSIBILITY OF SUCH DAMAGES, AND IN NO EVENT SHALL TYCO FIRE PRODUCTS' LIABILITY EXCEED AN AMOUNT EQUAL TO THE SALES PRICE.

THE FOREGOING WARRANTY IS MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Figure 772 Grooved Coupling



Pipe Size	O.D. Inches *mm*	Max.*‡ End Gap Inches *mm*	Max.† Pressure psi *kPa*	Max.† End Load Lbs. *N*	Nominal Dimensions A Inches *mm*	B Inches *mm*	C Inches *mm*	Bolt Size** Dia. x Lg.	Net Wt. Lbs. *Kg.*
1¼"	1.660 *42.4*	0.06 *1.5*	300 *2,068*	649 *2,887*	2.75 *69.9*	4.38 *111.3*	1.81 *46.0*	⅜" x 2¼" *M10 x 57*	1.0 *0.5*
1½"	1.900 *48.3*	0.08 *2.0*	500 *3,447*	1,417 *6,303*	3.00 *76.2*	4.62 *117.3*	1.81 *46.0*	⅜" x 2¼" *M10 x 57*	1.0 *0.5*
2"	2.375 *60.3*	0.13 *3.3*	500 *3,447*	2,214 *9,848*	3.41 *86.6*	5.12 *130.0*	1.88 *47.8*	⅜" x 2¼" *M10 x 57*	1.5 *0.7*
2½"	2.875 *73.0*	0.13 *3.3*	500 *3,447*	3,244 *14,430*	3.91 *99.3*	5.63 *143.0*	1.88 *47.8*	⅜" x 2¼" *M10 x 57*	2.5 *1.1*
76.1mm	3.000 *76.1*	0.13 *3.3*	300 *2,068*	2,120 *9,430*	4.19 *106.4*	5.72 *145.3*	2.00 *50.8*	M10 x 57	2.6 *1.2*
3"	3.500 *88.9*	0.13 *3.3*	500 *3,447*	4,808 *21,387*	4.63 *117.6*	6.25 *158.8*	1.88 *47.8*	⅜" x 2¼" *M10 x 57*	2.6 *1.2*
4"	4.500 *114.3*	0.19 *4.8*	500 *3,447*	7,948 *35,353*	5.81 *147.6*	7.50 *190.5*	1.97 *50.0*	⅜" x 2¼" *M10 x 57*	3.5 *1.6*
139.7mm	5.500 *139.7*	0.19 *4.8*	300 *2,068*	7,127 *31,701*	7.02 *178.3*	9.72 *246.9*	2.06 *52.3*	M16 x 83	7.5 *3.4*
5"	5.563 *141.3*	0.19 *4.8*	300 *2,068*	7,288 *32,417*	7.09 *180.1*	9.71 *246.6*	2.04 *51.8*	⅝" x 3¼" *M16 x 83*	7.5 *3.4*
165.1mm	6.500 *165.1*	0.19 *4.8*	300 *2,068*	9,950 *44,258*	8.09 *205.5*	10.53 *267.5*	2.13 *54.1*	M16 x 83	7.6 *3.4*
6"	6.625 *168.3*	0.19 *4.8*	400 *2,758*	13,782 *61,302*	8.09 *205.5*	10.53 *267.5*	2.13 *54.1*	⅝" x 3¼" *M16 x 83*	7.6 *3.4*
8"	8.625 *219.1*	0.19 *4.8*	450 *3,103*	26,278 *116,885*	10.56 *268.2*	13.56 *344.4*	2.62 *66.5*	¾" x 4¾" *M20 x 121*	18.0 *8.2*
10"	10.750 *273.0*	0.13 *3.3*	250 *1,724*	22,679 *100,876*	12.84 *326.1*	16.41 *416.8*	2.62 *66.5*	1" x 6½" *M24 x 165*	24.6 *11.2*
12"	12.750 *323.9*	0.13 *3.3*	250 *1,724*	31,903 *141,905*	15.41 *391.4*	18.84 *478.5*	2.62 *66.5*	1" x 6½" *M24 x 165*	42.0 *19.1*

* Maximum available gap between pipe ends. Minimum gap = 0.

† Maximum pressure and end load are total from all loads based on standard weight steel pipe. Pressure ratings and end loads may differ on other pipe materials and/or wall thickness. Contact Tyco Fire Products for details. See Fire Protection Equipment Submittal Sheet for Listing and Approval pressure ratings.

** Gold color coded metric bolt sizes are available upon request.

‡ Max End Gap is for cut grooved standard weight pipe. Values for roll grooved pipe will be ½ that of cut grooved.

Figure 772 Rigid Couplings have an Anti-Rotation Feature of "gripping teeth" along the coupling keys in sizes 1¼" - 4", which make the Figure 772 perfectly suited for "arm over" installations where the likelihood of rotation is greatest. This feature may eliminate the need of extra hangers to support the arm over due to increased rigidity and gripping force saving time and cost.

General Notes: It is the Designer's responsibility to select products suitable for the intended service and to ensure that pressure ratings and performance data is not exceeded. Always read and understand the installation instructions (IH-1000). Never remove any piping component or correct or modify any piping deficiencies without first depressurizing and draining the system. Material and gasket selection should be verified to be compatible for the specific application.

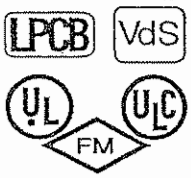
ISO 9001 Certified Company

tyco / Fire & Building Products

Technical Services: Tel: (800) 381-9312 / Fax: (800) 791-5500
www.tyco-fire.com

Grinnell Grooved Fire Protection Products
Grooved Fittings

General Description



See Fire Protection Submittal Sheet for Pressure Rating and Listing/Approval Information

The grooved fittings provide an economical and efficient method of changing direction, adding an outlet, reducing, or capping grooved piping systems. Grooved fittings are available in durable ductile iron or fabricated steel as indicated.

Note: Figure 510S and 519S fittings are special short radius fittings with smaller center to end dimensions than standard grooved fittings. Depending on the size and coupling used, there may be interferences at the bolt pads that require repositioning of the coupling orientation. The use of flange adapters is not recommended with Figures 510S and 519S fittings. Contact Tyco Fire Products for details.

WARNING

The Fittings described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. ***Failure to do so may impair the performance of this device.***

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Technical Data

Approvals:

UL, FM, ULC, VdS, and LPCB;

Note: See Fire Protection Submittal Sheet for exact Listing / Approval information.

Material:

Cast: Figures: 201, 210, 219, 250, 260, 501, 510, 519, 510DE, 501S, 510S and 519S - Ductile iron conforming to ASTM A-536, Grade 65-45-12

Fabricated Steel: Figures 391, 392, 393, 312, 313, 321, 327, 341 and 350 - Carbon Steel, (Sizes 1¼" - 6" are Schedule 40); (Sizes 8" - 12" are Schedule 30), conforming to ASTM A-53 Grade B

Protective Coatings:

- Non-lead orange paint
- Fire brigade red (optional) non-lead paint
- Hot dipped galvanized conforming to ASTM A-153

Ordering Procedure

When placing an order, indicate the full product name. Please specify the quantity, figure number, wall thickness, and size.

Grinnell Grooved Piping Products, valves, accessories and other products are available throughout the U.S., Canada, and internationally, through a network of distribution centers. You may write directly or call 215-362-0700 for the distributor nearest you.

Care and Maintenance

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in accordance with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any authority having jurisdiction. The installing contractor or product manufacturer should be contacted relative to any questions. Any impairment must be immediately corrected. It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service.

Limited Warranty

Products manufactured by Tyco Fire Products are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by Tyco Fire Products. No warranty is given for products or components manufactured by companies not affiliated by ownership with Tyco Fire Products or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association (NFPA), and/or the standards of any other Authorities Having Jurisdiction. Materials found by Tyco Fire Products to be defective shall be either repaired or replaced, at Tyco Fire Products' sole option. Tyco Fire Products neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. Tyco Fire Products shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

IN NO EVENT SHALL TYCO FIRE PRODUCTS BE LIABLE, IN CONTRACT, TORT, STRICT LIABILITY OR UNDER ANY OTHER LEGAL THEORY, FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LABOR CHARGES, REGARDLESS OF WHETHER TYCO FIRE PRODUCTS WAS INFORMED ABOUT THE POSSIBILITY OF SUCH DAMAGES, AND IN NO EVENT SHALL TYCO FIRE PRODUCTS' LIABILITY EXCEED AN AMOUNT EQUAL TO THE SALES PRICE.

THE FOREGOING WARRANTY IS MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Figures 201, 210, 219, and 260

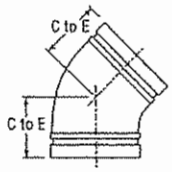


Figure 201

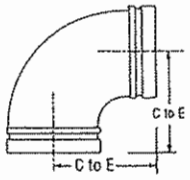


Figure 210

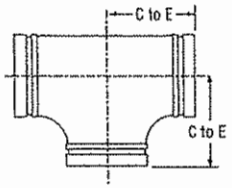


Figure 219

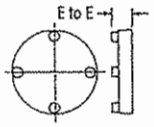


Figure 260

Friction Resistance* (Expressed as Equivalent Straight Pipe)				
Size Inches *mm*	Elbow 90° Feet *Meters*	Elbow 45° Feet *Meters*	Tee Branch Feet *Meters*	Tee Run Feet *Meters*
1¼ *42.4*	1.9 *0.6*	1.0 *0.3*	4.8 *1.5*	1.9 *0.6*
1½ *48.3*	2.3 *0.7*	1.2 *0.4*	5.8 *1.8*	2.3 *0.7*
2 *60.3*	3.2 *1.0*	1.6 *0.5*	8.0 *2.5*	3.2 *1.0*
2½ *73.0*	3.9 *1.2*	2.0 *0.6*	9.8 *3.0*	3.9 *1.2*
76.1mm	4.1 *1.2*	2.1 *0.6*	10.3 *3.1*	4.1 *1.2*
3 *88.9*	4.9 *1.5*	2.4 *0.7*	12.2 *3.7*	4.9 *1.5*
108.0mm	6.5 *2.0*	3.3 *1.0*	16.3 *5.0*	6.5 *2.0*
4 *114.3*	6.5 *2.0*	3.3 *1.0*	16.3 *5.0*	6.5 *2.0*
133.0mm	8.0 *2.4*	4.0 *1.2*	20.0 *6.1*	8.0 *2.4*
139.7mm	8.0 *2.4*	4.1 *1.3*	20.0 *6.1*	8.0 *2.4*
5 *141.3*	8.2 *2.5*	4.1 *1.3*	20.5 *6.3*	8.2 *2.5*
159.0mm	9.5 *2.9*	4.8 *1.4*	23.8 *7.2*	9.5 *2.9*
165.1mm	9.5 *2.9*	4.8 *1.4*	23.8 *7.2*	9.5 *2.9*
6 *168.3*	9.9 *3.0*	5.0 *1.5*	24.8 *7.6*	9.9 *3.0*
216.3mm	13.1 *4.0*	6.6 *2.0*	32.8 *10.0*	13.1 *4.0*
8 *219.1*	13.1 *4.0*	6.6 *2.0*	32.8 *10.0*	13.1 *4.0*
10 *273.0*	16.5 *5.0*	8.3 *2.5*	41.3 *12.6*	16.5 *5.0*
12 *323.4*	19.9 *6.1*	9.9 *3.0*	49.7 *15.1*	19.9 *6.1*

For reducing tees and branches, use the value that is corresponding to the branch size. Example: for 8" x 8" x 2" tee, the branch value 2" is 8.0 feet.

* Friction resistance for all elbows and tees except Figures 510S and 519S.

Nominal Size	Figure 201 45° Elbow C to E Inches *mm*	Figure 201 45° Elbow Appx. Wt. Lbs. *Kg.*	Figure 210 90° Elbow C to E Inches *mm*	Figure 210 90° Elbow Appx. Wt. Lbs. *Kg.*	Figure 219 Tee C to E Inches *mm*	Figure 219 Tee Appx. Wt. Lbs. *Kg.*	Figure 260‡ End Cap E to E Inches *mm*	Figure 260‡ End Cap Appx. Wt. Lbs. *Kg.*
1¼"	1.75 *44.5*	0.9 *0.4*	2.75 *69.9*	1.0 *0.5*	2.75 *69.9*	1.4 *0.6*	0.88 *22.4*	0.4 *0.2*
1½"	1.75 *44.5*	1.1 *0.5*	2.75 *69.9*	1.2 *0.5*	2.75 *69.9*	1.8 *0.8*	0.88 *22.4*	0.6 *0.3*
2"	2.00 *50.8*	1.8 *0.8*	3.25 *82.6*	2.0 *0.9*	3.25 *82.6*	2.7 *1.2*	0.88 *22.4*	0.9 *0.4*
2½"	2.25 *57.2*	2.2 *1.0*	3.75 *95.3*	3.0 *1.4*	3.75 *95.3*	5.8 *2.6*	0.88 *22.4*	0.9 *0.4*
76.1mm	2.25 *57.2*	2.2 *1.0*	3.75 *95.3*	3.0 *1.4*	3.75 *95.3*	5.8 *2.6*	0.94 *23.9*	1.1 *0.5*
3"	2.50 *63.5*	3.5 *1.6*	4.25 *108.0*	4.5 *2.0*	4.25 *108.0*	7.0 *3.2*	0.88 *22.4*	1.1 *0.5*
108.0mm	2.88 *73.0*	5.5 *2.5*	4.75 *120.7*	8.5 *3.9*	4.75 *120.7*	11.5 *5.2*	-	-
4"	3.00 *76.2*	5.2 *2.4*	5.00 *127.0*	8.5 *3.9*	5.00 *127.0*	11.8 *5.4*	1.00 *25.4*	2.6 *1.2*
133.0mm	3.25 *82.6*	7.7 *3.5*	5.25 *133.4*	11.3 *5.1*	5.25 *133.4*	10.6 *4.8*	-	-
139.7mm	3.25 *82.6*	7.7 *3.5*	5.50 *139.7*	11.3 *5.1*	5.50 *139.7*	15.3 *6.9*	0.92 *23.4*	4.7 *2.1*
5"	3.25 *82.6*	8.5 *3.9*	5.50 *139.7*	13.5 *6.1*	5.50 *139.7*	17.0 *7.7*	1.00 *25.4*	5.0 *2.3*
159.0mm	3.50 *88.9*	12.0 *5.4*	6.00 *152.4*	14.6 *6.6*	6.00 *152.4*	13.9 *6.3*	-	-
165.1mm	3.50 *88.9*	12.0 *5.4*	6.50 *165.1*	18.5 *8.4*	6.50 *165.1*	26.0 *11.8*	1.00 *25.4*	7.5 *3.4*
6"	3.50 *88.9*	12.0 *5.4*	6.50 *165.1*	18.5 *8.4*	6.50 *165.1*	26.0 *11.8*	1.00 *25.4*	7.5 *3.4*
216.3mm	4.25 *108.0*	23.0 *10.4*	7.75 *196.9*	36.5 *16.6*	7.75 *196.9*	45.0 *20.4*	-	-
8"	4.25 *108.0*	23.0 *10.4*	7.75 *196.9*	36.5 *16.6*	7.75 *196.9*	45.0 *20.4*	1.19 *30.2*	12.8 *5.8*
10"	4.75 *120.7*	31.0 *14.1*	9.00 *228.6*	60.0 *27.2*	9.00 *228.6*	72.1 *32.7*	1.25 *31.8*	20.0 *9.1*
12"	5.25 *133.4*	40.0 *18.1*	10.00 *254.0*	67.0 *30.4*	10.00 *254.0*	92.5 *42.0*	1.25 *31.8*	36.0 *16.3*

‡ - Available with tapped plugs, contact Tyco Fire & Building Products.

Figures 501, 510, 519 and 510DE

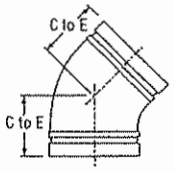


Figure 501

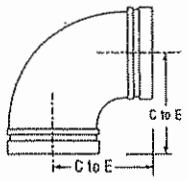


Figure 510

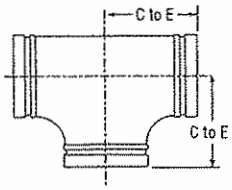


Figure 519

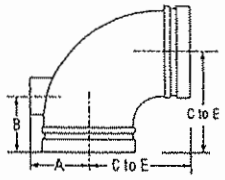


Figure 510DE

Nominal Size	Figure 501 45° Elbow C to E Inches / mm	Figure 501 45° Elbow Appx. Wt. Lbs. / Kg.	Figure 510 90° Elbow C to E Inches / mm	Figure 510 90° Elbow Appx. Wt. Lbs. / Kg.	Figure 519 Tee C to E Inches / mm	Figure 519 Tee Appx. Wt. Lbs. / Kg.	Figure 510DE 90° Drain Elbow C to E Inches / mm	A Inches / mm	B Inches / mm	Appx. Wt. Lbs. / Kg.
1¼"	1.75 / *44.5*	0.9 / *0.4*	2.75 / *69.9*	1.0 / *0.5*	2.75 / *69.9*	1.4 / *0.6*	-	-	-	-
1½"	1.75 / *44.5*	1.1 / *0.5*	2.75 / *69.9*	1.2 / *0.5*	2.75 / *69.9*	1.8 / *0.8*	-	-	-	-
2"	2.00 / *50.8*	1.8 / *0.8*	3.25 / *82.6*	2.0 / *0.9*	3.25 / *82.6*	2.7 / *1.2*	-	-	-	-
2½"	2.25 / *57.2*	2.2 / *1.0*	3.75 / *95.3*	3.0 / *1.4*	3.75 / *95.3*	5.8 / *2.6*	3.75 / *95.3*	2.00 / *50.8*	2.75 / *69.9*	2.7 / *1.2*
3"	2.50 / *63.5*	3.5 / *1.6*	4.25 / *108.0*	4.5 / *2.0*	4.25 / *108.0*	7.0 / *3.2*	4.25 / *108.0*	2.34 / *59.4*	2.75 / *69.9*	3.7 / *1.7*
4"	3.00 / *76.2*	5.2 / *2.4*	5.00 / *127.0*	8.5 / *3.9*	5.00 / *127.0*	11.8 / *5.4*	5.00 / *127.0*	2.85 / *72.4*	2.75 / *69.9*	7.0 / *3.2*
5"	3.25 / *82.6*	8.5 / *3.9*	5.50 / *139.7*	13.5 / *6.1*	5.50 / *139.7*	17.0 / *7.7*	5.50 / *139.7*	3.38 / *85.9*	2.75 / *69.9*	13.0 / *5.9*
6"	3.50 / *88.9*	12.0 / *5.4*	6.50 / *165.1*	18.5 / *8.4*	6.50 / *165.1*	26.0 / *11.8*	6.50 / *165.1*	3.92 / *99.6*	2.75 / *69.9*	13.4 / *6.1*
8"	4.25 / *108.0*	23.0 / *10.4*	7.75 / *196.9*	36.5 / *16.6*	7.75 / *196.9*	45.0 / *20.4*	7.75 / *196.9*	4.95 / *125.7*	2.75 / *69.9*	26.3 / *11.9*

Figures 501S, 510S and 519S

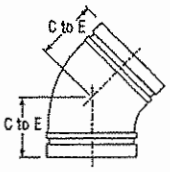


Figure 501S

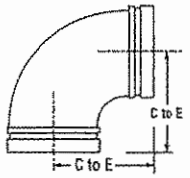


Figure 510S*

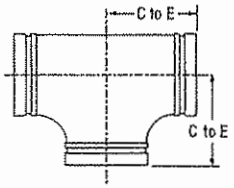


Figure 519S*

Friction Resistance 501S, 510S & 519S (Expressed as Equivalent Straight Pipe)				
Size Inches / mm	Elbow 90° Feet / Meters	Elbow 45° Feet / Meters	Tee Branch Feet / Meters	Tee Run Feet / Meters
2 / *60.3*	3.2 / *1.0*	1.6 / *0.5*	8.0 / *2.5*	3.2 / *1.0*
2½ / *73.0*	3.9 / *1.2*	2.0 / *0.6*	9.8 / *3.0*	3.9 / *1.2*
76.1mm	4.1 / *1.2*	2.1 / *0.6*	10.3 / *3.1*	4.1 / *1.2*
3 / *88.9*	4.9 / *1.5*	2.4 / *0.7*	12.2 / *3.7*	4.9 / *1.5*
4 / *114.3*	6.5 / *2.0*	3.3 / *1.0*	16.3 / *5.0*	6.5 / *2.0*
139.7mm	8.0 / *2.4*	4.1 / *1.3*	20.0 / *6.1*	8.0 / *2.4*
5 / *141.3*	8.2 / *2.5*	4.1 / *1.3*	20.5 / *6.3*	8.2 / *2.5*
165.1mm	9.5 / *2.9*	4.8 / *1.4*	23.8 / *7.2*	9.5 / *2.9*
6 / *168.3*	9.9 / *3.0*	5.0 / *1.5*	24.8 / *7.6*	9.9 / *3.0*
8 / *219.1*	13.1 / *4.0*	6.6 / *2.0*	32.8 / *10.0*	13.1 / *4.0*

Nominal Size	Figure 501S 45° Elbow C to E Inches / mm	Figure 501S 45° Elbow Appx Wt. Lbs. / Kg.	Figure 510S 90° Elbow C to E Inches / mm	Figure 510S 90° Elbow Appx. Wt. Lbs. / Kg.	Figure 519S Tee C to E Inches / mm	Figure 519S Tee Appx. Wt. Lbs. / Kg.
2"	2.00 / *50.8*	1.8 / *0.8*	2.75 / *69.9*	1.5 / *0.7*	2.75 / *69.9*	2.1 / *1.0*
2½"	2.25 / *57.2*	2.2 / *1.0*	3.00 / *76.2*	2.2 / *1.0*	3.00 / *76.2*	3.0 / *1.4*
76.1mm	2.25 / *57.2*	2.2 / *1.0*	3.00 / *76.2*	2.3 / *1.0*	3.00 / *76.2*	3.1 / *1.4*
3"	2.50 / *63.5*	3.5 / *1.6*	3.38 / *85.9*	3.0 / *1.3*	3.38 / *85.9*	4.1 / *1.9*
4"	3.00 / *76.2*	5.2 / *2.4*	4.00 / *101.6*	5.6 / *2.6*	4.00 / *101.6*	7.7 / *3.5*
139.7mm	3.25 / *82.6*	7.7 / *3.5*	4.88 / *124.0*	8.6 / *3.9*	4.88 / *124.0*	12.0 / *5.4*
5"	3.25 / *82.6*	8.5 / *3.9*	4.88 / *124.0*	8.8 / *3.9*	4.88 / *124.0*	12.0 / *5.4*
165.1mm	3.50 / *88.9*	12.0 / *5.4*	5.50 / *139.7*	11.00 / *5.0*	5.50 / *139.7*	15.0 / *6.8*
6"	3.50 / *88.9*	12.0 / *5.4*	5.50 / *139.7*	11.2 / *5.1*	5.50 / *139.7*	15.2 / *6.9*
8"	4.25 / *108.0*	23.0 / *10.4*	6.88 / *174.8*	23.4 / *10.6*	6.88 / *174.8*	31.2 / *14.2*

*Note: Figure 510S and 519S fittings are special short radius fittings with smaller center to end dimensions than standard grooved fittings. Depending on the size and coupling used, there may be interferences at the bolt pads which requires repositioning of the coupling orientation. The use of flange adapters is not recommended with Figures 510S and 519S fittings. Contact Tyco Fire Products for details.

Figures 250 and 350

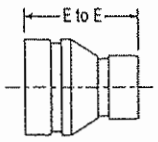


Figure 250
Cast

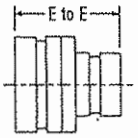


Figure 350
Fabricated
Sizes 3" to 6"

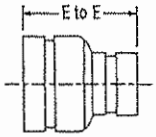


Figure 350
Fabricated
Sizes 8" to 12"

Figures 250 and 350 Concentric Reducer - Groove x Groove								
Nominal Size *Inches*	E to E Inches *mm*	Appx. Wt. Lbs. *Kg.*	Nominal Size *Inches*	E to E Inches *mm*	Appx. Wt. Lbs. *Kg.*	Nominal Size *Inches*	E to E Inches *mm*	Appx. Wt. Lbs. *Kg.*
*2 x 1¼	2.50 *63.5*	1.0 *0.5*	*139.7mm x 3	3.50 *88.9*	4.2 *1.9*	*6 x 5	4.00 *101.6*	5.8 *2.6*
*2 x 1½	2.50 *63.5*	1.3 *0.6*	*139.7mm x 4	3.50 *88.9*	4.4 *2.0*	8 x 2	5.00 *127.0*	12.2 *5.5*
*2½ x 2	2.50 *63.5*	1.2 *0.5*	5 x 1½	3.50 *88.9*	4.6 *2.1*	8 x 2½	5.00 *127.0*	12.1 *5.5*
*76.1mm x 1½	2.50 *63.5*	1.5 *0.7*	5 x 2	3.50 *88.9*	4.6 *2.1*	8 x 3	5.00 *127.0*	12.0 *5.5*
*76.1mm x 2	2.50 *63.5*	1.6 *0.8*	5 x 2½	3.50 *88.9*	4.5 *2.0*	8 x 4	5.00 *127.0*	11.9 *5.4*
3 x 1¼	2.50 *63.5*	1.3 *0.6*	5 x 3	3.50 *88.9*	4.4 *2.0*	8 x 5	5.00 *127.0*	11.3 *5.1*
3 x 1½	2.50 *63.5*	1.3 *0.6*	*5 x 4	3.50 *88.9*	4.5 *2.0*	8 x 6	5.00 *127.0*	10.8 *4.9*
*3 x 2	2.50 *63.5*	1.3 *0.6*	*165.1mm x 3	4.00 *101.6*	5.5 *2.5*	10 x 4	6.00 *152.4*	21.9 *10.0*
*3 x 2½	3.00 *76.2*	1.5 *0.7*	*165.1mm x 4	4.00 *101.6*	6.0 *2.7*	10 x 5	6.00 *152.4*	21.6 *9.8*
*3 x 76.1mm	3.00 *76.2*	2.0 *0.9*	*165.1mm x 139.7mm	4.00 *101.6*	5.6 *2.5*	10 x 6	6.00 *152.4*	21.1 *9.6*
4 x 1¼	3.00 *76.2*	2.2 *1.0*	*6 x 2	4.00 *101.6*	6.0 *2.7*	10 x 8	6.00 *152.4*	19.5 *8.9*
4 x 1½	3.00 *76.2*	2.3 *1.0*	6 x 2½	4.00 *101.6*	6.0 *2.7*	12 x 4	7.00 *177.8*	28.0 *12.7*
*4 x 2	3.00 *76.2*	2.3 *1.0*	*6 x 76.1mm	4.00 *101.6*	6.0 *2.7*	12 x 6	7.00 *177.8*	30.0 *13.6*
*4 x 2½	3.00 *76.2*	2.3 *1.0*	6 x 3	4.00 *101.6*	6.0 *2.7*	12 x 8	7.00 *177.8*	28.0 *12.7*
*4 x 76.1mm	3.00 *76.2*	3.2 *1.5*	*6 x 4	4.00 *101.6*	5.9 *2.7*	12 x 10	7.00 *177.8*	33.0 *15.0*
4 x 3	3.00 *76.2*	2.6 *1.2*	*6 x 139.7mm	4.00 *101.6*	6.3 *2.9*			

Note: Sizes marked with an asterisk (*) are only available in Figure 250 Cast.
Sizes without an asterisk are only available in Figure 350 Fabricated.

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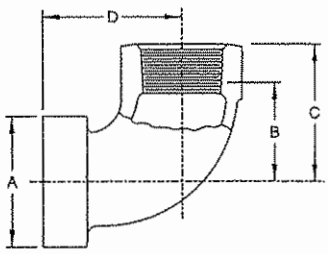


Pipe		Nominal Dimensions				Net Wt. Lbs. *Kg.*
		O.D.	Takeout	Center to End		
Size Inches	Outlet NPT* Inches	A Inches *mm*	B Inches *mm*	C Inches *mm*	D Inches *mm*	
1½	½	1.900 *48.3*	1.25 *31.8*	1.75 *44.5*	1.89 *48.0*	0.77 *0.3*
	¾		1.25 *31.8*	1.75 *44.5*	1.89 *48.0*	0.77 *0.3*
	1		1.37 *34.8*	2.00 *50.8*	2.02 *51.3*	0.88 *0.4*
2	½	2.375 *60.3*	1.25 *31.8*	1.75 *44.5*	1.89 *48.0*	0.92 *0.4*
	¾		1.25 *31.8*	1.75 *44.5*	1.89 *48.0*	0.92 *0.4*
	1		1.37 *34.8*	2.00 *50.8*	2.02 *51.3*	1.06 *0.5*
2½	½	2.875 *73.0*	1.47 *37.3*	1.97 *50.0*	1.89 *48.0*	1.28 *0.6*
	¾		1.47 *37.3*	1.97 *50.0*	1.89 *48.0*	1.28 *0.6*
	1		1.37 *34.8*	2.00 *50.8*	2.02 *51.3*	1.50 *0.7*

* ISO-7 threaded outlets are available upon request.

Figures 391, 392, 393, 312 and 313

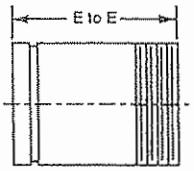


Figure 391

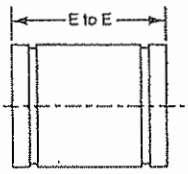


Figure 392

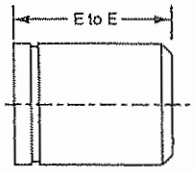


Figure 393

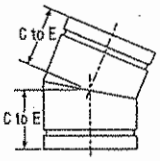


Figure 312

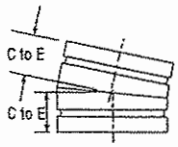


Figure 313

Nominal Size	Figures 391, 392 and 393 Adapter Nipples E to E Inches *mm*	Figures 391, 392 and 393 Adapter Nipples Appx. Wt. Lbs. *Kg.*	Figure 312 22½° Elbow C to E Inches *mm*	Figure 312 22½° Elbow Appx. Wt. Lbs. *Kg.*	Figure 313 11¼° Elbow C to E Inches *mm*	Figure 313 11¼° Elbow Appx. Wt. Lbs. *Kg.*
1¼"	4.00 *101.6*	0.8 *0.4*	1.75 *44.5*	0.4 *0.2*	1.38 *35.1*	0.4 *0.2*
1½"	4.00 *101.6*	0.9 *0.4*	1.75 *44.5*	0.5 *0.2*	1.38 *35.1*	0.5 *0.2*
2"	4.00 *101.6*	1.2 *0.5*	1.88 *47.8*	0.6 *0.3*	1.38 *35.1*	0.6 *0.3*
2½"	4.00 *101.6*	1.9 *0.9*	2.00 *50.8*	0.7 *0.3*	1.50 *38.1*	1.1 *0.5*
3"	4.00 *101.6*	2.5 *1.1*	2.25 *57.2*	1.4 *0.6*	1.50 *38.1*	1.2 *0.5*
4"	6.00 *152.4*	5.5 *2.5*	2.63 *66.8*	2.4 *1.1*	1.75 *44.5*	2.2 *1.0*
5"	6.00 *152.4*	7.4 *3.4*	2.88 *73.2*	4.1 *1.9*	2.00 *50.8*	3.3 *1.5*
6"	6.00 *152.4*	9.5 *4.3*	3.13 *79.5*	5.6 *2.5*	2.00 *50.8*	4.6 *2.1*
8"	6.00 *152.4*	14.2 *6.4*	3.88 *98.6*	11.1 *5.0*	2.00 *50.8*	8.7 *3.9*
10"	8.00 *203.2*	27.0 *12.2*	4.38 *11.3*	14.0 *6.4*	2.13 *54.1*	9.1 *4.1*
12"	8.00 *203.2*	33.0 *15.0*	4.88 *124.0*	22.0 *10.0*	2.25 *57.2*	16.7 *7.6*

Figures 327 and 341

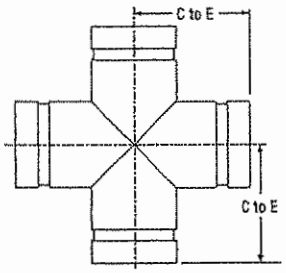


Figure 327

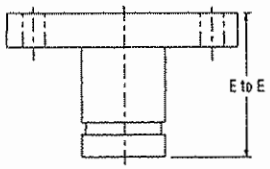


Figure 341

Nominal Size	Figure 327 Cross C to E nches *mm*	Figure 327 Cross Appx. Wt. Lbs. *kg.*	Figure 341 150 lbs. Flange Adapter E to E Inches *mm*	Figure 341 150 lbs. Flange Adapter Appx. Wt. Lbs. *kg.*
1¼"	2.75 *69.6*	2.0 *0.9*	4.00 *101.6*	2.8 *1.3*
1½"	2.75 *69.9*	2.2 *2.0*	4.00 *101.6*	3.2 *1.5*
2"	3.25 *82.6*	2.7 *1.2*	4.0 *101.6*	5.2 *2.4*
2½"	3.75 *95.3*	5.0 *2.3*	4.00 *101.6*	8.0 *3.6*
3"	4.25 *108.0*	7.1 *3.2*	4.00 *101.6*	10.2 *4.6*
4"	5.00 *127.0*	11.9 *5.4*	6.00 *152.4*	17.2 *7.8*
5"	5.50 *139.7*	17.1 *7.8*	6.00 *152.4*	21.4 *9.7*
6"	6.50 *165.1*	27.5 *12.5*	6.00 *152.4*	26.0 *11.8*
8"	7.75 *196.9*	47.0 *21.3*	6.00 *152.4*	38.4 *17.4*
10"	9.00 *228.6*	68.0 *30.8*	8.00 *203.2*	65.0 *29.5*
12"	10.00 *254.0*	107.0 *48.5*	8.00 *203.2*	91.0 *41.3*

Figure 321

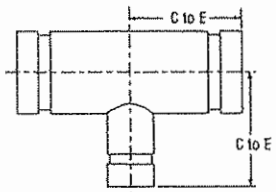


Figure 321

Figure 321 Reducing Tee					
Nominal Size Inches	C to E Inches *mm*	Appx. Wt. Lbs. *Kg.*	Nominal Size Inches	C to E Inches *mm*	Appx. Wt. Lbs. *Kg.*
1½ x 1½ x 1¼	3.25 *82.6*	2.0 *0.9*	6 x 6 x 4	6.50 *165.1*	26.6 *12.1*
2 x 2 x 1½	3.25 *82.6*	2.7 *1.2*	6 x 6 x 5	6.50 *165.1*	27.0 *12.2*
2½ x 2½ x 1¼	3.75 *95.3*	4.2 *1.9*	8 x 8 x 2	7.75 *196.9*	36.2 *16.4*
2½ x 2½ x 1½	3.75 *95.3*	4.2 *1.9*	8 x 8 x 3	7.75 *196.9*	36.5 *16.6*
2½ x 2½ x 2	3.75 *95.3*	4.3 *2.0*	8 x 8 x 4	7.75 *196.9*	36.6 *16.6*
3 x 3 x 1½	4.25 *108.0*	5.3 *2.4*	8 x 8 x 5	7.75 *196.9*	36.8 *16.7*
3 x 3 x 2	4.25 *108.0*	5.5 *2.5*	8 x 8 x 6	7.75 *196.9*	37.0 *16.8*
3 x 3 x 2½	4.25 *108.0*	5.8 *2.6*	10 x 10 x 2	9.00 *228.6*	57.1 *25.9*
4 x 4 x 1¼	5.00 *127.0*	9.8 *4.4*	10 x 10 x 3	9.00 *228.6*	57.4 *26.0*
4 x 4 x 1½	5.00 *127.0*	9.9 *4.5*	10 x 10 x 4	9.00 *228.6*	57.6 *26.1*
4 x 4 x 2	5.00 *127.0*	10.1 *4.6*	10 x 10 x 5	9.00 *228.6*	57.8 *26.2*
4 x 4 x 2½	5.00 *127.0*	10.3 *4.7*	10 x 10 x 6	9.00 *228.6*	58.0 *26.3*
4 x 4 x 3	5.00 *127.0*	10.5 *4.8*	10 x 10 x 8	9.00 *228.6*	58.4 *26.5*
5 x 5 x 2	5.50 *139.7*	14.5 *6.6*	12 x 12 x 3	10.00 *254.0*	80.2 *36.4*
5 x 5 x 2½	5.50 *139.7*	14.8 *6.7*	12 x 12 x 4	10.00 *254.0*	80.5 *36.5*
5 x 5 x 3	5.50 *139.7*	15.2 *6.9*	12 x 12 x 5	10.00 *254.0*	80.7 *36.6*
5 x 5 x 4	5.50 *139.7*	15.8 *7.2*	12 x 12 x 6	10.00 *254.0*	80.9 *36.7*
6 x 6 x 2	6.50 *165.1*	26.5 *11.9*	12 x 12 x 8	10.00 *254.0*	91.4 *41.5*
6 x 6 x 2½	6.50 *165.1*	26.5 *12.0*	12 x 12 x 10	10.00 *254.0*	91.8 *41.6*
6 x 6 x 3	6.50 *165.1*	26.5 *12.0*			

General Notes: It is the Designer's responsibility to select products suitable for the intended service and to ensure that pressure ratings and performance data is not exceeded. Always read and understand the installation instructions (IH-1000). Never remove any piping component or correct or modify any piping deficiencies without first depressurizing and draining the system. Material and gasket selection should be verified to be compatible for the specific application.

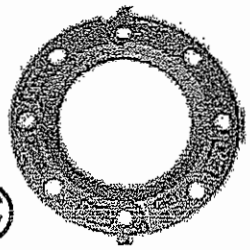
ISO 9001 Certified Company

tyco / Fire & Building Products

Technical Services: Tel: (800) 381-9312 / Fax: (800) 791-5500
www.tyco-fire.com

Grinnell Grooved Fire Protection Products
Figure 71
Flange Adapter

General Description



See Fire Protection Submittal Sheet for Pressure Rating and Listing/Approval Information

The 71 Flange Adapter allows a direct transition from flanged components into a grooved piping system. Flange bolt patterns conform to ANSI Class 125 and 150 standards and PN16 as indicated.

WARNING

The Figure 71 Flange Adapter described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. ***Failure to do so may impair the performance of this device.*** *The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.*

Technical Data

Figure: 71
Sizes: 2" - 12"
Approvals: UL, FM, ULC, VdS, and LPCB; See Fire Protection Submittal Sheet for exact Listing / Approval information.
Housing: Ductile iron conforming to ASTM A-536, Grade 65-45-12
Protective Coatings:
- Non-lead orange paint
- Fire brigade red (optional) non-lead paint
- Hot dipped galvanized conforming to ASTM A-153

Gasket: (specify when ordering)
- Grade "E" EPDM, green color code.

(See Data Sheet TFP1895 for aid in selecting proper gasket)

Ordering Procedure

When placing an order, indicate the full product name. Please specify the quantity, figure number, type of gasket, Grade "E" EPDM, and size.
Grinnell Grooved Piping Products, valves, accessories and other products are available throughout the U.S., Canada, and internationally, through a network of distribution centers. You may write directly or call 215-362-0700 for the distributor nearest you.

Care and Maintenance

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in accordance with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any authority having jurisdiction. The installing contractor or product manufacturer should be contacted relative to any questions. Any impairment must be immediately corrected. It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service.

Limited Warranty

Products manufactured by Tyco Fire Products are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by Tyco Fire Products. No warranty is given for products or components manufactured by companies not affiliated by ownership with Tyco Fire Products or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association (NFPA), and/or the standards of any other Authorities Having Jurisdiction. Materials found by Tyco Fire Products to be defective shall be either repaired or replaced, at Tyco Fire Products' sole option. Tyco Fire Products neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. Tyco Fire Products shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.
IN NO EVENT SHALL TYCO FIRE PRODUCTS BE LIABLE, IN CONTRACT, TORT, STRICT LIABILITY OR UNDER ANY OTHER LEGAL THEORY, FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LABOR CHARGES, REGARDLESS OF WHETHER TYCO FIRE PRODUCTS WAS INFORMED ABOUT THE POSSIBILITY OF SUCH DAMAGES, AND IN NO EVENT SHALL TYCO FIRE PRODUCTS' LIABILITY EXCEED AN AMOUNT EQUAL TO THE SALES PRICE.
THE FOREGOING WARRANTY IS MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Figure 71 Flange Adapter

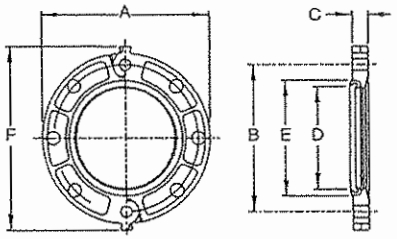


Figure 71 ANSI Calss 125 and 150

Pipe		Max †	Max †	Nominal Dimensions						Bolts ‡		Net
Nominal Size Inches	O.D. Inches *mm*	Pressure psi *kPa*	End Load Lbs. *N*	A Inches *mm*	B Inches *mm*	C Inches *mm*	*D Inches *mm*	*E Inches *mm*	F Inches *mm*	Size Dia. x Lg.	Qty.	Wt. lbs. *kg*
2	2.375 *60.3*	250 *1,724*	1,107 *4,924*	6.38 *162.1*	4.75 *120.7*	0.75 *19.1*	2.38 *60.5*	3.41 *86.6*	7.25 *184.2*	5/8" x 3"	4	3.0 *1.4*
2½	2.875 *73.0*	250 *1,724*	1,622 *7,215*	7.00 *178.0*	5.50 *140.0*	0.88 *22.0*	2.88 *73.0*	3.91 *99.0*	7.88 *200.0*	5/8" x 3"	4	5.0 *2.3*
3	3.500 *88.9*	250 *1,724*	2,404 *10,693*	7.50 *190.5*	6.00 *152.4*	0.94 *23.9*	3.50 *88.9*	4.53 *115.1*	9.88 *251.0*	5/8" x 3"	4	5.6 *2.5*
4	4.500 *114.3*	250 *1,724*	3,974 *17,676*	9.00 *228.6*	7.50 *190.5*	0.94 *23.9*	4.50 *114.3*	5.53 *140.5*	9.90 *251.5*	5/8" x 3"	8	7.0 *3.2*
5	5.563 *141.3*	250 *1,724*	6,073 *27,013*	10.00 *254.0*	8.50 *215.9*	1.00 *25.4*	5.56 *141.2*	6.72 *170.7*	11.38 *289.1*	3/4" x 3½"	8	9.2 *4.2*
6	6.625 *168.3*	250 *1,724*	8,614 *38,315*	11.00 *279.4*	9.50 *241.3*	1.00 *25.4*	6.62 *168.1*	7.78 *197.6*	11.88 *301.8*	3/4" x 3½"	8	10.0 *4.5*
8	8.625 *219.1*	250 *1,724*	14,599 *64,936*	13.50 *342.9*	11.75 *298.5*	1.13 *28.7*	8.62 *218.9*	9.94 *252.5*	14.38 *365.3*	3/4" x 3½"	8	16.6 *7.5*
10	10.750 *273.0*	250 *1,724*	22,679 *100,876*	16.00 *406.4*	14.25 *362.0*	1.19 *30.2*	10.75 *273.1*	12.31 *312.7*	16.88 *428.8*	7/8" x 4"	12	21.8 *9.9*
12	12.750 *323.9*	250 *1,724*	31,903 *141,905*	19.00 *482.6*	17.00 *431.8*	1.25 *31.8*	12.75 *323.9*	14.31 *363.5*	20.00 *508.0*	7/8" x 4"	12	24.2 *11.0*

Figure 71 PN16

Pipe		Max †	Max †	Nominal Dimensions						Bolts ‡		Net
Nom.Size Inches *mm*	O.D. *mm*	Pressure *Bar*	End Load Lbs. *N*	A Inches *mm*	B Inches *mm*	C Inches *mm*	*D Inches *mm*	*E Inches *mm*	F Inches *mm*	Size Dia. x Lg.	Qty.	Wt. lbs. *kg*
2" *50*	60.3	16	1,028 *4,573*	6.38 *162.1*	4.92 *125.0*	0.75 *19.1*	2.38 *60.5*	3.41 *86.6*	7.25 *184.2*	M16 x 76	4	3.0 *1.4*
2½" *65*	76.1	16	1,640 *7,295*	7.28 *184.9*	5.71 *145.0*	0.88 *22.4*	3.00 *76.1*	4.03 *102.4*	8.09 *205.5*	M16 x 76	4	5.6 *2.5*
3" *80*	88.9	16	2,232 *9,928*	7.88 *200.2*	6.30 *160.0*	0.94 *23.9*	3.50 *88.9*	4.53 *115.1*	8.75 *222.3*	M16 x 76	8	6.6 *3.0*
4" *100*	114.3	16	3,690 *16,413*	9.00 *228.6*	7.09 *180.1*	0.94 *23.9*	4.50 *114.3*	5.53 *140.5*	9.90 *251.5*	M16 x 76	8	7.0 *3.2*
5" *125*	139.7	16	5,512 *24,517*	9.84 *249.9*	8.27 *210.1*	1.00 *25.4*	5.50 *139.7*	6.53 *165.9*	10.69 *271.5*	M16 x 89	8	9.2 *4.2*
6" *150*	165.1	16	7,698 *34,241*	11.25 *285.8*	9.45 *240.0*	1.00 *25.4*	6.50 *165.1*	7.53 *191.3*	12.12 *307.8*	M20 x 89	8	10.0 *4.5*
6" *150*	168.3	16	7,997 *35,571*	11.00 *279.4*	9.49 *241.1*	1.00 *25.4*	6.62 *168.1*	7.78 *197.6*	11.88 *301.8*	M20 x 89	8	10.0 *4.5*
8" *200*	219.1	16	13,555 *60,293*	13.38 *339.9*	11.61 *294.9*	1.13 *28.7*	8.62 *218.9*	9.94 *252.5*	14.31 *363.5*	M20 x 89	12	16.6 *7.5*
10 *273.0*	273.0	16	21,057 *93,662*	16.00 *406.4*	13.98 *355.1*	1.19 *30.2*	10.75 *273.1*	12.31 *312.7*	16.88 *428.8*	M22 x 102	12	21.8 *9.9*
12" *300*	323.9	16	29,621 *131,754*	18.12 *460.2*	16.14 *410.0*	1.25 *31.8*	12.75 *323.9*	14.31 *363.9*	19.19 *487.4*	M24 x 102	12	28.0 *12.7*

† Maximum pressure and end load are total from all loads based on standard weight steel pipe. Pressure ratings and end loads may differ on other pipe materials and/or wall thickness. Contact Tyco Fire Products for details. See Fire Protection Equipment Submittal Sheet for Listing and Approval pressure ratings.

* Dimensions D and E represent minimum and maximum sealing surfaces.

‡ Bolts and Nuts are not supplied. Bolt lengths are standard; it is the responsibility of the purchaser to verify correct length for the intended application.

General Notes: It is the Designer's responsibility to select products suitable for the intended service and to ensure that pressure ratings and performance data is not exceeded. Always read and understand the installation instructions (IH-1000). Never remove any piping component or correct or modify any piping deficiencies without first depressurizing and draining the system. Material and gasket selection should be verified to be compatible for the specific application.

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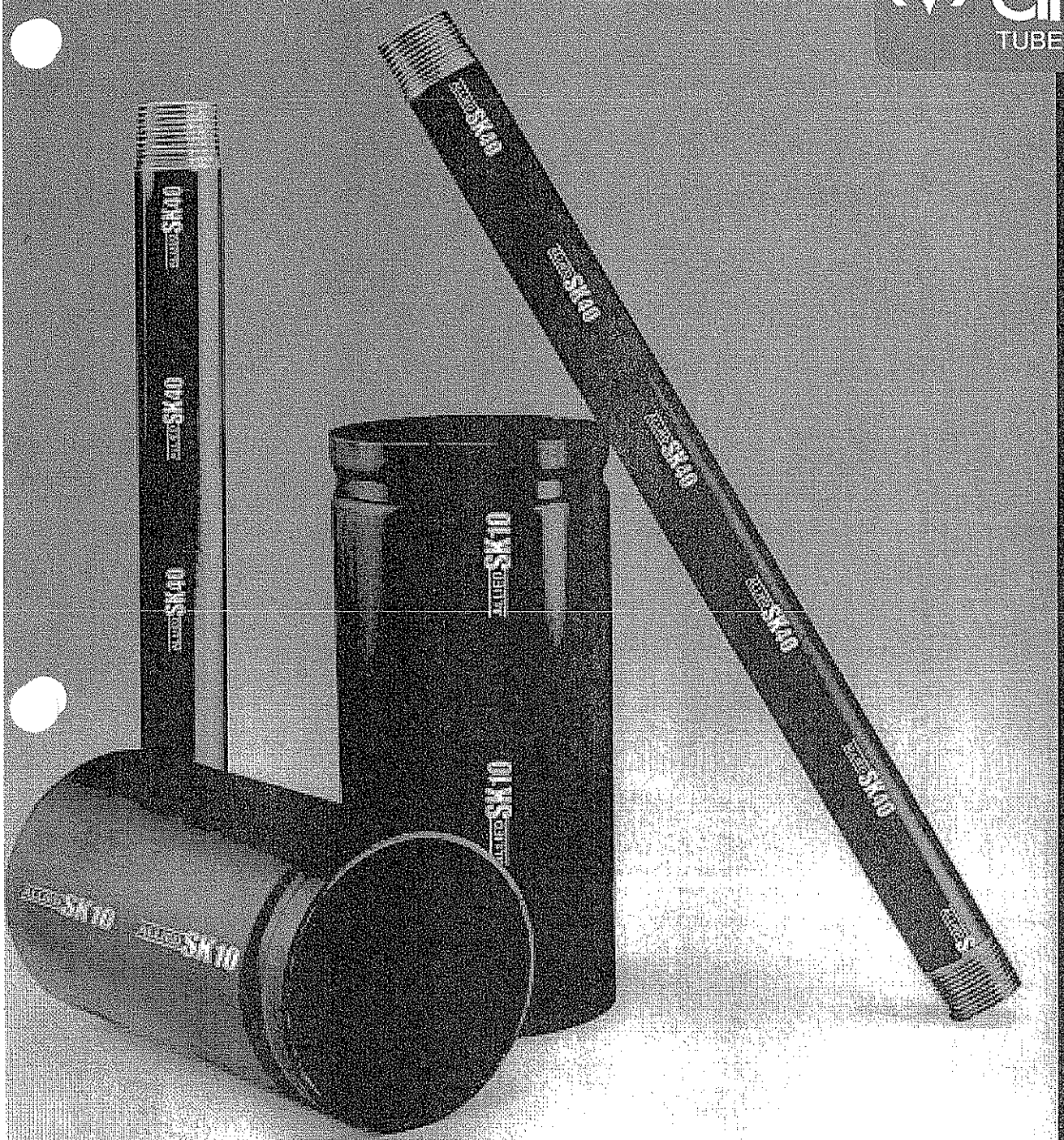

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Schedule-10®/Schedule-40®

Fully Listed and FM Approved Sprinkler Pipe

When you specify Schedule-10/Schedule-40 sprinkler pipe you get a UL listed and FM approved product. Although these products do not require separate approvals, Schedule-10/Schedule-40 gives you the extra quality assurance you demand. Our Sch-10 (1¼"– 8") pipe and Sch-40 (1"– 2½") pipe have passed the same thorough lab testing as our other listed pipe products, and receive periodic mill inspections from both UL and FM agents to ensure consistent quality.

Galvanized Pipe

Schedule-10/Schedule-40 product can be "hot-dip" galvanized to meet FM requirements for dry systems in accordance with the zinc coating specifications of ASTM A-123.

Superior Coating

Our advanced formula mill coating offers a clean, durable surface. It is also paint-ready for custom color applications without special preparation.

The internal surface of all black Allied Tube & Conduit Fire Sprinkler pipe products up to 4.5000" in diameter is coated with our new Antibacterial Formula, "ABF". In scientific laboratory test, ABS proved to have superior resistance to microbial colonization of pipe walls, thereby delaying or possibly preventing the onset of Microbiologically Influenced corrosion (MIC) when the First Sprinkler System is first installed.

American Made

Meets "Buy American" requirement and is available through distributors in the USA, Canada and Mexico.

Specifications & Approvals

Schedule-10/Schedule-40 pipe are in compliance with the following:

ASTM A-135, and NFPA 13. Both pipe products have a working pressure rating of 300 psi maximum and also meet the stringent requirement for the following tests:

- Welded Outlets
- Hydrostatic Pressure
- Side Wall Rupture
- Vibration Test

Sch-40 Specifications

NPS *In; mm*	Nominal I.D. *In; mm*	Wt. *Lbs/Ft; Kg/m*	Wt. (H20 Filled) *Lbs/Ft; Kg/m*	Pcs/ *Lift*	Wt/Lift (21') *Lbs; Kg*	Wt/Lift (24') *Lbs; Kg*	Wt/Lift (25') *Lbs; Kg*
1"	1.049	1.680	2.05	70	2,470	2,822	2,940
25	*26.6*	*2.5*	*3.05*	*70*	*1,120*	*1,280*	*1,334*
1¼"	1.380	2.270	2.93	51	2,431	2,778	2,894
32	*35.1*	*4.36*	*4.36*	*51*	*1,103*	*1,260*	*1,313*
1½"	1.610	2.720	3.61	44	2,513	2,872	2,992
40	*40.9*	*4.0*	*5.37*	*44*	*1,140*	*1,303*	*1,357*
2"	2.067	3.650	5.13	30	2,300	2,628	2,738
50	*52.5*	*5.4*	*7.63*	*30*	*1,043*	*1,192*	*1,242*
2½"	2.469	5.790	7.86	19	2,310	2,640	2,750
65	*62.7*	*8.6*	*11.73*	*19*	*1,048*	*1,197*	*1,247*

Sch-10 Specifications

NPS *In; mm*	Nominal I.D. *In; mm*	Wt. *Lbs/Ft; Kg/m*	Wt. (H20 Filled) *Lbs/Ft; Kg/m*	Pcs/ *Lift*	Wt/Lift (21') *Lbs; Kg*	Wt/Lift (24') *Lbs; Kg*	Wt/Lift (25') *Lbs; Kg*
1"	1.097	1.400	1.81	91	2,675	3,053	3,185
25	*27.9*	*2.1*	*2.70*	*91*	*1,213*	*1,385*	*1,445*
1¼"	1.442	1.810	2.52	61	2,319	2,664	2,760
32	*36.6*	*2.7*	*3.75*	*61*	*1,052*	*1,208*	*1,252*
1½"	1.682	2.080	3.04	61	2,664	3,045	3,172
40	*42.7*	*3.1*	*4.52*	*61*	*1,208*	*1,381*	*1,439*
2"	2.157	2.640	4.22	37	2,051	2,344	2,442
50	*54.8*	*3.9*	*6.28*	*37*	*930*	*1,063*	*1,108*
2½"	2.635	3.530	5.89	30	2,224	2,542	2,648
65	*66.9*	*5.3*	*8.77*	*30*	*1,009*	*1,153*	*1,201*
3"	3.260	4.330	7.94	19	1,728	1,975	2,057
80	*82.8*	*6.4*	*11.82*	*19*	*784*	*896*	*933*
4"	4.260	5.610	11.78	19	2,238	2,558	2,665
90	*108.2*	*8.3*	*17.53*	*19*	*1,015*	*1,160*	*1,209*
5"	5.295	7.77	17.33	10	1,632	1,865	1,943
125	*134.5*	*11.56*	*25.80*	*10*	*740*	*846*	*881*
6"	6.357	9.290	23.03	10	1,951	2,230	2,322
150	*161.5*	*13.8*	*34.27*	*10*	*885*	*1,012*	*1,053*
8"	8.249	16.490	40.15	7	2,424	2,770	2,885
200	*209.5*	*24.5*	*59.75*	*7*	*1,100*	*1,256*	*1,309*

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Fig. 69 Adjustable Swivel Ring, Tapped Per NFPA Standards

Size Range: ½" through 8"

Material: Carbon steel

Finish: Galvanized

Service: Recommended for suspension of non-insulated stationary pipe line.

Maximum Temperature: 650° F

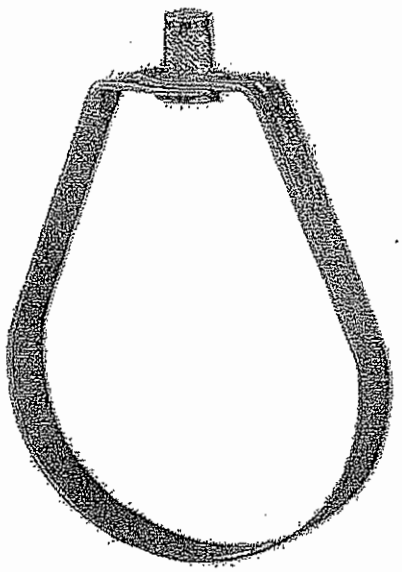
Approvals: Complies with Federal Specification A-A-1192A (Type 10) *WW-H-171-E (Type 10)* and MSS-SP-69 (Type 10).
UL, ULC Listed and FM Approved (Sizes ¾" - 8").

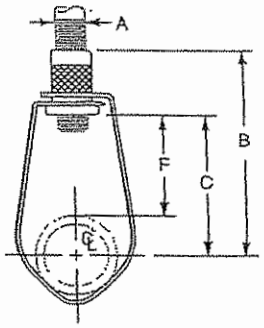
Features:

- Threads are countersunk so that they cannot become burred or damaged.
- Knurled swivel nut provides vertical adjustment after piping is in place.
- Captured swivel nut in the ½" through 3" sizes.

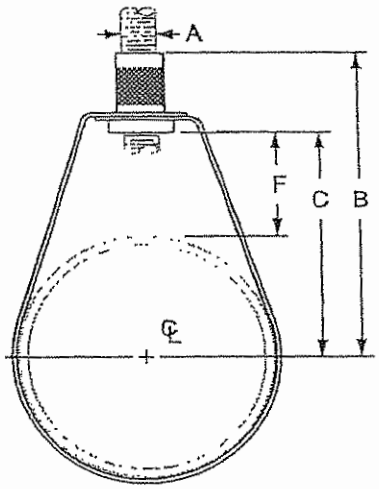
Ordering: Specify size, figure number and name.

Note: The acceptability of galvanized coatings at temperatures above 450°F is at the discretion of the end user.
Metric nut available upon request.





½" through 1" Pipe



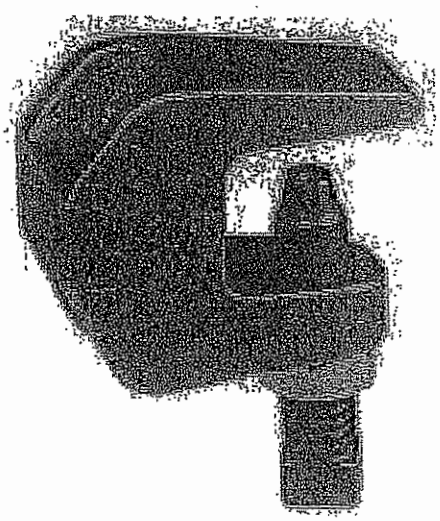
1¼" through 8" Pipe

Fig. 69: Loads (lbs) • Weight (lbs) • Dimensions (in)

Pipe Size	Max Load	Weight	Rod Size A	B	C	F
½	300	0.10	⅜	2 7/8	2	1 9/16
¾		0.10		2 3/4	1 7/8	1 5/16
1		0.10		2 9/16	1 11/16	1
1¼		0.10		2 5/8	1 3/4	⅞
1½		0.10		2 3/4	1 7/8	
2		0.11		3 1/4	2 3/8	1 1/8
2½	525	0.20		4	2 3/4	1 5/16
3		0.20		3 13/16	2 15/16	1 3/16
4	650	0.30		4 11/16	3 13/16	1 9/16
5	1,000	0.54	½	5 5/16	4 3/8	
6		0.65		6 11/16	5 9/16	2 1/4
8		1.00		8	7	2 11/16

Note: Reflects changes in rod diameter from previously published data per recent revisions in MSS-SP-58 & 69

Fig. 92 Universal C-type Clamp (Standard Throat)



Size Range: 3/8 and 1/2"

Material: Ductile iron, hardened steel cup point set screw and locknut.

Finish: Plain or Galvanized

Service: Recommended for use under roof installations with bar joist type construction, or for attachment to the top or bottom flange of structural shapes where the vertical hanger rod is required to be offset from the edge of the flange and where the thickness of joist or flange does not exceed 3/4".

Approvals: Complies with Federal Specification A-A-1192A (Type 19 & 23) *WW-H-171-E (Type 23)* and MSS-SP-69 (Type 19 & 23).
UL, ULC Listed and FM Approved.

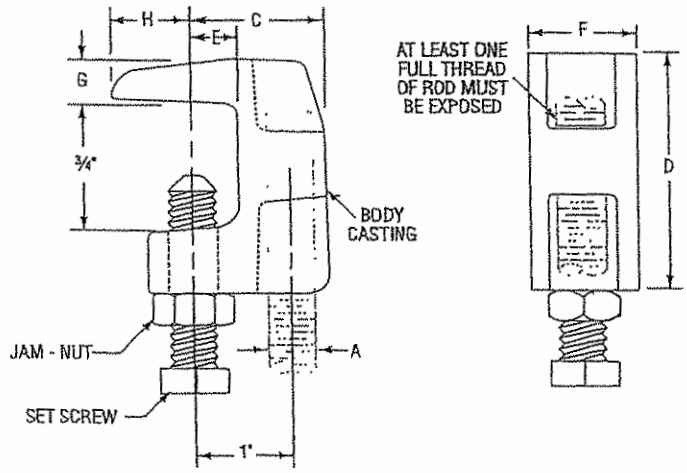
How to size: Size of clamp is determined by size of rod to be used.

Installation: Follow recommended set screw torque values per MSS-SP-69
(See table on page PH-212)

Features:

- They may be attached to horizontal flanges of structural members in either the top beam or bottom beam positions.
- Secured in place by a cup-pointed Set Screw tightened against the flange. A Jam Nut is provided for tightening the Set Screw against the Body Casting.
- Thru tapping of the body casting permits extended adjustment of the threaded rod.
- Can be used with Fig 89X retaining clip for seismic applications.

Ordering: Specify rod size, figure number, name of clamp and finish.



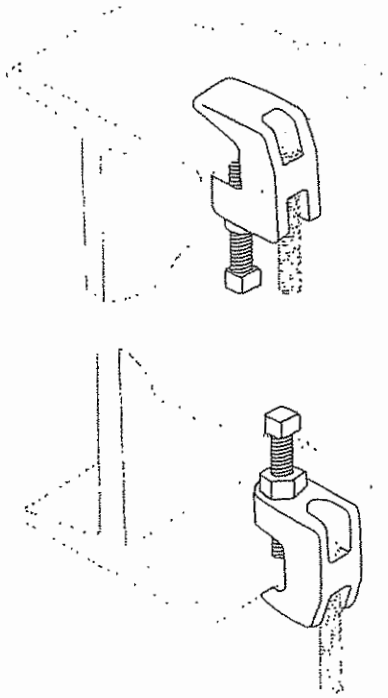


Fig. 92: Load (lbs) • Weight (lbs) • Dimensions (in)

Rod Size A	Set Screw Size	Max Loads ▣		Weight	C	D	E	F	G	H
		Top	Bottom							
3/8	3/8	500	250	0.34	1 5/16	1 9/16	9/16	13/16	3/8	1/2
1/2	1/2	950	760	0.63	1 3/8	1 13/16	1/2	1 1/16	7/16	23/32

▣ Maximum temperature of 450° F

Fig. 142 — Coach Screw Rods Machine Threaded on Opposite End

Size Range: 3/8" and 1/2"
Material: Carbon steel
Finish: Plain
Ordering: Specify rod size, figure number, name and rod length.

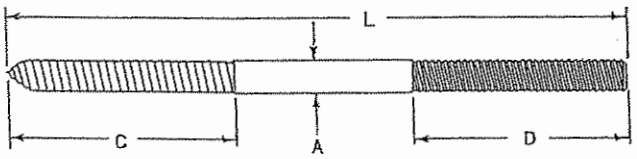


Fig. 142: Standard Thread Lengths(in) • Loads (lbs)

Rod Size A	Standard Length - L	Coach Screw Thread Length – C	Standard Rod Thread Length – D	Max Load
3/8	3 1/2	2	3/4	390
	8		2 1/2	
1/2	3 1/2	2 7/16	3/4	640
	8		2 1/2	

Fig. 146 — Continuous Threaded Rod

Size Range: 1/4" through 1 1/2" Stocked in six, ten, and twelve foot lengths. Other even foot lengths can be furnished to order.
Material: Carbon steel; rod threaded complete length.
Finish: Plain or galvanized.
Maximum Temperature: 650° F.
Ordering: Specify rod diameter and length, figure number, name and finish.
Note: The acceptability of galvanized coatings at temperatures above 450°F is at the discretion of the end user.

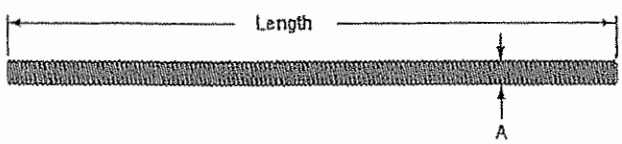


Fig. 146: Loads (lbs) • Weights (lbs) Dimensions (in)

Rod Size A	Threads per Inch	Max Load 650° F	Weight per Ft.
1/4	20	240	0.12
3/8	16	730	0.30
1/2	13	1,350	0.53
5/8	11	2,160	0.84
3/4	10	3,230	1.20
7/8	9	4,480	1.70
1	8	5,900	2.30
1 1/4	7	9,500	3.60
1 1/2	6	13,800	5.10

Note: Other rod sizes available upon request.
Class 2 fit is available upon request.

Fig. 89 Retaining Clip

Size Range: ⅜" through ½"

Material: Carbon steel

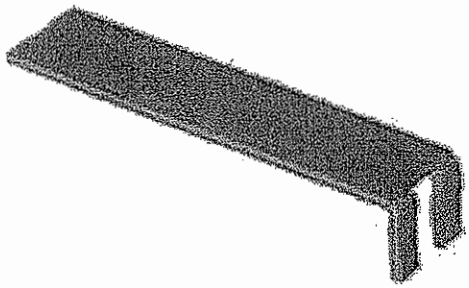
Finish: ☐ Plain or ☐ Galvanized

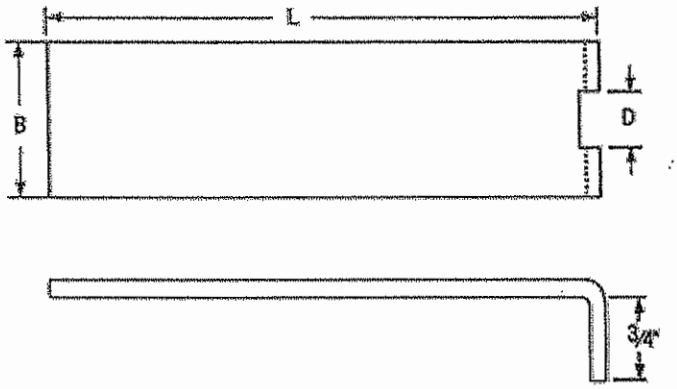
Service: For use with Figs. 86, 87, 88 & 95 in seismic applications.

How to size: Specify length of retaining strap based on beam size.

Installation: Length of strap should be adequate to allow at least 1" of strap to be bent over the beam side of the flange opposite the side the beam clamp is mounted on.

Ordering: Specify rod size, Figure number, name, length of retaining clip and finish (Add 2" to flange width of beam to arrive at proper length of retaining clip).
If required length is not standard, order next longer standard.





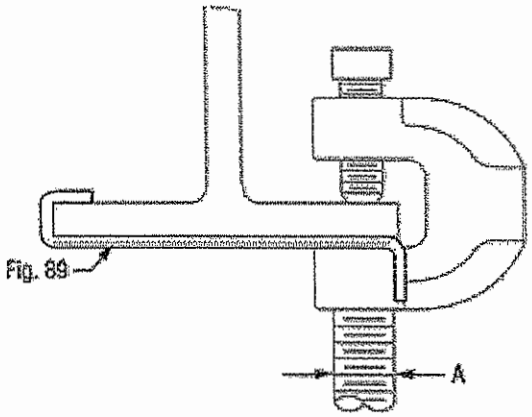


Fig. 89: Retaining Clip: Weight (lbs) • Dimensions (in)

Rod Size A	B	D	Weights				Length L
			4½	8	10	14	
⅜	1	7/16	0.17	0.28	0.35	0.53	4½, 8, 10, 14
½	1¼	15/32	0.22	0.37	0.46	0.69	
⅝	1⅜	11/16	0.25	0.43	00.51	0.73	
¾							

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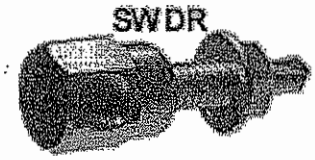
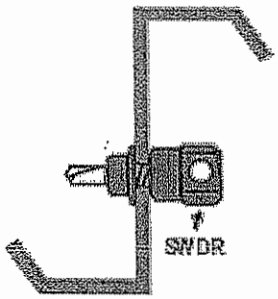




Steel • 1/4" Rod • Horizontal Mount									
Use #14SW Nut Driver (Item #101)									
Item No	Part #	Model	Screw Description	Rod Size	Shank Diameter	Minimum Thickness	Max Thickness	Actual Shear Pullout	
2003	8047957	SWD 100	1/4-14 x 1	1/4-20	1/4	.066" - 16 ga.	1/4"	1477# / 16 ga.	#14SW Item #101
206	8049957	SWDR 100	1/4-20	1/4-20	1/4	.036 - 20 ga.	1/4"	1900# / 20 ga.	PN 8114910

Steel • 3/8" Rod • Horizontal Mount													
Use #14SW Nut Driver (Item #101)													
	Item No	Part #	Model	Rod Size	Description	UL Test Load (lb)	UL Minimum Steel Thickness	FM Test Load (lb)	FM Minimum Steel Thickness	UL/FM Pipe Size inches	Minimum Thickness	Max. Thick.	Actua Shear/Pul

							inches		inches				
	39	8050957	SWD 10	3/8-16	¼-14x1						.066"-16ga	1/4	1477# / 1(
	40	8051957	SWD 15	3/8-16	¼-14x1½	Note: Screw diameter/design/performance for SWD 10 (1" length) through DST 30 (3" length) are constant. Only the lengths vary.							
	41	8052957	SWD 20	3/8-16	¼-14x2								
	42	8053957	SWD 516	3/8-16	$^5/_{16}$-18x1¼						.036"-20ga	1/4"	2480# / ga
FM UL	43	8055957	SWDR 1"	3/8-16	¼-20x1	1500	.037	1475	.060	4/4	.036"-20ga	1/4"	1900# / 2(
FM UL	44	8056957	SWDR 516	3/8-16	$^5/_{16}$-18x1¼	1500	.037	1475	.060	4/4	.036"-20ga	1/4"	2480# / 2(
FM UL	46	8054957	SWDR 1½"	3/8-16	¼-20x1½	1500	.037	1475	.060	4/4	.036"-20ga	1/2"	2375# /
	45	8057957	SWT 15	3/8-16	12-24x1½						.25"-¼"	1/2"	
1	When installing DSTR or SWDR add retainer nut and torque to 20 foot lbs. for maximum pull out in steel.												

Click on UL symbol to link direct to UL Online Certification

Click on FM symbol to link direct to FM Global Loss Prevention Data Sheet 1-2.

Legend	
FM	Factory Mutal Approved
UL	UL-listed.
◆	Box quantity 25. Standard box quantity 125, except where so indicated.

Factory Mutual and UL listed approvals - pdf

Link to DOWNLOADS including: Product Catalog, engineering (CAD) drawings, list of FM approvals, ICC Evaluation Servic
Dade Online Certification and UL test reports.

Download Steel Sammy Sell Sheet.pdf

Installation Instructions

DST, DSTR, TEK 50, SWD, SWDR, SWT
See Figures 1 through 4 (vertical) and 11 through 14 (horizontal) of detailed installation instructions for illustrations.
• DST self-drills & self-taps into steel up to $^3/_{16}$" thick. • DSTR self-drills & self-taps into steel up to $^3/_{16}$" thick and accepts retainer nut. • TEK 50 - Self-drills & self- taps into steel up to ½" thick. • SWD self-drills & self-taps through $^3/_{16}$" steel. • SWDR self-drills & self-taps through $^3/_{16}$" steel and accepts retainer nut. • SWT self-drills & self-taps through ½" steel.

Step 1: Insert the appropriate nut driver into a 3/8" or ½" portable drill:

a. use #14 Nut Driver for DST, DSTR, TEK 50;
b. use #14SW Nut Driver for SWD, SWDR, SWT.

Step 2: Insert the screw into the nut driver. Now you are ready to install the screw.

Step 3: Position drill and begin installation:

a. for installing DST, TEK 50, DSTR*, the drill should be in a vertical position;
b. for installing SWD, SWDR*, SWT, the drill should be in a horizontal position at a right angle to the structural member.

Step 4: When the nut driver spins freely on the cap of the screw installation is complete.

Step 5: Screw is now ready to receive ¼", 3/8", ½" or metric all-thread rod or bolt stock.

Warranty compliance requires that appropriate nut drivers be used for all installations.

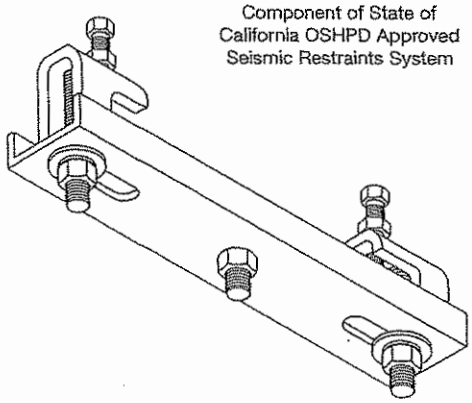
Download CAD Drawings ▸ Installation Instructions ▸ Safety Information ▸ Performance Data

Home | Seismicfreesample | Seismic | GST - Wood Sammy | SWG - Wood SW | DST - Steel Sammy | SWDR - Steel SW | CST - Concrete Sammy | SWC - Concrete SW | SS Wood | SS Steel | Sheetrock | Hurricane | Ceiling Screws | Pole Tool | Sammy Assortment | Sammy Saddle | Sammy Swivel Head | Dektite | Install Kit

g. 800 - Adjustable Sway Brace Attachment to Steel

c UL us LISTED
FM APPROVED

Component of State of California OSHPD Approved Seismic Restraints System



Size Range — 4" thru 18" beam width

Material — Carbon Steel

Function — Seismic brace attachment to steel.

Features — This product's design incorporates a concentric attachment point which is critical to the performance of structural seismic connections. NFPA 13 indicates the importance of **concentric** loading of connections and fasteners. Permits secure connection to steel where drilling and/or welding of brace connection could present structural issues.

Installation Instructions — The Fig. 800 is the structural attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with a TOLCO transitional attachment, "bracing pipe" and a TOLCO "braced pipe" attachment to form a complete bracing assembly. NFPA 13 and/or OSHPD guidelines should be followed.

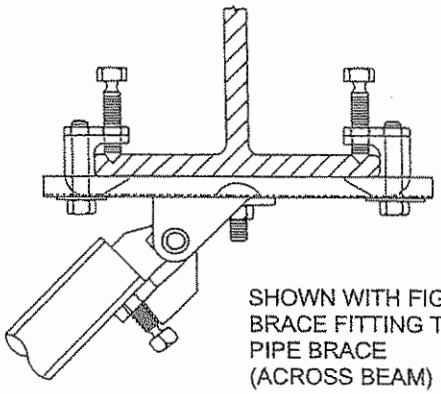
To Install — Place the Fig. 800 on the steel beam, tighten the cone point set bolts on flange until bolt heads break off. Tighten hex head bolts into clamp body until lock washers are fully flat. Attach other TOLCO transitional attachment fittings, Fig. 909, 910 or 980. Transitional fitting attachment can pivot for adjustment to proper brace angle.

Approvals — Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Approved by Factory Mutual Engineering **(FM)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development (**OSHPD**). For additional load, spacing and placement information relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines.

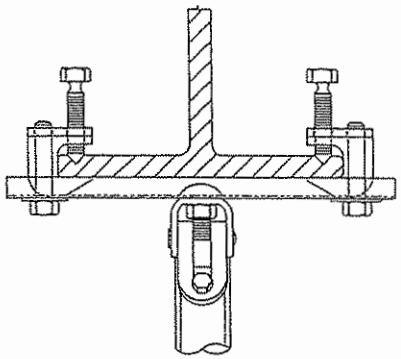
Finish — Plain

Note — Available in Electro-Galvanized and HDG finish.

Order By — Figure number, type number and size number.



SHOWN WITH FIG. 980 BRACE FITTING TO PIPE BRACE (ACROSS BEAM)



SHOWN WITH FIG. 980 BRACE FITTING TO PIPE BRACE (ALONG BEAM)

Dimensions • Weights

Size	Fits Beam Range (in.)	Max. Design Loads/Lbs. (cULus) Along Beam	Max. Design Loads/Lbs. (cULus) Across Beam	*Max. Design Loads/Lbs. (FM) Along Beam	*Max. Design Loads/Lbs. (FM) Across Beam
1	4 - 6	1265	2015	2800	2800
2	6 - 8	1265	2015	2800	2800
3	8 - 10	1265	2015	2800	2800
4	10 - 12	1265	2015	2800	2800
5	12 - 14	1265	2015	2800	2800
6	14 - 16	1265	2015	2800	2800
7	16 - 18	1265	2015	2800	2800

Dimensions • Weights

Type	Flange Thickness Max. (in.)	Max. Design Loads/Lbs. (cULus) Along Beam	Max. Design Loads/Lbs. (cULus) Across Beam	*Max. Design Loads/Lbs. (FM) Along Beam	*Max. Design Loads/Lbs. (FM) Across Beam
1	3/4	1265	2015	2800	2800
2	1¼	1265	2015	2800	2800

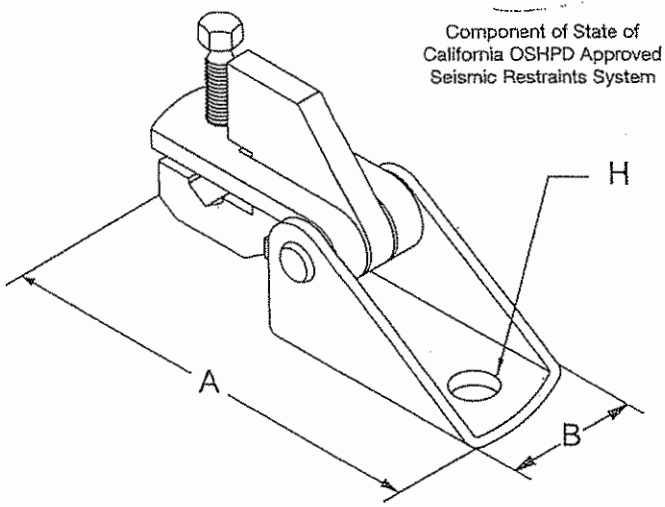
* Load shown is allowable with brace installed, between 30° - 90°. No reduction of load based on brace angle is required.

TOLCO® brand bracing components are desgined to be compatible **ONLY** with other TOLCO® brand bracing components, resulting in a Listed seismic bracing assembly. **DISCLAIMER** — NIBCO does **NOT** warrant against the failure of TOLCO® brand bracing components, in the instance that such TOLCO® brand bracing components are used in combination with products, parts or systems which are not manufactured or sold under the TOLCO® brand. NIBCO shall **NOT** be liable under any circumstance for any direct or indirect, incidental or consequential damages of any kind, including but not limited to loss of business or profit, where non-TOLCO brand bracing components have been, or are used.

Fig. 980 - Universal Swivel Sway Brace Attachment

c UL us LISTED
FM APPROVED

Component of State of California OSHPD Approved Seismic Restraints System



Size Range — One size fits bracing pipe 1" thru 2", TOLCO 12 gauge channel, and all structural steel up to 1/4" thick.

Material — Carbon Steel

Function — Multi-functional attachment to structure or braced pipe fitting.

Features — This product's design incorporates a **concentric** attachment opening which is critical to the performance of structural seismic connections. NFPA 13 (2002) Figure 9.3.5.9.1 indicates clearly that fastener table load values are based only on concentric loading. Mounts to any surface angle. Break off bolt head assures verification of proper installation.

Installation — The Fig.980 is the structural or transitional attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and TOLCO "braced pipe" attachment, Fig. 1000, 1001, 2002, 4L, 4A or 4B to form a complete bracing assembly. NFPA 13 and/or OSHPD guidelines should be followed.

To Install — Place the Fig. 980 onto the "bracing pipe". Tighten the set bolt until set bolt head breaks off. Attachment can pivot for adjustment to proper brace angle.

Approvals — Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Approved by Factory Mutual Engineering **(FM)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines.

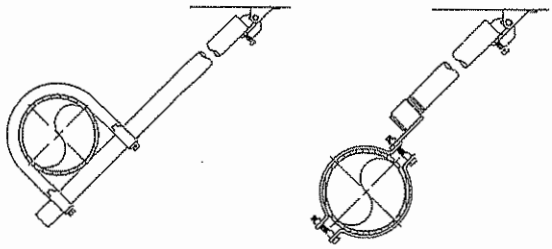
Note — The Fig. 980 Swivel Attachment and the Fig. 1001, Fig. 1000 , Fig. 2001 or Fig. 4A Pipe Clamp make up a sway brace system of **UL** Listed attachments and bracing materials which satisfies the requirements of Underwriters' Laboratories and the National Fire Protection Association **(NFPA)**

Finish — Plain

Note — Available in Electro-Galvanized finish.

Order By — Figure number and finish.

PATENT #6,273,372



Lateral Brace

Dimensions • Weights

A	B	H*	Max. Design Load Lbs. (cULus)	**Max. Design Load Lbs. (FM)	Approx. Wt./100
5¼	1⅞	17/32	2765	2800	132

* Available with hole sizes to accommodate up to 3/4" fastener. Consult factory.

** Load shown is allowable with brace installed, between 30° - 90°. No reduction of load based on brace angle is required.

TOLCO® brand bracing components are desgined to be compatible **ONLY** with other TOLCO® brand bracing components, resulting in a Listed seismic bracing assembly. **DISCLAIMER** — NIBCO does **NOT** warrant against the failure of TOLCO® brand bracing components, in the instance that such TOLCO® brand bracing components are used in combination with products, parts or systems which are not manufactured or sold under the TOLCO® brand. NIBCO shall **NOT** be liable under any circumstance for any direct or indirect, incidental or consequential damages of any kind, including but not limited to loss of business or profit, where non-TOLCO brand bracing components have been, or are used.

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ig. 1000 - "Fast Clamp" Sway Brace Attachment

Component of State of California OSHPD Approved Seismic Restraints System

Size Range — Pipe size to be braced: 1" thru 6" Schedule 10 thru 40 IPS.* Pipe size used for bracing: 1" and 1¼" Schedule 40 IPS.

* Additionally **(UL)** approved for use to brace Schedule 7 sprinkler pipe up to 4" (maximum horizontal design load 655 lbs.) Torque requirement 6 — 8 ft. lbs.

Material — Carbon Steel

Function — For bracing pipe against sway and seismic disturbance. The pipe attachment component of a sway brace system: Fig. 1000 is used in conjunction with a TOLCO Fig. 900 Series Fitting and joined together with bracing pipe per NFPA 13* or TOLCO OSHPD Approved Seismic Manual, forming a complete sway brace assembly.

Features — Field adjustable, making critical pre-engineering of bracing pipe unnecessary. Unique design requires no threading of bracing pipe. Can be used as a component of a 4-way riser brace. Can be used as longitudinal brace with Fig. 907. Comes assembled and individually packaged with illustrated installation instructions — sizes are clearly marked. Steel leaf spring insert provided to assure installer and inspector necessary minimum torque has been achieved.

Installation — The Fig. 1000 is the "braced pipe" attachment component of a lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and TOLCO structural attachment component, Fig. 980, 910 or 909 to form a complete bracing assembly. Follow NFPA 13 and/or OSHPD guidelines.

To Install — Place the Fig. 1000 over the pipe to be braced, insert bracing pipe through opening leaving a minimum of 1" extension. Brace pipe can be installed on top or bottom of pipe to be braced. Tighten hex nuts until leaf spring is flat. It is recommended that the brace angle be adjusted before hex nuts are fully tightened.

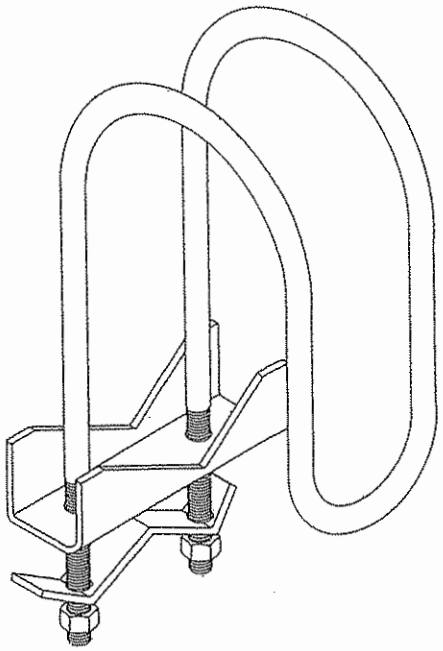
Approvals — Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Approved by Factory Mutual Engineering **(FM)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines.

Application Note — Position Fast Clamp and tighten two hex nuts until leaf spring flattens. A minimum of 1" pipe extension beyond the Fig. 1000 is recommended.

Finish — Plain

Note — Available in Electro-Galvanized and HDG finish or Stainless Steel materials.

Order By — Order first by pipe size to be braced, followed by pipe size used for bracing, figure number and finish.

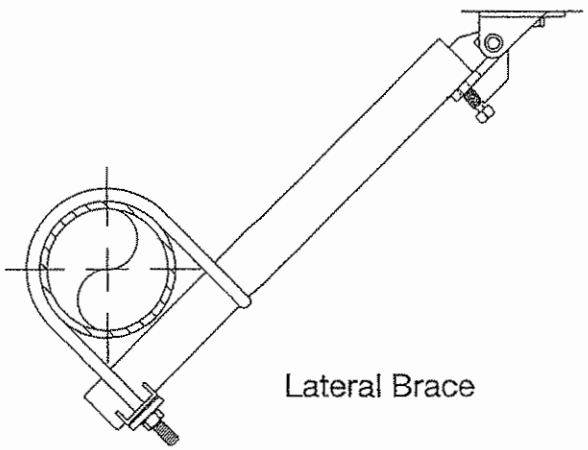


c UL us LISTED

FM APPROVED

Maximum Design Load
1" thru 4" pipe size — 2015 lbs.
6" size — 1265 lbs.

FM Approved Design Loads*
1" - 21/2" - 600 lbs.
3" - 4" - 700 lbs.



Lateral Brace

TOLCO® brand bracing components are desgined to be compatible **ONLY** with other TOLCO® brand bracing components, resulting in a Listed seismic bracing assembly. **DISCLAIMER** — NIBCO does **NOT** warrant against the failure of TOLCO® brand bracing components, in the instance that such TOLCO® brand bracing components are used in combination with products, parts or systems which are not manufactured or sold under the TOLCO® brand. NIBCO shall **NOT** be liable under any circumstance for any direct or indirect, incidental or consequential damages of any kind, including but not limited to loss of business or profit, where non-TOLCO brand bracing components have been, or are used.

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g. 825A - Bar Joist Sway Brace Attachment

c UL us LISTED

Size Range — One size accommodates all TOLCO Fig. 900 Series sway brace attachments. Maximum Horizontal Design Load 1265 lbs.

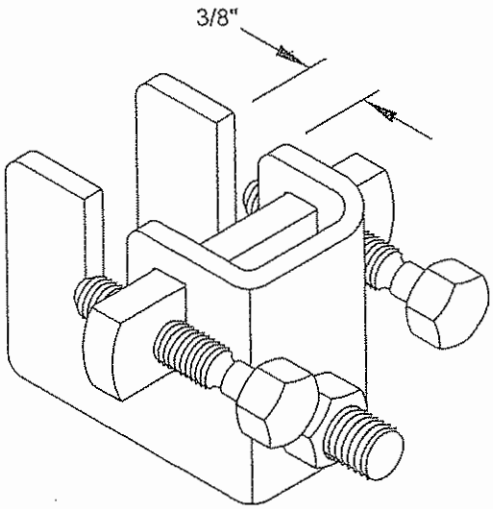
Material — Carbon Steel

Function — To attach sway bracing to steel open web structural members.

Features — This product's design incorporates a **concentric** attachment point which is critical to the performance of structural seismic connections. NFPA 13 indicates the importance of **concentric** loading of connections and fasteners. Permits secure non-friction connection without drilling or welding. Unique design reinforces point of connection to joist. Break off head bolt design assures verification of proper installation.

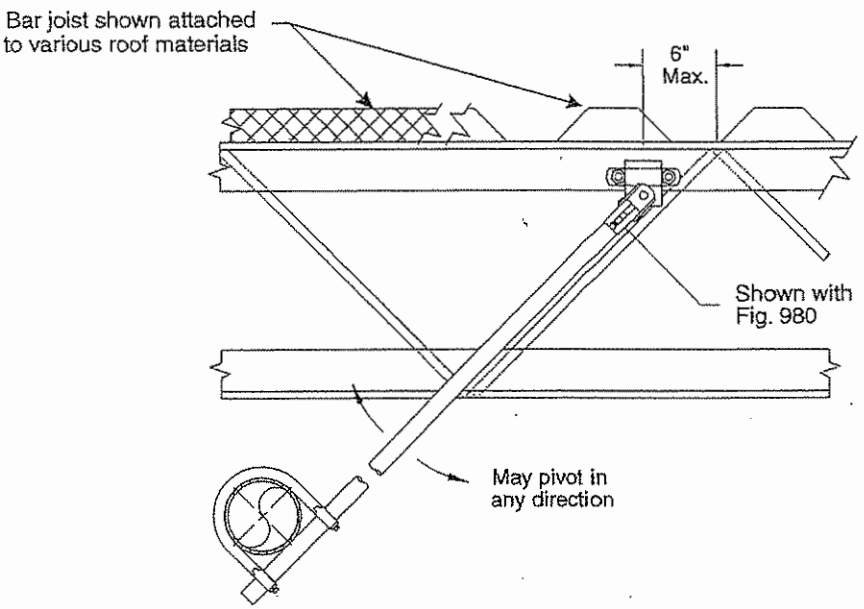
Approvals — Underwriter's Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines.

Installation Instructions — The Fig. 825A is the structural attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with a TOLCO transitional attachment, "bracing pipe" and a TOLCO "braced pipe" attachment to form a complete bracing assembly. NFPA 13 and/or OSHPD guidelines should be followed.



Maximum Design Load 1265 Lbs.

To Install — Place the Fig. 825A on the steel beam, tighten the cone point set bolts until bolt heads break off. Attach other TOLCO transitional attachment fitting, Fig. 909, 910 or 980. Transitional fitting attachment can pivot for adjustment to proper brace angle.



Important Structural Note:

The TOLCO Fig. 825A has significant UL established design loads, however, structural issues related to the steel joist member require restricted location installation for all bracing. Steel Joist Manufacturers require that all earthquake bracing connections be within 6" of the cord panel point. Installation of the Fig. 825A is not restricted to the two outer third sections of the joist. For greater design loads, refer to TOLCO Fig. 825.

Finish — Plain

Order By — Figure number and finish

Patent #6,098,942

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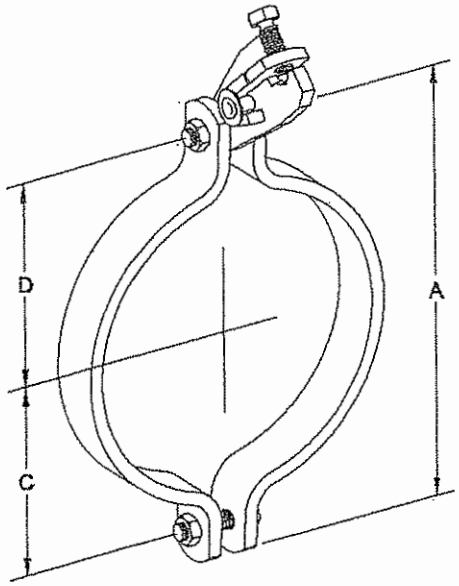
Fig. 4L
Longitudinal "In-Line" Sway Brace Attachment

c UL us LISTED
FM APPROVED



Size Range — 2½" through 8" IPS.

Material — Carbon Steel

Function — For bracing pipe against sway and seismic disturbance.

Approvals — Underwriter's Laboratories Listed in the USA **(UL)** and Canada **(cUL)** 2½" - 8". Approved by Factory Mutual Engineering **(FM)**, 2½" - 8" pipe.

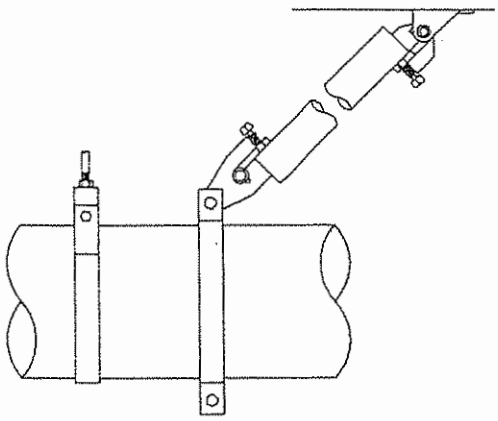
Installation Instructions — The Fig. 4L is the "braced pipe" attachment component of a longitudinal sway brace assembly. It is intended to be combined with the "bracing pipe" and TOLCO structural attachment component to form a complete bracing assembly. NFPA 13 and/or OSHPD guidelines should be followed.

To Install — Place the Fig. 4L over the pipe to be braced and tighten bolts. Then engage "bracing pipe" into jaw opening and tighten set bolt until hex head snaps off. Jaw attachment can pivot for adjustment to proper brace angle.

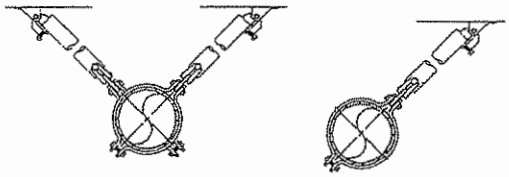
Finish — Plain

Note — Available in Electro-Galvanized and HDG finish.

Order By — Figure number, pipe size and finish.



Longitudinal Brace



4-Way Riser Brace
(Plan view)

Dimensions • Weights

Sizes	A	C	D	Bolt Size	Max. Rec. Load Lbs. (cULus)	*Max Rec. Load Lbs. (FM)	Approx. Wt./100
2½	6 7/16	2½	2¾	1/2	2015	3000	253
3	7	2¾	3 1/16	1/2	2015	1550	268
4	8½	3⅜	3 11/16	1/2	2015	1550	348
5	9¾	3⅞	4⅜	1/2	2015	1450	380
6	11½	5	5⅛	1/2	2015	1450	640
8	13¼	6 11/16	6⅛	1/2	2015	1450	728

* Load shown is allowable with brace installed, between 30° - 90°. No reduction of load based on brace angle is required.
FM approved when used with 1", 1¼", 1½" or 2" Sch. 40 brace pipe.

TOLCO® brand bracing components are designed to be compatible **ONLY** with other TOLCO® brand bracing components, resulting in a Listed seismic bracing assembly. **DISCLAIMER** — NIBCO does **NOT** warrant against the failure of TOLCO® brand bracing components, in the instance that such TOLCO® brand bracing components are used in combination with products, parts or systems which are not manufactured or sold under the TOLCO® brand. NIBCO shall **NOT** be liable under any circumstance for any direct or indirect, incidental or consequential damages of any kind, including but not limited to loss of business or profit, where non-TOLCO brand bracing components have been, or are used.

Fig. 25 - Surge Restrainer

c UL us LISTED

Size Range — One size fits 3/4" thru 2" pipe.

Material — Pre-Galvanized Steel

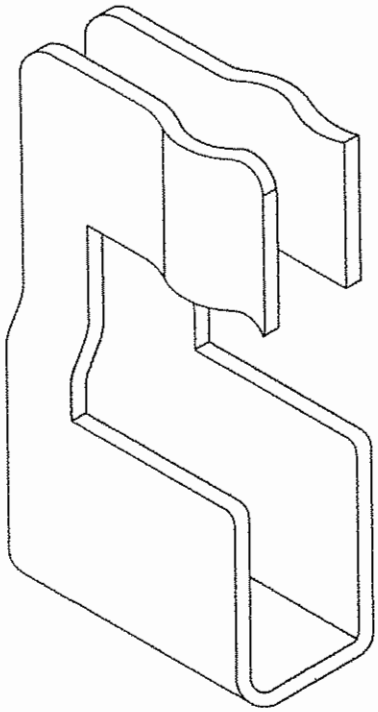
Function — Designed to be used in conjunction with TOLCO® Band Hangers to restrict the upward movement of piping as it occurs during sprinkler head activation or earthquake type activity. The surge restrainer is easily and efficiently installed by snapping into a locking position on the band hanger. This product is intended to satisfy the requirements as indicated in the National Fire Protection Association NFPA 13, 2007 edition, 9.2.3.4.4.1 and 9.2.3.4.4.4 Can be used to restrain either steel pipe or CPVC plastic Pipe.

Approvals — Underwriters' Laboratories Listed **only** when used with TOLCO band hangers Fig. 2, 2NFPA and 200, in the USA **(UL)** and Canada **(cUL)**.

Finish — Pre-Galvanized

Order By — Figure number and TOLCO band hanger, size from 3/4" thru 2".

Patent #5,344,108



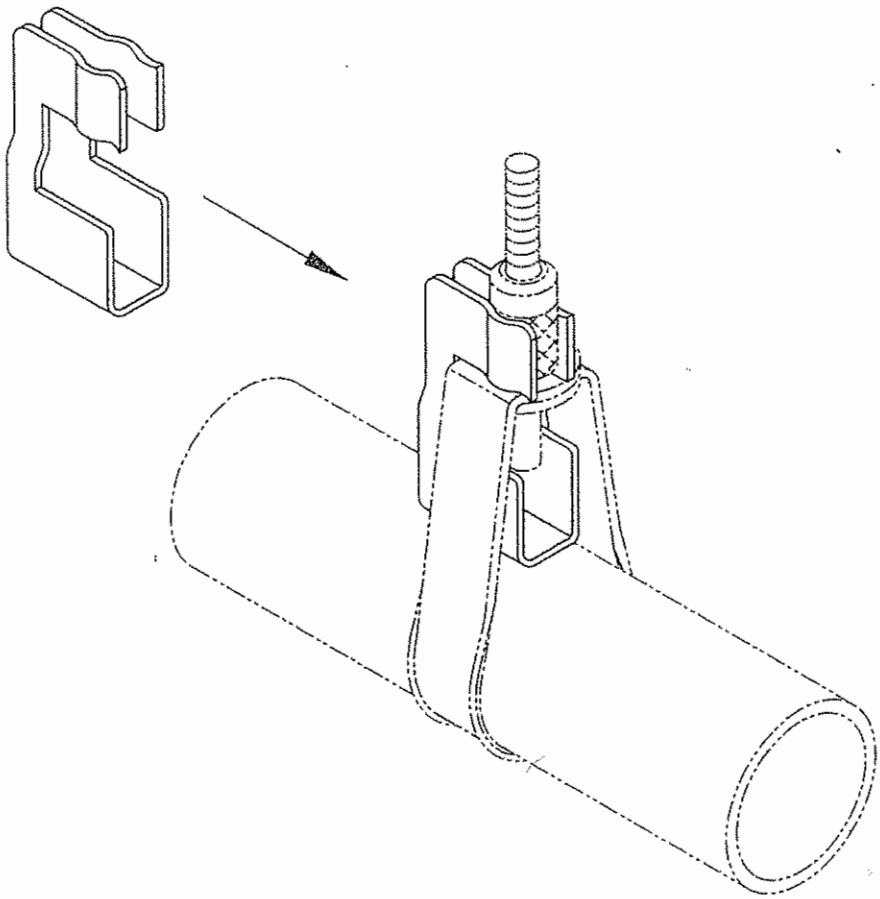


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Fig. 75 - Swivel Attachment

c UL us LISTED

Size Range — 3/8" Rod Attachment

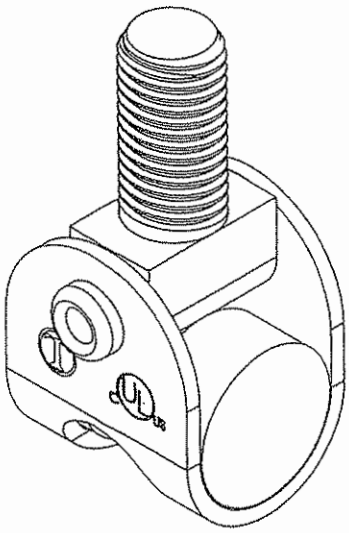
Material — Carbon Steel

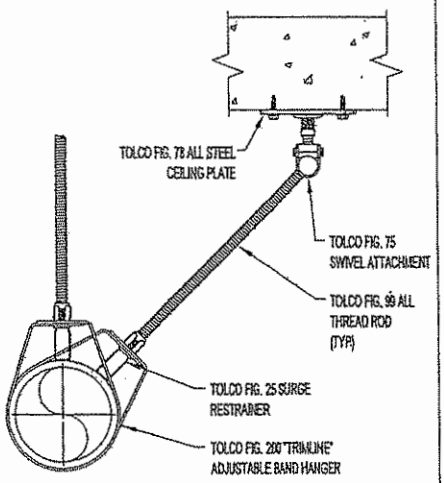
Function — There are three recommended applications for this product: May be used as a Branch Line Restraint for structural attachment to anchor bolt, beam clamp, etc. May be used in a pitched or sloped roof application, to meet requirements of NFPA 13 (2002) Sec 9.1.2.5. May be used as an upper attachment with short hanger rod to omit seismic bracing (per UBC97).

Approvals — Underwriters' Laboratories Listed in the USA **(UL)** and Canada **(cUL)** to support up to 4" pipe. Meets requirements of Uniform Building Code (UBC) 1997 Table O, Section 3.B.

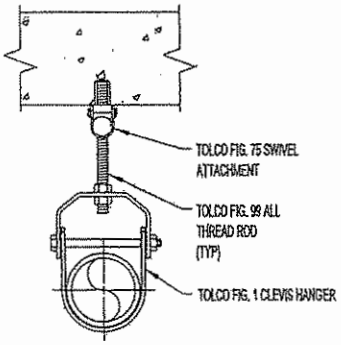
Finish — Electro-Galvanized

Order By — Figure number

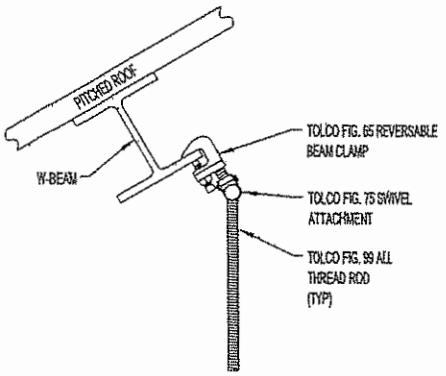




May be used as a structural attachment component of a branch line restraint



May be used as an upper attachment with short hanger rod to omit seismic bracing (per UBC97).

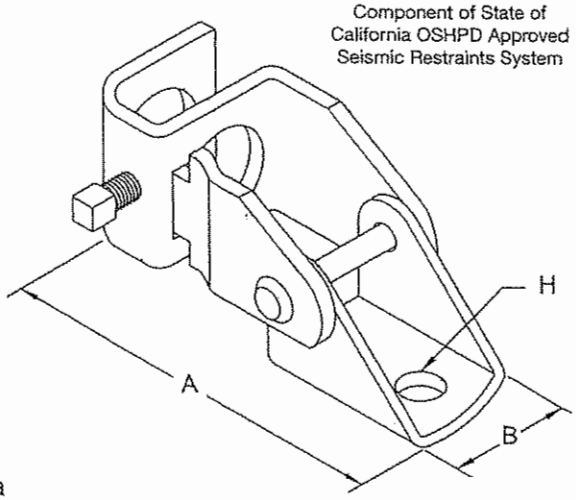


May be used with a pitched roof application, to meet requirements of NFPA 13 (2002) Sec 9.1.2.5.

Fig. 909 - No-Thread Swivel Sway Brace Attachment

c UL us LISTED

Component of State of California OSHPD Approved Seismic Restraints System



Size Range — 1" bracing pipe. For brace pipe sizes larger than 1", use TOLCO Fig. 980.

Material — Carbon Steel, hardened cone point engaging screw

Function — The structural component of a sway and seismic bracing system.

Features — This product's design incorporates a **concentric** attachment opening which is critical to the performance of structural seismic connections. NFPA 13 (2002) Figure 9.3.5.9.1 indicates clearly that fastener table load values are based only on concentric loading. No threading of the bracing pipe is required. Open design allows for easy inspection of pipe engagement.

Application Note — The Fig. 909 is used in conjunction with the TOLCO Fig. 1000, Fig. 1001, or Fig. 4 (A) pipe clamp, and joined together with bracing pipe. Sway brace assemblies are intended to be installed in accordance with NFPA 13 (or TOLCO State of California OSHPD Approved Seismic Restraint Manual) and the manufacturer's installation instructions. The required type, number and size of fasteners used for the structure attachment fitting shall be in accordance with NFPA 13 and/or OSHPD.

Approvals — Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines.

Installation Instructions — The Fig. 909 is the structural or transitional attachment component of a longitudinal or lateral sway brace assembly. It is intended to be combined with the "bracing pipe" and TOLCO "braced pipe" attachment, Fig. 1000, 1001, 4A, 4B or 4L to form a complete bracing assembly. NFPA 13 and/or OSHPD guidelines should be followed.

To Install — Place the Fig. 909 onto the bracing pipe. Tighten the set bolt until head bottoms out on surface. Attachment can pivot for adjustment to proper brace angle.

Finish — Plain

Note — Available in Electro-Galvanized and HDG finish.

Order By — Figure number, pipe size and finish.

Dimensions • Weights

Pipe Size	A	B	Hole Size H*	Max. Design Load Lbs.	Max. Design Load Lbs. w/Washer	Approx. Wt./100
1	6	1⅝	17/32	2015	2765	91

* Available with hole sizes to accommodate up to 3/4" fastener. Consult Factory.

g. 907 - 4-Way Longitudinal Sway Brace Attachment

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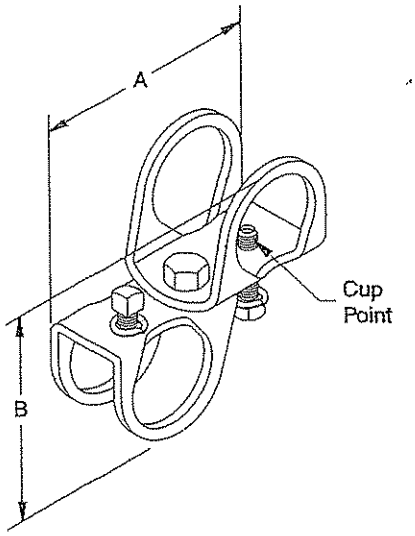
Component of State of California OSHPD Approved Seismic Restraints System



Size Range — 1" x 1", 1" x 1¼" and 1¼" x 1¼" bracing pipe.

Material — Carbon Steel, hardened cone (or cup) point engaging screw

Function — For bracing pipe against sway and seismic disturbances, Functions as a longitudinal brace connection when attached to a lateral brace pipe. Bracing connection must be positioned as close as physically possible to the braced pipe (No more than 3" away). Must be used only with TOLCO bracing components. When used in conjunction with TOLCO Fig. 1000, this combination bracing restricts piping movement in tension and compression both laterally and longitudinally.

Approvals — Underwriter's Laboratories Listed in the USA **(UL)** and Canada **(cUL)**. Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development **(OSHPD)**. For additional load, spacing and placement information relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines.

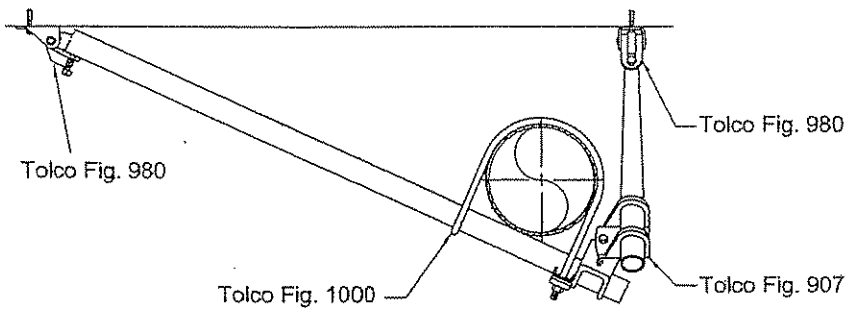
Installation Instructions — The Fig. 907 is a transitional component of a longitudinal 4-way sway brace assembly. It is intended to be installed with the longitudinal and lateral "bracing pipes", TOLCO structural attachment fittings, Fig. 909, 910 and 980 and the Fig. 1000 TOLCO "braced pipe" fitting, to form a complete bracing assembly. NFPA 13 and/or OSHPD guidelines should be followed.

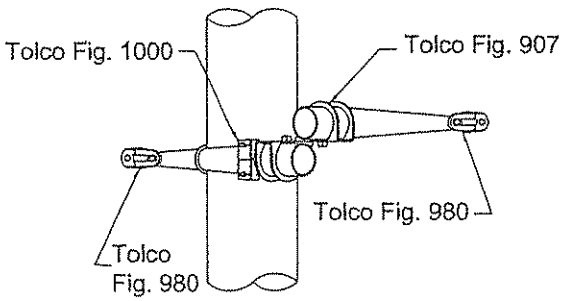
To Install — Attach the Fig. 907 over the lateral "bracing pipe" to within 3" of its position relative to the "braced pipe" connection. Adjust brace angle and tighten bolts until heads bottom out on surface.

Finish — Plain

'ote — Available in Electro-Galvanized and HDG finish.

rder By — Figure number, bracing pipe sizes and finish.





Dimensions • Weights

Pipe Size	A	B	Max. Design Load Lbs.*	Approx. Wt./100
1 x 1	4¾	4¾	655*	103
1 x 1¼	5 1/16	4 13/16	655*	107
1¼ x 1¼	5⅜	5¼	655*	109

* Load will accommodate up to 4" pipe at maximum spacing.

tyco / Fire & Security / SimplexGrinnell

STENNIS RIVERINE & COMBATANT TRAINING FACILITY
STENNIS SPACE CENTER
STENNIS, MS 39529

FIRE PROTECTION/ SPRINKLER SYSTEMS
OPERATIONS BUILDING 2440/2441
BOAT STORAGE BUILDING 2442

SECTION 5

HYDRAULIC CALCULATIONS

SIMPLEXGRINNELL
5800 JEFFERSON HWY SUITE A
HARAHAN, LA. 70123
PHONE 504-736-0104
FAX 504-736-9292

Hydraulic Overview

Job

Job Number: 2440 CAGES	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2440 CAGES	Phone: / FAX:
Address 1: OPERATIONS BLDG	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site:

System

Density: 0.150gpm/ft²	Area of Application: 3000.00ft² (Actual 3073.29ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 19.00 at 11.511	Hose Streams: 0.00
Coverage Per Sprinkler: 120.00ft²	Number Of Sprinklers Calculated: 25
System Pressure Demand: 46.889	System Flow Demand: 485.39
Total Demand: 485.39 @ 46.889	Pressure Result: +21.589 (31.5%)

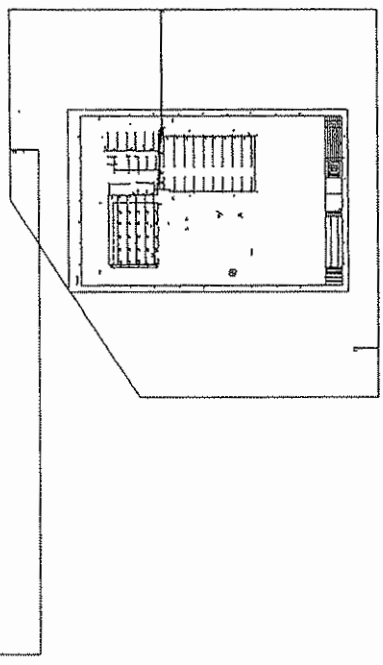
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	0.00	72.000	56.000

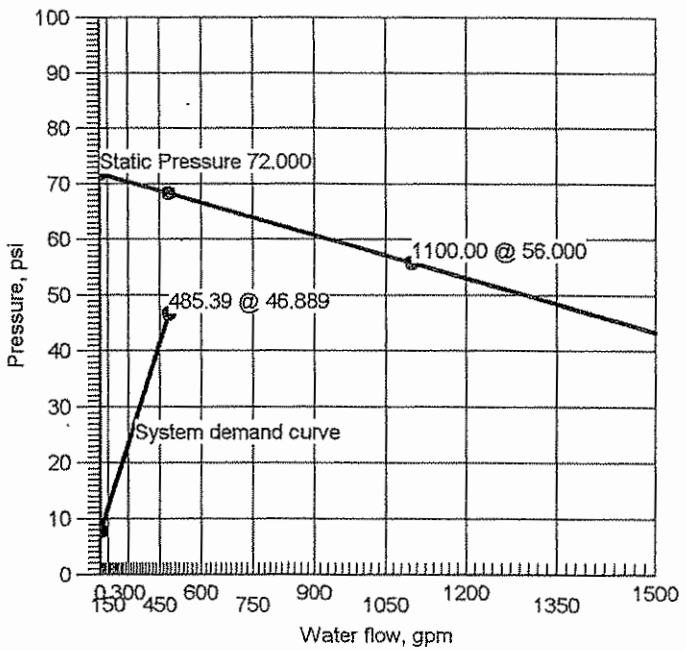
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)

FP-8 BLDG 2440 2441 1st Floor R8



Supply at Node 1 (1100.00, 0.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 2440 CAGES	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2440 CAGES	State Certification/License Number:
Address 1: OPERATIONS BLDG	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site:
City: STENNIS / State: MS / Zip Code:	Drawing Name: FP-3 BLDG 2440 2441 1st Floor R3

System

Most Demanding Sprinkler Data: 5.6 K-Factor 19.00 at 11.511	
Hose Allowance At Source: 0.00	
Additional Hose Supplies: Node / Flow(gpm)	
Total Hose Streams: 0.00	
System Flow Demand: 485.39	Total Water Required (Including Hose Allowance): 485.39
Maximum Pressure Unbalance In Loops: 0.000	
Maximum Velocity Above Ground: 21.09 between nodes 375 and 370	
Maximum Velocity Under Ground: 3.11 between nodes 1 and 12	
Volume capacity of Wet Pipes: 6958.20gal	Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Ordinary Group I	
Density: 0.150gpm/ft²	Area of Application: 3000.00ft² (Actual 3073.29ft²)
Number Of Sprinklers Calculated: 25	Coverage Per Sprinkler: 120.00ft²
AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area	

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required (psi)	Safety Margin (psi)
1	0.00	72.000	56.000	1100.00	68.478	485.39	46.889	21.589

Contractor

	Contractor Number:	Contact Name:	Contact Title:
Contractor Name: SIMPLEXGRINNELL		Phone:	Extension:
Address 1: 5800 JEFFERSON HWY		FAX:	
Address 2: SUITE A		E-mail:	
City: HARAHAN / State: LA / Zip Code: 70123		Web-Site:	

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	113	19.29	19.00	5.6	11.860		
Sprinkler	115	19.39	19.00	5.6	11.987		
Sprinkler	118	19.65	19.00	5.6	12.314		
Sprinkler	133	20.20	19.00	5.6	13.009		
Sprinkler	135	21.16	19.00	5.6	14.282		
Sprinkler	106	19.09	19.00	5.6	11.619		
Sprinkler	110	19.16	19.00	5.6	11.703		
Sprinkler	114	19.33	19.00	5.6	11.915		
Sprinkler	120	19.69	19.00	5.6	12.362		
Sprinkler	134	20.36	19.00	5.6	13.225		
Sprinkler	105	19.07	19.00	5.6	11.600		
Sprinkler	109	19.12	19.00	5.6	11.655		
Sprinkler	112	19.22	19.00	5.6	11.786		
Sprinkler	116	19.43	19.00	5.6	12.044		
Sprinkler	122	19.86	19.00	5.6	12.577		
⇨ Sprinkler	101	19.00	19.00	5.6	11.511		
Sprinkler	103	19.03	19.00	5.6	11.554		
Sprinkler	108	19.11	19.00	5.6	11.640		
Sprinkler	111	19.21	19.00	5.6	11.772		
Sprinkler	117	19.44	19.00	5.6	12.055		
Sprinkler	102	19.01	19.00	5.6	11.524		
Sprinkler	104	19.04	19.00	5.6	11.558		
Sprinkler	107	19.10	19.00	5.6	11.636		
Sprinkler	854	19.16	19.00	5.6	11.709		
Sprinkler	855	19.26	19.00	5.6	11.823		

⇨ Most Demanding Sprinkler Data

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
••••• Route 1 •••••							
	1.0490	Q=19.00	7.05	C=120	0.118351	0'-10¾	Pf 0.698
1	12'-1½	q=19.00	K=5.6	11.511	Spr(-11.511)	5'-0	Pe 0.388
414	11'-2¾			12.598	PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=9.43	0.83	C=120	0.000968	13'-5	Pf 0.013
414	11'-2¾			12.598			Pe
408	11'-2¾			12.611		13'-5	Pv
CM	2.1570	Q=28.50	2.50	C=120	0.007488	13'-5	Pf 0.100
408	11'-2¾			12.611			Pe
401	11'-2¾			12.711		13'-5	Pv
CM	2.1570	Q=47.59	4.18	C=120	0.019330	13'-2	Pf 0.255
401	11'-2¾			12.711			Pe
390	11'-2¾			12.966		13'-2	Pv
CM	2.1570	Q=66.88	5.87	C=120	0.036272	15'-6¾	Pf 1.145
390	11'-2¾			12.966		16'-0	Pe 0.533
362	10'-0			14.643	LtE(3'-8¼), PO(12'-3¾)	31'-6¾	Pv
CM	2.6350	Q=103.39	6.08	C=120	0.030638	9'-3	Pf 0.283
362	10'-0			14.643			Pe
364	10'-0			14.927		9'-3	Pv
CM	2.6350	Q=174.84	10.29	C=120	0.080974	9'-0	Pf 0.729
364	10'-0			14.927			Pe
366	10'-0			15.655		9'-0	Pv
CM	2.6350	Q=257.05	15.12	C=120	0.165190	9'-3	Pf 1.528
366	10'-0			15.655			Pe
370	10'-0			17.183		9'-3	Pv
CM	2.6350	Q=358.43	21.09	C=120	0.305559	8'-6	Pf 2.597
370	10'-0			17.183			Pe
375	10'-0			19.781		8'-6	Pv
CM	4.2600	Q=358.43	8.07	C=120	0.029449	0'-9	Pf 0.022
375	10'-0			19.781			Pe
377	10'-0			19.803		0'-9	Pv
CM	4.2600	Q=485.39	10.93	C=120	0.051606	17'-11¾	Pf 1.743
377	10'-0			19.803		15'-9½	Pe
530	10'-0			21.546	2LtE(7'-10¾)	33'-9¼	Pv
M	4.2600	Q=468.81	10.55	C=120	0.048391	6'-5¾	Pf 1.970
530	10'-0			21.546		34'-2¾	Pe -2.168
313	15'-0			21.348	LtE(7'-10¾), T(26'-4)	40'-8½	Pv
CM	4.2600	Q=356.58	8.03	C=120	0.029168	13'-4	Pf 0.389
313	15'-0			21.348			Pe 0.000
297	15'-0			21.737		13'-4	Pv
CM	4.2600	Q=364.28	8.20	C=120	0.030345	19'-6	Pf 0.592
297	15'-0			21.737			Pe
198	15'-0			22.329		19'-6	Pv
CM	4.2600	Q=373.16	8.40	C=120	0.031728	14'-7½	Pf 0.464
198	15'-0			22.329			Pe
284	15'-0			22.793		14'-7½	Pv
DY	6.3570	Q=373.16	3.77	C=120	0.004517	0'-0	Pf 0.000
284	15'-0			22.793			Pe 0.000
261	15'-0			22.793		0'-0	Pv
CM	6.3570	Q=485.39	4.91	C=120	0.007347	4'-3½	Pf 0.198
261	15'-0			22.793		22'-7½	Pe -0.000
163	15'-0			22.991	2LtE(11'-3¾)	26'-11	Pv
FR	6.3570	Q=485.39	4.91	C=120	0.007347	6'-9	Pf 0.050
163	15'-0			22.991			Pe 2.926
161	8'-3			25.967		6'-9	Pv
MS	6.3570	Q=485.39	4.91	C=120	0.007347	1'-1	Pf 0.513
161	8'-3			25.967		68'-9¾	Pe 1.838
84	4'-0¼			28.318	2f(-0.000), CV(40'-2¾), BV(12'-7), CV(16'-0)	69'-10¾	Pv
FR	6.0650	Q=485.39	5.39	C=120	0.009237	2'-0	Pf 0.111
84	4'-0¼			28.318		10'-0	Pe 1.305
7	1'-0			29.734	BV(10'-0)	12'-0	Pv
UG	8.3900	Q=485.39	2.82	C=140	0.001430	135'-2½	Pf 0.322
7	1'-0			29.734		89'-11	Pe 2.601
3	-5'-0			32.657	E(30'-6½), T(59'-4½)	225'-1½	Pv
UG	7.9800	Q=320.09	2.05	C=150	0.000744	303'-2¾	Pf 0.285
3	-5'-0			32.657		79'-11¾	Pe
5	-5'-0			32.942	E(27'-2), T(52'-9¾)	383'-2½	Pv
UG	7.9800	Q=485.39	3.11	C=150	0.001607	1'-11	Pf 0.035
5	-5'-0			32.942		19'-7½	Pe
11	-5'-0			32.977	LtE(19'-7½)	21'-6½	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC Pt	HWC Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
UG	8.3900	Q=485.39	2.82	C=140		0.001430	17'-0	Pf 12.119
	-5'-0			32.977			66'-2	Pe 0.434
2	-6'-0			45.529		3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv
UG	7.9800	Q=485.39	3.11	C=150		0.001607	727'-3	Pf 1.360
12	-6'-0			45.529			119'-2½	Pe
1	-6'-0			46.889		2E(27'-2), 2GV(6'-0½), T(52'-9¾), S	846'-5¾	Pv
••••• Route 2 •••••								
SP	1.0490	Q=19.01	7.06	C=120		0.118471	0'-10¾	Pf 0.698
102	12'-1½	q=19.01	K=5.6	11.524		Spr(-11.524)	5'-0	Pe 0.388
420	11'-2¾			12.611		PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=28.58	2.51	C=120		0.007525	4'-7¼	Pf 0.155
420	11'-2¾			12.611			16'-0	Pe 0.533
674	10'-0			13.299		LtE(3'-8¼), PO(12'-3¾)	20'-7¼	Pv
CM	2.6350	Q=36.52	2.15	C=120		0.004467	9'-6	Pf 0.116
674	10'-0			13.299			16'-5¾	Pe
671	10'-0			13.415		PO(16'-5¾)	25'-11¾	Pv
CM	2.1570	Q=36.52	3.21	C=120		0.011841	78'-5½	Pf 1.206
671	10'-0			13.415			23'-4½	Pe
360	10'-0			14.621		3LtE(3'-8¼), PO(12'-3¾)	101'-10	Pv
CM	2.6350	Q=36.52	2.15	C=120		0.004467	5'-0	Pf 0.022
360	10'-0			14.621				Pe
362	10'-0			14.643			5'-0	Pv
••••• Route 3 •••••								
SP	1.0490	Q=19.03	7.07	C=120		0.118753	0'-10¾	Pf 0.700
103	12'-1½	q=19.03	K=5.6	11.554		Spr(-11.554)	5'-0	Pe 0.388
415	11'-2¾			12.642		PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=13.78	1.21	C=120		0.001953	13'-5	Pf 0.026
415	11'-2¾			12.642				Pe
409	11'-2¾			12.669			13'-5	Pv
CM	2.1570	Q=32.90	2.89	C=120		0.009765	13'-5	Pf 0.131
409	11'-2¾			12.669				Pe
402	11'-2¾			12.800			13'-5	Pv
CM	2.1570	Q=52.06	4.57	C=120		0.022821	13'-2	Pf 0.300
402	11'-2¾			12.800				Pe
391	11'-2¾			13.100			13'-2	Pv
CM	2.1570	Q=71.45	6.27	C=120		0.040991	15'-6¾	Pf 1.294
391	11'-2¾			13.100			16'-0	Pe 0.533
364	10'-0			14.927		LtE(3'-8¼), PO(12'-3¾)	31'-6¾	Pv
••••• Route 4 •••••								
SP	1.0490	Q=19.04	7.07	C=120		0.118793	0'-10¾	Pf 0.700
104	12'-1½	q=19.04	K=5.6	11.558		Spr(-11.558)	5'-0	Pe 0.388
421	11'-2¾			12.647		PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=24.29	2.13	C=120		0.005569	4'-11¾	Pf 0.117
421	11'-2¾			12.647			16'-0	Pe 0.533
678	10'-0			13.296		LtE(3'-8¼), PO(12'-3¾)	20'-11¾	Pv
CM	2.6350	Q=16.35	0.96	C=120		0.001011	9'-0	Pf 0.009
678	10'-0			13.296				Pe
681	10'-0			13.306			9'-0	Pv
CM	2.6350	Q=30.56	1.80	C=120		0.003213	9'-3	Pf 0.030
681	10'-0			13.306				Pe
685	10'-0			13.335			9'-3	Pv
CM	2.6350	Q=26.88	1.58	C=120		0.002534	9'-6	Pf 0.066
685	10'-0			13.335			16'-5¾	Pe
688	10'-0			13.401		PO(16'-5¾)	25'-11¾	Pv
CM	2.1570	Q=26.88	2.36	C=120		0.006718	4'-11¾	Pf 0.058
688	10'-0			13.401			3'-8¼	Pe -0.533
668	11'-2¾			12.926		LtE(3'-8¼)	8'-8	Pv
CM	2.1570	Q=46.13	4.05	C=120		0.018250	13'-5	Pf 0.245
668	11'-2¾			12.926				Pe
418	11'-2¾			13.171			13'-5	Pv
CM	2.1570	Q=65.58	5.76	C=120		0.034979	13'-5	Pf 0.469
418	11'-2¾			13.171				Pe
412	11'-2¾			13.641			13'-5	Pv
CM	2.1570	Q=85.44	7.50	C=120		0.057063	13'-5	Pf 0.766
412	11'-2¾			13.641				Pe
405	11'-2¾			14.406			13'-5	Pv
CM	2.1570	Q=105.80	9.29	C=120		0.084746	13'-2	Pf 1.116
405	11'-2¾			14.406				Pe
394	11'-2¾			15.522			13'-2	Pv
CM	2.1570	Q=126.97	11.15	C=120		0.118747	15'-6¾	Pf 3.748
394	11'-2¾			15.522			16'-0	Pe 0.533
377	10'-0			19.803		LtE(3'-8¼), PO(12'-3¾)	31'-6¾	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
• • • • • Route 5 • • • • •							
D	1.0490	Q=19.07	7.08	C=120	0.119193	0'-9	Pf 0.685
D5	11'-11¾	q=19.07	K=5.6	11.600	Spr(-11.600)	5'-0	Pe 0.325
408	11'-2¾			12.611	PO(5'-0)	5'-9	Pv
• • • • • Route 6 • • • • •							
SP	1.0490	Q=19.09	7.09	C=120	0.119372	0'-10¾	Pf 0.704
106	12'-1½	q=19.09	K=5.6	11.619	Spr(-11.619)	5'-0	Pe 0.388
401	11'-2¾			12.711	PO(5'-0)	5'-10¾	Pv
• • • • • Route 7 • • • • •							
SP	1.0490	Q=19.10	7.09	C=120	0.119537	0'-10¾	Pf 0.705
107	12'-1½	q=19.10	K=5.6	11.636	Spr(-11.636)	5'-0	Pe 0.388
422	11'-2¾			12.729	PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=4.90	0.43	C=120	0.000288	13'-5	Pf 0.004
422	11'-2¾			12.729			Pe
416	11'-2¾			12.733		13'-5	Pv
CM	2.1570	Q=24.00	2.11	C=120	0.005448	13'-5	Pf 0.073
416	11'-2¾			12.733			Pe
410	11'-2¾			12.806		13'-5	Pv
CM	2.1570	Q=43.23	3.80	C=120	0.016179	13'-5	Pf 0.217
410	11'-2¾			12.806			Pe
403	11'-2¾			13.023		13'-5	Pv
CM	2.1570	Q=62.56	5.49	C=120	0.032056	13'-2	Pf 0.422
403	11'-2¾			13.023			Pe
392	11'-2¾			13.445		13'-2	Pv
CM	2.1570	Q=82.21	7.22	C=120	0.053137	15'-6¾	Pf 1.677
392	11'-2¾			13.445		16'-0	Pe 0.533
366	10'-0			15.655	LtE(3'-8¼), PO(12'-3¾)	31'-6¾	Pv
• • • • • Route 8 • • • • •							
SP	1.0490	Q=19.11	7.09	C=120	0.119571	0'-10¾	Pf 0.705
108	12'-1½	q=19.11	K=5.6	11.640	Spr(-11.640)	5'-0	Pe 0.388
416	11'-2¾			12.733	PO(5'-0)	5'-10¾	Pv
• • • • • Route 9 • • • • •							
SP	1.0490	Q=19.12	7.10	C=120	0.119715	0'-9	Pf 0.688
109	11'-11¾	q=19.12	K=5.6	11.655	Spr(-11.655)	5'-0	Pe 0.325
409	11'-2¾			12.669	PO(5'-0)	5'-9	Pv
• • • • • Route 10 • • • • •							
SP	1.0490	Q=19.16	7.11	C=120	0.120168	0'-10¾	Pf 0.708
110	12'-1½	q=19.16	K=5.6	11.703	Spr(-11.703)	5'-0	Pe 0.388
402	11'-2¾			12.800	PO(5'-0)	5'-10¾	Pv
• • • • • Route 11 • • • • •							
SP	1.0490	Q=19.16	7.11	C=120	0.120226	0'-10¾	Pf 0.709
854	12'-1½	q=19.16	K=5.6	11.709	Spr(-11.709)	5'-0	Pe 0.388
667	11'-2¾			12.806	PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=22.84	2.01	C=120	0.004971	13'-5	Pf 0.067
667	11'-2¾			12.806			Pe
417	11'-2¾			12.873		13'-5	Pv
CM	2.1570	Q=42.06	3.69	C=120	0.015377	13'-5	Pf 0.206
417	11'-2¾			12.873			Pe
411	11'-2¾			13.079		13'-5	Pv
CM	2.1570	Q=61.49	5.40	C=120	0.031052	13'-5	Pf 0.417
411	11'-2¾			13.079			Pe
404	11'-2¾			13.496		13'-5	Pv
CM	2.1570	Q=81.18	7.13	C=120	0.051913	13'-2	Pf 0.684
404	11'-2¾			13.496			Pe
393	11'-2¾			14.179		13'-2	Pv
CM	2.1570	Q=101.38	8.90	C=120	0.078306	15'-6¾	Pf 2.471
393	11'-2¾			14.179		16'-0	Pe 0.533
370	10'-0			17.183	LtE(3'-8¼), PO(12'-3¾)	31'-6¾	Pv
• • • • • Route 12 • • • • •							
SP	1.0490	Q=19.21	7.13	C=120	0.120825	0'-10¾	Pf 0.712
111	12'-1½	q=19.21	K=5.6	11.772	Spr(-11.772)	5'-0	Pe 0.388
417	11'-2¾			12.873	PO(5'-0)	5'-10¾	Pv
• • • • • Route 13 • • • • •							
SP	1.0490	Q=19.22	7.14	C=120	0.120956	0'-9	Pf 0.695
112	11'-11¾	q=19.22	K=5.6	11.786	Spr(-11.786)	5'-0	Pe 0.325
410	11'-2¾			12.806	PO(5'-0)	5'-9	Pv
• • • • • Route 14 • • • • •							
SP	1.0490	Q=19.26	7.15	C=120	0.121309	0'-10¾	Pf 0.715
855	12'-1½	q=19.26	K=5.6	11.823	Spr(-11.823)	5'-0	Pe 0.388
668	11'-2¾			12.926	PO(5'-0)	5'-10¾	Pv
• • • • • Route 15 • • • • •							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
SP	1.0490	Q=19.29	7.16	C=120	0.121661	0'-10¾	Pf 0.717
113	12'-1½	q=19.29	K=5.6	11.860	Spr(-11.860)	5'-0	Pe 0.388
90	11'-2¾			12.966	PO(5'-0)	5'-10¾	Pv
Route 16							
SP	1.0490	Q=19.33	7.18	C=120	0.122180	0'-10¾	Pf 0.720
114	12'-1½	q=19.33	K=5.6	11.915	Spr(-11.915)	5'-0	Pe 0.388
403	11'-2¾			13.023	PO(5'-0)	5'-10¾	Pv
Route 17							
SP	1.0490	Q=19.39	7.20	C=120	0.122868	0'-10¾	Pf 0.724
115	12'-1½	q=19.39	K=5.6	11.987	Spr(-11.987)	5'-0	Pe 0.388
391	11'-2¾			13.100	PO(5'-0)	5'-10¾	Pv
Route 18							
SP	1.0490	Q=19.43	7.21	C=120	0.123408	0'-9	Pf 0.710
116	11'-11¾	q=19.43	K=5.6	12.044	Spr(-12.044)	5'-0	Pe 0.325
411	11'-2¾			13.079	PO(5'-0)	5'-9	Pv
Route 19							
SP	1.0490	Q=19.44	7.22	C=120	0.123509	0'-10¾	Pf 0.728
117	12'-1½	q=19.44	K=5.6	12.055	Spr(-12.055)	5'-0	Pe 0.388
418	11'-2¾			13.171	PO(5'-0)	5'-10¾	Pv
Route 20							
SP	1.0490	Q=19.65	7.30	C=120	0.125967	0'-10¾	Pf 0.743
118	12'-1½	q=19.65	K=5.6	12.314	Spr(-12.314)	5'-0	Pe 0.388
392	11'-2¾			13.445	PO(5'-0)	5'-10¾	Pv
Route 21							
SP	1.0490	Q=19.69	7.31	C=120	0.126416	0'-10¾	Pf 0.745
120	12'-1½	q=19.69	K=5.6	12.362	Spr(-12.362)	5'-0	Pe 0.388
404	11'-2¾			13.496	PO(5'-0)	5'-10¾	Pv
Route 22							
SP	1.0490	Q=19.86	7.37	C=120	0.128449	0'-9	Pf 0.739
122	11'-11¾	q=19.86	K=5.6	12.577	Spr(-12.577)	5'-0	Pe 0.325
412	11'-2¾			13.641	PO(5'-0)	5'-9	Pv
Route 23							
SP	1.0490	Q=20.20	7.50	C=120	0.132529	0'-10¾	Pf 0.781
133	12'-1½	q=20.20	K=5.6	13.009	Spr(-13.009)	5'-0	Pe 0.388
393	11'-2¾			14.179	PO(5'-0)	5'-10¾	Pv
Route 24							
SP	1.0490	Q=20.36	7.56	C=120	0.134556	0'-10¾	Pf 0.793
134	12'-1½	q=20.36	K=5.6	13.225	Spr(-13.225)	5'-0	Pe 0.388
405	11'-2¾			14.406	PO(5'-0)	5'-10¾	Pv
Route 25							
SP	1.0490	Q=21.16	7.86	C=120	0.144478	0'-10¾	Pf 0.852
135	12'-1½	q=21.16	K=5.6	14.282	Spr(-14.282)	5'-0	Pe 0.388
394	11'-2¾			15.522	PO(5'-0)	5'-10¾	Pv
Route 26							
CM	4.2600	Q=112.23	2.53	C=120	0.003437	4'-4¾	Pf 0.106
123	18'-3			21.259		26'-4	Pe 0.253
262	17'-8			21.617	T(26'-4)	30'-8¾	Pv
CM	6.3570	Q=112.23	1.13	C=120	0.000489	2'-8	Pf 0.020
262	17'-8			21.617		37'-8¾	Pe 1.156
261	15'-0			22.793	T(37'-8¾)	40'-4¾	Pv
Route 27							
CM	2.6350	Q=7.70	0.45	C=120	0.000251	0'-11	Pf 0.000
480	10'-7¾			23.622			Pe 0.000
482	10'-7¾			23.622		0'-11	Pv
CM	3.2600	Q=7.70	0.30	C=120	0.000089	4'-4¼	Pf 0.003
482	10'-7¾			23.622		26'-10½	Pe -1.888
297	15'-0			21.737	LtE(6'-8¾), PO(20'-2)	31'-2¾	Pv
Route 28							
UG	7.9800	Q=165.30	1.06	C=150	0.000219	1167'-0	Pf 0.285
3	-5'-0			32.657		134'-3¾	Pe
5	-5'-0			32.942	2E(27'-2), 2EE(13'-7), T(52'-9¾)	1301'-3¾	Pv
Route 29							
CM	4.2600	Q=112.23	2.53	C=120	0.003437	171'-11	Pf 1.007
313	15'-0			21.348		121'-1¾	Pe -1.409
132	18'-3			20.947	2LtE(7'-10¾), 4T(26'-4)	293'-0½	Pv
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-0	Pf 0.034
132	18'-3			20.947			Pe
131	18'-3			20.981		10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-0	Pf 0.034
131	18'-3			20.981			Pe
130	18'-3			21.015		10'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-0	Pf 0.034
130	18'-3			21.015			Pe
29	18'-3			21.050		10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-0	Pf 0.034
129	18'-3			21.050			Pe
128	18'-3			21.084		10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-0	Pf 0.034
128	18'-3			21.084			Pe
127	18'-3			21.118		10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-0	Pf 0.034
127	18'-3			21.118			Pe
126	18'-3			21.153		10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-0	Pf 0.034
126	18'-3			21.153			Pe
125	18'-3			21.187		10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-0	Pf 0.034
125	18'-3			21.187			Pe
124	18'-3			21.222		10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-10	Pf 0.037
124	18'-3			21.222			Pe
123	18'-3			21.259		10'-10	Pv
••••• Route 30 •••••							
CM	2.6350	Q=7.94	0.47	C=120	0.000265	9'-3	Pf 0.002
678	10'-0			13.296			Pe
674	10'-0			13.299		9'-3	Pv
••••• Route 31 •••••							
CM	2.1570	Q=3.68	0.32	C=120	0.000170	4'-11¾	Pf 0.004
685	10'-0			13.335	PO(12'-3¾)	16'-0	Pe -0.533
667	11'-2¾			12.806	LtE(3'-8¼)	20'-11¾	Pv
••••• Route 32 •••••							
CM	2.1570	Q=14.21	1.25	C=120	0.002065	4'-11¾	Pf 0.043
422	11'-2¾			12.729		16'-0	Pe 0.533
681	10'-0			13.306	LtE(3'-8¼), PO(12'-3¾)	20'-11¾	Pv
••••• Route 33 •••••							
CM	2.1570	Q=5.25	0.46	C=120	0.000327	13'-5	Pf 0.004
415	11'-2¾			12.642			Pe
421	11'-2¾			12.647		13'-5	Pv
••••• Route 34 •••••							
CM	2.1570	Q=9.57	0.84	C=120	0.000994	13'-5	Pf 0.013
414	11'-2¾			12.598			Pe
420	11'-2¾			12.611		13'-5	Pv
••••• Route 35 •••••							
BL	1.0490	Q=8.88	3.30	C=120	0.029005	20'-0	Pf 0.870
479	7'-10			24.556		10'-0	Pe -0.217
358	8'-4			25.209	T(5'-0), PO(5'-0)	30'-0	Pv
CM	2.6350	Q=8.88	0.52	C=120	0.000327	8'-1¾	Pf 0.010
358	8'-4			25.209		21'-11½	Pe -2.890
198	15'-0			22.329	LtE(5'-6), PO(16'-5¾)	30'-1¼	Pv
••••• Route 36 •••••							
BL	1.0490	Q=7.70	2.86	C=120	0.022264	2'-9¾	Pf 0.285
479	7'-10			24.556	T(5'-0)	10'-0	Pe -1.219
480	10'-7¾			23.622	PO(5'-0)	12'-9¾	Pv
••••• Route 37 •••••							
BL	1.0490	Q=16.59	6.16	C=120	0.092043	15'-6	Pf 2.071
530	10'-0			21.546	PO(5'-0)	7'-0	Pe 0.939
479	7'-10			24.556	E(2'-0)	22'-6	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

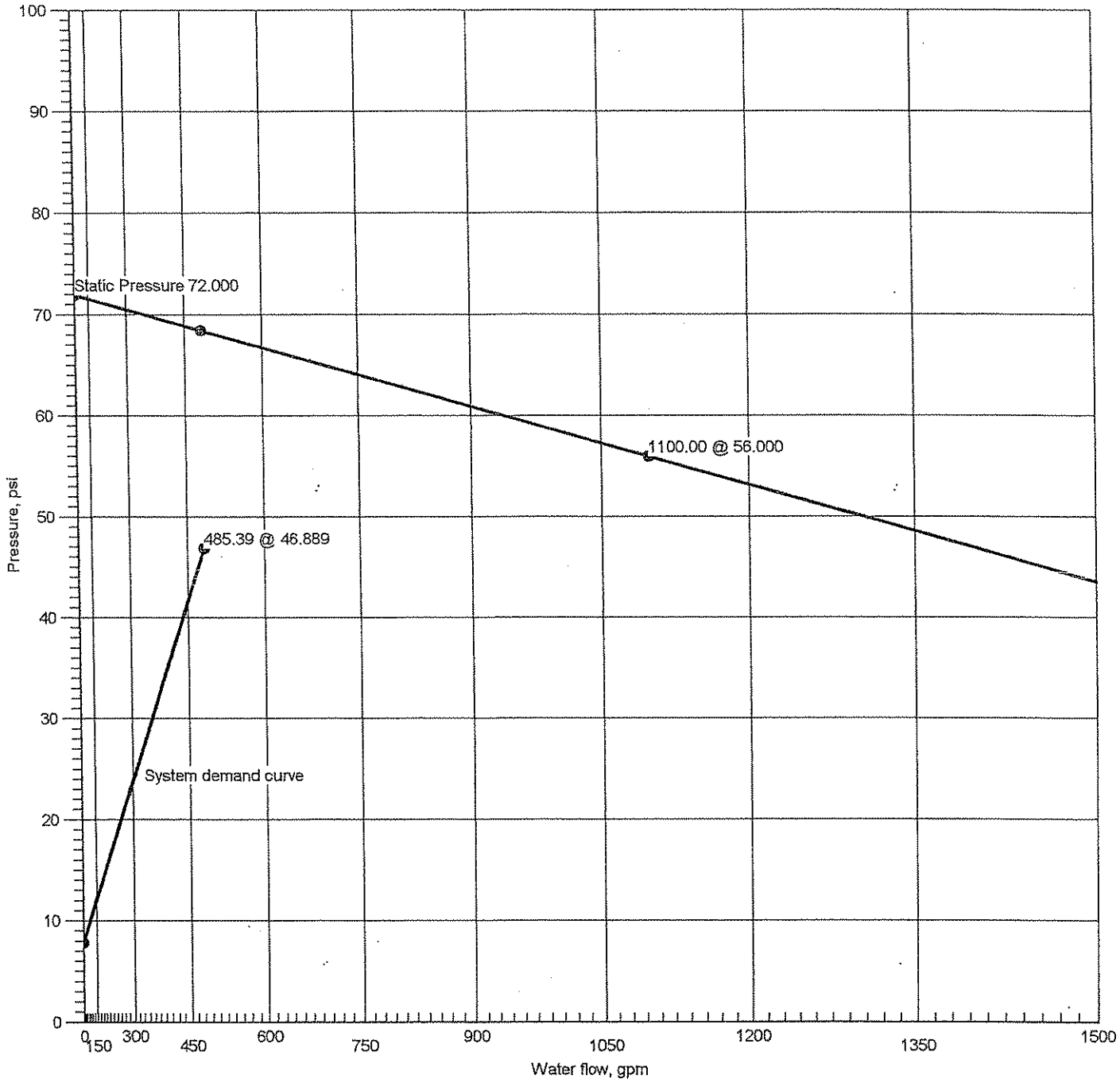
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph
Supply at Node 1

Static Pressure
72.000

Residual Pressure
1100.00 @ 56.000

Available Pressure/Time of Test
68.478 @ 485.39

System Demand
485.39 @ 46.889

System Demand (Including Hose Allowance)
485.39 @ 46.889

Hydraulic Overview

Job

Job Number: 2440 ARMORY	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2440 ARMORY & MISC	Phone: / FAX:
Jress 1: OPERATIONS BLDG	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site:

System

Density: 0.150gpm/ft²	Area of Application: 3000.00ft² (Actual 3009.76ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 19.00 at 11.511	Hose Streams: 0.00
Coverage Per Sprinkler: 100.00ft²	Number Of Sprinklers Calculated: 34
System Pressure Demand: 48.941	System Flow Demand: 652.22
Total Demand: 652.22 @ 48.941	Pressure Result: +16.975 (25.8%)

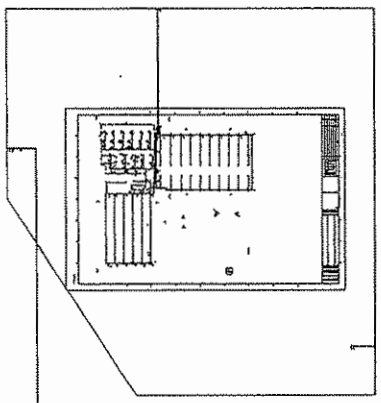
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	0.00	72.000	56.000

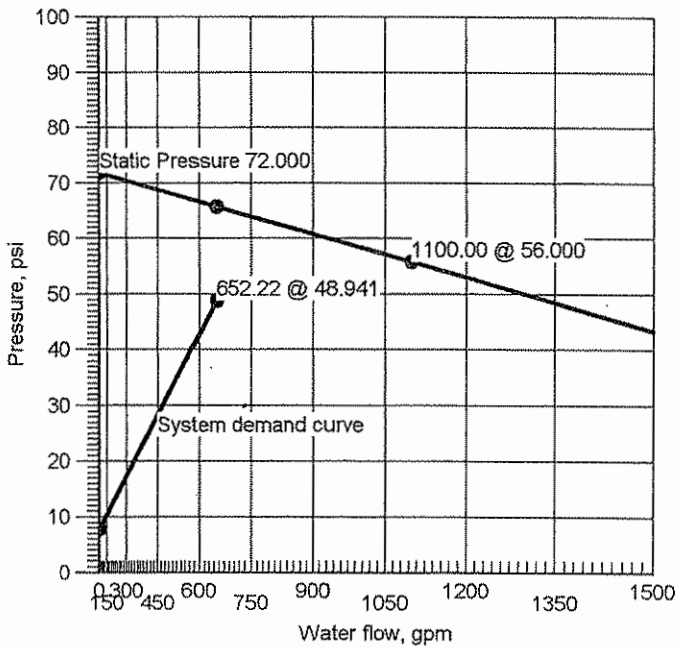
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)

FP 3 BLDG 2440 2441 1st Floor R5



Supply at Node 1 (1100.00, 0.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 2440 ARMORY	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2440 ARMORY & MISC	State Certification/License Number:
Address 1: OPERATIONS BLDG	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site:
City: STENNIS / State: MS / Zip Code:	Drawing Name: FP-3 BLDG 2440 2441 1st Floor R5

System

Most Demanding Sprinkler Data: 5.6 K-Factor 19.00 at 11.511

Hose Allowance At Source: 0.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 0.00

System Flow Demand: 652.22

Total Water Required (Including Hose Allowance): 652.22

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 19.87 between nodes 480 and 295

Maximum Velocity Under Ground: 4.18 between nodes 1 and 12

Volume capacity of Wet Pipes: 6939.58gal

Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Ordinary Group I

Density: 0.150gpm/ft²

Area of Application: 3000.00ft² (Actual 3009.76ft²)

Number Of Sprinklers Calculated: 34

Coverage Per Sprinkler: 100.00ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @ Flow (gpm)	Available (psi) @ Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	0.00	72.000	56.000 @ 1100.00	65.916 @ 652.22	48.941	16.975

Contractor

Contractor Number:		Contact Name:	Contact Title:
Contractor Name: SIMPLEXGRINNELL		Phone:	Extension:
Address 1: 5800 JEFFERSON HWY		FAX:	
Address 2: SUITE A		E-mail:	
City: HARAHAN / State: LA / Zip Code: 70123		Web-Site:	

Summary Of Outflowing Devices

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
⇨ Sprinkler	203	19.00	19.00	5.6	11.511		
Sprinkler	204	19.08	19.00	5.6	11.610		
Sprinkler	207	19.37	19.00	5.6	11.958		
Sprinkler	213	19.94	19.00	5.6	12.684		
Sprinkler	220	20.86	19.00	5.6	13.877		
Sprinkler	235	21.44	19.00	5.6	14.659		
Sprinkler	206	19.32	19.00	5.6	11.904		
Sprinkler	208	19.40	19.00	5.6	12.006		
Sprinkler	211	19.69	19.00	5.6	12.366		
Sprinkler	215	20.28	19.00	5.6	13.114		
Sprinkler	223	21.21	19.00	5.6	14.345		
Sprinkler	228	21.80	19.00	5.6	15.150		
Sprinkler	212	15.56	14.82	5.6	7.721		
Sprinkler	201	15.53	14.82	5.6	7.688		
Sprinkler	202	15.64	14.82	5.6	7.799		
Sprinkler	205	15.13	14.82	5.6	7.297		
Sprinkler	209	15.41	14.82	5.6	7.569		
Sprinkler	218	18.37	14.82	5.6	10.756		
Sprinkler	226	19.35	14.82	5.6	11.938		
Sprinkler	219	16.90	14.82	5.6	9.106		
Sprinkler	216	17.77	14.82	5.6	10.072		
Sprinkler	221	18.76	14.82	5.6	11.219		
Sprinkler	210	15.61	14.82	5.6	7.769		
Sprinkler	214	16.09	14.82	5.6	8.252		
Sprinkler	237	18.79	14.82	5.6	11.256		
Sprinkler	227	19.79	14.82	5.6	12.490		
Sprinkler	229	20.22	14.82	5.6	13.031		
Sprinkler	231	21.28	14.82	5.6	14.446		
Sprinkler	217	18.18	14.82	5.6	10.545		
Sprinkler	224	19.01	14.82	5.6	11.520		
Sprinkler	239	20.43	14.82	5.6	13.307		
Sprinkler	232	23.85	14.82	5.6	18.143		
Sprinkler	233	24.58	14.82	5.6	19.271		
Sprinkler	234	24.59	14.82	5.6	19.281		

⇨ Most Demanding Sprinkler Data

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
3	-5'-0	T(59'-4½)	33.402		
37	10'-0	PO(5'-0)	12.782		
38	10'-0	PO(5'-0)	12.886		
39	10'-0	PO(5'-0)	13.255		
40	10'-0	PO(5'-0)	14.023		
41	10'-0	PO(5'-0)	15.287		
42	10'-0	PO(5'-0)	16.113		
7	1'-0		30.244		
84	4'-0¼	CV(16'-0)	28.748		
161	8'-3		26.023		
163	15'-0	LtE(11'-3¾)	23.011		
261	15'-0	T(37'-8¾)	22.669		
262	17'-8		21.494		
123	18'-3	PO(12'-3¾)	21.141		
124	18'-3	PO(12'-3¾)	21.106		
125	18'-3	PO(12'-3¾)	21.074		
126	18'-3	PO(12'-3¾)	21.041		
127	18'-3	PO(12'-3¾)	21.008		
128	18'-3	PO(12'-3¾)	20.976		
129	18'-3	PO(12'-3¾)	20.943		
130	18'-3	PO(12'-3¾)	20.911		
131	18'-3	PO(12'-3¾)	20.878		
132	18'-3	PO(12'-3¾)	20.845		
284	15'-0		22.669		
165	10'-0	PO(5'-0)	13.198		
167	10'-0	PO(5'-0)	13.306		
169	10'-0	PO(5'-0)	13.686		
171	10'-0	PO(5'-0)	14.478		
172	10'-0	PO(5'-0)	15.781		
174	10'-0	PO(5'-0)	16.634		
5	-5'-0	2T(52'-9¾)	33.894		
11	-5'-0	LtE(19'-7½)	33.954		
12	-6'-0	LtE(22'-0¾)	46.592		
164	8'-4	PO(6'-0)	15.821		
190	10'-0	E(3'-0)	13.882		
166	8'-4	PO(6'-0)	15.944		
191	10'-0	E(3'-0)	13.996		
168	8'-4	PO(6'-0)	16.377		
192	10'-0	E(3'-0)	14.395		
170	8'-4	PO(6'-0)	17.279		
193	10'-0	E(3'-0)	15.227		
194	8'-4		18.697		
173	8'-4	PO(6'-0)	18.762		
195	10'-0	E(3'-0)	16.595		
175	8'-4	PO(6'-0)	19.732		
196	10'-0	E(3'-0)	17.490		
358	8'-4	PO(5'-0)	20.516		
198	15'-0	PO(16'-5¾)	21.740		
222	11'-2¾	2T(5'-0)	9.782		
225	11'-2¾	2T(5'-0)	8.995		
230	11'-2¾	T(5'-0)	9.818		
236	11'-2¾	T(5'-0)	10.419		
238	11'-2¾	T(5'-0)	11.704		
242	11'-2¾	T(5'-0)	9.547		
245	11'-2¾	T(5'-0)	12.063		
248	11'-2¾	T(5'-0)	13.432		
251	11'-2¾	T(5'-0)	9.586		
273	11'-2¾	T(5'-0)	14.033		
276	11'-2¾	T(5'-0)	15.601		
278	11'-2¾	T(8'-0), T(5'-0)	11.268		
280	11'-2¾	T(5'-0), T(6'-0)	12.723		
282	11'-2¾	2T(6'-0)	13.982		
289	10'-7¾	PO(8'-0)	14.372		
290	10'-7¾	PO(8'-0)	15.137		
478	10'-7¾	T(12'-3¾)	16.385		
293	10'-7¾	PO(8'-0)	16.461		
294	10'-7¾	PO(6'-0)	17.596		
295	10'-7¾	PO(6'-0)	19.498		
479	7'-10	T(5'-0)	21.699		
480	10'-7¾	PO(5'-0)	20.068		
482	10'-7¾		20.306		
297	15'-0	PO(20'-2)	21.298		
303	11'-2¾	E(2'-0)	13.635		
530	10'-0	PO(5'-0)	23.370		
313	15'-0	T(26'-4)	21.299		
360	10'-0	2PO(16'-5¾)	23.269		
362	10'-0	2PO(16'-5¾)	23.269		

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
364	10'-0	PO(12'-3¾)	23.268		
366	10'-0	PO(12'-3¾)	23.267		
396	10'-0	PO(5'-0)	23.266		
370	10'-0	PO(12'-3¾)	23.275		
399	10'-0	PO(5'-0)	23.277		
375	10'-0		23.318		
377	10'-0	PO(12'-3¾)	23.318		
497	10'-0	PO(5'-0)	23.319		
671	10'-0	PO(12'-3¾)	23.271		
674	10'-0	PO(12'-3¾)	23.272		
678	10'-0	PO(12'-3¾)	23.272		
681	10'-0	PO(12'-3¾)	23.273		
685	10'-0	PO(12'-3¾)	23.275		
688	10'-0	2PO(16'-5¾)	23.279		
203	11'-2¾	Spr(-11.511)	11.511	19.00	
204	11'-2¾	Spr(-11.610)	11.610	19.08	
207	11'-2¾	Spr(-11.958)	11.958	19.37	
213	11'-2¾	Spr(-12.684)	12.684	19.94	
220	11'-2¾	Spr(-13.877)	13.877	20.86	
235	11'-2¾	Spr(-14.659)	14.659	21.44	
206	11'-2¾	Spr(-11.904)	11.904	19.32	
208	11'-2¾	Spr(-12.006)	12.006	19.40	
211	11'-2¾	Spr(-12.366)	12.366	19.69	
215	11'-2¾	Spr(-13.114)	13.114	20.28	
223	11'-2¾	Spr(-14.345)	14.345	21.21	
228	11'-2¾	Spr(-15.150)	15.150	21.80	
212	12'-1½	Spr(-7.721)	7.721	15.56	
201	9'-0	Spr(-7.688)	7.688	15.53	
202	9'-0	Spr(-7.799)	7.799	15.64	
205	12'-1½	Spr(-7.297)	7.297	15.13	
209	12'-1½	Spr(-7.569)	7.569	15.41	
218	10'-0	Spr(-10.756)	10.756	18.37	
226	10'-0	Spr(-11.938)	11.938	19.35	
219	12'-1½	Spr(-9.106)	9.106	16.90	
216	9'-0	Spr(-10.072)	10.072	17.77	
221	9'-0	Spr(-11.219)	11.219	18.76	
210	12'-1½	Spr(-7.769)	7.769	15.61	
214	12'-1½	Spr(-8.252)	8.252	16.09	
237	10'-0	Spr(-11.256)	11.256	18.79	
227	10'-0	Spr(-12.490)	12.490	19.79	
229	10'-0	Spr(-13.031)	13.031	20.22	
231	10'-0	Spr(-14.446)	14.446	21.28	
217	9'-0	Spr(-10.545)	10.545	18.18	
224	9'-0	Spr(-11.520)	11.520	19.01	
239	9'-0	Spr(-13.307)	13.307	20.43	
232	10'-11¾	Spr(-18.143)	18.143	23.85	
233	12'-1½	Spr(-19.271)	19.271	24.58	
234	12'-1½	Spr(-19.281)	19.281	24.59	
1	-6'-0	S	48.941	652.22	

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
••••• Route 1 •••••							
P	1.0490	Q=19.00	7.05	C=120	0.118351	1'-2¾	Pf 0.737
203	11'-2¾	q=19.00	K=5.6	11.511	Spr(-11.511)	5'-0	Pe 0.533
37	10'-0			12.782	PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=19.00	4.08	C=120	0.031127	13'-4½	Pf 0.416
37	10'-0			12.782			Pe
165	10'-0			13.198		13'-4½	Pv
CM	1.3800	Q=38.32	8.22	C=120	0.113976	6'-0	Pf 0.684
165	10'-0			13.198			Pe
190	10'-0			13.882		6'-0	Pv
RN	1.3800	Q=38.32	8.22	C=120	0.113976	1'-8	Pf 1.216
190	10'-0			13.882	E(3'-0)	9'-0	Pe 0.723
164	8'-4			15.821	PO(6'-0)	10'-8	Pv
CM	2.1570	Q=38.32	3.36	C=120	0.012947	9'-6	Pf 0.123
164	8'-4			15.821			Pe
166	8'-4			15.944		9'-6	Pv
CM	2.1570	Q=76.81	6.74	C=120	0.046859	9'-3	Pf 0.433
166	8'-4			15.944			Pe
168	8'-4			16.377		9'-3	Pv
CM	2.1570	Q=115.86	10.17	C=120	0.100256	9'-0	Pf 0.902
168	8'-4			16.377			Pe
170	8'-4			17.279		9'-0	Pv
CM	2.1570	Q=156.09	13.70	C=120	0.173995	8'-1¾	Pf 1.417
170	8'-4			17.279			Pe
194	8'-4			18.697		8'-1¾	Pv
CM	2.6350	Q=156.09	9.18	C=120	0.065642	1'-0	Pf 0.066
194	8'-4			18.697			Pe
173	8'-4			18.762		1'-0	Pv
CM	2.6350	Q=198.16	11.66	C=120	0.102077	9'-6	Pf 0.970
173	8'-4			18.762			Pe
175	8'-4			19.732		9'-6	Pv
CM	2.6350	Q=241.40	14.20	C=120	0.147063	5'-4	Pf 0.784
175	8'-4			19.732			Pe -0.000
358	8'-4			20.516		5'-4	Pv
M	2.6350	Q=231.99	13.65	C=120	0.136639	8'-1¾	Pf 4.114
358	8'-4			20.516		21'-11½	Pe -2.890
198	15'-0			21.740	LtE(5'-6), PO(16'-5¾)	30'-1¼	Pv
CM	4.2600	Q=543.16	12.23	C=120	0.063540	14'-7½	Pf 0.929
198	15'-0			21.740			Pe
284	15'-0			22.669		14'-7½	Pv
DY	6.3570	Q=543.16	5.49	C=120	0.009046	0'-0	Pf 0.000
284	15'-0			22.669			Pe 0.000
261	15'-0			22.669		0'-0	Pv
CM	6.3570	Q=652.22	6.59	C=120	0.012690	4'-3½	Pf 0.342
261	15'-0			22.669		22'-7½	Pe -0.000
163	15'-0			23.011	2LtE(11'-3¾)	26'-11	Pv
FR	6.3570	Q=652.22	6.59	C=120	0.012690	6'-9	Pf 0.086
163	15'-0			23.011			Pe 2.926
161	8'-3			26.023		6'-9	Pv
MS	6.3570	Q=652.22	6.59	C=120	0.012690	1'-1	Pf 0.887
161	8'-3			26.023		68'-9¾	Pe 1.838
84	4'-0¼			28.748	2f(-0.000), CV(40'-2¾), BV(12'-7), CV(16'-0)	69'-10¾	Pv
FR	6.0650	Q=652.22	7.24	C=120	0.015955	2'-0	Pf 0.191
84	4'-0¼			28.748		10'-0	Pe 1.305
7	1'-0			30.244	BV(10'-0)	12'-0	Pv
UG	8.3900	Q=652.22	3.78	C=140	0.002470	135'-2½	Pf 0.556
7	1'-0			30.244		89'-11	Pe 2.601
3	-5'-0			33.402	E(30'-6½), T(59'-4½)	225'-1½	Pv
UG	7.9800	Q=430.10	2.76	C=150	0.001284	303'-2¾	Pf 0.492
3	-5'-0			33.402		79'-11¾	Pe
5	-5'-0			33.894	E(27'-2), T(52'-9¾)	383'-2½	Pv
UG	7.9800	Q=652.22	4.18	C=150	0.002775	1'-11	Pf 0.060
5	-5'-0			33.894		19'-7½	Pe
11	-5'-0			33.954	LtE(19'-7½)	21'-6½	Pv
UG	8.3900	Q=652.22	3.78	C=140	0.002470	17'-0	Pf 12.205
11	-5'-0			33.954		66'-2	Pe 0.434
12	-6'-0			46.592	3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv
UG	7.9800	Q=652.22	4.18	C=150	0.002775	727'-3	Pf 2.349
12	-6'-0			46.592		119'-2½	Pe
1	-6'-0			48.941	2E(27'-2), 2GV(6'-0½), T(52'-9¾), S	846'-5¾	Pv
••••• Route 2 •••••							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
SP	1.0490	Q=19.08	7.08	C=120	0.119290	1'-2¾	Pf 0.743
204	11'-2¾	q=19.08	K=5.6	11.610	Spr(-11.610)	5'-0	Pe 0.533
38	10'-0			12.886	PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=19.08	4.09	C=120	0.031374	13'-4½	Pf 0.419
38	10'-0			12.886			Pe
167	10'-0			13.306		13'-4½	Pv
CM	1.3800	Q=38.49	8.26	C=120	0.114879	6'-0	Pf 0.690
167	10'-0			13.306			Pe
191	10'-0			13.996		6'-0	Pv
RN	1.3800	Q=38.49	8.26	C=120	0.114879	1'-8	Pf 1.225
191	10'-0			13.996	E(3'-0)	9'-0	Pe 0.723
166	8'-4			15.944	PO(6'-0)	10'-8	Pv
Route 3							
SP	1.0490	Q=15.13	5.62	C=120	0.077635	7'-10½	Pf 1.309
205	12'-1½	q=15.13	K=5.6	7.297	Spr(-7.297)	9'-0	Pe 0.388
225	11'-2¾			8.995	2E(2'-0), T(5'-0)	16'-10½	Pv
BL	1.3800	Q=30.53	6.55	C=120	0.074869	7'-4½	Pf 0.552
225	11'-2¾			8.995			Pe
242	11'-2¾			9.547		7'-4½	Pv
BL	1.6100	Q=46.62	7.35	C=120	0.077320	0'-6	Pf 0.039
242	11'-2¾			9.547			Pe
251	11'-2¾			9.586		0'-6	Pv
BL	1.6100	Q=62.23	9.81	C=120	0.131921	4'-9	Pf 1.682
251	11'-2¾			9.586		8'-0	Pe
278	11'-2¾			11.268	T(8'-0)	12'-9	Pv
BL	1.6100	Q=80.41	12.67	C=120	0.211975	1'-5½	Pf 2.851
278	11'-2¾			11.268		12'-0	Pe 0.253
289	10'-7¾			14.372	E(4'-0), PO(8'-0)	13'-5½	Pv
CM	2.1570	Q=80.41	7.06	C=120	0.051012	15'-0	Pf 0.765
289	10'-7¾			14.372			Pe
290	10'-7¾			15.137		15'-0	Pv
CM	2.1570	Q=149.65	13.14	C=120	0.160959	7'-9	Pf 1.247
290	10'-7¾			15.137			Pe
478	10'-7¾			16.385	T(12'-3¾)	7'-9	Pv
M	2.6350	Q=149.65	8.80	C=120	0.060724	1'-3	Pf 0.076
478	10'-7¾			16.385			Pe
293	10'-7¾			16.461		1'-3	Pv
CM	2.6350	Q=220.01	12.94	C=120	0.123866	9'-2	Pf 1.135
293	10'-7¾			16.461			Pe
294	10'-7¾			17.596		9'-2	Pv
CM	2.6350	Q=277.37	16.32	C=120	0.190162	10'-0	Pf 1.902
294	10'-7¾			17.596			Pe
295	10'-7¾			19.498		10'-0	Pv
CM	2.6350	Q=337.80	19.87	C=120	0.273821	2'-1	Pf 0.570
295	10'-7¾			19.498			Pe
480	10'-7¾			20.068		2'-1	Pv
CM	2.6350	Q=328.41	19.32	C=120	0.259903	0'-11	Pf 0.238
480	10'-7¾			20.068			Pe 0.000
482	10'-7¾			20.306		0'-11	Pv
CM	3.2600	Q=328.41	12.62	C=120	0.092181	4'-4¼	Pf 2.879
482	10'-7¾			20.306		26'-10½	Pe -1.888
297	15'-0			21.298	LtE(6'-8¾), PO(20'-2)	31'-2¾	Pv
CM	4.2600	Q=311.17	7.00	C=120	0.022671	19'-6	Pf 0.442
297	15'-0			21.298			Pe
198	15'-0			21.740		19'-6	Pv
Route 4							
SP	1.0490	Q=19.32	7.17	C=120	0.122083	1'-2¾	Pf 0.760
206	11'-2¾	q=19.32	K=5.6	11.904	Spr(-11.904)	5'-0	Pe 0.533
165	10'-0			13.198	PO(5'-0)	6'-2¾	Pv
Route 5							
SP	1.0490	Q=19.37	7.19	C=120	0.122596	1'-2¾	Pf 0.764
207	11'-2¾	q=19.37	K=5.6	11.958	Spr(-11.958)	5'-0	Pe 0.533
39	10'-0			13.255	PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=19.37	4.15	C=120	0.032243	13'-4½	Pf 0.431
39	10'-0			13.255			Pe
169	10'-0			13.686		13'-4½	Pv
CM	1.3800	Q=39.06	8.38	C=120	0.118059	6'-0	Pf 0.709
169	10'-0			13.686			Pe
192	10'-0			14.395		6'-0	Pv
RN	1.3800	Q=39.06	8.38	C=120	0.118059	1'-8	Pf 1.259
192	10'-0			14.395	E(3'-0)	9'-0	Pe 0.723
168	8'-4			16.377	PO(6'-0)	10'-8	Pv
Route 6							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
SP	1.0490	Q=19.40	7.20	C=120	0.123049	1'-2¾	Pf 0.766
208	11'-2¾	q=19.40	K=5.6	12.006	Spr(-12.006)	5'-0	Pe 0.533
67	10'-0			13.306	PO(5'-0)	6'-2¾	Pv
••••• Route 7 •••••							
SP	1.0490	Q=15.41	5.72	C=120	0.080304	3'-11	Pf 1.038
209	12'-1½	q=15.41	K=5.6	7.569	Spr(-7.569)	9'-0	Pe 0.388
225	11'-2¾			8.995	2E(2'-0), T(5'-0)	12'-11	Pv
••••• Route 8 •••••							
DR	1.0490	Q=15.53	5.76	C=120	0.081474	28'-6¾	Pf 3.060
201	9'-0	q=15.53	K=5.6	7.688	Spr(-7.688)	9'-0	Pe -0.966
222	11'-2¾			9.782	2E(2'-0), T(5'-0)	37'-6¾	Pv
BL	1.0490	Q=31.17	11.57	C=120	0.295665	6'-6	Pf 1.922
222	11'-2¾			9.782			Pe
238	11'-2¾			11.704		6'-6	Pv
BL	1.3800	Q=49.92	10.71	C=120	0.185911	6'-3	Pf 2.277
238	11'-2¾			11.704		6'-0	Pe
282	11'-2¾			13.982	T(6'-0)	12'-3	Pv
BL	1.6100	Q=70.35	11.09	C=120	0.165526	1'-5½	Pf 2.226
282	11'-2¾			13.982		12'-0	Pe 0.253
293	10'-7¾			16.461	E(4'-0), PO(8'-0)	13'-5½	Pv
••••• Route 9 •••••							
SP	1.0490	Q=15.56	5.78	C=120	0.081791	6'-10¾	Pf 1.709
212	12'-1½	q=15.56	K=5.6	7.721	Spr(-7.721)	14'-0	Pe 0.388
230	11'-2¾			9.818	2T(5'-0), 2E(2'-0)	20'-10¾	Pv
BL	1.3800	Q=32.46	6.96	C=120	0.083833	4'-2	Pf 0.601
230	11'-2¾			9.818		3'-0	Pe
236	11'-2¾			10.419	E(3'-0)	7'-2	Pv
BL	1.3800	Q=50.23	10.77	C=120	0.188038	6'-3	Pf 2.303
236	11'-2¾			10.419		6'-0	Pe
280	11'-2¾			12.723	T(6'-0)	12'-3	Pv
BL	1.6100	Q=69.24	10.91	C=120	0.160716	1'-5½	Pf 2.162
280	11'-2¾			12.723		12'-0	Pe 0.253
290	10'-7¾			15.137	E(4'-0), PO(8'-0)	13'-5½	Pv
••••• Route 10 •••••							
P	1.0490	Q=15.61	5.79	C=120	0.082265	8'-4½	Pf 1.429
210	12'-1½	q=15.61	K=5.6	7.769	Spr(-7.769)	9'-0	Pe 0.388
251	11'-2¾			9.586	2E(2'-0), T(5'-0)	17'-4½	Pv
••••• Route 11 •••••							
DR	1.0490	Q=15.64	5.81	C=120	0.082558	26'-8¾	Pf 2.950
202	9'-0	q=15.64	K=5.6	7.799	Spr(-7.799)	9'-0	Pe -0.966
222	11'-2¾			9.782	2E(2'-0), T(5'-0)	35'-8¾	Pv
••••• Route 12 •••••							
SP	1.0490	Q=19.69	7.31	C=120	0.126451	1'-2¾	Pf 0.788
211	11'-2¾	q=19.69	K=5.6	12.366	Spr(-12.366)	5'-0	Pe 0.533
169	10'-0			13.686	PO(5'-0)	6'-2¾	Pv
••••• Route 13 •••••							
SP	1.0490	Q=19.94	7.40	C=120	0.129459	1'-2¾	Pf 0.806
213	11'-2¾	q=19.94	K=5.6	12.684	Spr(-12.684)	5'-0	Pe 0.533
40	10'-0			14.023	PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=19.94	4.28	C=120	0.034048	13'-4½	Pf 0.455
40	10'-0			14.023			Pe
171	10'-0			14.478		13'-4½	Pv
CM	1.3800	Q=40.22	8.63	C=120	0.124660	6'-0	Pf 0.749
171	10'-0			14.478			Pe
193	10'-0			15.227		6'-0	Pv
RN	1.3800	Q=40.22	8.63	C=120	0.124660	1'-8	Pf 1.330
193	10'-0			15.227	E(3'-0)	9'-0	Pe 0.723
170	8'-4			17.279	PO(6'-0)	10'-8	Pv
••••• Route 14 •••••							
SP	1.0490	Q=16.09	5.97	C=120	0.086987	3'-5	Pf 0.907
214	12'-1½	q=16.09	K=5.6	8.252	Spr(-8.252)	7'-0	Pe 0.388
242	11'-2¾			9.547	E(2'-0), T(5'-0)	10'-5	Pv
••••• Route 15 •••••							
SP	1.0490	Q=20.28	7.53	C=120	0.133513	1'-2¾	Pf 0.832
215	11'-2¾	q=20.28	K=5.6	13.114	Spr(-13.114)	5'-0	Pe 0.533
171	10'-0			14.478	PO(5'-0)	6'-2¾	Pv
••••• Route 16 •••••							
P	1.0490	Q=16.90	6.27	C=120	0.095282	1'-4¾	Pf 0.324
219	12'-1½	q=16.90	K=5.6	9.106	Spr(-9.106)	2'-0	Pe 0.388
230	11'-2¾			9.818	E(2'-0)	3'-4¾	Pv
••••• Route 17 •••••							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
SP	1.0490	Q=20.86	7.74	C=120		0.140688	1'-2¾	Pf 0.876
220	11'-2¾	q=20.86	K=5.6	13.877		Spr(-13.877)	5'-0	Pe 0.533
:1	10'-0			15.287		PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=20.86	4.47	C=120		0.037002	13'-4½	Pf 0.495
41	10'-0			15.287				Pe
172	10'-0			15.781			13'-4½	Pv
CM	1.3800	Q=42.07	9.02	C=120		0.135460	6'-0	Pf 0.813
172	10'-0			15.781				Pe
195	10'-0			16.595			6'-0	Pv
RN	1.3800	Q=42.07	9.02	C=120		0.135460	1'-8	Pf 1.445
195	10'-0			16.595		E(3'-0)	9'-0	Pe 0.723
173	8'-4			18.762		PO(6'-0)	10'-8	Pv
••••• Route 18 •••••								
SP	1.0490	Q=21.21	7.87	C=120		0.145066	1'-2¾	Pf 0.904
223	11'-2¾	q=21.21	K=5.6	14.345		Spr(-14.345)	5'-0	Pe 0.533
172	10'-0			15.781		PO(5'-0)	6'-2¾	Pv
••••• Route 19 •••••								
DR	1.0490	Q=17.77	6.60	C=120		0.104593	3'-6¾	Pf 1.314
216	9'-0	q=17.77	K=5.6	10.072		Spr(-10.072)	9'-0	Pe -0.966
236	11'-2¾			10.419		2E(2'-0), T(5'-0)	12'-6¾	Pv
••••• Route 20 •••••								
SP	1.0490	Q=21.44	7.96	C=120		0.147999	1'-2¾	Pf 0.922
235	11'-2¾	q=21.44	K=5.6	14.659		Spr(-14.659)	5'-0	Pe 0.533
42	10'-0			16.113		PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=21.44	4.60	C=120		0.038925	13'-4½	Pf 0.520
42	10'-0			16.113				Pe
174	10'-0			16.634			13'-4½	Pv
CM	1.3800	Q=43.24	9.27	C=120		0.142491	6'-0	Pf 0.856
174	10'-0			16.634				Pe
196	10'-0			17.490			6'-0	Pv
RN	1.3800	Q=43.24	9.27	C=120		0.142491	1'-8	Pf 1.520
196	10'-0			17.490		E(3'-0)	9'-0	Pe 0.723
175	8'-4			19.732		PO(6'-0)	10'-8	Pv
••••• Route 21 •••••								
R	1.0490	Q=18.18	6.75	C=120		0.109128	6'-5¾	Pf 1.690
217	9'-0	q=18.18	K=5.6	10.545		Spr(-10.545)	9'-0	Pe -0.966
278	11'-2¾			11.268		2E(2'-0), T(5'-0)	15'-5¾	Pv
••••• Route 22 •••••								
SP	1.0490	Q=21.80	8.09	C=120		0.152587	1'-2¾	Pf 0.950
228	11'-2¾	q=21.80	K=5.6	15.150		Spr(-15.150)	5'-0	Pe 0.533
174	10'-0			16.634		PO(5'-0)	6'-2¾	Pv
••••• Route 23 •••••								
DR	1.0490	Q=18.37	6.82	C=120		0.111143	10'-6¾	Pf 1.841
218	10'-0	q=18.37	K=5.6	10.756		Spr(-10.756)	6'-0	Pe -0.533
245	11'-2¾			12.063		3E(2'-0)	16'-6¾	Pv
BL	1.0490	Q=37.15	13.79	C=120		0.409239	4'-9¾	Pf 1.969
245	11'-2¾			12.063				Pe
273	11'-2¾			14.033			4'-9¾	Pv
BL	1.3800	Q=57.37	12.31	C=120		0.240432	1'-9¼	Pf 3.310
273	11'-2¾			14.033			12'-0	Pe 0.253
294	10'-7¾			17.596		2E(3'-0), PO(6'-0)	13'-9¼	Pv
••••• Route 24 •••••								
DR	1.0490	Q=18.76	6.96	C=120		0.115564	3'-6¾	Pf 1.452
221	9'-0	q=18.76	K=5.6	11.219		Spr(-11.219)	9'-0	Pe -0.966
238	11'-2¾			11.704		2E(2'-0), T(5'-0)	12'-6¾	Pv
••••• Route 25 •••••								
DR	1.0490	Q=18.79	6.97	C=120		0.115919	2'-6¾	Pf 1.340
237	10'-0	q=18.79	K=5.6	11.256		Spr(-11.256)	9'-0	Pe -0.533
245	11'-2¾			12.063		2E(2'-0), T(5'-0)	11'-6¾	Pv
••••• Route 26 •••••								
DR	1.0490	Q=19.01	7.06	C=120		0.118436	7'-3¾	Pf 2.169
224	9'-0	q=19.01	K=5.6	11.520		Spr(-11.520)	11'-0	Pe -0.966
280	11'-2¾			12.723		3E(2'-0), T(5'-0)	18'-3¾	Pv
••••• Route 27 •••••								
DR	1.0490	Q=19.35	7.18	C=120		0.122402	10'-6¾	Pf 2.027
226	10'-0	q=19.35	K=5.6	11.938		Spr(-11.938)	6'-0	Pe -0.533
248	11'-2¾			13.432		3E(2'-0)	16'-6¾	Pv
L	1.0490	Q=39.14	14.53	C=120		0.450627	4'-9¾	Pf 2.169
248	11'-2¾			13.432				Pe
276	11'-2¾			15.601			4'-9¾	Pv
BL	1.3800	Q=60.42	12.96	C=120		0.264654	1'-9¼	Pf 3.644
276	11'-2¾			15.601			12'-0	Pe 0.253
295	10'-7¾			19.498		2E(3'-0), PO(6'-0)	13'-9¼	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
••••• Route 28 •••••							
DR	1.0490	Q=19.79	7.35	C=120	0.127625	2'-6¾	Pf 1.476
227	10'-0	q=19.79	K=5.6	12.490	Spr(-12.490)	9'-0	Pe -0.533
248	11'-2¾			13.432	2E(2'-0), T(5'-0)	11'-6¾	Pv
••••• Route 29 •••••							
DR	1.0490	Q=20.22	7.50	C=120	0.132734	2'-6¾	Pf 1.535
229	10'-0	q=20.22	K=5.6	13.031	Spr(-13.031)	9'-0	Pe -0.533
273	11'-2¾			14.033	2E(2'-0), T(5'-0)	11'-6¾	Pv
••••• Route 30 •••••							
DR	1.0490	Q=20.43	7.58	C=120	0.135330	3'-6¾	Pf 1.294
239	9'-0	q=20.43	K=5.6	13.307	Spr(-13.307)	6'-0	Pe -0.966
303	11'-2¾			13.635	3E(2'-0)	9'-6¾	Pv
BL	1.3800	Q=20.43	4.38	C=120	0.035593	3'-9	Pf 0.347
303	11'-2¾			13.635		6'-0	Pe
282	11'-2¾			13.982	T(6'-0)	9'-9	Pv
••••• Route 31 •••••							
DR	1.0490	Q=21.28	7.90	C=120	0.146011	2'-6¾	Pf 1.688
231	10'-0	q=21.28	K=5.6	14.446	Spr(-14.446)	9'-0	Pe -0.533
276	11'-2¾			15.601	2E(2'-0), T(5'-0)	11'-6¾	Pv
••••• Route 32 •••••							
BL	1.0490	Q=23.85	8.85	C=120	0.180271	14'-4¼	Pf 4.751
232	10'-11¾	q=23.85	K=5.6	18.143	Spr(-18.143)	12'-0	Pe 0.424
497	10'-0			23.319	T(5'-0), E(2'-0), PO(5'-0)	26'-4¼	Pv
CM	4.2600	Q=73.03	1.64	C=120	0.001552	17'-7	Pf 0.052
497	10'-0			23.319		15'-9½	Pe
530	10'-0			23.370	2LtE(7'-10¾)	33'-4¾	Pv
CM	4.2600	Q=91.82	2.07	C=120	0.002371	6'-5¾	Pf 0.097
530	10'-0			23.370		34'-2¾	Pe -2.168
313	15'-0			21.299	LtE(7'-10¾), T(26'-4)	40'-8½	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	171'-11	Pf 0.955
313	15'-0			21.299		121'-1¾	Pe -1.409
132	18'-3			20.845	2LtE(7'-10¾), 4T(26'-4)	293'-0½	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
132	18'-3			20.845			Pe
131	18'-3			20.878		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
131	18'-3			20.878			Pe
130	18'-3			20.911		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
130	18'-3			20.911			Pe
129	18'-3			20.943		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
129	18'-3			20.943			Pe
128	18'-3			20.976		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
128	18'-3			20.976			Pe
127	18'-3			21.008		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
127	18'-3			21.008			Pe
126	18'-3			21.041		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
126	18'-3			21.041			Pe
125	18'-3			21.074		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
125	18'-3			21.074			Pe
124	18'-3			21.106		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-10	Pf 0.035
124	18'-3			21.106			Pe
123	18'-3			21.141		10'-10	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	4'-4¾	Pf 0.100
123	18'-3			21.141		26'-4	Pe 0.253
262	17'-8			21.494	T(26'-4)	30'-8¾	Pv
CM	6.3570	Q=109.06	1.10	C=120	0.000464	2'-8	Pf 0.019
262	17'-8			21.494		37'-8¾	Pe 1.156
261	15'-0			22.669	T(37'-8¾)	40'-4¾	Pv
••••• Route 33 •••••							
SP	1.0490	Q=24.58	9.13	C=120	0.190620	7'-1½	Pf 3.074
233	12'-1½	q=24.58	K=5.6	19.271	Spr(-19.271)	9'-0	Pe 0.921
396	10'-0			23.266	2E(2'-0), PO(5'-0)	16'-1½	Pv
CM	2.6350	Q=18.00	1.06	C=120	0.001207	7'-3	Pf 0.009
396	10'-0			23.266			Pe
370	10'-0			23.275		7'-3	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.6350	Q=18.55	1.09	C=120	0.001276	1'-10¼	Pf 0.002
370	10'-0			23.275			Pe
399	10'-0			23.277		1'-10¼	Pv
CM	2.6350	Q=43.14	2.54	C=120	0.006082	6'-7¾	Pf 0.040
399	10'-0			23.277			Pe
375	10'-0			23.318		6'-7¾	Pv
CM	4.2600	Q=43.14	0.97	C=120	0.000586	0'-9	Pf 0.000
375	10'-0			23.318			Pe
377	10'-0			23.318		0'-9	Pv
CM	4.2600	Q=49.17	1.11	C=120	0.000747	0'-4¾	Pf 0.000
377	10'-0			23.318			Pe
497	10'-0			23.319		0'-4¾	Pv
Route 34							
SP	1.0490	Q=24.59	9.13	C=120	0.190708	7'-1½	Pf 3.075
234	12'-1½	q=24.59	K=5.6	19.281	Spr(-19.281)	9'-0	Pe 0.921
399	10'-0			23.277	2E(2'-0), PO(5'-0)	16'-1½	Pv
Route 35							
UG	7.9800	Q=222.12	1.42	C=150	0.000378	1167'-0	Pf 0.492
3	-5'-0			33.402		134'-3¾	Pe
5	-5'-0			33.894	2E(27'-2), 2EE(13'-7), T(52'-9¾)	1301'-3¾	Pv
Route 36							
CM	2.6350	Q=6.59	0.39	C=120	0.000188	2'-0	Pf 0.000
396	10'-0			23.266			Pe
366	10'-0			23.267		2'-0	Pv
CM	2.6350	Q=4.54	0.27	C=120	0.000094	9'-0	Pf 0.001
366	10'-0			23.267			Pe
364	10'-0			23.268		9'-0	Pv
CM	2.6350	Q=2.82	0.17	C=120	0.000039	9'-3	Pf 0.001
364	10'-0			23.268		16'-5¾	Pe
362	10'-0			23.269	PO(16'-5¾)	25'-8¾	Pv
CM	2.1570	Q=1.50	0.13	C=120	0.000032	73'-7	Pf 0.003
362	10'-0			23.269		19'-8¼	Pe 0.000
674	10'-0			23.272	2LtE(3'-8¼), PO(12'-3¾)	93'-3¼	Pv
CM	2.6350	Q=2.82	0.17	C=120	0.000039	9'-3	Pf 0.000
674	10'-0			23.272			Pe
678	10'-0			23.272		9'-3	Pv
CM	2.6350	Q=4.54	0.27	C=120	0.000094	9'-0	Pf 0.001
678	10'-0			23.272			Pe
681	10'-0			23.273		9'-0	Pv
CM	2.6350	Q=6.59	0.39	C=120	0.000188	9'-3	Pf 0.002
681	10'-0			23.273			Pe
685	10'-0			23.275		9'-3	Pv
CM	2.6350	Q=6.03	0.35	C=120	0.000160	9'-6	Pf 0.004
685	10'-0			23.275		16'-5¾	Pe
688	10'-0			23.279	PO(16'-5¾)	25'-11¾	Pv
CM	2.1570	Q=6.03	0.53	C=120	0.000423	73'-11½	Pf 0.040
688	10'-0			23.279		19'-8¼	Pe
377	10'-0			23.318	2LtE(3'-8¼), PO(12'-3¾)	93'-7¾	Pv
Route 37							
CM	2.6350	Q=1.31	0.08	C=120	0.000010	5'-0	Pf 0.000
362	10'-0			23.269	PO(16'-5¾)	32'-11½	Pe
360	10'-0			23.269	PO(16'-5¾)	37'-11½	Pv
CM	2.1570	Q=1.31	0.12	C=120	0.000025	78'-5½	Pf 0.003
360	10'-0			23.269		23'-4½	Pe
671	10'-0			23.271	3LtE(3'-8¼), PO(12'-3¾)	101'-10	Pv
CM	2.6350	Q=1.31	0.08	C=120	0.000010	9'-6	Pf 0.000
671	10'-0			23.271			Pe
674	10'-0			23.272		9'-6	Pv
Route 38							
CM	2.1570	Q=0.56	0.05	C=120	0.000005	73'-11½	Pf 0.001
685	10'-0			23.275	PO(12'-3¾)	32'-0	Pe
370	10'-0			23.275	2LtE(3'-8¼), PO(12'-3¾)	105'-11½	Pv
Route 39							
CM	4.2600	Q=17.23	0.39	C=120	0.000107	13'-4	Pf 0.001
297	15'-0			21.298			Pe -0.000
313	15'-0			21.299		13'-4	Pv
Route 40							
L	1.0490	Q=9.39	3.49	C=120	0.032145	2'-9¾	Pf 0.412
480	10'-7¾			20.068	PO(5'-0)	10'-0	Pe 1.219
479	7'-10			21.699	T(5'-0)	12'-9¾	Pv
BL	1.0490	Q=18.80	6.98	C=120	0.116030	15'-6	Pf 2.610
479	7'-10			21.699		7'-0	Pe -0.939
530	10'-0			23.370	E(2'-0), PO(5'-0)	22'-6	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
Route 41							
BL	1.0490	Q=9.41	3.49	C=120	0.032227	20'-0	Pf 0.967
358	8'-4			20.516	PO(5'-0)	10'-0	Pe 0.217
479	7'-10			21.699	T(5'-0)	30'-0	Pv
Route 42							
CM	2.1570	Q=2.05	0.18	C=120	0.000057	73'-11½	Pf 0.006
366	10'-0			23.267	PO(12'-3¾)	32'-0	Pe 0.000
681	10'-0			23.273	2LtE(3'-8¼), PO(12'-3¾)	105'-11½	Pv
Route 43							
CM	2.1570	Q=1.72	0.15	C=120	0.000041	73'-11½	Pf 0.004
364	10'-0			23.268	PO(12'-3¾)	32'-0	Pe 0.000
678	10'-0			23.272	2LtE(3'-8¼), PO(12'-3¾)	105'-11½	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

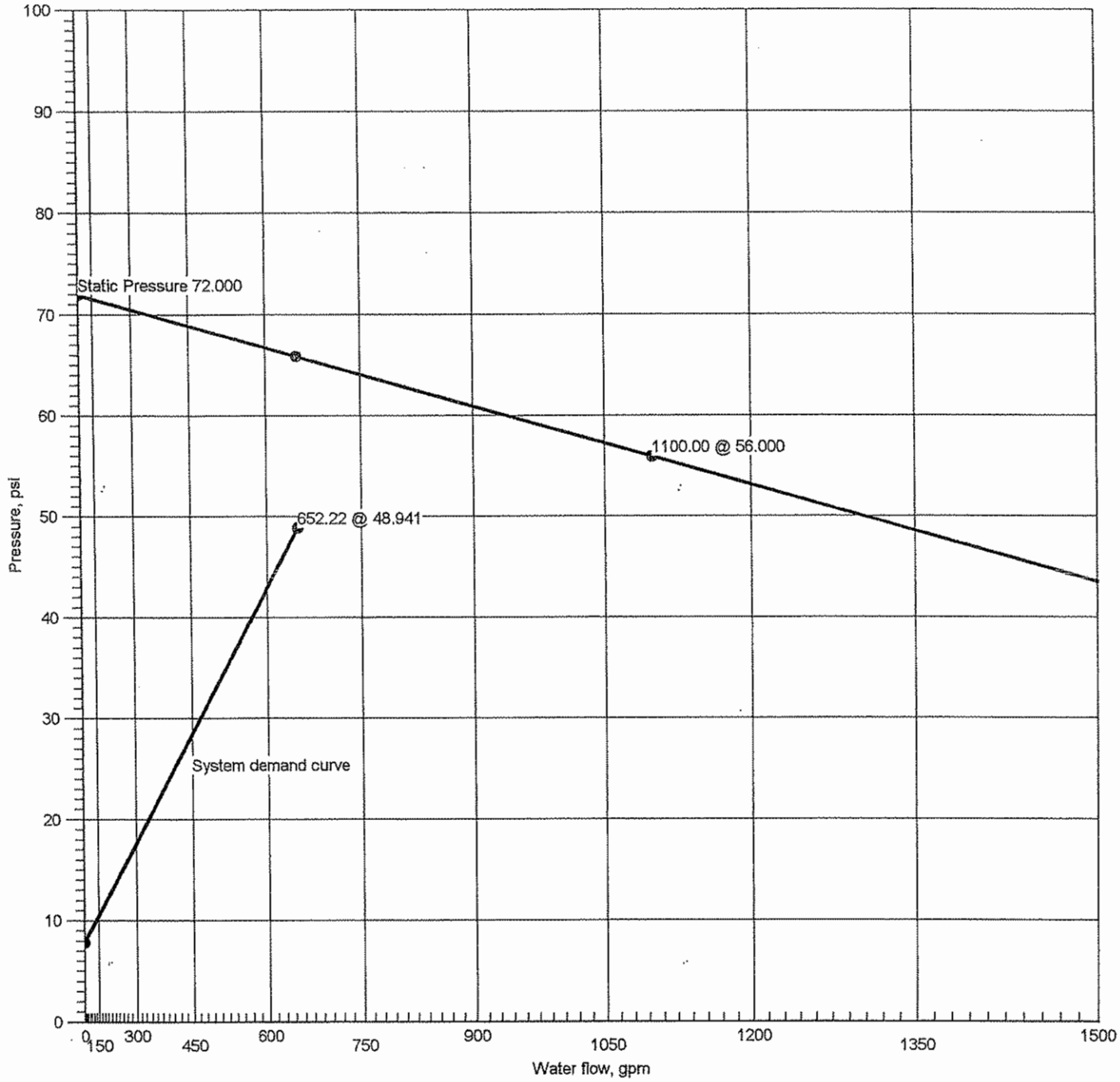
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available PressureTime of Test	65.916 @ 652.22
System Demand	652.22 @ 48.941
stem Demand (Including Hose Allowance)	652.22 @ 48.941

Hydraulic Overview

Job

Job Number: 2441 MAINT	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2441 BOAT MAINTENANCE	Phone: / FAX:
Address 1: MAINTENANCE BLDG	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site:

System

Density: 0.200gpm/ft²	Area of Application: 3900.00ft² (Actual 3915.38ft²)
Most Demanding Sprinkler Data: 8 K-Factor 21.17 at 7.000	Hose Streams: 0.00
Coverage Per Sprinkler: 104.17ft²	Number Of Sprinklers Calculated: 38
System Pressure Demand: 54.532	System Flow Demand: 956.82
Total Demand: 956.82 @ 54.532	Pressure Result: +5.107 (8.6%)

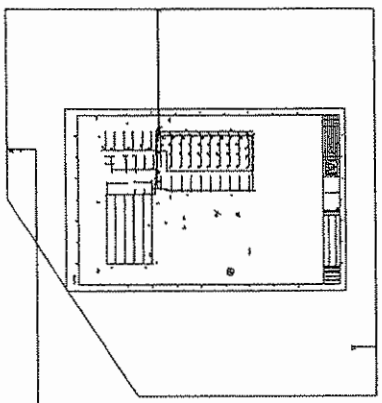
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	0.00	72.000	56.000

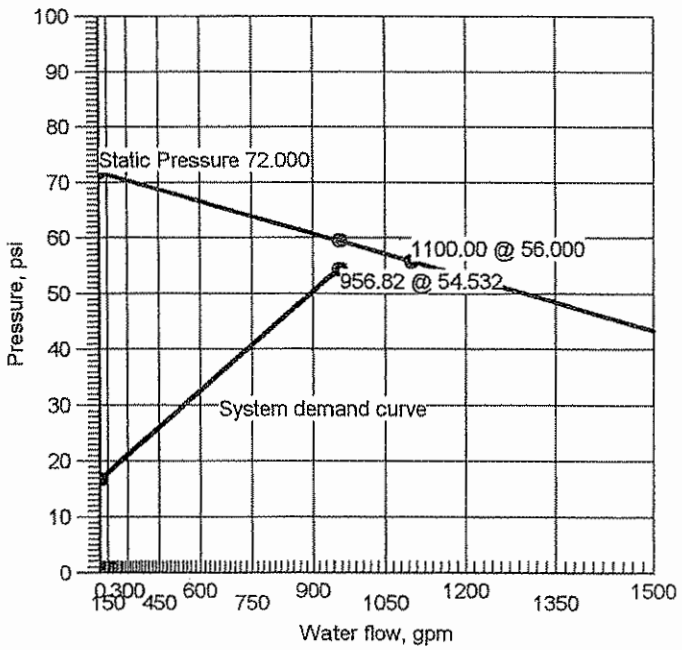
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)

FP-3 BLDG 2440 2441 1st Floor R3



Supply at Node 1 (1100.00, 0.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 2441 MAINT	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2441 BOAT MAINTENANCE	State Certification/License Number:
Address 1: MAINTENANCE BLDG	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site:
City: STENNIS / State: MS / Zip Code:	Drawing Name: FP-3 BLDG 2440 2441 1st Floor R3

System

Most Demanding Sprinkler Data: 8 K-Factor 21.17 at 7.000

Hose Allowance At Source: 0.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 0.00

System Flow Demand: 956.82

Total Water Required (including Hose Allowance): 956.82

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 15.52 between nodes 262 and 123

Maximum Velocity Under Ground: 6.14 between nodes 1 and 12

Volume capacity of Wet Pipes: 6958.20gal

Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Ordinary Group II

Density: 0.200gpm/ft²

Area of Application: 3900.00ft² (Actual 3915.38ft²)

Number Of Sprinklers Calculated: 38

Coverage Per Sprinkler: 104.17ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Right: 52.539

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @	Flow (gpm)	Available (psi) @	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	0.00	72.000	56.000	1100.00	59.638	956.82	54.532	5.107

Contractor

Contractor Number:	Contact Name: / Contact Title:
Contractor Name: SIMPLEXGRINNELL	Phone: / Extension:
Address 1: 5800 JEFFERSON HWY	FAX:
Address 2: SUITE A	E-mail:
City: HARAHAN / State: LA / Zip Code: 70123	Web-Site:

Summary Of Outflowing Devices

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	338	31.42	24.70	8	15.423		
Sprinkler	336	29.30	20.87	8	13.418		
Sprinkler	332	28.73	20.87	8	12.900		
Sprinkler	328	28.34	20.87	8	12.553		
Sprinkler	324	28.11	20.87	8	12.342		
Sprinkler	320	27.98	20.87	8	12.235		
Sprinkler	312	27.94	20.87	8	12.198		
Sprinkler	304	27.94	20.87	8	12.196		
Sprinkler	308	27.95	20.87	8	12.209		
Sprinkler	316	28.03	20.87	8	12.273		
Sprinkler	337	29.75	24.70	8	13.825		
Sprinkler	335	27.03	20.87	8	11.420		
Sprinkler	331	26.44	20.87	8	10.925		
Sprinkler	327	26.04	20.87	8	10.593		
Sprinkler	323	25.79	20.87	8	10.391		
Sprinkler	319	25.66	20.87	8	10.289		
Sprinkler	311	25.62	20.87	8	10.254		
Sprinkler	802	25.61	20.87	8	10.252		
Sprinkler	307	25.63	20.87	8	10.264		
Sprinkler	315	25.71	20.87	8	10.325		
Sprinkler	334	24.91	20.87	8	9.698		
Sprinkler	330	24.28	20.87	8	9.214		
Sprinkler	326	23.85	20.87	8	8.889		
Sprinkler	322	23.59	20.87	8	8.692		
Sprinkler	318	23.45	20.87	8	8.592		
Sprinkler	310	23.40	20.87	8	8.558		
Sprinkler	302	23.40	20.87	8	8.556		
Sprinkler	306	23.42	20.87	8	8.567		
Sprinkler	314	23.50	20.87	8	8.627		
Sprinkler	333	22.82	20.87	8	8.135		
Sprinkler	329	22.13	20.87	8	7.654		
Sprinkler	325	21.66	20.87	8	7.331		
Sprinkler	321	21.37	20.87	8	7.136		
Sprinkler	317	21.22	20.87	8	7.036		
Sprinkler	309	21.17	20.87	8	7.002		
⇨ Sprinkler	301	21.17	20.87	8	7.000		
Sprinkler	305	21.18	20.87	8	7.012		
Sprinkler	806	21.27	20.87	8	7.071		

⇨ Most Demanding Sprinkler Data

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
••••• Route 1 •••••							
CM	2.1570	Q=21.17	1.86	C=120	0.004318	11'-0	Pf 0.047
01	32'-11	q=21.17	K=8	7.000	Spr(-7.000)		Pe 1.508
302	29'-5¼			8.556		11'-0	Pv
CM	2.1570	Q=44.57	3.91	C=120	0.017118	11'-0	Pf 0.188
302	29'-5¼	q=23.40	K=8	8.556	Spr(-8.556)		Pe 1.508
802	25'-11½			10.252		11'-0	Pv
CM	2.1570	Q=70.18	6.16	C=120	0.039656	11'-0	Pf 0.436
802	25'-11½	q=25.61	K=8	10.252	Spr(-10.252)		Pe 1.508
304	22'-5¾			12.196		11'-0	Pv
CM	2.1570	Q=98.12	8.61	C=120	0.073713	1'-6	Pf 0.111
304	22'-5¾	q=27.94	K=8	12.196	Spr(-12.196)		Pe 0.206
148	22'-0			12.513		1'-6	Pv
RN	2.1570	Q=98.12	8.61	C=120	0.073713	3'-11½	Pf 1.471
148	22'-0			12.513	LtE(3'-8¼)	16'-0	Pe 1.628
130	18'-3			15.612	PO(12'-3¾)	19'-11½	Pv
CM	4.2600	Q=27.27	0.61	C=120	0.000251	10'-0	Pf 0.003
130	18'-3			15.612			Pe
129	18'-3			15.615		10'-0	Pv
CM	4.2600	Q=125.40	2.82	C=120	0.004219	10'-0	Pf 0.042
129	18'-3			15.615			Pe
128	18'-3			15.657		10'-0	Pv
CM	4.2600	Q=223.71	5.04	C=120	0.012313	10'-0	Pf 0.123
128	18'-3			15.657			Pe
127	18'-3			15.780		10'-0	Pv
CM	4.2600	Q=322.56	7.26	C=120	0.024230	10'-0	Pf 0.242
127	18'-3			15.780			Pe
126	18'-3			16.022		10'-0	Pv
CM	4.2600	Q=422.45	9.51	C=120	0.039913	10'-0	Pf 0.399
126	18'-3			16.022			Pe
125	18'-3			16.421		10'-0	Pv
CM	4.2600	Q=524.04	11.80	C=120	0.059465	10'-0	Pf 0.595
125	18'-3			16.421			Pe
124	18'-3			17.016		10'-0	Pv
CM	4.2600	Q=628.11	14.14	C=120	0.083138	10'-10	Pf 0.901
124	18'-3			17.016			Pe
123	18'-3			17.917		10'-10	Pv
CM	4.2600	Q=689.28	15.52	C=120	0.098732	4'-4¾	Pf 3.034
123	18'-3			17.917		26'-4	Pe 0.253
262	17'-8			21.203	T(26'-4)	30'-8¾	Pv
CM	6.3570	Q=689.28	6.97	C=120	0.014055	2'-8	Pf 0.568
262	17'-8			21.203		37'-8¾	Pe 1.156
261	15'-0			22.927	T(37'-8¾)	40'-4¾	Pv
CM	6.3570	Q=956.82	9.67	C=120	0.025784	4'-3½	Pf 0.694
261	15'-0			22.927		22'-7½	Pe -0.000
163	15'-0			23.621	2LtE(11'-3¾)	26'-11	Pv
FR	6.3570	Q=956.82	9.67	C=120	0.025784	6'-9	Pf 0.174
163	15'-0			23.621			Pe 2.926
161	8'-3			26.721		6'-9	Pv
MS	6.3570	Q=956.82	9.67	C=120	0.025784	1'-1	Pf 1.802
161	8'-3			26.721		68'-9¾	Pe 1.838
84	4'-0¼			30.361	2f(-0.000), CV(40'-2¾), BV(12'-7), CV(16'-0)	69'-10¾	Pv
FR	6.0650	Q=956.82	10.63	C=120	0.032419	2'-0	Pf 0.389
84	4'-0¼			30.361		10'-0	Pe 1.305
7	1'-0			32.055	BV(10'-0)	12'-0	Pv
UG	8.3900	Q=956.82	5.55	C=140	0.005019	135'-2½	Pf 1.130
7	1'-0			32.055		89'-11	Pe 2.601
3	-5'-0			35.787	E(30'-6½), T(59'-4½)	225'-1½	Pv
UG	7.9800	Q=630.97	4.05	C=150	0.002610	303'-2¾	Pf 1.000
3	-5'-0			35.787		79'-11¾	Pe
5	-5'-0			36.787	E(27'-2), T(52'-9¾)	383'-2½	Pv
UG	7.9800	Q=956.82	6.14	C=150	0.005638	1'-11	Pf 0.121
5	-5'-0			36.787		19'-7½	Pe
11	-5'-0			36.908	LtE(19'-7½)	21'-6½	Pv
UG	8.3900	Q=956.82	5.55	C=140	0.005019	17'-0	Pf 12.417
11	-5'-0			36.908		66'-2	Pe 0.434
12	-6'-0			49.759	3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv
UG	7.9800	Q=956.82	6.14	C=150	0.005638	727'-3	Pf 4.773
12	-6'-0			49.759		119'-2½	Pe
1	-6'-0			54.532	2E(27'-2), 2GV(6'-0½), T(52'-9¾), S	846'-5¾	Pv
••••• Route 2 •••••							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure / Summary
CM	2.1570	Q=21.17	1.86	C=120	0.004319	11'-0	Pf 0.048
309	32'-11	q=21.17	K=8	7.002	Spr(-7.002)		Pe 1.508
10	29'-5¼			8.558		11'-0	Pv
CM	2.1570	Q=44.57	3.91	C=120	0.017122	11'-0	Pf 0.188
310	29'-5¼	q=23.40	K=8	8.558	Spr(-8.558)		Pe 1.508
311	25'-11½			10.254		11'-0	Pv
CM	2.1570	Q=70.19	6.16	C=120	0.039665	11'-0	Pf 0.436
311	25'-11½	q=25.62	K=8	10.254	Spr(-10.254)		Pe 1.508
312	22'-5¾			12.198		11'-0	Pv
CM	2.1570	Q=98.13	8.62	C=120	0.073729	1'-6	Pf 0.111
312	22'-5¾	q=27.94	K=8	12.198	Spr(-12.198)		Pe 0.206
147	22'-0			12.515		1'-6	Pv
RN	2.1570	Q=98.13	8.62	C=120	0.073729	3'-11½	Pf 1.471
147	22'-0			12.515	LtE(3'-8¼)	16'-0	Pe 1.628
129	18'-3			15.615	PO(12'-3¾)	19'-11½	Pv
Route 3							
CM	2.1570	Q=21.18	1.86	C=120	0.004324	11'-0	Pf 0.048
305	32'-11	q=21.18	K=8	7.012	Spr(-7.012)		Pe 1.508
306	29'-5¼			8.567		11'-0	Pv
CM	2.1570	Q=44.60	3.92	C=120	0.017142	11'-0	Pf 0.189
306	29'-5¼	q=23.42	K=8	8.567	Spr(-8.567)		Pe 1.508
307	25'-11½			10.264		11'-0	Pv
CM	2.1570	Q=70.23	6.17	C=120	0.039707	11'-0	Pf 0.437
307	25'-11½	q=25.63	K=8	10.264	Spr(-10.264)		Pe 1.508
308	22'-5¾			12.209		11'-0	Pv
CM	2.1570	Q=98.18	8.62	C=120	0.073802	1'-6	Pf 0.111
308	22'-5¾	q=27.95	K=8	12.209	Spr(-12.209)		Pe 0.206
149	22'-0			12.526		1'-6	Pv
RN	2.1570	Q=98.18	8.62	C=120	0.073802	3'-11½	Pf 1.473
149	22'-0			12.526	LtE(3'-8¼)	16'-0	Pe 1.628
131	18'-3			15.627	PO(12'-3¾)	19'-11½	Pv
CM	4.2600	Q=169.04	3.80	C=120	0.007331	10'-0	Pf 0.073
131	18'-3			15.627			Pe
132	18'-3			15.700		10'-0	Pv
CM	4.2600	Q=267.54	6.02	C=120	0.017143	171'-11	Pf 5.024
132	18'-3			15.700		121'-1¾	Pe 1.409
313	15'-0			22.133	4T(26'-4), 2LtE(7'-10¾)	293'-0½	Pv
CM	4.2600	Q=262.59	5.91	C=120	0.016562	13'-4	Pf 0.221
313	15'-0			22.133			Pe 0.000
297	15'-0			22.354		13'-4	Pv
CM	4.2600	Q=262.38	5.91	C=120	0.016537	19'-6	Pf 0.322
297	15'-0			22.354			Pe
198	15'-0			22.676		19'-6	Pv
CM	4.2600	Q=267.54	6.02	C=120	0.017143	14'-7½	Pf 0.251
198	15'-0			22.676			Pe
284	15'-0			22.927		14'-7½	Pv
DY	6.3570	Q=267.54	2.70	C=120	0.002441	0'-0	Pf 0.000
284	15'-0			22.927			Pe 0.000
261	15'-0			22.927		0'-0	Pv
Route 4							
CM	2.1570	Q=21.22	1.86	C=120	0.004338	11'-0	Pf 0.048
317	32'-11	q=21.22	K=8	7.036	Spr(-7.036)		Pe 1.508
318	29'-5¼			8.592		11'-0	Pv
CM	2.1570	Q=44.67	3.92	C=120	0.017192	11'-0	Pf 0.189
318	29'-5¼	q=23.45	K=8	8.592	Spr(-8.592)		Pe 1.508
319	25'-11½			10.289		11'-0	Pv
CM	2.1570	Q=70.33	6.18	C=120	0.039813	11'-0	Pf 0.438
319	25'-11½	q=25.66	K=8	10.289	Spr(-10.289)		Pe 1.508
320	22'-5¾			12.235		11'-0	Pv
CM	2.1570	Q=98.31	8.63	C=120	0.073985	1'-6	Pf 0.111
320	22'-5¾	q=27.98	K=8	12.235	Spr(-12.235)		Pe 0.206
146	22'-0			12.552		1'-6	Pv
RN	2.1570	Q=98.31	8.63	C=120	0.073985	3'-11½	Pf 1.476
146	22'-0			12.552	LtE(3'-8¼)	16'-0	Pe 1.628
128	18'-3			15.657	PO(12'-3¾)	19'-11½	Pv
Route 5							
CM	2.1570	Q=21.27	1.87	C=120	0.004358	11'-0	Pf 0.048
806	32'-11	q=21.27	K=8	7.071	Spr(-7.071)		Pe 1.508
314	29'-5¼			8.627		11'-0	Pv
CM	2.1570	Q=44.77	3.93	C=120	0.017264	11'-0	Pf 0.190
314	29'-5¼	q=23.50	K=8	8.627	Spr(-8.627)		Pe 1.508
315	25'-11½			10.325		11'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.1570	Q=70.48	6.19	C=120	0.039966	11'-0	Pf 0.440
315	25'-11½	q=25.71	K=8	10.325	Spr(-10.325)		Pe 1.508
16	22'-5¾			12.273		11'-0	Pv
CM	2.1570	Q=98.50	8.65	C=120	0.074247	1'-6	Pf 0.112
316	22'-5¾	q=28.03	K=8	12.273	Spr(-12.273)		Pe 0.206
150	22'-0			12.590		1'-6	Pv
RN	2.1570	Q=98.50	8.65	C=120	0.074247	3'-11½	Pf 1.482
150	22'-0			12.590	LtE(3'-8¼)	16'-0	Pe 1.628
132	18'-3			15.700	PO(12'-3¾)	19'-11½	Pv
Route 6							
CM	2.1570	Q=21.37	1.88	C=120	0.004395	11'-0	Pf 0.048
321	32'-11	q=21.37	K=8	7.136	Spr(-7.136)		Pe 1.508
322	29'-5¼			8.692		11'-0	Pv
CM	2.1570	Q=44.96	3.95	C=120	0.017396	11'-0	Pf 0.191
322	29'-5¼	q=23.59	K=8	8.692	Spr(-8.692)		Pe 1.508
323	25'-11½			10.391		11'-0	Pv
CM	2.1570	Q=70.74	6.21	C=120	0.040247	11'-0	Pf 0.443
323	25'-11½	q=25.79	K=8	10.391	Spr(-10.391)		Pe 1.508
324	22'-5¾			12.342		11'-0	Pv
CM	2.1570	Q=98.85	8.68	C=120	0.074731	1'-6	Pf 0.112
324	22'-5¾	q=28.11	K=8	12.342	Spr(-12.342)		Pe 0.206
145	22'-0			12.660		1'-6	Pv
RN	2.1570	Q=98.85	8.68	C=120	0.074731	3'-11½	Pf 1.491
145	22'-0			12.660	LtE(3'-8¼)	16'-0	Pe 1.628
127	18'-3			15.780	PO(12'-3¾)	19'-11½	Pv
Route 7							
CM	2.1570	Q=21.66	1.90	C=120	0.004506	11'-0	Pf 0.050
325	32'-11	q=21.66	K=8	7.331	Spr(-7.331)		Pe 1.508
326	29'-5¼			8.889		11'-0	Pv
CM	2.1570	Q=45.51	4.00	C=120	0.017797	11'-0	Pf 0.196
326	29'-5¼	q=23.85	K=8	8.889	Spr(-8.889)		Pe 1.508
327	25'-11½			10.593		11'-0	Pv
CM	2.1570	Q=71.55	6.28	C=120	0.041099	11'-0	Pf 0.452
327	25'-11½	q=26.04	K=8	10.593	Spr(-10.593)		Pe 1.508
328	22'-5¾			12.553		11'-0	Pv
CM	2.1570	Q=99.89	8.77	C=120	0.076199	1'-6	Pf 0.114
328	22'-5¾	q=28.34	K=8	12.553	Spr(-12.553)		Pe 0.206
144	22'-0			12.873		1'-6	Pv
RN	2.1570	Q=99.89	8.77	C=120	0.076199	3'-11½	Pf 1.521
144	22'-0			12.873	LtE(3'-8¼)	16'-0	Pe 1.628
126	18'-3			16.022	PO(12'-3¾)	19'-11½	Pv
Route 8							
CM	2.1570	Q=22.13	1.94	C=120	0.004689	11'-0	Pf 0.052
329	32'-11	q=22.13	K=8	7.654	Spr(-7.654)		Pe 1.508
330	29'-5¼			9.214		11'-0	Pv
CM	2.1570	Q=46.42	4.08	C=120	0.018456	11'-0	Pf 0.203
330	29'-5¼	q=24.28	K=8	9.214	Spr(-9.214)		Pe 1.508
331	25'-11½			10.925		11'-0	Pv
CM	2.1570	Q=72.86	6.40	C=120	0.042500	11'-0	Pf 0.467
331	25'-11½	q=26.44	K=8	10.925	Spr(-10.925)		Pe 1.508
332	22'-5¾			12.900		11'-0	Pv
CM	2.1570	Q=101.59	8.92	C=120	0.078612	1'-6	Pf 0.118
332	22'-5¾	q=28.73	K=8	12.900	Spr(-12.900)		Pe 0.206
143	22'-0			13.224		1'-6	Pv
RN	2.1570	Q=101.59	8.92	C=120	0.078612	3'-11½	Pf 1.569
143	22'-0			13.224	LtE(3'-8¼)	16'-0	Pe 1.628
125	18'-3			16.421	PO(12'-3¾)	19'-11½	Pv
Route 9							
CM	2.1570	Q=22.82	2.00	C=120	0.004961	11'-0	Pf 0.055
333	32'-11	q=22.82	K=8	8.135	Spr(-8.135)		Pe 1.508
334	29'-5¼			9.698		11'-0	Pv
CM	2.1570	Q=47.73	4.19	C=120	0.019435	11'-0	Pf 0.214
334	29'-5¼	q=24.91	K=8	9.698	Spr(-9.698)		Pe 1.508
335	25'-11½			11.420		11'-0	Pv
CM	2.1570	Q=74.77	6.56	C=120	0.044581	11'-0	Pf 0.490
335	25'-11½	q=27.03	K=8	11.420	Spr(-11.420)		Pe 1.508
336	22'-5¾			13.418		11'-0	Pv
CM	2.1570	Q=104.07	9.14	C=120	0.082196	1'-6	Pf 0.123
336	22'-5¾	q=29.30	K=8	13.418	Spr(-13.418)		Pe 0.206
142	22'-0			13.747		1'-6	Pv
RN	2.1570	Q=104.07	9.14	C=120	0.082196	3'-11½	Pf 1.640
142	22'-0			13.747	LtE(3'-8¼)	16'-0	Pe 1.628
124	18'-3			17.016	PO(12'-3¾)	19'-11½	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
Route 10								
CM	2.1570	Q=29.75	2.61	C=120		0.008103	11'-0	Pf 0.089
37	25'-11½	q=29.75	K=8	13.825		Spr(-13.825)		Pe 1.508
338	22'-5¾			15.423			11'-0	Pv
CM	2.1570	Q=61.16	5.37	C=120		0.030748	1'-6	Pf 0.046
338	22'-5¾	q=31.42	K=8	15.423		Spr(-15.423)		Pe 0.206
141	22'-0			15.675			1'-6	Pv
RN	2.1570	Q=61.16	5.37	C=120		0.030748	3'-11½	Pf 0.614
141	22'-0			15.675		LtE(3'-8¼)	16'-0	Pe 1.628
123	18'-3			17.917		PO(12'-3¾)	19'-11½	Pv
Route 11								
CM	2.6350	Q=0.22	0.01	C=120		0.000000	0'-11	Pf 0.000
482	10'-7¾			24.241				Pe -0.000
480	10'-7¾			24.241			0'-11	Pv
BL	1.0490	Q=0.22	0.08	C=120		0.000030	2'-9¾	Pf 0.000
480	10'-7¾			24.241		PO(5'-0)	10'-0	Pe 1.219
479	7'-10			25.461		T(5'-0)	12'-9¾	Pv
BL	1.0490	Q=5.16	1.92	C=120		0.010616	20'-0	Pf 0.318
479	7'-10			25.461			10'-0	Pe -0.217
358	8'-4			25.563		T(5'-0), PO(5'-0)	30'-0	Pv
CM	2.6350	Q=5.16	0.30	C=120		0.000120	8'-1¾	Pf 0.004
358	8'-4			25.563			21'-11½	Pe -2.890
198	15'-0			22.676		LtE(5'-6), PO(16'-5¾)	30'-1¼	Pv
Route 12								
UG	7.9800	Q=325.85	2.09	C=150		0.000769	1167'-0	Pf 1.000
3	-5'-0			35.787			134'-3¾	Pe
5	-5'-0			36.787		2E(27'-2), 2EE(13'-7), T(52'-9¾)	1301'-3¾	Pv
Route 13								
CM	4.2600	Q=70.85	1.59	C=120		0.001468	10'-0	Pf 0.015
130	18'-3			15.612				Pe
131	18'-3			15.627			10'-0	Pv
Route 14								
BL	1.0490	Q=4.95	1.84	C=120		0.009811	15'-6	Pf 0.221
530	10'-0			24.301		PO(5'-0)	7'-0	Pe 0.939
479	7'-10			25.461		E(2'-0)	22'-6	Pv
Route 15								
CM	3.2600	Q=0.22	0.01	C=120		0.000000	4'-4¼	Pf 0.000
297	15'-0			22.354		PO(20'-2)	26'-10½	Pe 1.888
482	10'-7¾			24.241		LtE(6'-8¾)	31'-2¾	Pv
Route 16								
CM	4.2600	Q=4.95	0.11	C=120		0.000011	6'-5¾	Pf 0.000
313	15'-0			22.133		T(26'-4)	34'-2¾	Pe 2.168
530	10'-0			24.301		LtE(7'-10¾)	40'-8½	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

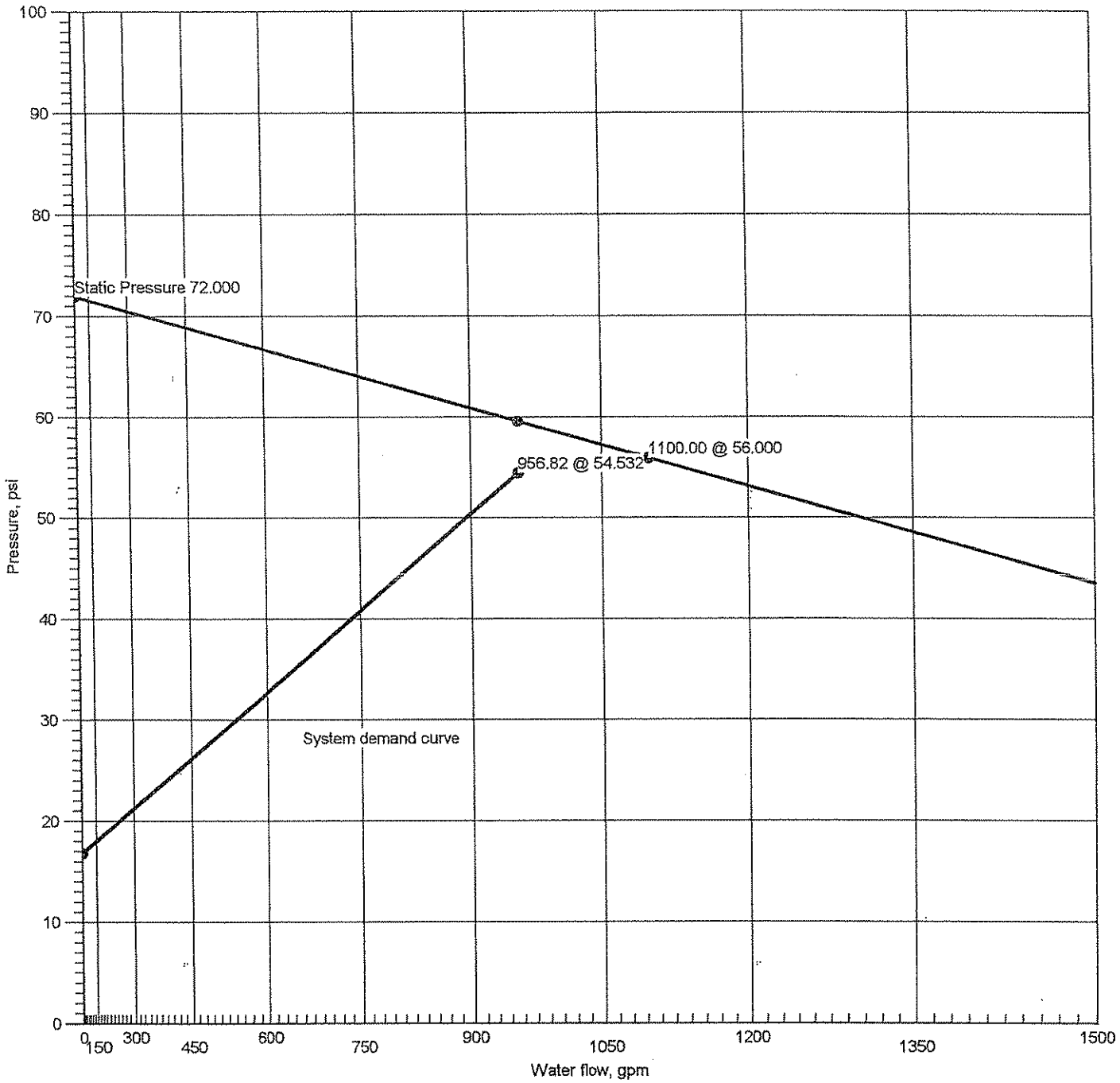
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available PressureTime of Test	59.638 @ 956.82
System Demand	956.82 @ 54.532
System Demand (Including Hose Allowance)	956.82 @ 54.532

Hydraulic Overview

Job

Job Number: 2440 2nd Fl	Design Engineer:
Job Name: STENNIS RIVERINE OPERATIONS BLDG 2ND FLOOR	Phone: / FAX:
ress 1: OPERATIONS BLDG	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site:

System

Density: 0.100gpm/ft²	Area of Application: 3000.00ft² (Actual 3044.18ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 14.82 at 7.000	Hose Streams: 0.00
Coverage Per Sprinkler: 130.00ft²	Number Of Sprinklers Calculated: 30
System Pressure Demand: 55.661	System Flow Demand: 464.56
Total Demand: 464.56 @ 55.661	Pressure Result: +13.092 (19.0%)

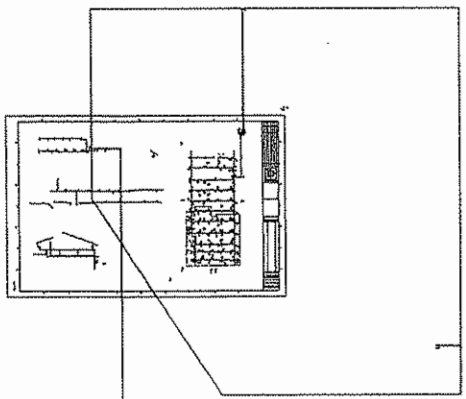
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	0.00	72.000	56.000

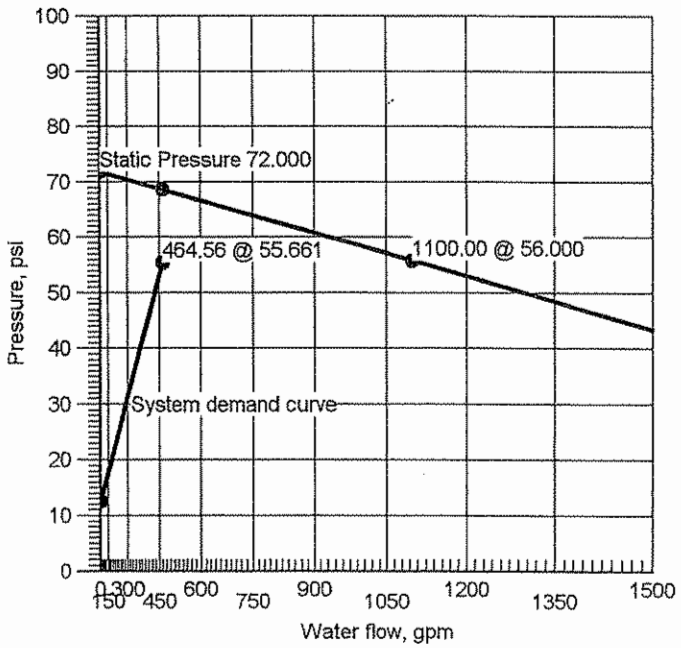
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)

FP 4 BLDG 2440 2441 SECT & 2ND FL R5



Supply at Node 1 (1100.00, 0.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 2440 2nd Fl	Design Engineer:
Job Name: STENNIS RIVERINE OPERATIONS BLDG 2ND FLOOR	State Certification/License Number:
Address 1: OPERATIONS BLDG	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site:
City: STENNIS / State: MS / Zip Code:	Drawing Name: FP-4 BLDG 2440 2441 SECT & 2ND FL R5

System

Most Demanding Sprinkler Data: 5.6 K-Factor 14.82 at 7.000	
Hose Allowance At Source: 0.00	
Additional Hose Supplies: Node / Flow(gpm)	
Total Hose Streams: 0.00	
System Flow Demand: 464.56	Total Water Required (Including Hose Allowance): 464.56
Maximum Pressure Unbalance In Loops: 0.000	
Maximum Velocity Above Ground: 17.86 between nodes 305 and 245	
Maximum Velocity Under Ground: 2.98 between nodes 1 and 12	
Volume capacity of Wet Pipes: 7042.73gal	Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Light Hazard	
Density: 0.100gpm/ft²	Area of Application: 3000.00ft² (Actual 3044.18ft²)
Number Of Sprinklers Calculated: 30	Coverage Per Sprinkler: 130.00ft²
AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area	

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required (psi)	Safety Margin (psi)
1	0.00	72.000	56.000	1100.00	68.752	464.56	55.661	13.092

Contractor

Contractor Number: 21		Contact Name:	Contact Title:
Contractor Name: SIMPLEXGRINNELL		Phone:	Extension:
Address 1: 5800 JEFFERSON HWY		FAX:	
Address 2: SUITE A		E-mail:	
City: HARAHAN	State: LA / Zip Code: 70123	Web-Site:	

Summary Of Outflowing Devices

Job Number: 2440 2nd Fl
Report Description: Light Hazard

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	129	16.69	14.82	5.6	8.883		
Sprinkler	130	16.71	14.82	5.6	8.900		
Sprinkler	127	16.09	14.82	5.6	8.252		
Sprinkler	125	15.88	14.82	5.6	8.040		
Sprinkler	123	15.87	14.82	5.6	8.030		
Sprinkler	124	15.87	14.82	5.6	8.032		
Sprinkler	126	15.90	14.82	5.6	8.063		
Sprinkler	128	16.04	14.82	5.6	8.203		
Sprinkler	122	15.88	14.82	5.6	8.041		
Sprinkler	120	15.65	14.82	5.6	7.814		
Sprinkler	118	15.47	14.82	5.6	7.630		
Sprinkler	116	15.46	14.82	5.6	7.621		
Sprinkler	117	15.46	14.82	5.6	7.624		
Sprinkler	119	15.49	14.82	5.6	7.654		
Sprinkler	121	15.63	14.82	5.6	7.790		
Sprinkler	106	15.04	14.82	5.6	7.209		
Sprinkler	104	14.93	14.82	5.6	7.106		
Sprinkler	102	14.86	14.82	5.6	7.046		
Sprinkler	113	15.26	14.82	5.6	7.427		
Sprinkler	115	15.39	14.82	5.6	7.557		
Sprinkler	110	15.15	14.82	5.6	7.320		
Sprinkler	111	15.20	14.82	5.6	7.370		
Sprinkler	114	15.33	14.82	5.6	7.495		
Sprinkler	103	14.87	14.82	5.6	7.052		
⇨ Sprinkler	101	14.82	14.82	5.6	7.000		
Sprinkler	105	15.02	14.82	5.6	7.194		
Sprinkler	107	15.10	14.82	5.6	7.270		
Sprinkler	109	15.14	14.82	5.6	7.305		
Sprinkler	108	15.11	14.82	5.6	7.285		
Sprinkler	112	15.24	14.82	5.6	7.407		

⇨ Most Demanding Sprinkler Data

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
3	-5'-0	T(59'-4½)	41.578		
39	9'-0	E(13'-2)	31.537		
74	7'-7¾		32.620		
63	5'-1		36.330		
8	1'-0		38.680		
7	-5'-0	2T(52'-9¾)	41.841		
10	-5'-0	LtE(19'-7½)	41.872		
12	-6'-0	LtE(22'-0¾)	54.416		
216	23'-0	PO(12'-3¾)	15.010		
226	23'-0	2PO(16'-5¾)	12.337		
292	24'-0	T(12'-3¾)	13.867		
239	23'-0	PO(12'-3¾)	15.054		
352	24'-0	LtE(3'-8¼)	14.243		
305	9'-0		28.741		
306	23'-0		15.275		
245	23'-0	2T(20'-2)	15.437		
253	23'-0	PO(12'-3¾)	11.670		
277	23'-0	PO(12'-3¾)	12.723		
391	24'-0	LtE(3'-8¼)	12.062		
507	50'-7	E(3'-0)	0.000		
279	23'-0	PO(12'-3¾)	11.212		
301	23'-0	PO(12'-3¾)	11.727		
528	24'-0	LtE(3'-8¼)	11.183		
313	23'-0	PO(12'-3¾)	10.496		
325	23'-0	PO(12'-3¾)	10.784		
562	24'-0	LtE(3'-8¼)	10.289		
675	4'-9	Z	0.000		
393	23'-0	PO(12'-3¾)	9.705		
641	24'-0	PO(5'-0)	9.265		
643	24'-0	PO(5'-0)	9.284		
410	23'-0	PO(12'-3¾)	10.043		
694	24'-0	LtE(3'-8¼)	9.479		
667	23'-0	PO(6'-0)	9.605		
386	23'-0	PO(5'-0)	8.915		
429	23'-0	PO(12'-3¾)	8.884		
680	24'-0	PO(5'-0)	8.307		
682	24'-0	PO(5'-0)	8.296		
685	24'-0	PO(5'-0)	8.299		
688	24'-0	PO(5'-0)	8.334		
690	24'-0	PO(5'-0)	8.490		
411	23'-0	PO(12'-3¾)	9.370		
731	24'-0	LtE(3'-8¼)	8.514		
450	23'-0	E(2'-0)	8.410		
414	23'-0	PO(6'-0)	8.638		
423	23'-0	PO(5'-0)	8.428		
467	23'-0	PO(12'-3¾)	8.415		
708	24'-0	PO(5'-0)	7.849		
710	24'-0	PO(5'-0)	7.839		
713	24'-0	PO(5'-0)	7.842		
716	24'-0	PO(5'-0)	7.876		
718	24'-0	PO(5'-0)	8.028		
448	23'-0	PO(12'-3¾)	8.892		
761	24'-0	LtE(3'-8¼)	8.051		
788	5'-10½	LtE(3'-8¼)	0.000		
739	24'-0	E(2'-0)	7.393		
741	24'-0	PO(6'-0)	7.575		
745	24'-0	PO(12'-3¾)	7.570		
747	24'-0	PO(5'-0)	7.557		
749	24'-0	PO(5'-0)	7.562		
752	24'-0	PO(5'-0)	7.622		
754	24'-0	PO(5'-0)	7.767		
477	23'-0	PO(12'-3¾)	8.616		
798	24'-0	LtE(3'-8¼)	7.790		
773	24'-0	E(2'-0)	7.335		
775	24'-0	PO(6'-0)	7.515		
777	24'-0	PO(12'-3¾)	7.514		
779	24'-0	PO(5'-0)	7.498		
781	24'-0	PO(5'-0)	7.502		
784	24'-0	PO(5'-0)	7.558		
786	24'-0	PO(5'-0)	7.698		
538	23'-0	PO(12'-3¾)	8.533		
828	24'-0	LtE(3'-8¼)	7.719		
845	24'-0	PO(5'-0)	7.499		
861	24'-0	PO(12'-3¾)	7.499		
863	24'-0	PO(5'-0)	7.481		
865	24'-0	PO(5'-0)	7.485		
868	24'-0	PO(5'-0)	7.540		

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
870	24'-0	PO(5'-0)	7.678		
661	23'-0	PO(12'-3¾)	8.509		
935	24'-0	LtE(3'-8¼)	7.700		
129	22'-3	Spr(-8.883)	8.883	16.69	
130	22'-3	Spr(-8.900)	8.900	16.71	
127	22'-3¼	Spr(-8.252)	8.252	16.09	
125	22'-3	Spr(-8.040)	8.040	15.88	
123	22'-3	Spr(-8.030)	8.030	15.87	
124	22'-3	Spr(-8.032)	8.032	15.87	
126	22'-3	Spr(-8.063)	8.063	15.90	
128	22'-3	Spr(-8.203)	8.203	16.04	
122	22'-3¼	Spr(-8.041)	8.041	15.88	
120	22'-3¼	Spr(-7.814)	7.814	15.65	
118	22'-3	Spr(-7.630)	7.630	15.47	
116	22'-3	Spr(-7.621)	7.621	15.46	
117	22'-3	Spr(-7.624)	7.624	15.46	
119	22'-3	Spr(-7.654)	7.654	15.49	
121	22'-3	Spr(-7.790)	7.790	15.63	
106	22'-3¼	Spr(-7.209)	7.209	15.04	
104	23'-3	Spr(-7.106)	7.106	14.93	
102	23'-3¼	Spr(-7.046)	7.046	14.86	
113	22'-3	Spr(-7.427)	7.427	15.26	
115	22'-3	Spr(-7.557)	7.557	15.39	
110	22'-3	Spr(-7.320)	7.320	15.15	
111	22'-3	Spr(-7.370)	7.370	15.20	
114	22'-3	Spr(-7.495)	7.495	15.33	
103	23'-3	Spr(-7.052)	7.052	14.87	
101	23'-3	Spr(-7.000)	7.000	14.82	
105	22'-3	Spr(-7.194)	7.194	15.02	
107	22'-3	Spr(-7.270)	7.270	15.10	
109	22'-3	Spr(-7.305)	7.305	15.14	
108	22'-3	Spr(-7.285)	7.285	15.11	
112	22'-3	Spr(-7.407)	7.407	15.24	
1	-6'-0	S	55.661	464.56	

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
••••• Route 1 •••••							
R	1.0490	Q=14.82	5.50	C=120	0.074703	2'-0¼	Pf 0.823
101	23'-3	q=14.82	K=5.6	7.000	Spr(-7.000)	9'-0	Pe -0.325
779	24'-0			7.498	2E(2'-0), PO(5'-0)	11'-0¼	Pv
CM	2.1570	Q=5.83	0.51	C=120	0.000398	9'-8	Pf 0.004
779	24'-0			7.498			Pe 0.000
781	24'-0			7.502		9'-8	Pv
CM	2.1570	Q=20.98	1.84	C=120	0.004248	13'-2	Pf 0.056
781	24'-0			7.502			Pe -0.000
784	24'-0			7.558		13'-2	Pv
CM	2.1570	Q=36.18	3.18	C=120	0.011643	12'-0	Pf 0.140
784	24'-0			7.558			Pe
786	24'-0			7.698		12'-0	Pv
CM	2.1570	Q=51.52	4.52	C=120	0.022381	0'-11½	Pf 0.021
786	24'-0			7.698			Pe
828	24'-0			7.719		0'-11½	Pv
RN	2.1570	Q=51.52	4.52	C=120	0.022381	1'-0	Pf 0.380
828	24'-0			7.719	LtE(3'-8¼)	16'-0	Pe 0.434
538	23'-0			8.533	PO(12'-3¾)	17'-0	Pv
CM	3.2600	Q=102.73	3.95	C=120	0.010737	7'-8½	Pf 0.083
538	23'-0			8.533			Pe
477	23'-0			8.616		7'-8½	Pv
CM	3.2600	Q=155.14	5.96	C=120	0.023021	12'-0	Pf 0.276
477	23'-0			8.616			Pe
448	23'-0			8.892		12'-0	Pv
CM	3.2600	Q=208.62	8.02	C=120	0.039819	12'-0	Pf 0.478
448	23'-0			8.892			Pe
411	23'-0			9.370		12'-0	Pv
CM	3.2600	Q=263.13	10.11	C=120	0.061180	11'-0	Pf 0.673
411	23'-0			9.370			Pe
410	23'-0			10.043		11'-0	Pv
CM	3.2600	Q=291.96	11.22	C=120	0.074152	10'-0	Pf 0.742
410	23'-0			10.043			Pe 0.000
325	23'-0			10.784		10'-0	Pv
M	3.2600	Q=311.31	11.97	C=120	0.083502	11'-3½	Pf 0.943
325	23'-0			10.784			Pe -0.000
301	23'-0			11.727		11'-3½	Pv
CM	3.2600	Q=337.78	12.98	C=120	0.097109	10'-3	Pf 0.995
301	23'-0			11.727			Pe
277	23'-0			12.723		10'-3	Pv
CM	3.2600	Q=376.73	14.48	C=120	0.118831	2'-8¼	Pf 2.714
277	23'-0			12.723		20'-2	Pe
245	23'-0			15.437	T(20'-2)	22'-10	Pv
CM	3.2600	Q=464.56	17.86	C=120	0.175108	21'-2	Pf 7.237
245	23'-0			15.437		20'-2	Pe 6.067
305	9'-0			28.741	3LtE(6'-8¾)	41'-4	Pv
FM	4.2600	Q=464.56	10.46	C=120	0.047583	45'-7¼	Pf 2.797
305	9'-0			28.741		13'-2	Pe
39	9'-0			31.537	E(13'-2)	58'-9¼	Pv
FR	4.2600	Q=464.56	10.46	C=120	0.047583	2'-5	Pf 0.491
39	9'-0			31.537		7'-10¾	Pe 0.592
74	7'-7¾			32.620	LtE(7'-10¾)	10'-4	Pv
MS	4.2600	Q=464.56	10.46	C=120	0.047583	2'-0	Pf 2.602
74	7'-7¾			32.620		52'-8	Pe 1.109
63	5'-1			36.330	2f(-0.000), CV(28'-11½), BV(15'-9½), LtE(7'-10¾)	54'-8	Pv
FR	6.0650	Q=464.56	5.16	C=120	0.008517	2'-0	Pf 0.579
63	5'-1			36.330		66'-0	Pe 1.770
8	1'-0			38.680	C(30'-0), CV(16'-0), 2BV(10'-0)	68'-0	Pv
UG	8.3900	Q=464.56	2.70	C=140	0.001319	135'-2½	Pf 0.297
8	1'-0			38.680		89'-11	Pe 2.601
3	-5'-0			41.578	E(30'-6½), T(59'-4½)	225'-1½	Pv
UG	7.9800	Q=306.35	1.97	C=150	0.000686	303'-2¾	Pf 0.263
3	-5'-0			41.578		79'-11¾	Pe
7	-5'-0			41.841	E(27'-2), T(52'-9¾)	383'-2½	Pv
UG	7.9800	Q=464.56	2.98	C=150	0.001481	1'-11	Pf 0.032
7	-5'-0			41.841		19'-7½	Pe
10	-5'-0			41.872	LtE(19'-7½)	21'-6½	Pv
UG	8.3900	Q=464.56	2.70	C=140	0.001319	17'-0	Pf 12.110
10	-5'-0			41.872		66'-2	Pe 0.434
12	-6'-0			54.416	3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
UG	7.9800	Q=464.56	2.98	C=150	0.001481	727'-3	Pf 1.245
12	-6'-0			54.416		113'-2¼	Pe
1	-6'-0			55.661	2E(27'-2), GV(6'-0½), T(52'-9¾), S	840'-5¼	Pv
• • • • • Route 2 • • • • •							
DR	1.0490	Q=14.86	5.52	C=120	0.075158	2'-0	Pf 0.827
102	23'-3¼	q=14.86	K=5.6	7.046	Spr(-7.046)	9'-0	Pe -0.316
747	24'-0			7.557	2E(2'-0), PO(5'-0)	11'-0	Pv
CM	2.1570	Q=6.72	0.59	C=120	0.000517	9'-8	Pf 0.005
747	24'-0			7.557			Pe 0.000
749	24'-0			7.562		9'-8	Pv
CM	2.1570	Q=21.76	1.91	C=120	0.004543	13'-2	Pf 0.060
749	24'-0			7.562			Pe -0.000
752	24'-0			7.622		13'-2	Pv
CM	2.1570	Q=37.02	3.25	C=120	0.012145	12'-0	Pf 0.146
752	24'-0			7.622			Pe
754	24'-0			7.767		12'-0	Pv
CM	2.1570	Q=52.41	4.60	C=120	0.023108	0'-11½	Pf 0.022
754	24'-0			7.767			Pe
798	24'-0			7.790		0'-11½	Pv
RN	2.1570	Q=52.41	4.60	C=120	0.023108	1'-0	Pf 0.393
798	24'-0			7.790	LtE(3'-8¼)	16'-0	Pe 0.434
477	23'-0			8.616	PO(12'-3¾)	17'-0	Pv
• • • • • Route 3 • • • • •							
DR	1.0490	Q=14.87	5.52	C=120	0.075217	2'-1	Pf 0.608
103	23'-3	q=14.87	K=5.6	7.052	Spr(-7.052)	6'-0	Pe -0.325
773	24'-0			7.335	3E(2'-0)	8'-1	Pv
BL	1.3800	Q=14.87	3.19	C=120	0.019783	3'-1½	Pf 0.181
773	24'-0			7.335		6'-0	Pe
775	24'-0			7.515	PO(6'-0)	9'-1½	Pv
CM	2.6350	Q=48.26	2.84	C=120	0.007482	7'-3¼	Pf 0.054
775	24'-0			7.515			Pe
745	24'-0			7.570		7'-3¼	Pv
CM	2.6350	Q=56.40	3.32	C=120	0.009984	0'-6	Pf 0.005
745	24'-0			7.570			Pe
741	24'-0			7.575		0'-6	Pv
CM	2.6350	Q=71.33	4.20	C=120	0.015416	15'-4½	Pf 0.406
741	24'-0			7.575		10'-11¾	Pe 0.434
467	23'-0			8.415	2LtE(5'-6)	26'-4¼	Pv
CM	2.6350	Q=95.36	5.61	C=120	0.026381	0'-6	Pf 0.013
467	23'-0			8.415			Pe
423	23'-0			8.428		0'-6	Pv
CM	2.6350	Q=111.01	6.53	C=120	0.034946	6'-0	Pf 0.210
423	23'-0			8.428			Pe
414	23'-0			8.638		6'-0	Pv
CM	2.6350	Q=126.89	7.47	C=120	0.044753	5'-6	Pf 0.246
414	23'-0			8.638			Pe
429	23'-0			8.884		5'-6	Pv
CM	2.6350	Q=151.94	8.94	C=120	0.062452	0'-6	Pf 0.031
429	23'-0			8.884			Pe
386	23'-0			8.915		0'-6	Pv
CM	2.6350	Q=168.03	9.89	C=120	0.075232	9'-2	Pf 0.690
386	23'-0			8.915			Pe
667	23'-0			9.605		9'-2	Pv
CM	2.6350	Q=168.03	9.89	C=120	0.075232	1'-4	Pf 0.100
667	23'-0			9.605			Pe
393	23'-0			9.705		1'-4	Pv
CM	2.6350	Q=172.60	10.15	C=120	0.079065	10'-0	Pf 0.791
393	23'-0			9.705			Pe
313	23'-0			10.496		10'-0	Pv
CM	2.1570	Q=19.36	1.70	C=120	0.003660	45'-11	Pf 0.227
313	23'-0			10.496	PO(12'-3¾)	16'-0	Pe -0.434
562	24'-0			10.289	LtE(3'-8¼)	61'-11	Pv
RN	2.1570	Q=19.36	1.70	C=120	0.003660	1'-0	Pf 0.062
562	24'-0			10.289	LtE(3'-8¼)	16'-0	Pe 0.434
325	23'-0			10.784	PO(12'-3¾)	17'-0	Pv
• • • • • Route 4 • • • • •							
DR	1.0490	Q=14.93	5.54	C=120	0.075748	2'-1	Pf 0.612
104	23'-3	q=14.93	K=5.6	7.106	Spr(-7.106)	6'-0	Pe -0.325
739	24'-0			7.393	3E(2'-0)	8'-1	Pv
BL	1.3800	Q=14.93	3.20	C=120	0.019922	3'-1½	Pf 0.182
739	24'-0			7.393		6'-0	Pe
741	24'-0			7.575	PO(6'-0)	9'-1½	Pv
• • • • • Route 5 • • • • •							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
DR	1.0490	Q=15.02	5.58	C=120		0.076620	4'-10½	Pf 1.063
105	22'-3	q=15.02	K=5.6	7.194		Spr(-7.194)	9'-0	Pe -0.759
345	24'-0			7.499		2E(2'-0), PO(5'-0)	13'-10½	Pv
CM	2.6350	Q=24.40	1.44	C=120		0.002119	7'-0¾	Pf 0.015
845	24'-0			7.499				Pe
777	24'-0			7.514			7'-0¾	Pv
CM	2.6350	Q=33.39	1.96	C=120		0.003785	0'-5¼	Pf 0.002
777	24'-0			7.514				Pe
775	24'-0			7.515			0'-5¼	Pv
Route 6								
DR	1.0490	Q=15.04	5.58	C=120		0.076769	5'-4¼	Pf 1.102
106	22'-3¼	q=15.04	K=5.6	7.209		Spr(-7.209)	9'-0	Pe -0.750
749	24'-0			7.562		2E(2'-0), PO(5'-0)	14'-4¼	Pv
Route 7								
DR	1.0490	Q=15.10	5.61	C=120		0.077369	3'-6¼	Pf 0.969
107	22'-3	q=15.10	K=5.6	7.270		Spr(-7.270)	9'-0	Pe -0.759
863	24'-0			7.481		2E(2'-0), PO(5'-0)	12'-6¼	Pv
CM	2.1570	Q=5.72	0.50	C=120		0.000384	9'-4	Pf 0.004
863	24'-0			7.481				Pe 0.000
865	24'-0			7.485			9'-4	Pv
CM	2.1570	Q=20.86	1.83	C=120		0.004201	13'-2	Pf 0.055
865	24'-0			7.485				Pe -0.000
868	24'-0			7.540			13'-2	Pv
CM	2.1570	Q=35.97	3.16	C=120		0.011516	12'-0	Pf 0.138
868	24'-0			7.540				Pe
870	24'-0			7.678			12'-0	Pv
CM	2.1570	Q=51.21	4.50	C=120		0.022137	0'-11½	Pf 0.021
870	24'-0			7.678				Pe
935	24'-0			7.700			0'-11½	Pv
RN	2.1570	Q=51.21	4.50	C=120		0.022137	1'-0	Pf 0.376
935	24'-0			7.700		LtE(3'-8¼)	16'-0	Pe 0.434
661	23'-0			8.509		PO(12'-3¾)	17'-0	Pv
CM	3.2600	Q=51.21	1.97	C=120		0.002962	8'-0	Pf 0.024
661	23'-0			8.509				Pe
538	23'-0			8.533			8'-0	Pv
Route 8								
DR	1.0490	Q=15.11	5.61	C=120		0.077510	4'-1	Pf 1.014
108	22'-3	q=15.11	K=5.6	7.285		Spr(-7.285)	9'-0	Pe -0.759
868	24'-0			7.540		2E(2'-0), PO(5'-0)	13'-1	Pv
Route 9								
DR	1.0490	Q=15.14	5.62	C=120		0.077705	3'-1	Pf 0.939
109	22'-3	q=15.14	K=5.6	7.305		Spr(-7.305)	9'-0	Pe -0.759
865	24'-0			7.485		2E(2'-0), PO(5'-0)	12'-1	Pv
Route 10								
DR	1.0490	Q=15.15	5.62	C=120		0.077856	3'-1	Pf 0.941
110	22'-3	q=15.15	K=5.6	7.320		Spr(-7.320)	9'-0	Pe -0.759
781	24'-0			7.502		2E(2'-0), PO(5'-0)	12'-1	Pv
Route 11								
DR	1.0490	Q=15.20	5.64	C=120		0.078348	3'-1	Pf 0.947
111	22'-3	q=15.20	K=5.6	7.370		Spr(-7.370)	9'-0	Pe -0.759
784	24'-0			7.558		2E(2'-0), PO(5'-0)	12'-1	Pv
Route 12								
DR	1.0490	Q=15.24	5.66	C=120		0.078714	4'-1	Pf 1.030
112	22'-3	q=15.24	K=5.6	7.407		Spr(-7.407)	9'-0	Pe -0.759
870	24'-0			7.678		2E(2'-0), PO(5'-0)	13'-1	Pv
Route 13								
DR	1.0490	Q=15.26	5.67	C=120		0.078907	3'-1	Pf 0.953
113	22'-3	q=15.26	K=5.6	7.427		Spr(-7.427)	9'-0	Pe -0.759
752	24'-0			7.622		2E(2'-0), PO(5'-0)	12'-1	Pv
Route 14								
DR	1.0490	Q=15.33	5.69	C=120		0.079575	3'-1	Pf 0.962
114	22'-3	q=15.33	K=5.6	7.495		Spr(-7.495)	9'-0	Pe -0.759
786	24'-0			7.698		2E(2'-0), PO(5'-0)	12'-1	Pv
Route 15								
DR	1.0490	Q=15.39	5.71	C=120		0.080187	3'-1	Pf 0.969
115	22'-3	q=15.39	K=5.6	7.557		Spr(-7.557)	9'-0	Pe -0.759
754	24'-0			7.767		2E(2'-0), PO(5'-0)	12'-1	Pv
Route 16								
DR	1.0490	Q=15.46	5.74	C=120		0.080813	3'-1	Pf 0.976
116	22'-3	q=15.46	K=5.6	7.621		Spr(-7.621)	9'-0	Pe -0.759
710	24'-0			7.839		2E(2'-0), PO(5'-0)	12'-1	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.1570	Q=6.89	0.61	C=120	0.000542	5'-5¾	Pf 0.003
710	24'-0			7.839			Pe
713	24'-0			7.842		5'-5¾	Pv
CM	2.1570	Q=22.36	1.96	C=120	0.004778	7'-2	Pf 0.034
713	24'-0			7.842			Pe
716	24'-0			7.876		7'-2	Pv
CM	2.1570	Q=37.85	3.32	C=120	0.012654	12'-0	Pf 0.152
716	24'-0			7.876			Pe
718	24'-0			8.028		12'-0	Pv
CM	2.1570	Q=53.48	4.70	C=120	0.023986	0'-11½	Pf 0.023
718	24'-0			8.028			Pe
761	24'-0			8.051		0'-11½	Pv
RN	2.1570	Q=53.48	4.70	C=120	0.023986	1'-0	Pf 0.408
761	24'-0			8.051	LtE(3'-8¼)	16'-0	Pe 0.434
448	23'-0			8.892	PO(12'-3¾)	17'-0	Pv
Route 17							
DR	1.0490	Q=15.46	5.74	C=120	0.080840	3'-1	Pf 0.977
117	22'-3	q=15.46	K=5.6	7.624	Spr(-7.624)	9'-0	Pe -0.759
713	24'-0			7.842	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 18							
DR	1.0490	Q=15.47	5.74	C=120	0.080899	3'-1	Pf 0.978
118	22'-3	q=15.47	K=5.6	7.630	Spr(-7.630)	9'-0	Pe -0.759
708	24'-0			7.849	2E(2'-0), PO(5'-0)	12'-1	Pv
CM	2.1570	Q=24.03	2.11	C=120	0.005461	8'-3¾	Pf 0.133
708	24'-0			7.849		16'-0	Pe 0.434
467	23'-0			8.415	LtE(3'-8¼), PO(12'-3¾)	24'-3¾	Pv
Route 19							
DR	1.0490	Q=15.49	5.75	C=120	0.081140	3'-1	Pf 0.980
119	22'-3	q=15.49	K=5.6	7.654	Spr(-7.654)	9'-0	Pe -0.759
716	24'-0			7.876	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 20							
DR	1.0490	Q=15.63	5.80	C=120	0.082470	3'-1	Pf 0.997
121	22'-3	q=15.63	K=5.6	7.790	Spr(-7.790)	9'-0	Pe -0.759
718	24'-0			8.028	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 21							
DR	1.0490	Q=15.65	5.81	C=120	0.082702	2'-3	Pf 0.930
120	22'-3¼	q=15.65	K=5.6	7.814	Spr(-7.814)	9'-0	Pe -0.316
423	23'-0			8.428	2E(2'-0), PO(5'-0)	11'-3	Pv
Route 22							
DR	1.0490	Q=15.87	5.89	C=120	0.084816	3'-1	Pf 1.025
123	22'-3	q=15.87	K=5.6	8.030	Spr(-8.030)	9'-0	Pe -0.759
682	24'-0			8.296	2E(2'-0), PO(5'-0)	12'-1	Pv
CM	2.1570	Q=6.70	0.59	C=120	0.000514	5'-5¾	Pf 0.003
682	24'-0			8.296			Pe
685	24'-0			8.299		5'-5¾	Pv
CM	2.1570	Q=22.57	1.98	C=120	0.004863	7'-2	Pf 0.035
685	24'-0			8.299			Pe
688	24'-0			8.334		7'-2	Pv
CM	2.1570	Q=38.47	3.38	C=120	0.013043	12'-0	Pf 0.157
688	24'-0			8.334			Pe
690	24'-0			8.490		12'-0	Pv
CM	2.1570	Q=54.51	4.79	C=120	0.024851	0'-11½	Pf 0.024
690	24'-0			8.490			Pe
731	24'-0			8.514		0'-11½	Pv
RN	2.1570	Q=54.51	4.79	C=120	0.024851	1'-0	Pf 0.422
731	24'-0			8.514	LtE(3'-8¼)	16'-0	Pe 0.434
411	23'-0			9.370	PO(12'-3¾)	17'-0	Pv
Route 23							
DR	1.0490	Q=15.87	5.89	C=120	0.084840	3'-1	Pf 1.025
124	22'-3	q=15.87	K=5.6	8.032	Spr(-8.032)	9'-0	Pe -0.759
685	24'-0			8.299	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 24							
DR	1.0490	Q=15.88	5.89	C=120	0.084912	3'-1	Pf 1.026
125	22'-3	q=15.88	K=5.6	8.040	Spr(-8.040)	9'-0	Pe -0.759
680	24'-0			8.307	2E(2'-0), PO(5'-0)	12'-1	Pv
CM	2.1570	Q=25.05	2.20	C=120	0.005895	8'-3¾	Pf 0.143
680	24'-0			8.307		16'-0	Pe 0.434
429	23'-0			8.884	LtE(3'-8¼), PO(12'-3¾)	24'-3¾	Pv
Route 25							
DR	1.0490	Q=15.88	5.90	C=120	0.084930	2'-0¾	Pf 0.685
122	22'-3¼	q=15.88	K=5.6	8.041	Spr(-8.041)	6'-0	Pe -0.316
450	23'-0			8.410	3E(2'-0)	8'-0¾	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
BL	1.3800	Q=15.88	3.41	C=120	0.022337	4'-2¼	Pf 0.228
150	23'-0			8.410		6'-0	Pe
14	23'-0			8.638	PO(6'-0)	10'-2¼	Pv
••••• Route 26 •••••							
DR	1.0490	Q=15.90	5.90	C=120	0.085145	3'-1	Pf 1.029
126	22'-3	q=15.90	K=5.6	8.063	Spr(-8.063)	9'-0	Pe -0.759
688	24'-0			8.334	2E(2'-0), PO(5'-0)	12'-1	Pv
••••• Route 27 •••••							
DR	1.0490	Q=16.04	5.95	C=120	0.086511	3'-1	Pf 1.045
128	22'-3	q=16.04	K=5.6	8.203	Spr(-8.203)	9'-0	Pe -0.759
690	24'-0			8.490	2E(2'-0), PO(5'-0)	12'-1	Pv
••••• Route 28 •••••							
DR	1.0490	Q=16.09	5.97	C=120	0.086989	2'-3	Pf 0.979
127	22'-3¼	q=16.09	K=5.6	8.252	Spr(-8.252)	9'-0	Pe -0.316
386	23'-0			8.915	2E(2'-0), PO(5'-0)	11'-3	Pv
••••• Route 29 •••••							
DR	1.0490	Q=16.69	6.20	C=120	0.093122	3'-3	Pf 1.141
129	22'-3	q=16.69	K=5.6	8.883	Spr(-8.883)	9'-0	Pe -0.759
641	24'-0			9.265	2E(2'-0), PO(5'-0)	12'-3	Pv
CM	2.1570	Q=12.12	1.06	C=120	0.001538	12'-0	Pf 0.018
641	24'-0			9.265			Pe
643	24'-0			9.284		12'-0	Pv
CM	2.1570	Q=28.82	2.53	C=120	0.007644	25'-7¼	Pf 0.196
643	24'-0			9.284			Pe
694	24'-0			9.479		25'-7¼	Pv
RN	2.1570	Q=28.82	2.53	C=120	0.007644	1'-0	Pf 0.130
694	24'-0			9.479	LtE(3'-8¼)	16'-0	Pe 0.434
410	23'-0			10.043	PO(12'-3¾)	17'-0	Pv
••••• Route 30 •••••							
DR	1.0490	Q=16.71	6.20	C=120	0.093282	3'-3	Pf 1.143
130	22'-3	q=16.71	K=5.6	8.900	Spr(-8.900)	9'-0	Pe -0.759
643	24'-0			9.284	2E(2'-0), PO(5'-0)	12'-3	Pv
••••• Route 31 •••••							
DY	3.2600	Q=87.83	3.38	C=120	0.008036	0'-0	Pf 0.162
306	23'-0			15.275		20'-2	Pe
245	23'-0			15.437	T(20'-2)	20'-2	Pv
••••• Route 32 •••••							
UG	7.9800	Q=158.21	1.01	C=150	0.000202	1167'-0	Pf 0.263
3	-5'-0			41.578		134'-3¾	Pe
7	-5'-0			41.841	2E(27'-2), 2EE(13'-7), T(52'-9¾)	1301'-3¾	Pv
••••• Route 33 •••••							
CM	2.1570	Q=87.83	7.71	C=120	0.060056	29'-0	Pf 1.963
226	23'-0			12.337		3'-8¼	Pe -0.434
292	24'-0			13.867	LtE(3'-8¼)	32'-8¼	Pv
CM	2.1570	Q=51.32	4.51	C=120	0.022227	16'-11	Pf 0.376
292	24'-0			13.867			Pe
352	24'-0			14.243		16'-11	Pv
RN	2.1570	Q=51.32	4.51	C=120	0.022227	1'-0	Pf 0.378
352	24'-0			14.243	LtE(3'-8¼)	16'-0	Pe 0.434
239	23'-0			15.054	PO(12'-3¾)	17'-0	Pv
CM	2.6350	Q=87.83	5.17	C=120	0.022657	9'-8¾	Pf 0.221
239	23'-0			15.054			Pe
306	23'-0			15.275		9'-8¾	Pv
••••• Route 34 •••••							
CM	2.1570	Q=36.51	3.21	C=120	0.011837	27'-11	Pf 0.709
292	24'-0			13.867	T(12'-3¾)	32'-0	Pe 0.434
216	23'-0			15.010	2LtE(3'-8¼), PO(12'-3¾)	59'-11	Pv
CM	2.6350	Q=36.51	2.15	C=120	0.004466	10'-0	Pf 0.045
216	23'-0			15.010			Pe
239	23'-0			15.054		10'-0	Pv
••••• Route 35 •••••							
CM	2.1570	Q=26.47	2.32	C=120	0.006529	45'-11	Pf 0.404
279	23'-0			11.212	PO(12'-3¾)	16'-0	Pe -0.434
528	24'-0			11.183	LtE(3'-8¼)	61'-11	Pv
RN	2.1570	Q=26.47	2.32	C=120	0.006529	1'-0	Pf 0.111
528	24'-0			11.183	LtE(3'-8¼)	16'-0	Pe 0.434
301	23'-0			11.727	PO(12'-3¾)	17'-0	Pv
••••• Route 36 •••••							
CM	2.6350	Q=126.78	7.46	C=120	0.044676	10'-3	Pf 0.458
279	23'-0			11.212			Pe
253	23'-0			11.670		10'-3	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.1570	Q=38.95	3.42	C=120	0.013340	45'-11	Pf 0.826
253	23'-0			11.670	PO(12'-3¾)	16'-0	Pe -0.434
91	24'-0			12.062	LtE(3'-8¼)	61'-11	Pv
RN	2.1570	Q=38.95	3.42	C=120	0.013340	1'-0	Pf 0.227
391	24'-0			12.062	LtE(3'-8¼)	16'-0	Pe 0.434
277	23'-0			12.723	PO(12'-3¾)	17'-0	Pv
Route 37							
CM	2.6350	Q=87.83	5.17	C=120	0.022657	12'-11¾	Pf 0.667
253	23'-0			11.670		16'-5¾	Pe
226	23'-0			12.337	PO(16'-5¾)	29'-5½	Pv
Route 38							
CM	2.6350	Q=153.25	9.02	C=120	0.063448	11'-3½	Pf 0.716
313	23'-0			10.496			Pe
279	23'-0			11.212		11'-3½	Pv
Route 39							
CM	2.1570	Q=9.38	0.82	C=120	0.000958	5'-8½	Pf 0.017
863	24'-0			7.481		12'-3¾	Pe
861	24'-0			7.499	PO(12'-3¾)	18'-0¼	Pv
CM	2.6350	Q=9.38	0.55	C=120	0.000361	0'-11¼	Pf 0.000
861	24'-0			7.499			Pe
845	24'-0			7.499		0'-11¼	Pv
Route 40							
CM	2.1570	Q=4.57	0.40	C=120	0.000254	8'-3¾	Pf 0.006
641	24'-0			9.265		16'-0	Pe 0.434
393	23'-0			9.705	LtE(3'-8¼), PO(12'-3¾)	24'-3¾	Pv
Route 41							
CM	2.1570	Q=9.17	0.80	C=120	0.000918	12'-0	Pf 0.011
682	24'-0			8.296			Pe
680	24'-0			8.307		12'-0	Pv
Route 42							
CM	2.1570	Q=8.56	0.75	C=120	0.000810	12'-0	Pf 0.010
710	24'-0			7.839			Pe
708	24'-0			7.849		12'-0	Pv
Route 43							
M	2.1570	Q=8.14	0.72	C=120	0.000738	5'-4½	Pf 0.013
747	24'-0			7.557		12'-3¾	Pe
745	24'-0			7.570	PO(12'-3¾)	17'-8¼	Pv
Route 44							
CM	2.1570	Q=8.99	0.79	C=120	0.000885	5'-4½	Pf 0.016
779	24'-0			7.498		12'-3¾	Pe
777	24'-0			7.514	PO(12'-3¾)	17'-8¼	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

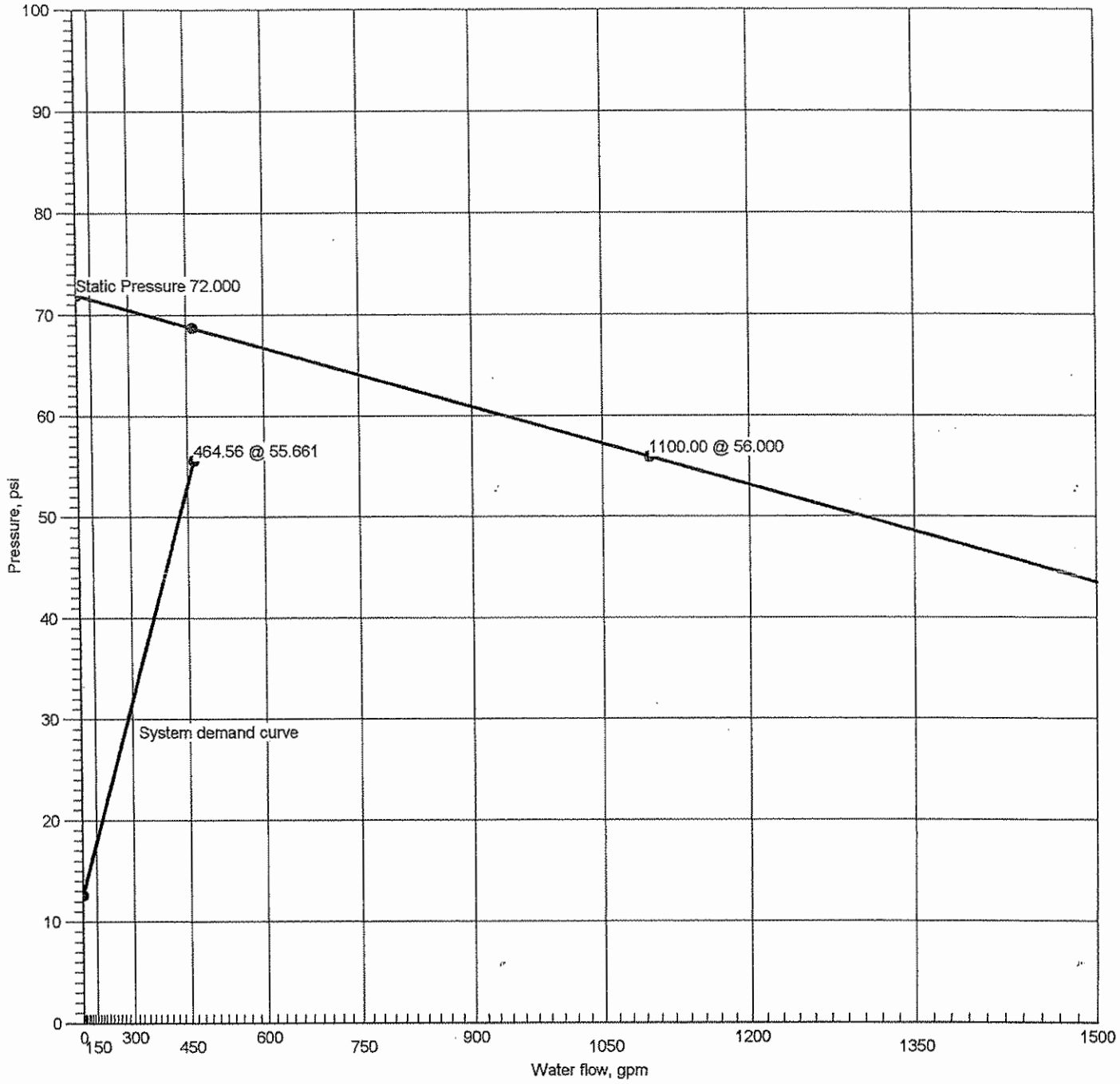
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available PressureTime of Test	68.752 @ 464.56
System Demand	464.56 @ 55.661
stem Demand (Including Hose Allowance)	464.56 @ 55.661

Hydraulic Overview

Job

Job Number: 269-941989101	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2442 BOAT STORAGE	Phone: / FAX:
Address 1: OAT STORAGE BLDG	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site:

System

Density: 0.200gpm/ft²	Area of Application: 3900.00ft² (Actual 3927.08ft²)
Most Demanding Sprinkler Data: 8 K-Factor 21.17 at 7.000	Hose Streams: 0.00
Coverage Per Sprinkler: 100.00ft²	Number Of Sprinklers Calculated: 39
System Pressure Demand: 52.151	System Flow Demand: 956.90
Total Demand: 956.90 @ 52.151	Pressure Result: +7.485 (12.6%)

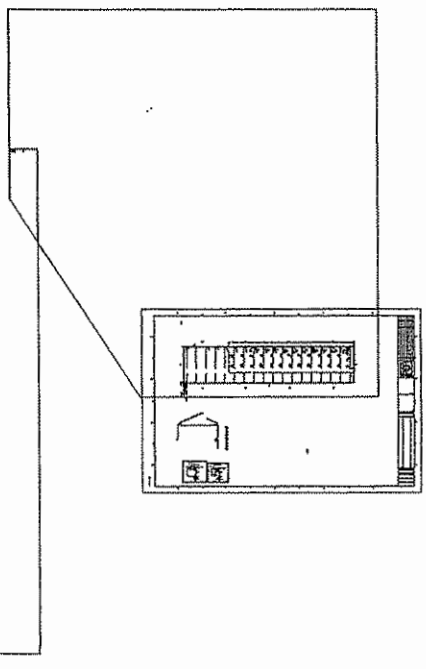
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	0.00	72.000	56.000

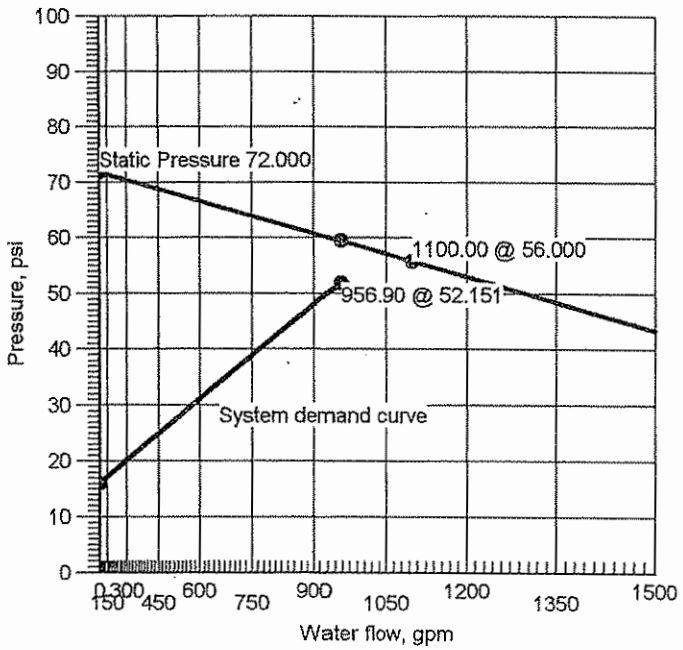
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR	0.000	0	0.00
BOR	0.000	0	0.00

FP 2 BLDG 2442 R2



Supply at Node 1 (1100.00, 0.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 269-941989101	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2442 BOAT STORAGE	State Certification/License Number:
Class 1: BOAT STORAGE BLDG	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site:
City: STENNIS / State: MS / Zip Code:	Drawing Name: FP-2 BLDG 2442 R2

System

Most Demanding Sprinkler Data: 8 K-Factor 21.17 at 7.000

Hose Allowance At Source: 0.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 0.00

System Flow Demand: 956.90

Total Water Required (Including Hose Allowance): 956.90

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 12.88 between nodes 146 and 112

Maximum Velocity Under Ground: 6.14 between nodes 1 and 9

Volume capacity of Wet Pipes: 6638.97gal

Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Ordinary Group II

Density: 0.200gpm/ft²

Area of Application: 3900.00ft² (Actual 3927.08ft²)

Number Of Sprinklers Calculated: 39

Coverage Per Sprinkler: 100.00ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @ Flow (gpm)	Available (psi) @ Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	0.00	72.000	56.000 @ 1100.00	59.636 @ 956.90	52.151	7.485

Contractor

Contractor Number: 21	Contact Name: / Contact Title:
Contractor Name: SIMPLEXGRINNELL	Phone: / Extension:
Address 1: 5800 JEFFERSON HWY	FAX:
Address 2: SUITE A	E-mail:
City: HARAHAN / State: LA / Zip Code: 70123	Web-Site:

Summary Of Outflowing Devices

Job Number: 269-941989101
Report Description: Ordinary Group II

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	139	28.51	20.25	8	12.703		
Sprinkler	136	28.38	20.25	8	12.587		
Sprinkler	133	28.17	20.25	8	12.401		
Sprinkler	130	27.61	20.25	8	11.908		
Sprinkler	127	27.18	20.25	8	11.544		
Sprinkler	124	26.88	20.25	8	11.290		
Sprinkler	506	26.66	20.25	8	11.109		
Sprinkler	507	26.55	20.25	8	11.016		
Sprinkler	508	26.52	20.25	8	10.991		
Sprinkler	106	26.51	20.25	8	10.982		
Sprinkler	103	26.49	20.25	8	10.966		
Sprinkler	109	26.52	20.25	8	10.985		
Sprinkler	509	26.61	20.25	8	11.060		
Sprinkler	138	26.06	20.25	8	10.609		
Sprinkler	135	25.92	20.25	8	10.496		
Sprinkler	132	25.69	20.25	8	10.314		
Sprinkler	129	25.08	20.25	8	9.832		
Sprinkler	126	24.63	20.25	8	9.476		
Sprinkler	123	24.30	20.25	8	9.228		
Sprinkler	515	24.07	20.25	8	9.051		
Sprinkler	516	23.95	20.25	8	8.960		
Sprinkler	111	23.91	20.25	8	8.935		
Sprinkler	105	23.90	20.25	8	8.926		
Sprinkler	102	23.88	20.25	8	8.911		
Sprinkler	108	23.91	20.25	8	8.929		
Sprinkler	517	24.00	20.25	8	9.003		
Sprinkler	137	23.58	20.25	8	8.688		
Sprinkler	134	23.43	20.25	8	8.575		
Sprinkler	131	23.18	20.25	8	8.394		
Sprinkler	128	22.51	20.25	8	7.915		
Sprinkler	125	22.00	20.25	8	7.562		
Sprinkler	523	21.64	20.25	8	7.315		
Sprinkler	524	21.37	20.25	8	7.139		
Sprinkler	525	21.24	20.25	8	7.048		
Sprinkler	110	21.20	20.25	8	7.024		
Sprinkler	104	21.19	20.25	8	7.015		
⇨ Sprinkler	101	21.17	20.25	8	7.000		
Sprinkler	107	21.19	20.25	8	7.018		
Sprinkler	526	21.30	20.25	8	7.092		

⇨ Most Demanding Sprinkler Data

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
Route 1							
CM	2.1570	Q=21.17	1.86	C=120	0.004318	11'-0	Pf 0.047
101	31'-3	q=21.17	K=8	7.000	Spr(-7.000)		Pe 1.863
102	26'-11¼			8.911		11'-0	Pv
CM	2.1570	Q=45.05	3.96	C=120	0.017461	11'-0	Pf 0.192
102	26'-11¼	q=23.88	K=8	8.911	Spr(-8.911)		Pe 1.863
103	22'-7¾			10.966		11'-0	Pv
CM	2.1570	Q=71.54	6.28	C=120	0.041087	5'-0½	Pf 0.865
103	22'-7¾	q=26.49	K=8	10.966	Spr(-10.966)	16'-0	Pe 1.683
120	18'-9¼			13.514	LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv
CM	4.2600	Q=85.19	1.92	C=120	0.002064	10'-0	Pf 0.021
120	18'-9¼			13.514			Pe 0.000
121	18'-9¼			13.535		10'-0	Pv
CM	4.2600	Q=156.81	3.53	C=120	0.006381	10'-0	Pf 0.064
121	18'-9¼			13.535			Pe -0.000
122	18'-9¼			13.599		10'-0	Pv
CM	4.2600	Q=228.72	5.15	C=120	0.012828	216'-8½	Pf 3.793
122	18'-9¼			13.599		79'-0	Pe -0.000
316	18'-9¼			17.392	2T(26'-4), C(26'-4)	295'-8½	Pv
CM	6.3570	Q=956.90	9.67	C=120	0.025788	1'-8	Pf 0.335
316	18'-9¼			17.392		11'-3¾	Pe -0.000
338	18'-9¼			17.727	LtE(11'-3¾)	13'-0	Pv
FR	6.3570	Q=956.90	9.67	C=120	0.025788	13'-8¼	Pf 4.715
338	18'-9¼			17.727		52'-9¾	Pe 6.731
332	3'-3			29.173	f(-3.000), CV(40'-2¾), BV(12'-7	66'-6	Pv
FR	6.0650	Q=956.90	10.63	C=120	0.032424	2'-0	Pf 0.065
332	3'-3			29.173			Pe 0.971
14	1'-0			30.209		2'-0	Pv
UG	8.3900	Q=956.90	5.55	C=140	0.005020	19'-3½	Pf 0.548
14	1'-0			30.209		89'-11	Pe 2.601
16	-5'-0			33.358	E(30'-6½), T(59'-4½)	109'-2½	Pv
UG	7.9800	Q=616.55	3.96	C=150	0.002501	340'-11¼	Pf 1.053
16	-5'-0			33.358		79'-11¾	Pe
5	-5'-0			34.411	2EE(13'-7), T(52'-9¾)	420'-11¼	Pv
UG	7.9800	Q=956.90	6.14	C=150	0.005639	1'-11	Pf 0.121
5	-5'-0			34.411		19'-7½	Pe
7	-5'-0			34.532	LtE(19'-7½)	21'-6½	Pv
UG	8.3900	Q=956.90	5.55	C=140	0.005020	17'-0	Pf 12.417
7	-5'-0			34.532		66'-2	Pe 0.434
9	-6'-0			47.383	3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv
UG	7.9800	Q=956.90	6.14	C=150	0.005639	726'-3½	Pf 4.768
9	-6'-0			47.383		119'-2½	Pe
1	-6'-0			52.151	2E(27'-2), 2GV(6'-0½), T(52'-9¾), S	845'-6¼	Pv
Route 2							
CM	2.1570	Q=21.19	1.86	C=120	0.004326	11'-0	Pf 0.048
104	31'-3	q=21.19	K=8	7.015	Spr(-7.015)		Pe 1.863
105	26'-11¼			8.926		11'-0	Pv
CM	2.1570	Q=45.09	3.96	C=120	0.017493	11'-0	Pf 0.192
105	26'-11¼	q=23.90	K=8	8.926	Spr(-8.926)		Pe 1.863
106	22'-7¾			10.982		11'-0	Pv
CM	2.1570	Q=71.60	6.29	C=120	0.041155	4'-7¼	Pf 0.342
106	22'-7¾	q=26.51	K=8	10.982	Spr(-10.982)	3'-8¼	Pe 1.509
100	19'-2			12.832	LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=71.60	6.29	C=120	0.041155	0'-0	Pf 0.506
100	19'-2			12.832		12'-3¾	Pe 0.175
119	18'-9¼			13.513	PO(12'-3¾)	12'-3¾	Pv
CM	4.2600	Q=57.95	1.30	C=120	0.001012	10'-0	Pf 0.010
119	18'-9¼			13.513			Pe
118	18'-9¼			13.524		10'-0	Pv
CM	4.2600	Q=129.59	2.92	C=120	0.004484	10'-0	Pf 0.045
118	18'-9¼			13.524			Pe 0.000
117	18'-9¼			13.568		10'-0	Pv
CM	4.2600	Q=201.33	4.53	C=120	0.010131	10'-0	Pf 0.101
117	18'-9¼			13.568			Pe -0.000
116	18'-9¼			13.670		10'-0	Pv
CM	4.2600	Q=273.43	6.15	C=120	0.017848	10'-0	Pf 0.178
116	18'-9¼			13.670			Pe -0.000
115	18'-9¼			13.848		10'-0	Pv
CM	4.2600	Q=346.25	7.79	C=120	0.027625	10'-0	Pf 0.276
115	18'-9¼			13.848			Pe
114	18'-9¼			14.124		10'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	4.2600	Q=420.06	9.46	C=120	0.039496	10'-0	Pf 0.395
114	18'-9¼			14.124			Pe
13	18'-9¼			14.519		10'-0	Pv
CM	4.2600	Q=495.25	11.15	C=120	0.053562	10'-0	Pf 0.536
113	18'-9¼			14.519			Pe
112	18'-9¼			15.055		10'-0	Pv
CM	4.2600	Q=572.30	12.88	C=120	0.069989	2'-1	Pf 0.146
112	18'-9¼			15.055			Pe 0.000
146	18'-9¼			15.201		2'-1	Pv
CM	6.3570	Q=572.30	5.79	C=120	0.009964	7'-9	Pf 0.077
146	18'-9¼			15.201			Pe -0.000
148	18'-9¼			15.278		7'-9	Pv
CM	6.3570	Q=650.02	6.57	C=120	0.012611	10'-0	Pf 0.126
148	18'-9¼			15.278			Pe -0.000
147	18'-9¼			15.404		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	10'-0	Pf 0.156
147	18'-9¼			15.404			Pe -0.000
162	18'-9¼			15.560		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	10'-0	Pf 0.156
162	18'-9¼			15.560			Pe -0.000
161	18'-9¼			15.715		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	10'-0	Pf 0.156
161	18'-9¼			15.715			Pe -0.000
160	18'-9¼			15.871		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	10'-0	Pf 0.156
160	18'-9¼			15.871			Pe 0.000
159	18'-9¼			16.027		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	10'-0	Pf 0.156
159	18'-9¼			16.027			Pe -0.000
158	18'-9¼			16.182		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	40'-0½	Pf 1.210
158	18'-9¼			16.182		37'-8¾	Pe -0.000
316	18'-9¼			17.392	T(37'-8¾)	77'-9	Pv
Route 3							
CM	2.1570	Q=21.19	1.86	C=120	0.004328	11'-0	Pf 0.048
107	31'-3	q=21.19	K=8	7.018	Spr(-7.018)		Pe 1.863
108	26'-11¼			8.929		11'-0	Pv
CM	2.1570	Q=45.10	3.96	C=120	0.017499	11'-0	Pf 0.192
108	26'-11¼	q=23.91	K=8	8.929	Spr(-8.929)		Pe 1.863
109	22'-7¾			10.985		11'-0	Pv
CM	2.1570	Q=71.61	6.29	C=120	0.041168	5'-0½	Pf 0.867
109	22'-7¾	q=26.52	K=8	10.985	Spr(-10.985)	16'-0	Pe 1.683
121	18'-9¼			13.535	LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv
Route 4							
CM	2.1570	Q=21.20	1.86	C=120	0.004331	11'-0	Pf 0.048
110	31'-3	q=21.20	K=8	7.024	Spr(-7.024)		Pe 1.863
111	26'-11¼			8.935		11'-0	Pv
CM	2.1570	Q=45.12	3.96	C=120	0.017512	11'-0	Pf 0.193
111	26'-11¼	q=23.91	K=8	8.935	Spr(-8.935)		Pe 1.863
508	22'-7¾			10.991		11'-0	Pv
CM	2.1570	Q=71.64	6.29	C=120	0.041194	4'-7¼	Pf 0.342
508	22'-7¾	q=26.52	K=8	10.991	Spr(-10.991)	3'-8¼	Pe 1.509
99	19'-2			12.842	LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=71.64	6.29	C=120	0.041194	0'-0	Pf 0.507
99	19'-2			12.842		12'-3¾	Pe 0.175
118	18'-9¼			13.524	PO(12'-3¾)	12'-3¾	Pv
Route 5							
CM	2.1570	Q=21.24	1.86	C=120	0.004345	11'-0	Pf 0.048
525	31'-3	q=21.24	K=8	7.048	Spr(-7.048)		Pe 1.863
516	26'-11¼			8.960		11'-0	Pv
CM	2.1570	Q=45.19	3.97	C=120	0.017561	11'-0	Pf 0.193
516	26'-11¼	q=23.95	K=8	8.960	Spr(-8.960)		Pe 1.863
507	22'-7¾			11.016		11'-0	Pv
CM	2.1570	Q=71.74	6.30	C=120	0.041298	5'-0½	Pf 0.869
507	22'-7¾	q=26.55	K=8	11.016	Spr(-11.016)	16'-0	Pe 1.683
117	18'-9¼			13.568	LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv
Route 6							
CM	2.1570	Q=21.30	1.87	C=120	0.004370	11'-0	Pf 0.048
526	31'-3	q=21.30	K=8	7.092	Spr(-7.092)		Pe 1.863
517	26'-11¼			9.003		11'-0	Pv
CM	2.1570	Q=45.31	3.98	C=120	0.017649	11'-0	Pf 0.194
517	26'-11¼	q=24.00	K=8	9.003	Spr(-9.003)		Pe 1.863
509	22'-7¾			11.060		11'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.1570	Q=71.91	6.31	C=120		0.041486	4'-7¼	Pf 0.345
509	22'-7¾	q=26.61	K=8	11.060		Spr(-11.060)	3'-8¼	Pe 1.509
55	19'-2			12.913		LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=71.91	6.31	C=120		0.041486	0'-0	Pf 0.511
155	19'-2			12.913			12'-3¾	Pe 0.175
122	18'-9¼			13.599		PO(12'-3¾)	12'-3¾	Pv
Route 7								
CM	2.1570	Q=21.37	1.88	C=120		0.004397	11'-0	Pf 0.048
524	31'-3	q=21.37	K=8	7.139		Spr(-7.139)		Pe 1.863
515	26'-11¼			9.051			11'-0	Pv
CM	2.1570	Q=45.44	3.99	C=120		0.017746	11'-0	Pf 0.195
515	26'-11¼	q=24.07	K=8	9.051		Spr(-9.051)		Pe 1.863
506	22'-7¾			11.109			11'-0	Pv
CM	2.1570	Q=72.11	6.33	C=120		0.041692	5'-0½	Pf 0.878
506	22'-7¾	q=26.66	K=8	11.109		Spr(-11.109)	16'-0	Pe 1.683
116	18'-9¼			13.670		LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv
Route 8								
CM	2.1570	Q=21.64	1.90	C=120		0.004497	11'-0	Pf 0.049
523	31'-3	q=21.64	K=8	7.315		Spr(-7.315)		Pe 1.863
123	26'-11¼			9.228			11'-0	Pv
CM	2.1570	Q=45.94	4.03	C=120		0.018106	11'-0	Pf 0.199
123	26'-11¼	q=24.30	K=8	9.228		Spr(-9.228)		Pe 1.863
124	22'-7¾			11.290			11'-0	Pv
CM	2.1570	Q=72.82	6.39	C=120		0.042457	4'-7¼	Pf 0.353
124	22'-7¾	q=26.88	K=8	11.290		Spr(-11.290)	3'-8¼	Pe 1.509
96	19'-2			13.151		LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=72.82	6.39	C=120		0.042457	0'-0	Pf 0.523
96	19'-2			13.151			12'-3¾	Pe 0.175
115	18'-9¼			13.848		PO(12'-3¾)	12'-3¾	Pv
Route 9								
CM	2.1570	Q=22.00	1.93	C=120		0.004637	11'-0	Pf 0.051
125	31'-3	q=22.00	K=8	7.562		Spr(-7.562)		Pe 1.863
126	26'-11¼			9.476			11'-0	Pv
CM	2.1570	Q=46.63	4.09	C=120		0.018610	11'-0	Pf 0.205
126	26'-11¼	q=24.63	K=8	9.476		Spr(-9.476)		Pe 1.863
127	22'-7¾			11.544			11'-0	Pv
CM	2.1570	Q=73.81	6.48	C=120		0.043529	4'-7¼	Pf 0.362
127	22'-7¾	q=27.18	K=8	11.544		Spr(-11.544)	3'-8¼	Pe 1.509
95	19'-2			13.414		LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=73.81	6.48	C=120		0.043529	0'-0	Pf 0.536
95	19'-2			13.414			12'-3¾	Pe 0.175
114	18'-9¼			14.124		PO(12'-3¾)	12'-3¾	Pv
Route 10								
CM	2.1570	Q=22.51	1.98	C=120		0.004837	11'-0	Pf 0.053
128	31'-3	q=22.51	K=8	7.915		Spr(-7.915)		Pe 1.863
129	26'-11¼			9.832			11'-0	Pv
CM	2.1570	Q=47.59	4.18	C=120		0.019330	11'-0	Pf 0.213
129	26'-11¼	q=25.08	K=8	9.832		Spr(-9.832)		Pe 1.863
130	22'-7¾			11.908			11'-0	Pv
CM	2.1570	Q=75.20	6.60	C=120		0.045059	4'-7¼	Pf 0.374
130	22'-7¾	q=27.61	K=8	11.908		Spr(-11.908)	3'-8¼	Pe 1.509
94	19'-2			13.790		LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=75.20	6.60	C=120		0.045059	0'-0	Pf 0.555
94	19'-2			13.790			12'-3¾	Pe 0.175
113	18'-9¼			14.519		PO(12'-3¾)	12'-3¾	Pv
Route 11								
CM	2.1570	Q=23.18	2.04	C=120		0.005108	11'-0	Pf 0.056
131	31'-3	q=23.18	K=8	8.394		Spr(-8.394)		Pe 1.863
132	26'-11¼			10.314			11'-0	Pv
CM	2.1570	Q=48.87	4.29	C=120		0.020302	11'-0	Pf 0.223
132	26'-11¼	q=25.69	K=8	10.314		Spr(-10.314)		Pe 1.863
133	22'-7¾			12.401			11'-0	Pv
CM	2.1570	Q=77.04	6.76	C=120		0.047125	4'-7¼	Pf 0.391
133	22'-7¾	q=28.17	K=8	12.401		Spr(-12.401)	3'-8¼	Pe 1.509
93	19'-2			14.301		LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=77.04	6.76	C=120		0.047125	0'-0	Pf 0.580
93	19'-2			14.301			12'-3¾	Pe 0.175
112	18'-9¼			15.055		PO(12'-3¾)	12'-3¾	Pv
Route 12								
CM	2.1570	Q=23.43	2.06	C=120		0.005209	11'-0	Pf 0.057
134	31'-3	q=23.43	K=8	8.575		Spr(-8.575)		Pe 1.863
135	26'-11¼			10.496			11'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC Pt	HWC Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary	
CM	2.1570	Q=49.34	4.33	C=120		0.020668	11'-0	Pf	0.227
135	26'-11¼	q=25.92	K=8	10.496		Spr(-10.496)		Pe	1.863
36	22'-7¾			12.587			11'-0	Pv	
CM	2.1570	Q=77.73	6.82	C=120		0.047903	5'-0½	Pf	1.008
136	22'-7¾	q=28.38	K=8	12.587		Spr(-12.587)	16'-0	Pe	1.683
148	18'-9¼			15.278		LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv	
Route 13									
CM	2.1570	Q=23.58	2.07	C=120		0.005273	11'-0	Pf	0.058
137	31'-3	q=23.58	K=8	8.688		Spr(-8.688)		Pe	1.863
138	26'-11¼			10.609			11'-0	Pv	
CM	2.1570	Q=49.64	4.36	C=120		0.020896	11'-0	Pf	0.230
138	26'-11¼	q=26.06	K=8	10.609		Spr(-10.609)		Pe	1.863
139	22'-7¾			12.703			11'-0	Pv	
CM	2.1570	Q=78.15	6.86	C=120		0.048387	5'-0½	Pf	1.019
139	22'-7¾	q=28.51	K=8	12.703		Spr(-12.703)	16'-0	Pe	1.683
147	18'-9¼			15.404		LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv	
Route 14									
UG	7.9800	Q=340.34	2.18	C=150		0.000833	1129'-3½	Pf	1.053
16	-5'-0			33.358			134'-3¾	Pe	
5	-5'-0			34.411		3E(27'-2), T(52'-9¾)	1263'-7¼	Pv	
Route 15									
CM	4.2600	Q=13.65	0.31	C=120		0.000070	10'-0	Pf	0.001
119	18'-9¼			13.513				Pe	0.000
120	18'-9¼			13.514			10'-0	Pv	

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

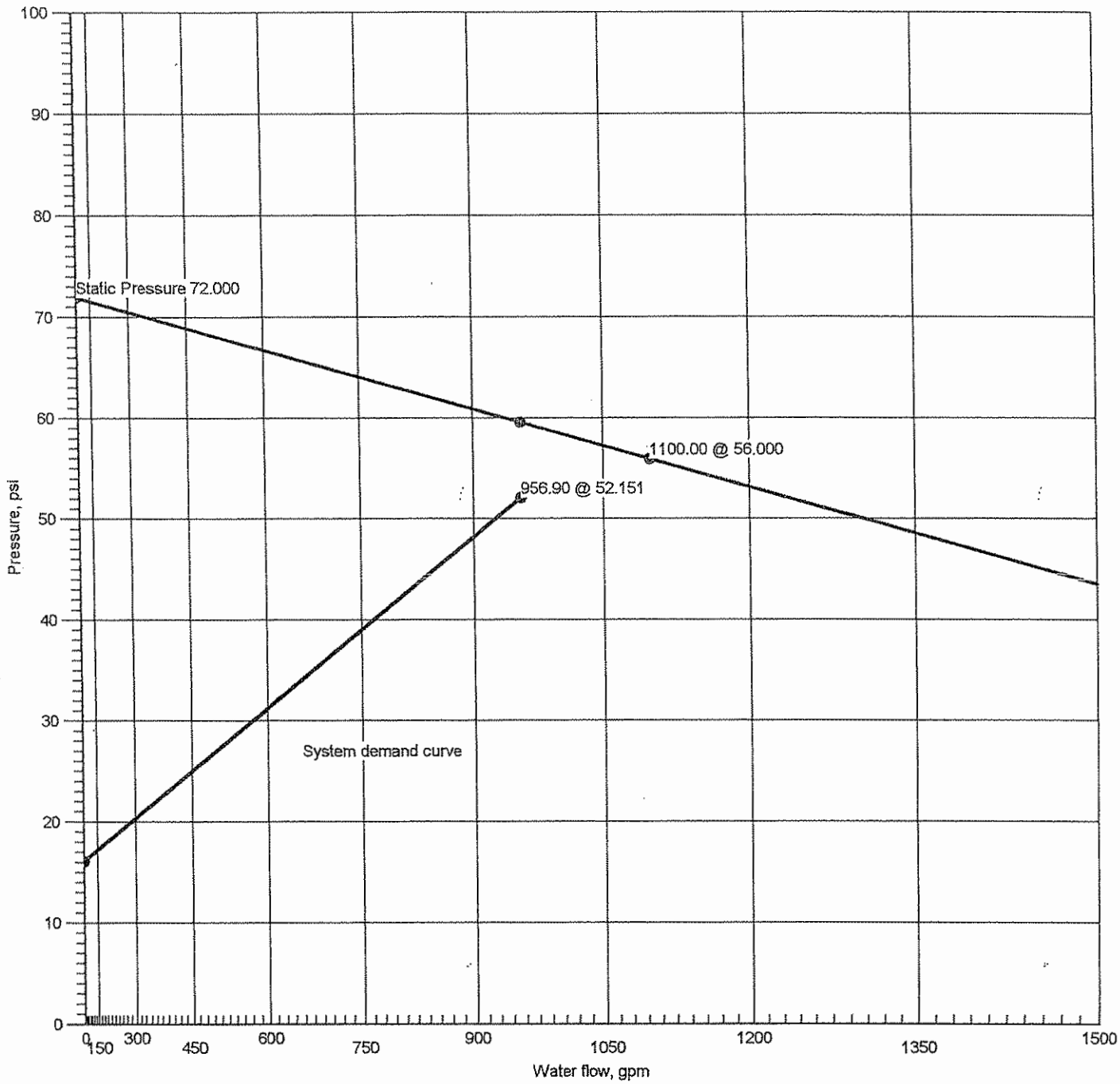
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available Pressure/Time of Test	59.636 @ 956.90
System Demand	956.90 @ 52.151
System Demand (Including Hose Allowance)	956.90 @ 52.151

Hydraulic Overview

Job

Job Number: 269-941989101	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2442 BOAT STORAGE PLATF	Phone: / FAX:
ase 1: LATFORM IN BOAT STORAGE	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site:

System

Density: 0.200gpm/ft²	Area of Application: 632.00ft²
Most Demanding Sprinkler Data: 5.6 K-Factor 18.00 at 10.332	Hose Streams: 0.00
Coverage Per Sprinkler: 90.00ft²	Number Of Sprinklers Calculated: 7
System Pressure Demand: 52.310	System Flow Demand: 160.33
Total Demand: 160.33 @ 52.310	Pressure Result: +19.236 (26.9%)

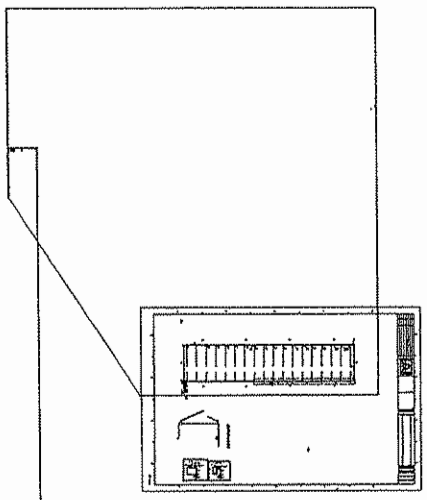
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	0.00	72.000	56.000

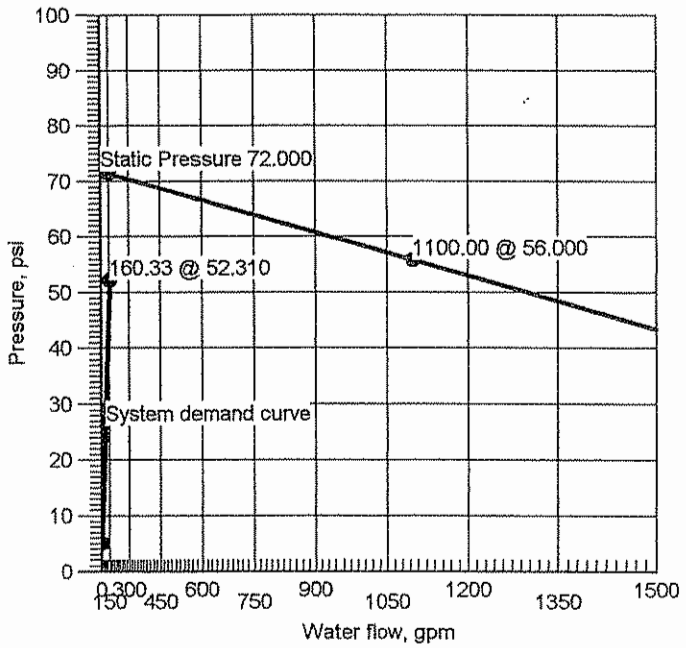
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR	0.000	0	0.00
BOR	0.000	0	0.00

FP-2 BLDG 2442 R2



Supply at Node 1 (1100.00, 0.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 269-941989101	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2442 BOAT STORAGE PLATF	State Certification/License Number:
Address 1: PLATFORM IN BOAT STORAGE	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site:
City: STENNIS / State: MS / Zip Code:	Drawing Name: FP-2 BLDG 2442 R2

System

Most Demanding Sprinkler Data: 5.6 K-Factor 18.00 at 10.332

Hose Allowance At Source: 0.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 0.00

System Flow Demand: 160.33

Total Water Required (Including Hose Allowance): 160.33

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 16.80 between nodes 363 and 205

Maximum Velocity Under Ground: 1.03 between nodes 1 and 9

Volume capacity of Wet Pipes: 6638.97gal

Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Ordinary Group II

Density: 0.200gpm/ft²

Area of Application: 632.00ft²

Number Of Sprinklers Calculated: 7

Coverage Per Sprinkler: 90.00ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Left: 52.310 Right: 52.310

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @ Flow (gpm)	Available (psi) @ Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	0.00	72.000	56.000 @ 1100.00	71.546 @ 160.33	52.310	19.236

Contractor

Contractor Number: 21		Contact Name:	Contact Title:
Contractor Name: SIMPLEXGRINNELL		Phone:	Extension:
Address 1: 5800 JEFFERSON HWY		FAX:	
Address 2: SUITE A		E-mail:	
City: HARAHAN	State: LA / Zip Code: 70123	Web-Site:	

Summary Of Outflowing Devices

Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler 207	27.54	18.00	5.6	24.189		
Sprinkler 206	26.21	18.00	5.6	21.909		
Sprinkler 205	25.35	18.00	5.6	20.485		
Sprinkler 204	23.26	18.00	5.6	17.246		
Sprinkler 203	20.63	18.00	5.6	13.568		
Sprinkler 202	19.35	18.00	5.6	11.938		
⇨ Sprinkler 201	18.00	18.00	5.6	10.332		

⇨ Most Demanding Sprinkler Data

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
Route 1								
BL	1.0490	Q=18.00	6.68	C=120		0.107085	15'-0	Pf 1.606
01	6'-0	q=18.00	K=5.6	10.332		Spr(-10.332)		Pe
02	6'-0			11.938			15'-0	Pv
BL	1.3800	Q=37.35	8.01	C=120		0.108681	15'-0	Pf 1.630
202	6'-0	q=19.35	K=5.6	11.938		Spr(-11.938)		Pe
203	6'-0			13.568			15'-0	Pv
BL	1.3800	Q=57.98	12.44	C=120		0.245163	15'-0	Pf 3.677
203	6'-0	q=20.63	K=5.6	13.568		Spr(-13.568)		Pe
204	6'-0			17.246			15'-0	Pv
BL	1.6100	Q=81.23	12.80	C=120		0.215976	15'-0	Pf 3.240
204	6'-0	q=23.26	K=5.6	17.246		Spr(-17.246)		Pe
205	6'-0			20.485			15'-0	Pv
BL	1.6100	Q=106.58	16.80	C=120		0.356939	0'-6	Pf 0.178
205	6'-0	q=25.35	K=5.6	20.485		Spr(-20.485)		Pe
363	6'-0			20.664			0'-6	Pv
CM	2.1570	Q=106.58	9.36	C=120		0.085899	14'-6	Pf 1.246
363	6'-0			20.664				Pe
206	6'-0			21.909			14'-6	Pv
CM	2.1570	Q=132.79	11.66	C=120		0.129020	6'-6	Pf 2.426
206	6'-0	q=26.21	K=5.6	21.909		Spr(-21.909)	12'-3¾	Pe
352	6'-0			24.336		T(12'-3¾)	18'-9¾	Pv
CM	2.1570	Q=160.33	14.08	C=120		0.182848	19'-2¾	Pf 7.116
352	6'-0			24.336			19'-8¼	Pe -5.535
330	18'-9¼			25.917		2LtE(3'-8¼), PO(12'-3¾)	38'-11	Pv
CM	4.2600	Q=100.57	2.26	C=120		0.002806	89'-3½	Pf 0.324
330	18'-9¼			25.917			26'-4	Pe -0.000
316	18'-9¼			26.242		C(26'-4)	115'-7½	Pv
CM	6.3570	Q=160.33	1.62	C=120		0.000946	1'-8	Pf 0.012
316	18'-9¼			26.242			11'-3¾	Pe -0.000
338	18'-9¼			26.254		LtE(11'-3¾)	13'-0	Pv
FR	6.3570	Q=160.33	1.62	C=120		0.000946	13'-8¼	Pf 3.063
338	18'-9¼			26.254			52'-9¾	Pe 6.731
332	3'-3			36.048		f(-3.000), CV(40'-2¾), BV(12'-7)	66'-6	Pv
FR	6.0650	Q=160.33	1.78	C=120		0.001190	2'-0	Pf 0.002
332	3'-3			36.048				Pe 0.971
14	1'-0			37.022			2'-0	Pv
UG	8.3900	Q=160.33	0.93	C=140		0.000184	19'-3½	Pf 0.020
14	1'-0			37.022			89'-11	Pe 2.601
16	-5'-0			39.643		E(30'-6½), T(59'-4½)	109'-2½	Pv
UG	7.9800	Q=103.31	0.66	C=150		0.000092	340'-11¼	Pf 0.039
16	-5'-0			39.643			79'-11¾	Pe
5	-5'-0			39.682		2EE(13'-7), T(52'-9¾)	420'-11¼	Pv
UG	7.9800	Q=160.33	1.03	C=150		0.000207	1'-11	Pf 0.004
5	-5'-0			39.682			19'-7½	Pe
7	-5'-0			39.686		LtE(19'-7½)	21'-6½	Pv
UG	8.3900	Q=160.33	0.93	C=140		0.000184	17'-0	Pf 12.015
7	-5'-0			39.686			66'-2	Pe 0.434
9	-6'-0			52.135		3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv
UG	7.9800	Q=160.33	1.03	C=150		0.000207	726'-3½	Pf 0.175
9	-6'-0			52.135			119'-2½	Pe
1	-6'-0			52.310		2E(27'-2), 2GV(6'-0½), T(52'-9¾), S	845'-6¼	Pv
Route 2								
CM	2.1570	Q=27.54	2.42	C=120		0.007028	8'-6	Pf 0.146
207	6'-0	q=27.54	K=5.6	24.189		Spr(-24.189)	12'-3¾	Pe
352	6'-0			24.336		T(12'-3¾)	20'-9¾	Pv
Route 3								
CM	6.3570	Q=59.76	0.60	C=120		0.000152	7'-9	Pf 0.001
146	18'-9¼			26.220				Pe -0.000
148	18'-9¼			26.221			7'-9	Pv
CM	6.3570	Q=59.76	0.60	C=120		0.000152	10'-0	Pf 0.002
148	18'-9¼			26.221				Pe -0.000
147	18'-9¼			26.222			10'-0	Pv
CM	6.3570	Q=59.76	0.60	C=120		0.000152	10'-0	Pf 0.002
147	18'-9¼			26.222				Pe -0.000
162	18'-9¼			26.224			10'-0	Pv
CM	6.3570	Q=59.76	0.60	C=120		0.000152	10'-0	Pf 0.002
162	18'-9¼			26.224				Pe -0.000
161	18'-9¼			26.225			10'-0	Pv
CM	6.3570	Q=59.76	0.60	C=120		0.000152	10'-0	Pf 0.002
161	18'-9¼			26.225				Pe -0.000
160	18'-9¼			26.227			10'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	6.3570	Q=59.76	0.60	C=120	0.000152	10'-0	Pf 0.002
160	18'-9¼			26.227			Pe 0.000
159	18'-9¼			26.228		10'-0	Pv
CM	6.3570	Q=59.76	0.60	C=120	0.000152	10'-0	Pf 0.002
159	18'-9¼			26.228			Pe -0.000
158	18'-9¼			26.230		10'-0	Pv
CM	6.3570	Q=59.76	0.60	C=120	0.000152	40'-0½	Pf 0.012
158	18'-9¼			26.230		37'-8¾	Pe -0.000
316	18'-9¼			26.242	T(37'-8¾)	77'-9	Pv
Route 4							
UG	7.9800	Q=57.03	0.37	C=150	0.000031	1129'-3½	Pf 0.039
16	-5'-0			39.643		134'-3¾	Pe
5	-5'-0			39.682	3E(27'-2), T(52'-9¾)	1263'-7¼	Pv
Route 5							
CM	4.2600	Q=59.76	1.35	C=120	0.001071	10'-0	Pf 0.011
121	18'-9¼			26.121			Pe -0.000
120	18'-9¼			26.132		10'-0	Pv
CM	4.2600	Q=59.76	1.35	C=120	0.001071	30'-0	Pf 0.032
120	18'-9¼			26.132			Pe 0.000
117	18'-9¼			26.164		30'-0	Pv
CM	4.2600	Q=59.76	1.35	C=120	0.001071	10'-0	Pf 0.011
117	18'-9¼			26.164			Pe -0.000
116	18'-9¼			26.174		10'-0	Pv
CM	4.2600	Q=59.76	1.35	C=120	0.001071	42'-1	Pf 0.045
116	18'-9¼			26.174			Pe -0.000
146	18'-9¼			26.220		42'-1	Pv
Route 6							
CM	4.2600	Q=59.76	1.35	C=120	0.001071	137'-5	Pf 0.204
330	18'-9¼			25.917		52'-8	Pe -0.000
121	18'-9¼			26.121	2T(26'-4)	190'-1	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

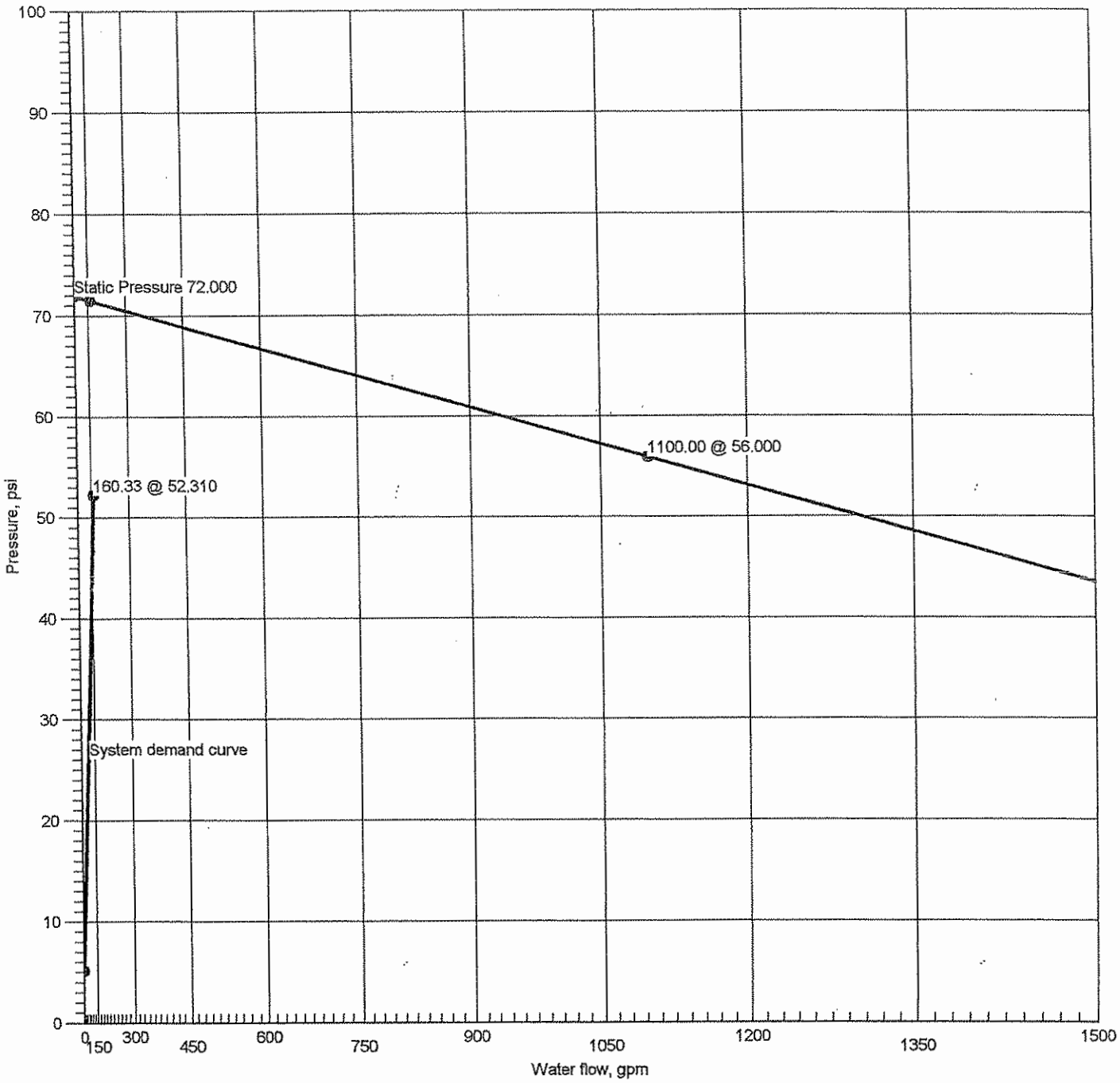
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available Pressure/Time of Test	71.546 @ 160.33
System Demand	160.33 @ 52.310
System Demand (Including Hose Allowance)	160.33 @ 52.310

tyco / Fire & Security / SimplexGrinnell

STENNIS RIVERINE & COMBATANT TRAINING FACILITY
STENNIS SPACE CENTER
STENNIS, MS 39529

FIRE PROTECTION/ SPRINKLER SYSTEMS
OPERATIONS BUILDING 2440/2441
BOAT STORAGE BUILDING 2442

SECTION 6

HYDRAULIC CALCULATIONS WITH HOSE ALLOWANCE FOR REFERENCE ONLY

SIMPLEXGRINNELL
5800 JEFFERSON HWY, SUITE A
HARAHAN, LA 70123
PHONE: 504-736-0104
FAX: 504-736-9292

Hydraulic Overview

Job Number: 269-941989101 R1
Report Description: Ordinary Group II

Job

Job Number: 269-941989101 R1	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2442 BOAT STORAGE	Phone: / FAX:
Address 1: BOAT STORAGE BLDG	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site: DEMAND WITH 500 GPM HOSE ALLOWANCE

System

Density: 0.200gpm/ft²	Area of Application: 3900.00ft² (Actual 3927.08ft²)
Most Demanding Sprinkler Data: 8 K-Factor 21.17 at 7.000	Hose Streams: 500.00
Coverage Per Sprinkler: 100.00ft²	Number Of Sprinklers Calculated: 39
System Pressure Demand: 52.151	System Flow Demand: 956.90
Total Demand: 1456.90 @ 52.151	Pressure Result: -7.059 (-13.5%)

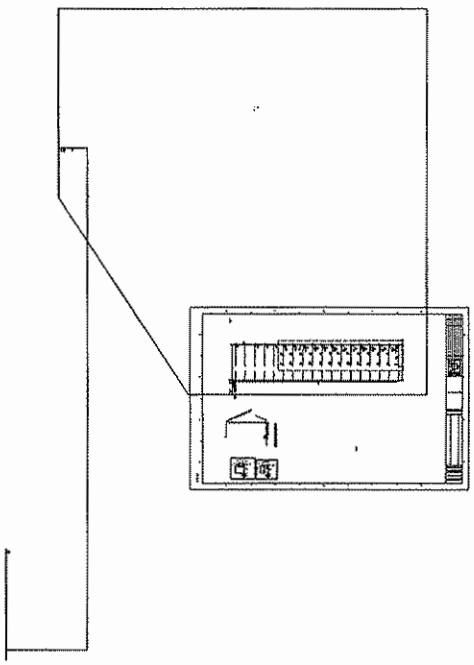
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	500.00	72.000	56.000

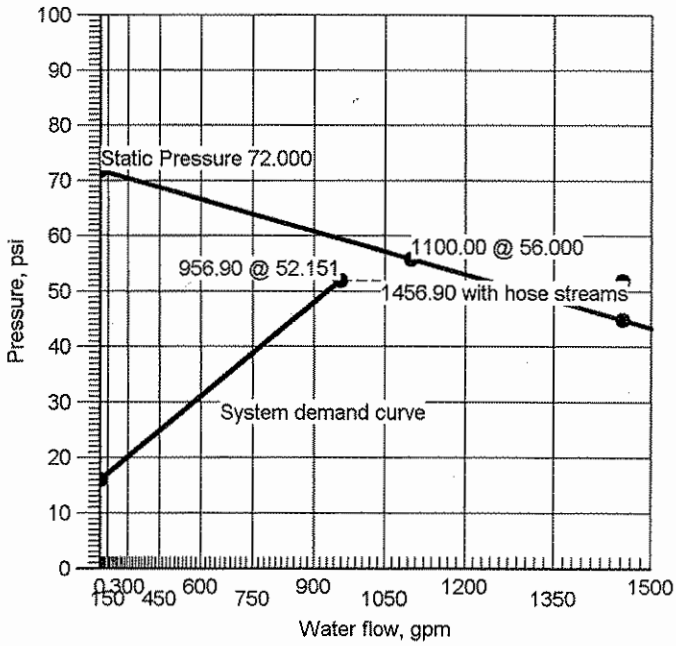
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR	0.000	0	0.00
BOR	0.000	0	0.00

FP-2 BLDG 2442 R5



Supply at Node 1 (1100.00, 500.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 269-941989101 R1	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2442 BOAT STORAGE	State Certification/License Number:
Address 1: BOAT STORAGE BLDG	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site: DEMAND WITH 500 GPM HOSE ALLOWANCE
City: STENNIS, State: MS, Zip Code:	Drawing Name: FP-2 BLDG 2442 R5

System

Most Demanding Sprinkler Data: 8 K-Factor 21.17 at 7.000	
Hose Allowance At Source: 500.00	
Additional Hose Supplies: Node / Flow(gpm)	
Total Hose Streams: 500.00	
System Flow Demand: 956.90	Total Water Required (Including Hose Allowance): 1456.90
Maximum Pressure Unbalance In Loops: 0.000	
Maximum Velocity Above Ground: 12.88 between nodes 146 and 112	
Maximum Velocity Under Ground: 6.14 between nodes 1 and 9	
Volume capacity of Wet Pipes: 6646.41gal	Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Ordinary Group II	
Density: 0.200gpm/ft²	Area of Application: 3900.00ft² (Actual 3927.08ft²)
Number Of Sprinklers Calculated: 39	Coverage Per Sprinkler: 100.00ft²
AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area	

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required (psi)	Safety Margin (psi)
1	500.00	72.000	56.000	1100.00	45.092	1456.90	52.151	-7.059

Contractor

Contractor Number: 21	Contact Name: / Contact Title:
Contractor Name: SIMPLEXGRINNELL	Phone: / Extension:
Address 1: 5800 JEFFERSON HWY	FAX:
Address 2: SUITE A	E-mail:
City: HARAHAN, State: LA, Zip Code: 70123	Web-Site:

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	139	28.51	20.25	8	12.703		
Sprinkler	136	28.38	20.25	8	12.587		
Sprinkler	133	28.17	20.25	8	12.401		
Sprinkler	130	27.61	20.25	8	11.908		
Sprinkler	127	27.18	20.25	8	11.544		
Sprinkler	124	26.88	20.25	8	11.290		
Sprinkler	606	26.66	20.25	8	11.109		
Sprinkler	607	26.55	20.25	8	11.016		
Sprinkler	608	26.52	20.25	8	10.991		
Sprinkler	106	26.51	20.25	8	10.982		
Sprinkler	103	26.49	20.25	8	10.966		
Sprinkler	109	26.52	20.25	8	10.985		
Sprinkler	609	26.61	20.25	8	11.060		
Sprinkler	138	26.06	20.25	8	10.609		
Sprinkler	135	25.92	20.25	8	10.496		
Sprinkler	132	25.69	20.25	8	10.314		
Sprinkler	129	25.08	20.25	8	9.832		
Sprinkler	126	24.63	20.25	8	9.476		
Sprinkler	123	24.30	20.25	8	9.228		
Sprinkler	615	24.07	20.25	8	9.051		
Sprinkler	616	23.95	20.25	8	8.960		
Sprinkler	111	23.91	20.25	8	8.935		
Sprinkler	105	23.90	20.25	8	8.926		
Sprinkler	102	23.88	20.25	8	8.911		
Sprinkler	108	23.91	20.25	8	8.929		
Sprinkler	617	24.00	20.25	8	9.003		
Sprinkler	137	23.58	20.25	8	8.688		
Sprinkler	134	23.43	20.25	8	8.575		
Sprinkler	131	23.18	20.25	8	8.394		
Sprinkler	128	22.51	20.25	8	7.915		
Sprinkler	125	22.00	20.25	8	7.562		
Sprinkler	623	21.64	20.25	8	7.315		
Sprinkler	624	21.37	20.25	8	7.139		
Sprinkler	625	21.24	20.25	8	7.048		
Sprinkler	110	21.20	20.25	8	7.024		
Sprinkler	104	21.19	20.25	8	7.015		
⇨ Sprinkler	101	21.17	20.25	8	7.000		
Sprinkler	107	21.19	20.25	8	7.018		
Sprinkler	626	21.30	20.25	8	7.092		

⇨ Most Demanding Sprinkler Data

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
5	-5'-0	2T(52'-9¾)	34.411		
7	-5'-0	LtE(19'-7½)	34.532		
9	-6'-0	LtE(22'-0¾)	47.383		
93	19'-2		14.301		
94	19'-2		13.790		
95	19'-2		13.414		
96	19'-2		13.151		
99	19'-2		12.842		
100	19'-2		12.832		
155	19'-2		12.913		
158	18'-9¼	PO(12'-3¾)	16.182		
159	18'-9¼	PO(12'-3¾)	16.027		
160	18'-9¼	PO(12'-3¾)	15.871		
161	18'-9¼	PO(12'-3¾)	15.715		
162	18'-9¼	PO(12'-3¾)	15.560		
147	18'-9¼	PO(12'-3¾)	15.404		
148	18'-9¼	PO(12'-3¾)	15.278		
146	18'-9¼		15.201		
112	18'-9¼	PO(12'-3¾)	15.055		
113	18'-9¼	PO(12'-3¾)	14.519		
114	18'-9¼	PO(12'-3¾)	14.124		
115	18'-9¼	PO(12'-3¾)	13.848		
116	18'-9¼	PO(12'-3¾)	13.670		
117	18'-9¼	PO(12'-3¾)	13.568		
118	18'-9¼	PO(12'-3¾)	13.524		
119	18'-9¼	PO(12'-3¾)	13.513		
120	18'-9¼	PO(12'-3¾)	13.514		
121	18'-9¼	PO(12'-3¾)	13.535		
122	18'-9¼	PO(12'-3¾)	13.599		
316	18'-9¼	C(26'-4), C(37'-8¾)	17.392		
14	1'-0		30.209		
332	3'-3	BV(12'-7)	29.173		
338	18'-9¼	LtE(11'-3¾)	17.727		
16	-5'-0	T(59'-4½)	33.358		
454	-4'-10		0.000		
139	22'-7¾	Spr(-12.703)	12.703	28.51	
136	22'-7¾	Spr(-12.587)	12.587	28.38	
133	22'-7¾	Spr(-12.401)	12.401	28.17	
130	22'-7¾	Spr(-11.908)	11.908	27.61	
127	22'-7¾	Spr(-11.544)	11.544	27.18	
124	22'-7¾	Spr(-11.290)	11.290	26.88	
606	22'-7¾	Spr(-11.109)	11.109	26.66	
607	22'-7¾	Spr(-11.016)	11.016	26.55	
608	22'-7¾	Spr(-10.991)	10.991	26.52	
106	22'-7¾	Spr(-10.982)	10.982	26.51	
103	22'-7¾	Spr(-10.966)	10.966	26.49	
109	22'-7¾	Spr(-10.985)	10.985	26.52	
609	22'-7¾	Spr(-11.060)	11.060	26.61	
138	26'-11¼	Spr(-10.609)	10.609	26.06	
135	26'-11¼	Spr(-10.496)	10.496	25.92	
132	26'-11¼	Spr(-10.314)	10.314	25.69	
129	26'-11¼	Spr(-9.832)	9.832	25.08	
126	26'-11¼	Spr(-9.476)	9.476	24.63	
123	26'-11¼	Spr(-9.228)	9.228	24.30	
615	26'-11¼	Spr(-9.051)	9.051	24.07	
616	26'-11¼	Spr(-8.960)	8.960	23.95	
111	26'-11¼	Spr(-8.935)	8.935	23.91	
105	26'-11¼	Spr(-8.926)	8.926	23.90	
102	26'-11¼	Spr(-8.911)	8.911	23.88	
108	26'-11¼	Spr(-8.929)	8.929	23.91	
617	26'-11¼	Spr(-9.003)	9.003	24.00	
137	31'-3	Spr(-8.688)	8.688	23.58	
134	31'-3	Spr(-8.575)	8.575	23.43	
131	31'-3	Spr(-8.394)	8.394	23.18	
128	31'-3	Spr(-7.915)	7.915	22.51	
125	31'-3	Spr(-7.562)	7.562	22.00	
623	31'-3	Spr(-7.315)	7.315	21.64	
624	31'-3	Spr(-7.139)	7.139	21.37	
625	31'-3	Spr(-7.048)	7.048	21.24	
110	31'-3	Spr(-7.024)	7.024	21.20	
104	31'-3	Spr(-7.015)	7.015	21.19	
101	31'-3	Spr(-7.000)	7.000	21.17	
107	31'-3	Spr(-7.018)	7.018	21.19	
626	31'-3	Spr(-7.092)	7.092	21.30	
1	-6'-0	S	52.151	956.90	

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
••••• Route 1 •••••							
CM	2.1570	Q=21.17	1.86	C=120	0.004318	11'-0	Pf 0.047
101	31'-3	q=21.17	K=8	7.000	Spr(-7.000)		Pe 1.863
102	26'-11¼			8.911		11'-0	Pv
CM	2.1570	Q=45.05	3.96	C=120	0.017461	11'-0	Pf 0.192
102	26'-11¼	q=23.88	K=8	8.911	Spr(-8.911)		Pe 1.863
103	22'-7¾			10.966		11'-0	Pv
CM	2.1570	Q=71.54	6.28	C=120	0.041087	5'-0½	Pf 0.865
103	22'-7¾	q=26.49	K=8	10.966	Spr(-10.966)	16'-0	Pe 1.683
120	18'-9¼			13.514	LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv
CM	4.2600	Q=85.19	1.92	C=120	0.002064	10'-0	Pf 0.021
120	18'-9¼			13.514			Pe 0.000
121	18'-9¼			13.535		10'-0	Pv
CM	4.2600	Q=156.81	3.53	C=120	0.006381	10'-0	Pf 0.064
121	18'-9¼			13.535			Pe -0.000
122	18'-9¼			13.599		10'-0	Pv
CM	4.2600	Q=228.72	5.15	C=120	0.012828	216'-8½	Pf 3.793
122	18'-9¼			13.599		79'-0	Pe -0.000
316	18'-9¼			17.392	2T(26'-4), C(26'-4)	295'-8½	Pv
CM	6.3570	Q=956.90	9.67	C=120	0.025788	1'-8	Pf 0.335
316	18'-9¼			17.392		11'-3¾	Pe -0.000
338	18'-9¼			17.727	LtE(11'-3¾)	13'-0	Pv
FR	6.3570	Q=956.90	9.67	C=120	0.025788	13'-8¼	Pf 4.715
338	18'-9¼			17.727		52'-9¾	Pe 6.731
332	3'-3			29.173	f(-3.000), CV(40'-2¾), BV(12'-7)	66'-6	Pv
FR	6.0650	Q=956.90	10.63	C=120	0.032424	2'-0	Pf 0.065
332	3'-3			29.173			Pe 0.971
14	1'-0			30.209		2'-0	Pv
UG	8.3900	Q=956.90	5.55	C=140	0.005020	19'-3½	Pf 0.548
14	1'-0			30.209		89'-11	Pe 2.601
16	-5'-0			33.358	E(30'-6½), T(59'-4½)	109'-2½	Pv
UG	7.9800	Q=616.55	3.96	C=150	0.002501	340'-11¼	Pf 1.053
16	-5'-0			33.358		79'-11¾	Pe
5	-5'-0			34.411	2EE(13'-7), T(52'-9¾)	420'-11¼	Pv
UG	7.9800	Q=956.90	6.14	C=150	0.005639	1'-11	Pf 0.121
5	-5'-0			34.411		19'-7½	Pe
7	-5'-0			34.532	LtE(19'-7½)	21'-6½	Pv
UG	8.3900	Q=956.90	5.55	C=140	0.005020	17'-0	Pf 12.417
7	-5'-0			34.532		66'-2	Pe 0.434
9	-6'-0			47.383	3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv
UG	7.9800	Q=956.90	6.14	C=150	0.005639	726'-3½	Pf 4.768
9	-6'-0			47.383		119'-2½	Pe
1	-6'-0			52.151	2E(27'-2), 2GV(6'-0½), T(52'-9¾), S	845'-6¼	Pv
••••• Route 2 •••••							
CM	2.1570	Q=21.19	1.86	C=120	0.004326	11'-0	Pf 0.048
104	31'-3	q=21.19	K=8	7.015	Spr(-7.015)		Pe 1.863
105	26'-11¼			8.926		11'-0	Pv
CM	2.1570	Q=45.09	3.96	C=120	0.017493	11'-0	Pf 0.192
105	26'-11¼	q=23.90	K=8	8.926	Spr(-8.926)		Pe 1.863
106	22'-7¾			10.982		11'-0	Pv
CM	2.1570	Q=71.60	6.29	C=120	0.041155	4'-7¼	Pf 0.342
106	22'-7¾	q=26.51	K=8	10.982	Spr(-10.982)	3'-8¼	Pe 1.509
100	19'-2			12.832	LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=71.60	6.29	C=120	0.041155	0'-0	Pf 0.506
100	19'-2			12.832		12'-3¾	Pe 0.175
119	18'-9¼			13.513	PO(12'-3¾)	12'-3¾	Pv
CM	4.2600	Q=57.95	1.30	C=120	0.001012	10'-0	Pf 0.010
119	18'-9¼			13.513			Pe
118	18'-9¼			13.524		10'-0	Pv
CM	4.2600	Q=129.59	2.92	C=120	0.004484	10'-0	Pf 0.045
118	18'-9¼			13.524			Pe 0.000
117	18'-9¼			13.568		10'-0	Pv
CM	4.2600	Q=201.33	4.53	C=120	0.010131	10'-0	Pf 0.101
117	18'-9¼			13.568			Pe -0.000
116	18'-9¼			13.670		10'-0	Pv
CM	4.2600	Q=273.43	6.15	C=120	0.017848	10'-0	Pf 0.178
116	18'-9¼			13.670			Pe -0.000
115	18'-9¼			13.848		10'-0	Pv
CM	4.2600	Q=346.25	7.79	C=120	0.027625	10'-0	Pf 0.276
115	18'-9¼			13.848			Pe
114	18'-9¼			14.124		10'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	4.2600	Q=420.06	9.46	C=120	0.039496	10'-0	Pf 0.395
114	18'-9¼			14.124			Pe
113	18'-9¼			14.519		10'-0	Pv
CM	4.2600	Q=495.25	11.15	C=120	0.053562	10'-0	Pf 0.536
113	18'-9¼			14.519			Pe
112	18'-9¼			15.055		10'-0	Pv
CM	4.2600	Q=572.30	12.88	C=120	0.069989	2'-1	Pf 0.146
112	18'-9¼			15.055			Pe 0.000
146	18'-9¼			15.201		2'-1	Pv
CM	6.3570	Q=572.30	5.79	C=120	0.009964	7'-9	Pf 0.077
146	18'-9¼			15.201			Pe -0.000
148	18'-9¼			15.278		7'-9	Pv
CM	6.3570	Q=650.02	6.57	C=120	0.012611	10'-0	Pf 0.126
148	18'-9¼			15.278			Pe -0.000
147	18'-9¼			15.404		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	10'-0	Pf 0.156
147	18'-9¼			15.404			Pe -0.000
162	18'-9¼			15.560		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	10'-0	Pf 0.156
162	18'-9¼			15.560			Pe -0.000
161	18'-9¼			15.715		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	10'-0	Pf 0.156
161	18'-9¼			15.715			Pe -0.000
160	18'-9¼			15.871		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	10'-0	Pf 0.156
160	18'-9¼			15.871			Pe 0.000
159	18'-9¼			16.027		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	10'-0	Pf 0.156
159	18'-9¼			16.027			Pe -0.000
158	18'-9¼			16.182		10'-0	Pv
CM	6.3570	Q=728.17	7.36	C=120	0.015558	40'-0½	Pf 1.210
158	18'-9¼			16.182		37'-8¾	Pe -0.000
316	18'-9¼			17.392	T(37'-8¾)	77'-9	Pv
••••• Route 3 •••••							
CM	2.1570	Q=21.19	1.86	C=120	0.004328	11'-0	Pf 0.048
107	31'-3	q=21.19	K=8	7.018	Spr(-7.018)		Pe 1.863
108	26'-11¼			8.929		11'-0	Pv
CM	2.1570	Q=45.10	3.96	C=120	0.017499	11'-0	Pf 0.192
108	26'-11¼	q=23.91	K=8	8.929	Spr(-8.929)		Pe 1.863
109	22'-7¾			10.985		11'-0	Pv
CM	2.1570	Q=71.61	6.29	C=120	0.041168	5'-0½	Pf 0.867
109	22'-7¾	q=26.52	K=8	10.985	Spr(-10.985)	16'-0	Pe 1.683
121	18'-9¼			13.535	LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv
••••• Route 4 •••••							
CM	2.1570	Q=21.20	1.86	C=120	0.004331	11'-0	Pf 0.048
110	31'-3	q=21.20	K=8	7.024	Spr(-7.024)		Pe 1.863
111	26'-11¼			8.935		11'-0	Pv
CM	2.1570	Q=45.12	3.96	C=120	0.017512	11'-0	Pf 0.193
111	26'-11¼	q=23.91	K=8	8.935	Spr(-8.935)		Pe 1.863
608	22'-7¾			10.991		11'-0	Pv
CM	2.1570	Q=71.64	6.29	C=120	0.041194	4'-7¼	Pf 0.342
608	22'-7¾	q=26.52	K=8	10.991	Spr(-10.991)	3'-8¼	Pe 1.509
99	19'-2			12.842	LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=71.64	6.29	C=120	0.041194	0'-0	Pf 0.507
99	19'-2			12.842		12'-3¾	Pe 0.175
118	18'-9¼			13.524	PO(12'-3¾)	12'-3¾	Pv
••••• Route 5 •••••							
CM	2.1570	Q=21.24	1.86	C=120	0.004345	11'-0	Pf 0.048
625	31'-3	q=21.24	K=8	7.048	Spr(-7.048)		Pe 1.863
616	26'-11¼			8.960		11'-0	Pv
CM	2.1570	Q=45.19	3.97	C=120	0.017561	11'-0	Pf 0.193
616	26'-11¼	q=23.95	K=8	8.960	Spr(-8.960)		Pe 1.863
607	22'-7¾			11.016		11'-0	Pv
CM	2.1570	Q=71.74	6.30	C=120	0.041298	5'-0½	Pf 0.869
607	22'-7¾	q=26.55	K=8	11.016	Spr(-11.016)	16'-0	Pe 1.683
117	18'-9¼			13.568	LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv
••••• Route 6 •••••							
CM	2.1570	Q=21.30	1.87	C=120	0.004370	11'-0	Pf 0.048
626	31'-3	q=21.30	K=8	7.092	Spr(-7.092)		Pe 1.863
617	26'-11¼			9.003		11'-0	Pv
CM	2.1570	Q=45.31	3.98	C=120	0.017649	11'-0	Pf 0.194
617	26'-11¼	q=24.00	K=8	9.003	Spr(-9.003)		Pe 1.863
609	22'-7¾			11.060		11'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.1570	Q=71.91	6.31	C=120	0.041486	4'-7¼	Pf 0.345
609	22'-7¾	q=26.61	K=8	11.060	Spr(-11.060)	3'-8¼	Pe 1.509
155	19'-2			12.913	LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=71.91	6.31	C=120	0.041486	0'-0	Pf 0.511
155	19'-2			12.913		12'-3¾	Pe 0.175
122	18'-9¼			13.599	PO(12'-3¾)	12'-3¾	Pv
••••• Route 7 •••••							
CM	2.1570	Q=21.37	1.88	C=120	0.004397	11'-0	Pf 0.048
624	31'-3	q=21.37	K=8	7.139	Spr(-7.139)		Pe 1.863
615	26'-11¼			9.051		11'-0	Pv
CM	2.1570	Q=45.44	3.99	C=120	0.017746	11'-0	Pf 0.195
615	26'-11¼	q=24.07	K=8	9.051	Spr(-9.051)		Pe 1.863
606	22'-7¾			11.109		11'-0	Pv
CM	2.1570	Q=72.11	6.33	C=120	0.041692	5'-0½	Pf 0.878
606	22'-7¾	q=26.66	K=8	11.109	Spr(-11.109)	16'-0	Pe 1.683
116	18'-9¼			13.670	LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv
••••• Route 8 •••••							
CM	2.1570	Q=21.64	1.90	C=120	0.004497	11'-0	Pf 0.049
623	31'-3	q=21.64	K=8	7.315	Spr(-7.315)		Pe 1.863
123	26'-11¼			9.228		11'-0	Pv
CM	2.1570	Q=45.94	4.03	C=120	0.018106	11'-0	Pf 0.199
123	26'-11¼	q=24.30	K=8	9.228	Spr(-9.228)		Pe 1.863
124	22'-7¾			11.290		11'-0	Pv
CM	2.1570	Q=72.82	6.39	C=120	0.042457	4'-7¼	Pf 0.353
124	22'-7¾	q=26.88	K=8	11.290	Spr(-11.290)	3'-8¼	Pe 1.509
96	19'-2			13.151	LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=72.82	6.39	C=120	0.042457	0'-0	Pf 0.523
96	19'-2			13.151		12'-3¾	Pe 0.175
115	18'-9¼			13.848	PO(12'-3¾)	12'-3¾	Pv
••••• Route 9 •••••							
CM	2.1570	Q=22.00	1.93	C=120	0.004637	11'-0	Pf 0.051
125	31'-3	q=22.00	K=8	7.562	Spr(-7.562)		Pe 1.863
126	26'-11¼			9.476		11'-0	Pv
CM	2.1570	Q=46.63	4.09	C=120	0.018610	11'-0	Pf 0.205
126	26'-11¼	q=24.63	K=8	9.476	Spr(-9.476)		Pe 1.863
127	22'-7¾			11.544		11'-0	Pv
CM	2.1570	Q=73.81	6.48	C=120	0.043529	4'-7¼	Pf 0.362
127	22'-7¾	q=27.18	K=8	11.544	Spr(-11.544)	3'-8¼	Pe 1.509
95	19'-2			13.414	LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=73.81	6.48	C=120	0.043529	0'-0	Pf 0.536
95	19'-2			13.414		12'-3¾	Pe 0.175
114	18'-9¼			14.124	PO(12'-3¾)	12'-3¾	Pv
••••• Route 10 •••••							
CM	2.1570	Q=22.51	1.98	C=120	0.004837	11'-0	Pf 0.053
128	31'-3	q=22.51	K=8	7.915	Spr(-7.915)		Pe 1.863
129	26'-11¼			9.832		11'-0	Pv
CM	2.1570	Q=47.59	4.18	C=120	0.019330	11'-0	Pf 0.213
129	26'-11¼	q=25.08	K=8	9.832	Spr(-9.832)		Pe 1.863
130	22'-7¾			11.908		11'-0	Pv
CM	2.1570	Q=75.20	6.60	C=120	0.045059	4'-7¼	Pf 0.374
130	22'-7¾	q=27.61	K=8	11.908	Spr(-11.908)	3'-8¼	Pe 1.509
94	19'-2			13.790	LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=75.20	6.60	C=120	0.045059	0'-0	Pf 0.555
94	19'-2			13.790		12'-3¾	Pe 0.175
113	18'-9¼			14.519	PO(12'-3¾)	12'-3¾	Pv
••••• Route 11 •••••							
CM	2.1570	Q=23.18	2.04	C=120	0.005108	11'-0	Pf 0.056
131	31'-3	q=23.18	K=8	8.394	Spr(-8.394)		Pe 1.863
132	26'-11¼			10.314		11'-0	Pv
CM	2.1570	Q=48.87	4.29	C=120	0.020302	11'-0	Pf 0.223
132	26'-11¼	q=25.69	K=8	10.314	Spr(-10.314)		Pe 1.863
133	22'-7¾			12.401		11'-0	Pv
CM	2.1570	Q=77.04	6.76	C=120	0.047125	4'-7¼	Pf 0.391
133	22'-7¾	q=28.17	K=8	12.401	Spr(-12.401)	3'-8¼	Pe 1.509
93	19'-2			14.301	LtE(3'-8¼)	8'-3¾	Pv
DY	2.1570	Q=77.04	6.76	C=120	0.047125	0'-0	Pf 0.580
93	19'-2			14.301		12'-3¾	Pe 0.175
112	18'-9¼			15.055	PO(12'-3¾)	12'-3¾	Pv
••••• Route 12 •••••							
CM	2.1570	Q=23.43	2.06	C=120	0.005209	11'-0	Pf 0.057
134	31'-3	q=23.43	K=8	8.575	Spr(-8.575)		Pe 1.863
135	26'-11¼			10.496		11'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.1570	Q=49.34	4.33	C=120	0.020668	11'-0	Pf 0.227
135	26'-11¼	q=25.92	K=8	10.496	Spr(-10.496)		Pe 1.863
136	22'-7¾			12.587		11'-0	Pv
CM	2.1570	Q=77.73	6.82	C=120	0.047903	5'-0½	Pf 1.008
136	22'-7¾	q=28.38	K=8	12.587	Spr(-12.587)	16'-0	Pe 1.683
148	18'-9¼			15.278	LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv
••••• Route 13 •••••							
CM	2.1570	Q=23.58	2.07	C=120	0.005273	11'-0	Pf 0.058
137	31'-3	q=23.58	K=8	8.688	Spr(-8.688)		Pe 1.863
138	26'-11¼			10.609		11'-0	Pv
CM	2.1570	Q=49.64	4.36	C=120	0.020896	11'-0	Pf 0.230
138	26'-11¼	q=26.06	K=8	10.609	Spr(-10.609)		Pe 1.863
139	22'-7¾			12.703		11'-0	Pv
CM	2.1570	Q=78.15	6.86	C=120	0.048387	5'-0½	Pf 1.019
139	22'-7¾	q=28.51	K=8	12.703	Spr(-12.703)	16'-0	Pe 1.683
147	18'-9¼			15.404	LtE(3'-8¼), PO(12'-3¾)	21'-0½	Pv
••••• Route 14 •••••							
UG	7.9800	Q=340.34	2.18	C=150	0.000833	1129'-3½	Pf 1.053
16	-5'-0			33.358		134'-3¾	Pe
5	-5'-0			34.411	3E(27'-2), T(52'-9¾)	1263'-7¼	Pv
••••• Route 15 •••••							
CM	4.2600	Q=13.65	0.31	C=120	0.000070	10'-0	Pf 0.001
119	18'-9¼			13.513			Pe 0.000
120	18'-9¼			13.514		10'-0	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

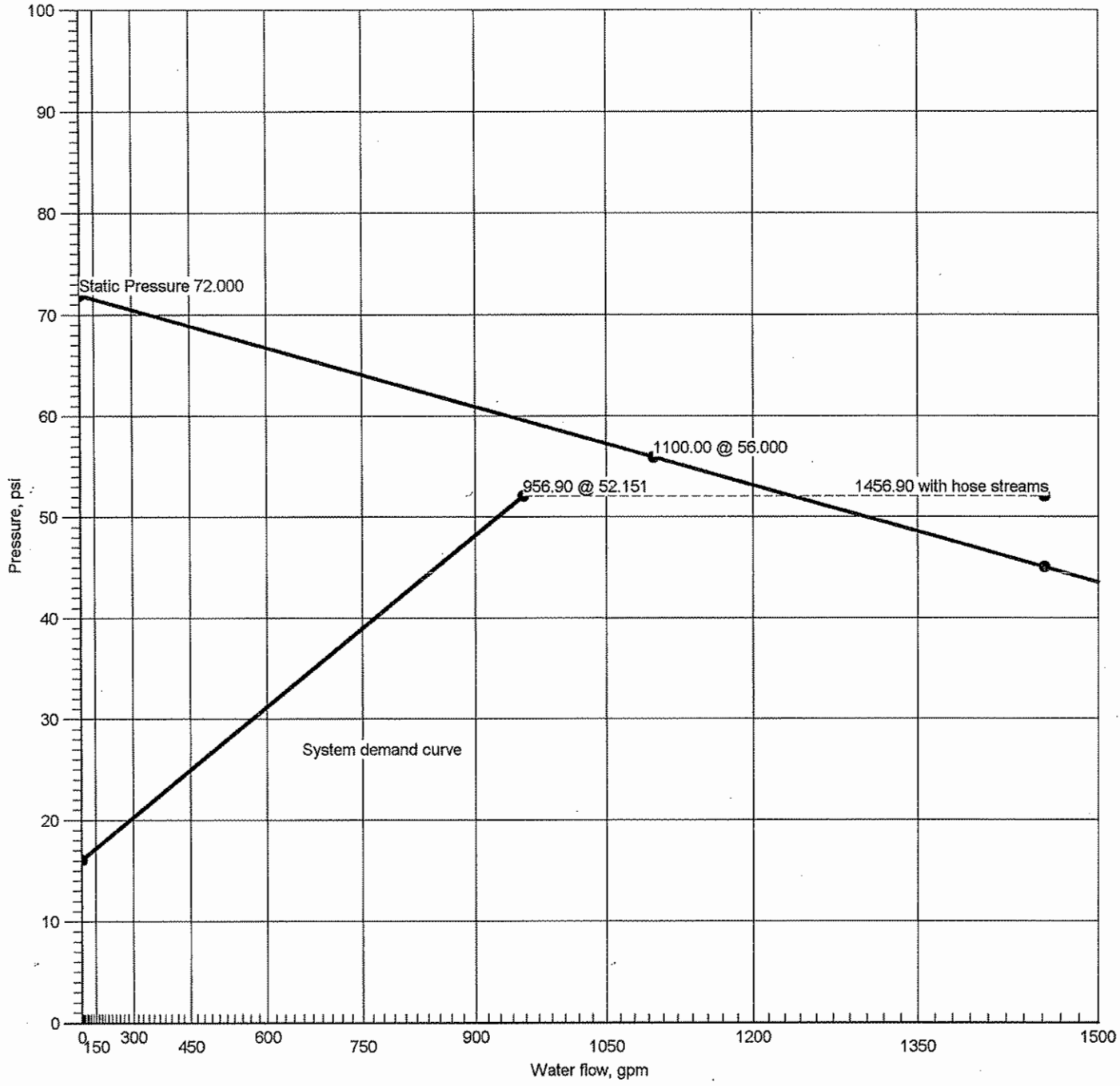
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available PressureTime of Test	45.092 @ 1456.90
System Demand	956.90 @ 52.151
System Demand (Including Hose Allowance)	1456.90 @ 52.151

Hydraulic Overview

Job

Job Number: 2440 2nd Fl	Design Engineer:
Job Name: STENNIS RIVERINE OPERATIONS BLDG 2ND FLOOR	Phone: / FAX:
Address 1: OPERATIONS BLDG	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site: DEMAND WITH 250 GPM HOSE ALLOWANCE

System

Density: 0.100gpm/ft²	Area of Application: 3000.00ft² (Actual 3044.18ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 14.82 at 7.000	Hose Streams: 250.00
Coverage Per Sprinkler: 130.00ft²	Number Of Sprinklers Calculated: 30
System Pressure Demand: 55.661	System Flow Demand: 464.56
Total Demand: 714.56 @ 55.661	Pressure Result: +9.136 (14.1%)

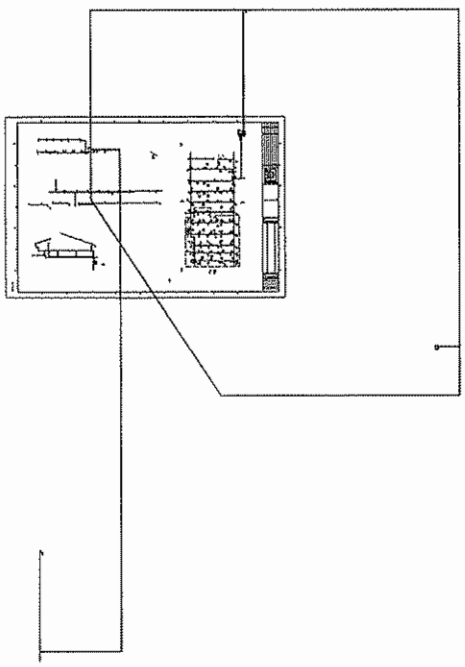
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	250.00	72.000	56.000

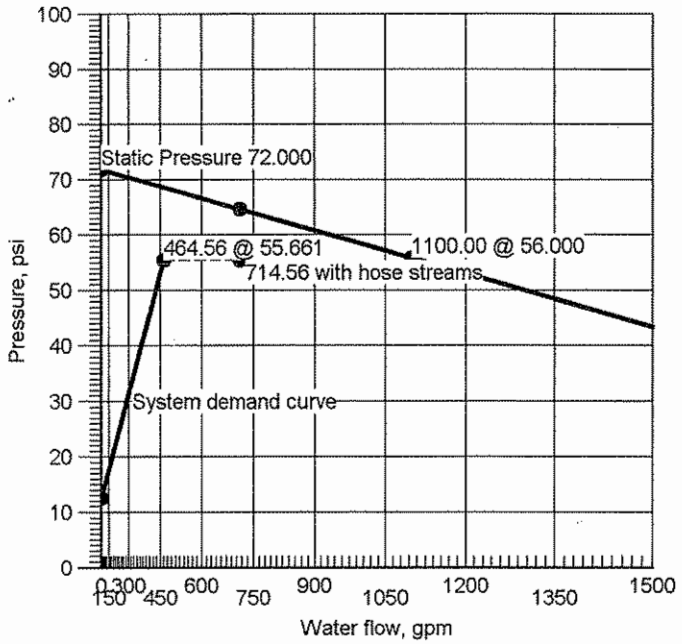
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)

FP-4 BLDG 2440 2441 SECT & 2ND FL R5



Supply at Node 1 (1100.00, 250.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 2440 2nd Fl	Design Engineer:
Job Name: STENNIS RIVERINE OPERATIONS BLDG 2ND FLOOR	State Certification/License Number:
Address 1: OPERATIONS BLDG	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site: DEMAND WITH 250 GPM HOSE ALLOWANCE
City: STENNIS / State: MS / Zip Code:	Drawing Name: FP-4 BLDG 2440 2441 SECT & 2ND FL R5

System

Most Demanding Sprinkler Data: 5.6 K-Factor 14.82 at 7.000

Hose Allowance At Source: 250.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 250.00

System Flow Demand: 464.56

Total Water Required (including Hose Allowance): 714.56

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 17.86 between nodes 305 and 245

Maximum Velocity Under Ground: 2.98 between nodes 1 and 12

Volume capacity of Wet Pipes: 7042.73gal

Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Light Hazard

Density: 0.100gpm/ft²

Area of Application: 3000.00ft² (Actual 3044.18ft²)

Number Of Sprinklers Calculated: 30

Coverage Per Sprinkler: 130.00ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @ Flow (gpm)	Available (psi) @ Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	250.00	72.000	56.000 @ 1100.00	64.797 @ 714.56	55.661	9.136

Contractor

Contractor Number: 21	Contact Name: / Contact Title:
Contractor Name: SIMPLEXGRINNELL	Phone: / Extension:
Address 1: 5800 JEFFERSON HWY	FAX:
Address 2: SUITE A	E-mail:
City: HARAHAN / State: LA / Zip Code: 70123	Web-Site:

Summary Of Outflowing Devices

Device	Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler 129	16.69	14.82	5.6	8.883		
Sprinkler 130	16.71	14.82	5.6	8.900		
Sprinkler 127	16.09	14.82	5.6	8.252		
Sprinkler 125	15.88	14.82	5.6	8.040		
Sprinkler 123	15.87	14.82	5.6	8.030		
Sprinkler 124	15.87	14.82	5.6	8.032		
Sprinkler 126	15.90	14.82	5.6	8.063		
Sprinkler 128	16.04	14.82	5.6	8.203		
Sprinkler 122	15.88	14.82	5.6	8.041		
Sprinkler 120	15.65	14.82	5.6	7.814		
Sprinkler 118	15.47	14.82	5.6	7.630		
Sprinkler 116	15.46	14.82	5.6	7.621		
Sprinkler 117	15.46	14.82	5.6	7.624		
Sprinkler 119	15.49	14.82	5.6	7.654		
Sprinkler 121	15.63	14.82	5.6	7.790		
Sprinkler 106	15.04	14.82	5.6	7.209		
Sprinkler 104	14.93	14.82	5.6	7.106		
Sprinkler 102	14.86	14.82	5.6	7.046		
Sprinkler 113	15.26	14.82	5.6	7.427		
Sprinkler 115	15.39	14.82	5.6	7.557		
Sprinkler 110	15.15	14.82	5.6	7.320		
Sprinkler 111	15.20	14.82	5.6	7.370		
Sprinkler 114	15.33	14.82	5.6	7.495		
Sprinkler 103	14.87	14.82	5.6	7.052		
⇨ Sprinkler 101	14.82	14.82	5.6	7.000		
Sprinkler 105	15.02	14.82	5.6	7.194		
Sprinkler 107	15.10	14.82	5.6	7.270		
Sprinkler 109	15.14	14.82	5.6	7.305		
Sprinkler 108	15.11	14.82	5.6	7.285		
Sprinkler 112	15.24	14.82	5.6	7.407		

⇨ Most Demanding Sprinkler Data

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
3	-5'-0	T(59'-4½)	41.578		
39	9'-0	E(13'-2)	31.537		
74	7'-7¾		32.620		
63	5'-1		36.330		
8	1'-0		38.680		
7	-5'-0	2T(52'-9¾)	41.841		
10	-5'-0	LtE(19'-7½)	41.872		
12	-6'-0	LtE(22'-0¾)	54.416		
216	23'-0	PO(12'-3¾)	15.010		
226	23'-0	2PO(16'-5¾)	12.337		
292	24'-0	T(12'-3¾)	13.867		
239	23'-0	PO(12'-3¾)	15.054		
352	24'-0	LtE(3'-8¼)	14.243		
305	9'-0		28.741		
306	23'-0		15.275		
245	23'-0	2T(20'-2)	15.437		
253	23'-0	PO(12'-3¾)	11.670		
277	23'-0	PO(12'-3¾)	12.723		
391	24'-0	LtE(3'-8¼)	12.062		
507	50'-7	E(3'-0)	0.000		
279	23'-0	PO(12'-3¾)	11.212		
301	23'-0	PO(12'-3¾)	11.727		
528	24'-0	LtE(3'-8¼)	11.183		
313	23'-0	PO(12'-3¾)	10.496		
325	23'-0	PO(12'-3¾)	10.784		
562	24'-0	LtE(3'-8¼)	10.289		
675	4'-9	Z	0.000		
393	23'-0	PO(12'-3¾)	9.705		
641	24'-0	PO(5'-0)	9.265		
643	24'-0	PO(5'-0)	9.284		
410	23'-0	PO(12'-3¾)	10.043		
694	24'-0	LtE(3'-8¼)	9.479		
667	23'-0	PO(6'-0)	9.605		
386	23'-0	PO(5'-0)	8.915		
429	23'-0	PO(12'-3¾)	8.884		
680	24'-0	PO(5'-0)	8.307		
682	24'-0	PO(5'-0)	8.296		
685	24'-0	PO(5'-0)	8.299		
688	24'-0	PO(5'-0)	8.334		
690	24'-0	PO(5'-0)	8.490		
411	23'-0	PO(12'-3¾)	9.370		
731	24'-0	LtE(3'-8¼)	8.514		
450	23'-0	E(2'-0)	8.410		
414	23'-0	PO(6'-0)	8.638		
423	23'-0	PO(5'-0)	8.428		
467	23'-0	PO(12'-3¾)	8.415		
708	24'-0	PO(5'-0)	7.849		
710	24'-0	PO(5'-0)	7.839		
713	24'-0	PO(5'-0)	7.842		
716	24'-0	PO(5'-0)	7.876		
718	24'-0	PO(5'-0)	8.028		
448	23'-0	PO(12'-3¾)	8.892		
761	24'-0	LtE(3'-8¼)	8.051		
788	5'-10½	LtE(3'-8¼)	0.000		
739	24'-0	E(2'-0)	7.393		
741	24'-0	PO(6'-0)	7.575		
745	24'-0	PO(12'-3¾)	7.570		
747	24'-0	PO(5'-0)	7.557		
749	24'-0	PO(5'-0)	7.562		
752	24'-0	PO(5'-0)	7.622		
754	24'-0	PO(5'-0)	7.767		
477	23'-0	PO(12'-3¾)	8.616		
798	24'-0	LtE(3'-8¼)	7.790		
773	24'-0	E(2'-0)	7.335		
775	24'-0	PO(6'-0)	7.515		
777	24'-0	PO(12'-3¾)	7.514		
779	24'-0	PO(5'-0)	7.498		
781	24'-0	PO(5'-0)	7.502		
784	24'-0	PO(5'-0)	7.558		
786	24'-0	PO(5'-0)	7.698		
538	23'-0	PO(12'-3¾)	8.533		
828	24'-0	LtE(3'-8¼)	7.719		
845	24'-0	PO(5'-0)	7.499		
861	24'-0	PO(12'-3¾)	7.499		
863	24'-0	PO(5'-0)	7.481		
865	24'-0	PO(5'-0)	7.485		
868	24'-0	PO(5'-0)	7.540		

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
870	24'-0	PO(5'-0)	7.678		
661	23'-0	PO(12'-3¾)	8.509		
935	24'-0	LtE(3'-8¼)	7.700		
129	22'-3	Spr(-8.883)	8.883	16.69	
130	22'-3	Spr(-8.900)	8.900	16.71	
127	22'-3¼	Spr(-8.252)	8.252	16.09	
125	22'-3	Spr(-8.040)	8.040	15.88	
123	22'-3	Spr(-8.030)	8.030	15.87	
124	22'-3	Spr(-8.032)	8.032	15.87	
126	22'-3	Spr(-8.063)	8.063	15.90	
128	22'-3	Spr(-8.203)	8.203	16.04	
122	22'-3¼	Spr(-8.041)	8.041	15.88	
120	22'-3¼	Spr(-7.814)	7.814	15.65	
118	22'-3	Spr(-7.630)	7.630	15.47	
116	22'-3	Spr(-7.621)	7.621	15.46	
117	22'-3	Spr(-7.624)	7.624	15.46	
119	22'-3	Spr(-7.654)	7.654	15.49	
121	22'-3	Spr(-7.790)	7.790	15.63	
106	22'-3¼	Spr(-7.209)	7.209	15.04	
104	23'-3	Spr(-7.106)	7.106	14.93	
102	23'-3¼	Spr(-7.046)	7.046	14.86	
113	22'-3	Spr(-7.427)	7.427	15.26	
115	22'-3	Spr(-7.557)	7.557	15.39	
110	22'-3	Spr(-7.320)	7.320	15.15	
111	22'-3	Spr(-7.370)	7.370	15.20	
114	22'-3	Spr(-7.495)	7.495	15.33	
103	23'-3	Spr(-7.052)	7.052	14.87	
101	23'-3	Spr(-7.000)	7.000	14.82	
105	22'-3	Spr(-7.194)	7.194	15.02	
107	22'-3	Spr(-7.270)	7.270	15.10	
109	22'-3	Spr(-7.305)	7.305	15.14	
108	22'-3	Spr(-7.285)	7.285	15.11	
112	22'-3	Spr(-7.407)	7.407	15.24	
1	-6'-0	S	55.661	464.56	

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
• • • • • Route 1 • • • • •							
DR	1.0490	Q=14.82	5.50	C=120	0.074703	2'-0¼	Pf 0.823
101	23'-3	q=14.82	K=5.6	7.000	Spr(-7.000)	9'-0	Pe -0.325
779	24'-0			7.498	2E(2'-0), PO(5'-0)	11'-0¼	Pv
CM	2.1570	Q=5.83	0.51	C=120	0.000398	9'-8	Pf 0.004
779	24'-0			7.498			Pe 0.000
781	24'-0			7.502		9'-8	Pv
CM	2.1570	Q=20.98	1.84	C=120	0.004248	13'-2	Pf 0.056
781	24'-0			7.502			Pe -0.000
784	24'-0			7.558		13'-2	Pv
CM	2.1570	Q=36.18	3.18	C=120	0.011643	12'-0	Pf 0.140
784	24'-0			7.558			Pe
786	24'-0			7.698		12'-0	Pv
CM	2.1570	Q=51.52	4.52	C=120	0.022381	0'-11½	Pf 0.021
786	24'-0			7.698			Pe
828	24'-0			7.719		0'-11½	Pv
RN	2.1570	Q=51.52	4.52	C=120	0.022381	1'-0	Pf 0.380
828	24'-0			7.719	LtE(3'-8¼)	16'-0	Pe 0.434
538	23'-0			8.533	PO(12'-3¾)	17'-0	Pv
CM	3.2600	Q=102.73	3.95	C=120	0.010737	7'-8½	Pf 0.083
538	23'-0			8.533			Pe
477	23'-0			8.616		7'-8½	Pv
CM	3.2600	Q=155.14	5.96	C=120	0.023021	12'-0	Pf 0.276
477	23'-0			8.616			Pe
448	23'-0			8.892		12'-0	Pv
CM	3.2600	Q=208.62	8.02	C=120	0.039819	12'-0	Pf 0.478
448	23'-0			8.892			Pe
411	23'-0			9.370		12'-0	Pv
CM	3.2600	Q=263.13	10.11	C=120	0.061180	11'-0	Pf 0.673
411	23'-0			9.370			Pe
410	23'-0			10.043		11'-0	Pv
CM	3.2600	Q=291.96	11.22	C=120	0.074152	10'-0	Pf 0.742
410	23'-0			10.043			Pe 0.000
325	23'-0			10.784		10'-0	Pv
CM	3.2600	Q=311.31	11.97	C=120	0.083502	11'-3½	Pf 0.943
325	23'-0			10.784			Pe -0.000
301	23'-0			11.727		11'-3½	Pv
CM	3.2600	Q=337.78	12.98	C=120	0.097109	10'-3	Pf 0.995
301	23'-0			11.727			Pe
277	23'-0			12.723		10'-3	Pv
CM	3.2600	Q=376.73	14.48	C=120	0.118831	2'-8¼	Pf 2.714
277	23'-0			12.723		20'-2	Pe
245	23'-0			15.437	T(20'-2)	22'-10	Pv
CM	3.2600	Q=464.56	17.86	C=120	0.175108	21'-2	Pf 7.237
245	23'-0			15.437		20'-2	Pe 6.067
305	9'-0			28.741	3LtE(6'-8¾)	41'-4	Pv
FM	4.2600	Q=464.56	10.46	C=120	0.047583	45'-7¼	Pf 2.797
305	9'-0			28.741		13'-2	Pe
39	9'-0			31.537	E(13'-2)	58'-9¼	Pv
FR	4.2600	Q=464.56	10.46	C=120	0.047583	2'-5	Pf 0.491
39	9'-0			31.537		7'-10¾	Pe 0.592
74	7'-7¾			32.620	LtE(7'-10¾)	10'-4	Pv
MS	4.2600	Q=464.56	10.46	C=120	0.047583	2'-0	Pf 2.602
74	7'-7¾			32.620		52'-8	Pe 1.109
63	5'-1			36.330	2f(-0.000), CV(28'-11½), BV(15'-9½), LtE(7'-10¾)	54'-8	Pv
FR	6.0650	Q=464.56	5.16	C=120	0.008517	2'-0	Pf 0.579
63	5'-1			36.330		66'-0	Pe 1.770
8	1'-0			38.680	C(30'-0), CV(16'-0), 2BV(10'-0)	68'-0	Pv
UG	8.3900	Q=464.56	2.70	C=140	0.001319	135'-2½	Pf 0.297
8	1'-0			38.680		89'-11	Pe 2.601
3	-5'-0			41.578	E(30'-6½), T(59'-4½)	225'-1½	Pv
UG	7.9800	Q=306.35	1.97	C=150	0.000686	303'-2¾	Pf 0.263
3	-5'-0			41.578		79'-11¾	Pe
7	-5'-0			41.841	E(27'-2), T(52'-9¾)	383'-2½	Pv
UG	7.9800	Q=464.56	2.98	C=150	0.001481	1'-11	Pf 0.032
7	-5'-0			41.841		19'-7½	Pe
10	-5'-0			41.872	LtE(19'-7½)	21'-6½	Pv
UG	8.3900	Q=464.56	2.70	C=140	0.001319	17'-0	Pf 12.110
10	-5'-0			41.872		66'-2	Pe 0.434
12	-6'-0			54.416	3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
UG	7.9800	Q=464.56	2.98	C=150	0.001481	727'-3	Pf 1.245
12	-6'-0			54.416		113'-2¼	Pe
1	-6'-0			55.661	2E(27'-2), GV(6'-0½), T(52'-9¾), S	840'-5¼	Pv
Route 2							
DR	1.0490	Q=14.86	5.52	C=120	0.075158	2'-0	Pf 0.827
102	23'-3¼	q=14.86	K=5.6	7.046	Spr(-7.046)	9'-0	Pe -0.316
747	24'-0			7.557	2E(2'-0), PO(5'-0)	11'-0	Pv
CM	2.1570	Q=6.72	0.59	C=120	0.000517	9'-8	Pf 0.005
747	24'-0			7.557			Pe 0.000
749	24'-0			7.562		9'-8	Pv
CM	2.1570	Q=21.76	1.91	C=120	0.004543	13'-2	Pf 0.060
749	24'-0			7.562			Pe -0.000
752	24'-0			7.622		13'-2	Pv
CM	2.1570	Q=37.02	3.25	C=120	0.012145	12'-0	Pf 0.146
752	24'-0			7.622			Pe
754	24'-0			7.767		12'-0	Pv
CM	2.1570	Q=52.41	4.60	C=120	0.023108	0'-11½	Pf 0.022
754	24'-0			7.767			Pe
798	24'-0			7.790		0'-11½	Pv
RN	2.1570	Q=52.41	4.60	C=120	0.023108	1'-0	Pf 0.393
798	24'-0			7.790	LtE(3'-8¼)	16'-0	Pe 0.434
477	23'-0			8.616	PO(12'-3¾)	17'-0	Pv
Route 3							
DR	1.0490	Q=14.87	5.52	C=120	0.075217	2'-1	Pf 0.608
103	23'-3	q=14.87	K=5.6	7.052	Spr(-7.052)	6'-0	Pe -0.325
773	24'-0			7.335	3E(2'-0)	8'-1	Pv
BL	1.3800	Q=14.87	3.19	C=120	0.019783	3'-1½	Pf 0.181
773	24'-0			7.335		6'-0	Pe
775	24'-0			7.515	PO(6'-0)	9'-1½	Pv
CM	2.6350	Q=48.26	2.84	C=120	0.007482	7'-3¼	Pf 0.054
775	24'-0			7.515			Pe
745	24'-0			7.570		7'-3¼	Pv
CM	2.6350	Q=56.40	3.32	C=120	0.009984	0'-6	Pf 0.005
745	24'-0			7.570			Pe
741	24'-0			7.575		0'-6	Pv
CM	2.6350	Q=71.33	4.20	C=120	0.015416	15'-4½	Pf 0.406
741	24'-0			7.575		10'-11¾	Pe 0.434
467	23'-0			8.415	2LtE(5'-6)	26'-4¼	Pv
CM	2.6350	Q=95.36	5.61	C=120	0.026381	0'-6	Pf 0.013
467	23'-0			8.415			Pe
423	23'-0			8.428		0'-6	Pv
CM	2.6350	Q=111.01	6.53	C=120	0.034946	6'-0	Pf 0.210
423	23'-0			8.428			Pe
414	23'-0			8.638		6'-0	Pv
CM	2.6350	Q=126.89	7.47	C=120	0.044753	5'-6	Pf 0.246
414	23'-0			8.638			Pe
429	23'-0			8.884		5'-6	Pv
CM	2.6350	Q=151.94	8.94	C=120	0.062452	0'-6	Pf 0.031
429	23'-0			8.884			Pe
386	23'-0			8.915		0'-6	Pv
CM	2.6350	Q=168.03	9.89	C=120	0.075232	9'-2	Pf 0.690
386	23'-0			8.915			Pe
667	23'-0			9.605		9'-2	Pv
CM	2.6350	Q=168.03	9.89	C=120	0.075232	1'-4	Pf 0.100
667	23'-0			9.605			Pe
393	23'-0			9.705		1'-4	Pv
CM	2.6350	Q=172.60	10.15	C=120	0.079065	10'-0	Pf 0.791
393	23'-0			9.705			Pe
313	23'-0			10.496		10'-0	Pv
CM	2.1570	Q=19.36	1.70	C=120	0.003660	45'-11	Pf 0.227
313	23'-0			10.496	PO(12'-3¾)	16'-0	Pe -0.434
562	24'-0			10.289	LtE(3'-8¼)	61'-11	Pv
RN	2.1570	Q=19.36	1.70	C=120	0.003660	1'-0	Pf 0.062
562	24'-0			10.289	LtE(3'-8¼)	16'-0	Pe 0.434
325	23'-0			10.784	PO(12'-3¾)	17'-0	Pv
Route 4							
DR	1.0490	Q=14.93	5.54	C=120	0.075748	2'-1	Pf 0.612
104	23'-3	q=14.93	K=5.6	7.106	Spr(-7.106)	6'-0	Pe -0.325
739	24'-0			7.393	3E(2'-0)	8'-1	Pv
BL	1.3800	Q=14.93	3.20	C=120	0.019922	3'-1½	Pf 0.182
739	24'-0			7.393		6'-0	Pe
741	24'-0			7.575	PO(6'-0)	9'-1½	Pv
Route 5							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
DR	1.0490	Q=15.02	5.58	C=120	0.076620	4'-10½	Pf 1.063
105	22'-3	q=15.02	K=5.6	7.194	Spr(-7.194)	9'-0	Pe -0.759
845	24'-0			7.499	2E(2'-0), PO(5'-0)	13'-10½	Pv
CM	2.6350	Q=24.40	1.44	C=120	0.002119	7'-0¾	Pf 0.015
845	24'-0			7.499			Pe
777	24'-0			7.514		7'-0¾	Pv
CM	2.6350	Q=33.39	1.96	C=120	0.003785	0'-5¼	Pf 0.002
777	24'-0			7.514			Pe
775	24'-0			7.515		0'-5¼	Pv
Route 6							
DR	1.0490	Q=15.04	5.58	C=120	0.076769	5'-4¼	Pf 1.102
106	22'-3¼	q=15.04	K=5.6	7.209	Spr(-7.209)	9'-0	Pe -0.750
749	24'-0			7.562	2E(2'-0), PO(5'-0)	14'-4¼	Pv
Route 7							
DR	1.0490	Q=15.10	5.61	C=120	0.077369	3'-6¼	Pf 0.969
107	22'-3	q=15.10	K=5.6	7.270	Spr(-7.270)	9'-0	Pe -0.759
863	24'-0			7.481	2E(2'-0), PO(5'-0)	12'-6¼	Pv
CM	2.1570	Q=5.72	0.50	C=120	0.000384	9'-4	Pf 0.004
863	24'-0			7.481			Pe 0.000
865	24'-0			7.485		9'-4	Pv
CM	2.1570	Q=20.86	1.83	C=120	0.004201	13'-2	Pf 0.055
865	24'-0			7.485			Pe -0.000
868	24'-0			7.540		13'-2	Pv
CM	2.1570	Q=35.97	3.16	C=120	0.011516	12'-0	Pf 0.138
868	24'-0			7.540			Pe
870	24'-0			7.678		12'-0	Pv
CM	2.1570	Q=51.21	4.50	C=120	0.022137	0'-11½	Pf 0.021
870	24'-0			7.678			Pe
935	24'-0			7.700		0'-11½	Pv
RN	2.1570	Q=51.21	4.50	C=120	0.022137	1'-0	Pf 0.376
935	24'-0			7.700	LtE(3'-8¼)	16'-0	Pe 0.434
661	23'-0			8.509	PO(12'-3¾)	17'-0	Pv
CM	3.2600	Q=51.21	1.97	C=120	0.002962	8'-0	Pf 0.024
661	23'-0			8.509			Pe
538	23'-0			8.533		8'-0	Pv
Route 8							
DR	1.0490	Q=15.11	5.61	C=120	0.077510	4'-1	Pf 1.014
108	22'-3	q=15.11	K=5.6	7.285	Spr(-7.285)	9'-0	Pe -0.759
868	24'-0			7.540	2E(2'-0), PO(5'-0)	13'-1	Pv
Route 9							
DR	1.0490	Q=15.14	5.62	C=120	0.077705	3'-1	Pf 0.939
109	22'-3	q=15.14	K=5.6	7.305	Spr(-7.305)	9'-0	Pe -0.759
865	24'-0			7.485	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 10							
DR	1.0490	Q=15.15	5.62	C=120	0.077856	3'-1	Pf 0.941
110	22'-3	q=15.15	K=5.6	7.320	Spr(-7.320)	9'-0	Pe -0.759
781	24'-0			7.502	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 11							
DR	1.0490	Q=15.20	5.64	C=120	0.078348	3'-1	Pf 0.947
111	22'-3	q=15.20	K=5.6	7.370	Spr(-7.370)	9'-0	Pe -0.759
784	24'-0			7.558	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 12							
DR	1.0490	Q=15.24	5.66	C=120	0.078714	4'-1	Pf 1.030
112	22'-3	q=15.24	K=5.6	7.407	Spr(-7.407)	9'-0	Pe -0.759
870	24'-0			7.678	2E(2'-0), PO(5'-0)	13'-1	Pv
Route 13							
DR	1.0490	Q=15.26	5.67	C=120	0.078907	3'-1	Pf 0.953
113	22'-3	q=15.26	K=5.6	7.427	Spr(-7.427)	9'-0	Pe -0.759
752	24'-0			7.622	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 14							
DR	1.0490	Q=15.33	5.69	C=120	0.079575	3'-1	Pf 0.962
114	22'-3	q=15.33	K=5.6	7.495	Spr(-7.495)	9'-0	Pe -0.759
786	24'-0			7.698	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 15							
DR	1.0490	Q=15.39	5.71	C=120	0.080187	3'-1	Pf 0.969
115	22'-3	q=15.39	K=5.6	7.557	Spr(-7.557)	9'-0	Pe -0.759
754	24'-0			7.767	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 16							
DR	1.0490	Q=15.46	5.74	C=120	0.080813	3'-1	Pf 0.976
116	22'-3	q=15.46	K=5.6	7.621	Spr(-7.621)	9'-0	Pe -0.759
710	24'-0			7.839	2E(2'-0), PO(5'-0)	12'-1	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.1570	Q=6.89	0.61	C=120	0.000542	5'-5¾	Pf 0.003
710	24'-0			7.839			Pe
713	24'-0			7.842		5'-5¾	Pv
CM	2.1570	Q=22.36	1.96	C=120	0.004778	7'-2	Pf 0.034
713	24'-0			7.842			Pe
716	24'-0			7.876		7'-2	Pv
CM	2.1570	Q=37.85	3.32	C=120	0.012654	12'-0	Pf 0.152
716	24'-0			7.876			Pe
718	24'-0			8.028		12'-0	Pv
CM	2.1570	Q=53.48	4.70	C=120	0.023986	0'-11½	Pf 0.023
718	24'-0			8.028			Pe
761	24'-0			8.051		0'-11½	Pv
RN	2.1570	Q=53.48	4.70	C=120	0.023986	1'-0	Pf 0.408
761	24'-0			8.051	LtE(3'-8¼)	16'-0	Pe 0.434
448	23'-0			8.892	PO(12'-3¾)	17'-0	Pv
Route 17							
DR	1.0490	Q=15.46	5.74	C=120	0.080840	3'-1	Pf 0.977
117	22'-3	q=15.46	K=5.6	7.624	Spr(-7.624)	9'-0	Pe -0.759
713	24'-0			7.842	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 18							
DR	1.0490	Q=15.47	5.74	C=120	0.080899	3'-1	Pf 0.978
118	22'-3	q=15.47	K=5.6	7.630	Spr(-7.630)	9'-0	Pe -0.759
708	24'-0			7.849	2E(2'-0), PO(5'-0)	12'-1	Pv
CM	2.1570	Q=24.03	2.11	C=120	0.005461	8'-3¾	Pf 0.133
708	24'-0			7.849		16'-0	Pe 0.434
467	23'-0			8.415	LtE(3'-8¼), PO(12'-3¾)	24'-3¾	Pv
Route 19							
DR	1.0490	Q=15.49	5.75	C=120	0.081140	3'-1	Pf 0.980
119	22'-3	q=15.49	K=5.6	7.654	Spr(-7.654)	9'-0	Pe -0.759
716	24'-0			7.876	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 20							
DR	1.0490	Q=15.63	5.80	C=120	0.082470	3'-1	Pf 0.997
121	22'-3	q=15.63	K=5.6	7.790	Spr(-7.790)	9'-0	Pe -0.759
718	24'-0			8.028	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 21							
DR	1.0490	Q=15.65	5.81	C=120	0.082702	2'-3	Pf 0.930
120	22'-3¼	q=15.65	K=5.6	7.814	Spr(-7.814)	9'-0	Pe -0.316
423	23'-0			8.428	2E(2'-0), PO(5'-0)	11'-3	Pv
Route 22							
DR	1.0490	Q=15.87	5.89	C=120	0.084816	3'-1	Pf 1.025
123	22'-3	q=15.87	K=5.6	8.030	Spr(-8.030)	9'-0	Pe -0.759
682	24'-0			8.296	2E(2'-0), PO(5'-0)	12'-1	Pv
CM	2.1570	Q=6.70	0.59	C=120	0.000514	5'-5¾	Pf 0.003
682	24'-0			8.296			Pe
685	24'-0			8.299		5'-5¾	Pv
CM	2.1570	Q=22.57	1.98	C=120	0.004863	7'-2	Pf 0.035
685	24'-0			8.299			Pe
688	24'-0			8.334		7'-2	Pv
CM	2.1570	Q=38.47	3.38	C=120	0.013043	12'-0	Pf 0.157
688	24'-0			8.334			Pe
690	24'-0			8.490		12'-0	Pv
CM	2.1570	Q=54.51	4.79	C=120	0.024851	0'-11½	Pf 0.024
690	24'-0			8.490			Pe
731	24'-0			8.514		0'-11½	Pv
RN	2.1570	Q=54.51	4.79	C=120	0.024851	1'-0	Pf 0.422
731	24'-0			8.514	LtE(3'-8¼)	16'-0	Pe 0.434
411	23'-0			9.370	PO(12'-3¾)	17'-0	Pv
Route 23							
DR	1.0490	Q=15.87	5.89	C=120	0.084840	3'-1	Pf 1.025
124	22'-3	q=15.87	K=5.6	8.032	Spr(-8.032)	9'-0	Pe -0.759
685	24'-0			8.299	2E(2'-0), PO(5'-0)	12'-1	Pv
Route 24							
DR	1.0490	Q=15.88	5.89	C=120	0.084912	3'-1	Pf 1.026
125	22'-3	q=15.88	K=5.6	8.040	Spr(-8.040)	9'-0	Pe -0.759
680	24'-0			8.307	2E(2'-0), PO(5'-0)	12'-1	Pv
CM	2.1570	Q=25.05	2.20	C=120	0.005895	8'-3¾	Pf 0.143
680	24'-0			8.307		16'-0	Pe 0.434
429	23'-0			8.884	LtE(3'-8¼), PO(12'-3¾)	24'-3¾	Pv
Route 25							
DR	1.0490	Q=15.88	5.90	C=120	0.084930	2'-0¾	Pf 0.685
122	22'-3¼	q=15.88	K=5.6	8.041	Spr(-8.041)	6'-0	Pe -0.316
450	23'-0			8.410	3E(2'-0)	8'-0¾	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
BL	1.3800	Q=15.88	3.41	C=120	0.022337	4'-2¼	Pf 0.228
450	23'-0			8.410		6'-0	Pe
414	23'-0			8.638	PO(6'-0)	10'-2¼	Pv
••••• Route 26 •••••							
DR	1.0490	Q=15.90	5.90	C=120	0.085145	3'-1	Pf 1.029
126	22'-3	q=15.90	K=5.6	8.063	Spr(-8.063)	9'-0	Pe -0.759
688	24'-0			8.334	2E(2'-0), PO(5'-0)	12'-1	Pv
••••• Route 27 •••••							
DR	1.0490	Q=16.04	5.95	C=120	0.086511	3'-1	Pf 1.045
128	22'-3	q=16.04	K=5.6	8.203	Spr(-8.203)	9'-0	Pe -0.759
690	24'-0			8.490	2E(2'-0), PO(5'-0)	12'-1	Pv
••••• Route 28 •••••							
DR	1.0490	Q=16.09	5.97	C=120	0.086989	2'-3	Pf 0.979
127	22'-3¼	q=16.09	K=5.6	8.252	Spr(-8.252)	9'-0	Pe -0.316
386	23'-0			8.915	2E(2'-0), PO(5'-0)	11'-3	Pv
••••• Route 29 •••••							
DR	1.0490	Q=16.69	6.20	C=120	0.093122	3'-3	Pf 1.141
129	22'-3	q=16.69	K=5.6	8.883	Spr(-8.883)	9'-0	Pe -0.759
641	24'-0			9.265	2E(2'-0), PO(5'-0)	12'-3	Pv
CM	2.1570	Q=12.12	1.06	C=120	0.001538	12'-0	Pf 0.018
641	24'-0			9.265			Pe
643	24'-0			9.284		12'-0	Pv
CM	2.1570	Q=28.82	2.53	C=120	0.007644	25'-7¼	Pf 0.196
643	24'-0			9.284			Pe
694	24'-0			9.479		25'-7¼	Pv
RN	2.1570	Q=28.82	2.53	C=120	0.007644	1'-0	Pf 0.130
694	24'-0			9.479	LtE(3'-8¼)	16'-0	Pe 0.434
410	23'-0			10.043	PO(12'-3¾)	17'-0	Pv
••••• Route 30 •••••							
DR	1.0490	Q=16.71	6.20	C=120	0.093282	3'-3	Pf 1.143
130	22'-3	q=16.71	K=5.6	8.900	Spr(-8.900)	9'-0	Pe -0.759
643	24'-0			9.284	2E(2'-0), PO(5'-0)	12'-3	Pv
••••• Route 31 •••••							
DY	3.2600	Q=87.83	3.38	C=120	0.008036	0'-0	Pf 0.162
306	23'-0			15.275		20'-2	Pe
245	23'-0			15.437	T(20'-2)	20'-2	Pv
••••• Route 32 •••••							
UG	7.9800	Q=158.21	1.01	C=150	0.000202	1167'-0	Pf 0.263
3	-5'-0			41.578		134'-3¾	Pe
7	-5'-0			41.841	2E(27'-2), 2EE(13'-7), T(52'-9¾)	1301'-3¾	Pv
••••• Route 33 •••••							
CM	2.1570	Q=87.83	7.71	C=120	0.060056	29'-0	Pf 1.963
226	23'-0			12.337		3'-8¼	Pe -0.434
292	24'-0			13.867	LtE(3'-8¼)	32'-8¼	Pv
CM	2.1570	Q=51.32	4.51	C=120	0.022227	16'-11	Pf 0.376
292	24'-0			13.867			Pe
352	24'-0			14.243		16'-11	Pv
RN	2.1570	Q=51.32	4.51	C=120	0.022227	1'-0	Pf 0.378
352	24'-0			14.243	LtE(3'-8¼)	16'-0	Pe 0.434
239	23'-0			15.054	PO(12'-3¾)	17'-0	Pv
CM	2.6350	Q=87.83	5.17	C=120	0.022657	9'-8¾	Pf 0.221
239	23'-0			15.054			Pe
306	23'-0			15.275		9'-8¾	Pv
••••• Route 34 •••••							
CM	2.1570	Q=36.51	3.21	C=120	0.011837	27'-11	Pf 0.709
292	24'-0			13.867	T(12'-3¾)	32'-0	Pe 0.434
216	23'-0			15.010	2LtE(3'-8¼), PO(12'-3¾)	59'-11	Pv
CM	2.6350	Q=36.51	2.15	C=120	0.004466	10'-0	Pf 0.045
216	23'-0			15.010			Pe
239	23'-0			15.054		10'-0	Pv
••••• Route 35 •••••							
CM	2.1570	Q=26.47	2.32	C=120	0.006529	45'-11	Pf 0.404
279	23'-0			11.212	PO(12'-3¾)	16'-0	Pe -0.434
528	24'-0			11.183	LtE(3'-8¼)	61'-11	Pv
RN	2.1570	Q=26.47	2.32	C=120	0.006529	1'-0	Pf 0.111
528	24'-0			11.183	LtE(3'-8¼)	16'-0	Pe 0.434
301	23'-0			11.727	PO(12'-3¾)	17'-0	Pv
••••• Route 36 •••••							
CM	2.6350	Q=126.78	7.46	C=120	0.044676	10'-3	Pf 0.458
279	23'-0			11.212			Pe
253	23'-0			11.670		10'-3	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.1570	Q=38.95	3.42	C=120		0.013340	45'-11	Pf 0.826
253	23'-0			11.670		PO(12'-3¾)	16'-0	Pe -0.434
391	24'-0			12.062		LtE(3'-8¼)	61'-11	Pv
RN	2.1570	Q=38.95	3.42	C=120		0.013340	1'-0	Pf 0.227
391	24'-0			12.062		LtE(3'-8¼)	16'-0	Pe 0.434
277	23'-0			12.723		PO(12'-3¾)	17'-0	Pv
Route 37								
CM	2.6350	Q=87.83	5.17	C=120		0.022657	12'-11¾	Pf 0.667
253	23'-0			11.670			16'-5¾	Pe
226	23'-0			12.337		PO(16'-5¾)	29'-5½	Pv
Route 38								
CM	2.6350	Q=153.25	9.02	C=120		0.063448	11'-3½	Pf 0.716
313	23'-0			10.496				Pe
279	23'-0			11.212			11'-3½	Pv
Route 39								
CM	2.1570	Q=9.38	0.82	C=120		0.000958	5'-8½	Pf 0.017
863	24'-0			7.481			12'-3¾	Pe
861	24'-0			7.499		PO(12'-3¾)	18'-0¼	Pv
CM	2.6350	Q=9.38	0.55	C=120		0.000361	0'-11¼	Pf 0.000
861	24'-0			7.499				Pe
845	24'-0			7.499			0'-11¼	Pv
Route 40								
CM	2.1570	Q=4.57	0.40	C=120		0.000254	8'-3¾	Pf 0.006
641	24'-0			9.265			16'-0	Pe 0.434
393	23'-0			9.705		LtE(3'-8¼), PO(12'-3¾)	24'-3¾	Pv
Route 41								
CM	2.1570	Q=9.17	0.80	C=120		0.000918	12'-0	Pf 0.011
682	24'-0			8.296				Pe
680	24'-0			8.307			12'-0	Pv
Route 42								
CM	2.1570	Q=8.56	0.75	C=120		0.000810	12'-0	Pf 0.010
710	24'-0			7.839				Pe
708	24'-0			7.849			12'-0	Pv
Route 43								
CM	2.1570	Q=8.14	0.72	C=120		0.000738	5'-4½	Pf 0.013
747	24'-0			7.557			12'-3¾	Pe
745	24'-0			7.570		PO(12'-3¾)	17'-8¼	Pv
Route 44								
CM	2.1570	Q=8.99	0.79	C=120		0.000885	5'-4½	Pf 0.016
779	24'-0			7.498			12'-3¾	Pe
777	24'-0			7.514		PO(12'-3¾)	17'-8¼	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

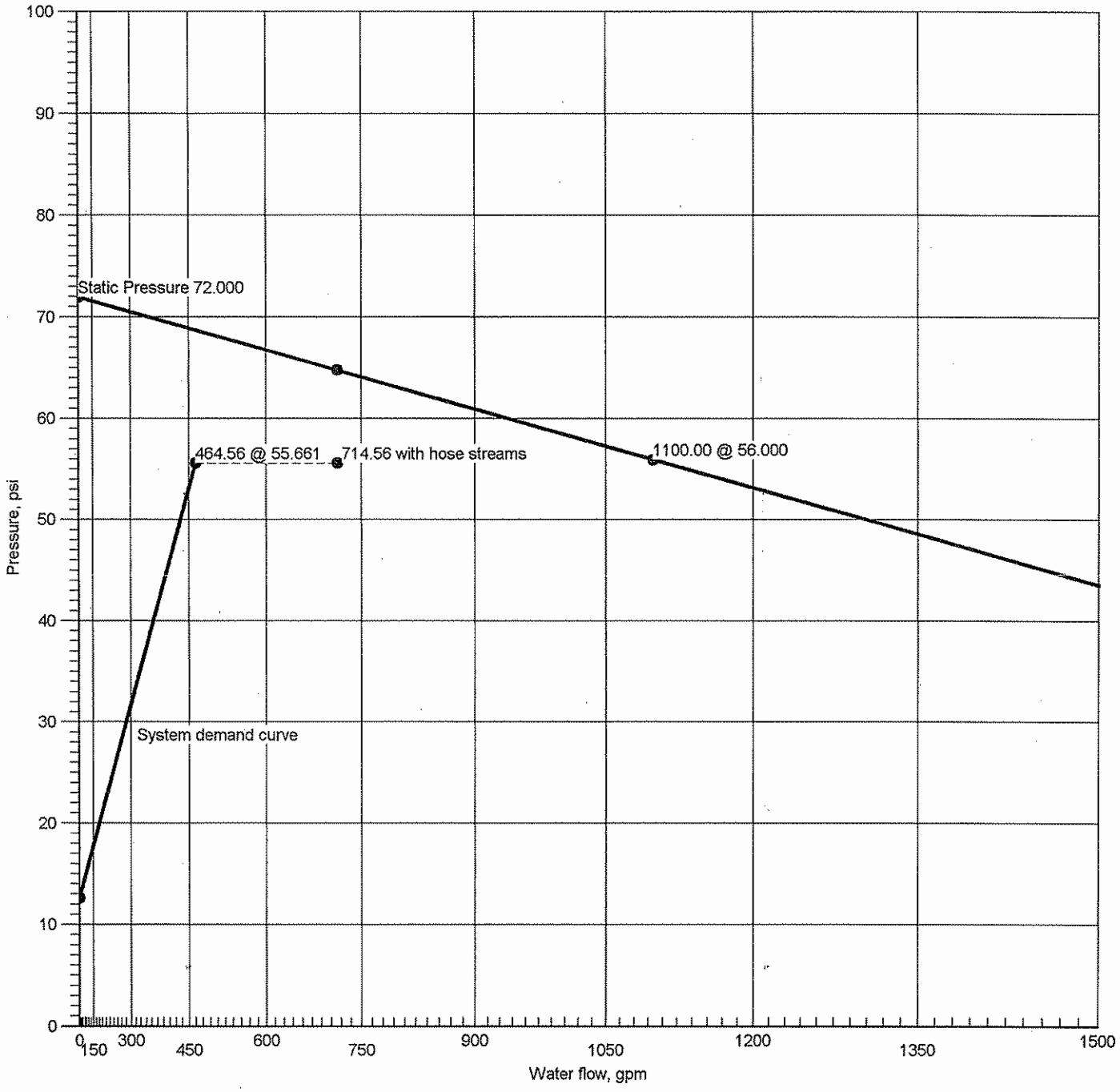
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available PressureTime of Test	64.797 @ 714.56
System Demand	464.56 @ 55.661
System Demand (Including Hose Allowance)	714.56 @ 55.661

Hydraulic Overview

Job Number: 269-941989101
Report Description: Ordinary Group II

Job

Job Number: 269-941989101	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2442 BOAT STORAGE PLATF	Phone: / FAX:
Address 1: PLATFORM IN BOAT STORAGE	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site: DEMAND WITH 500 GPM HOSE ALLOWANCE

System

Density: 0.200gpm/ft²	Area of Application: 632.00ft²
Most Demanding Sprinkler Data: 5.6 K-Factor 18.00 at 10.332	Hose Streams: 500.00
Coverage Per Sprinkler: 90.00ft²	Number Of Sprinklers Calculated: 7
System Pressure Demand: 52.218	System Flow Demand: 160.33
Total Demand: 660.33 @ 52.218	Pressure Result: +13.557 (20.6%)

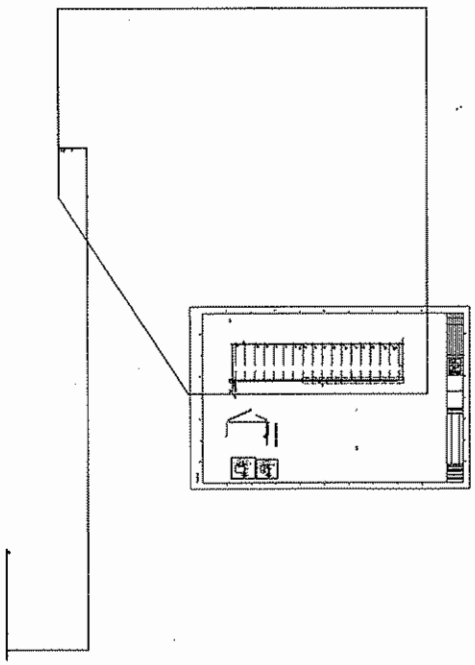
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	500.00	72.000	56.000

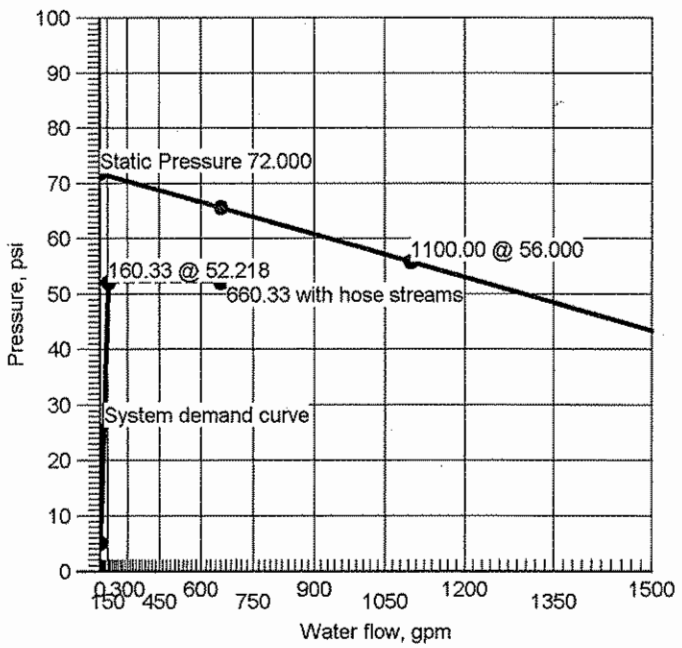
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)
BOR	0.000	0	0.00
BOR	0.000	0	0.00

FP-2 BLDG 2442 R5



Supply at Node 1 (1100.00, 500.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 269-941989101	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2442 BOAT STORAGE PLATF	State Certification/License Number:
Address 1: PLATFORM IN BOAT STORAGE	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site: DEMAND WITH 500 GPM HOSE ALLOWANCE
City: STENNIS, State: MS, Zip Code:	Drawing Name: FP-2 BLDG 2442 R5

System

Most Demanding Sprinkler Data: 5.6 K-Factor 18.00 at 10.332

Hose Allowance At Source: 500.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 500.00

System Flow Demand: 160.33

Total Water Required (Including Hose Allowance): 660.33

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 16.80 between nodes 363 and 205

Maximum Velocity Under Ground: 1.03 between nodes 1 and 9

Volume capacity of Wet Pipes: 6646.41gal

Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Ordinary Group II

Density: 0.200gpm/ft²

Area of Application: 632.00ft²

Number Of Sprinklers Calculated: 7

Coverage Per Sprinkler: 90.00ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Left: 52.218 Right: 52.218

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @	Flow (gpm)	Available (psi) @	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	500.00	72.000	56.000	1100.00	65.776	660.33	52.218	13.557

Contractor

Contractor Number: 21	Contact Name: / Contact Title:
Contractor Name: SIMPLEXGRINNELL	Phone: / Extension:
Address 1: 5800 JEFFERSON HWY	FAX:
Address 2: SUITE A	E-mail:
City: HARAHAN, State: LA, Zip Code: 70123	Web-Site:

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	207	27.54	18.00	5.6	24.189		
Sprinkler	206	26.21	18.00	5.6	21.909		
Sprinkler	205	25.35	18.00	5.6	20.485		
Sprinkler	204	23.26	18.00	5.6	17.246		
Sprinkler	203	20.63	18.00	5.6	13.568		
Sprinkler	202	19.35	18.00	5.6	11.938		
⇨ Sprinkler	201	18.00	18.00	5.6	10.332		

⇨ Most Demanding Sprinkler Data

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
5	-5'-0	2T(52'-9¾)	39.590		
7	-5'-0	LtE(19'-7½)	39.595		
9	-6'-0	LtE(22'-0¾)	52.043		
93	19'-2		25.951		
94	19'-2		25.941		
95	19'-2		25.930		
96	19'-2		25.919		
99	19'-2		25.887		
100	19'-2		25.876		
155	19'-2		25.844		
158	18'-9¼	PO(12'-3¾)	26.138		
159	18'-9¼	PO(12'-3¾)	26.137		
160	18'-9¼	PO(12'-3¾)	26.135		
161	18'-9¼	PO(12'-3¾)	26.134		
162	18'-9¼	PO(12'-3¾)	26.132		
147	18'-9¼	PO(12'-3¾)	26.131		
148	18'-9¼	PO(12'-3¾)	26.129		
146	18'-9¼		26.128		
116	18'-9¼	PO(12'-3¾)	26.083		
117	18'-9¼	PO(12'-3¾)	26.072		
120	18'-9¼	PO(12'-3¾)	26.040		
121	18'-9¼	PO(12'-3¾)	26.030		
316	18'-9¼	C(26'-4), C(37'-8¾)	26.150		
330	18'-9¼	PO(12'-3¾)	25.826		
352	6'-0	2T(12'-3¾)	24.336		
363	6'-0		20.664		
14	1'-0		36.930		
332	3'-3	BV(12'-7)	35.957		
338	18'-9¼	LtE(11'-3¾)	26.163		
16	-5'-0	T(59'-4½)	39.552		
454	-4'-10		0.000		
207	6'-0	Spr(-24.189)	24.189	27.54	
206	6'-0	Spr(-21.909)	21.909	26.21	
205	6'-0	Spr(-20.485)	20.485	25.35	
204	6'-0	Spr(-17.246)	17.246	23.26	
203	6'-0	Spr(-13.568)	13.568	20.63	
202	6'-0	Spr(-11.938)	11.938	19.35	
201	6'-0	Spr(-10.332)	10.332	18.00	
1	-6'-0	S	52.218	160.33	

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
••••• Route 1 •••••								
BL	1.0490	Q=18.00	6.68	C=120		0.107085	15'-0	Pf 1.606
201	6'-0	q=18.00	K=5.6	10.332		Spr(-10.332)		Pe
202	6'-0			11.938			15'-0	Pv
BL	1.3800	Q=37.35	8.01	C=120		0.108681	15'-0	Pf 1.630
202	6'-0	q=19.35	K=5.6	11.938		Spr(-11.938)		Pe
203	6'-0			13.568			15'-0	Pv
BL	1.3800	Q=57.98	12.44	C=120		0.245163	15'-0	Pf 3.677
203	6'-0	q=20.63	K=5.6	13.568		Spr(-13.568)		Pe
204	6'-0			17.246			15'-0	Pv
BL	1.6100	Q=81.23	12.80	C=120		0.215976	15'-0	Pf 3.240
204	6'-0	q=23.26	K=5.6	17.246		Spr(-17.246)		Pe
205	6'-0			20.485			15'-0	Pv
BL	1.6100	Q=106.58	16.80	C=120		0.356939	0'-6	Pf 0.178
205	6'-0	q=25.35	K=5.6	20.485		Spr(-20.485)		Pe
363	6'-0			20.664			0'-6	Pv
CM	2.1570	Q=106.58	9.36	C=120		0.085899	14'-6	Pf 1.246
363	6'-0			20.664				Pe
206	6'-0			21.909			14'-6	Pv
CM	2.1570	Q=132.79	11.66	C=120		0.129020	6'-6	Pf 2.426
206	6'-0	q=26.21	K=5.6	21.909		Spr(-21.909)	12'-3¾	Pe
352	6'-0			24.336		T(12'-3¾)	18'-9¾	Pv
CM	2.1570	Q=160.33	14.08	C=120		0.182848	18'-8¾	Pf 7.025
352	6'-0			24.336			19'-8¼	Pe -5.535
330	18'-9¼			25.826		2LtE(3'-8¼), PO(12'-3¾)	38'-5	Pv
CM	4.2600	Q=100.57	2.26	C=120		0.002806	89'-3½	Pf 0.324
330	18'-9¼			25.826			26'-4	Pe -0.000
316	18'-9¼			26.150		C(26'-4)	115'-7½	Pv
CM	6.3570	Q=160.33	1.62	C=120		0.000946	1'-8	Pf 0.012
316	18'-9¼			26.150			11'-3¾	Pe -0.000
338	18'-9¼			26.163		LtE(11'-3¾)	13'-0	Pv
FR	6.3570	Q=160.33	1.62	C=120		0.000946	13'-8¼	Pf 3.063
338	18'-9¼			26.163			52'-9¾	Pe 6.731
332	3'-3			35.957		f(-3.000), CV(40'-2¾), BV(12'-7)	66'-6	Pv
FR	6.0650	Q=160.33	1.78	C=120		0.001190	2'-0	Pf 0.002
332	3'-3			35.957				Pe 0.971
14	1'-0			36.930			2'-0	Pv
UG	8.3900	Q=160.33	0.93	C=140		0.000184	19'-3½	Pf 0.020
14	1'-0			36.930			89'-11	Pe 2.601
16	-5'-0			39.552		E(30'-6½), T(59'-4½)	109'-2½	Pv
UG	7.9800	Q=103.31	0.66	C=150		0.000092	340'-11¼	Pf 0.039
16	-5'-0			39.552			79'-11¾	Pe
5	-5'-0			39.590		2EE(13'-7), T(52'-9¾)	420'-11¼	Pv
UG	7.9800	Q=160.33	1.03	C=150		0.000207	1'-11	Pf 0.004
5	-5'-0			39.590			19'-7½	Pe
7	-5'-0			39.595		LtE(19'-7½)	21'-6½	Pv
UG	8.3900	Q=160.33	0.93	C=140		0.000184	17'-0	Pf 12.015
7	-5'-0			39.595			66'-2	Pe 0.434
9	-6'-0			52.043		3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv
UG	7.9800	Q=160.33	1.03	C=150		0.000207	726'-3½	Pf 0.175
9	-6'-0			52.043			119'-2½	Pe
1	-6'-0			52.218		2E(27'-2), 2GV(6'-0½), T(52'-9¾), S	845'-6¼	Pv
••••• Route 2 •••••								
CM	2.1570	Q=27.54	2.42	C=120		0.007028	8'-6	Pf 0.146
207	6'-0	q=27.54	K=5.6	24.189		Spr(-24.189)	12'-3¾	Pe
352	6'-0			24.336		T(12'-3¾)	20'-9¾	Pv
••••• Route 3 •••••								
CM	6.3570	Q=59.76	0.60	C=120		0.000152	7'-9	Pf 0.001
146	18'-9¼			26.128				Pe -0.000
148	18'-9¼			26.129			7'-9	Pv
CM	6.3570	Q=59.76	0.60	C=120		0.000152	10'-0	Pf 0.002
148	18'-9¼			26.129				Pe -0.000
147	18'-9¼			26.131			10'-0	Pv
CM	6.3570	Q=59.76	0.60	C=120		0.000152	10'-0	Pf 0.002
147	18'-9¼			26.131				Pe -0.000
162	18'-9¼			26.132			10'-0	Pv
CM	6.3570	Q=59.76	0.60	C=120		0.000152	10'-0	Pf 0.002
162	18'-9¼			26.132				Pe -0.000
161	18'-9¼			26.134			10'-0	Pv
CM	6.3570	Q=59.76	0.60	C=120		0.000152	10'-0	Pf 0.002
161	18'-9¼			26.134				Pe -0.000
160	18'-9¼			26.135			10'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	6.3570	Q=59.76	0.60	C=120	0.000152	10'-0	Pf 0.002
160	18'-9¼			26.135			Pe 0.000
159	18'-9¼			26.137		10'-0	Pv
CM	6.3570	Q=59.76	0.60	C=120	0.000152	10'-0	Pf 0.002
159	18'-9¼			26.137			Pe -0.000
158	18'-9¼			26.138		10'-0	Pv
CM	6.3570	Q=59.76	0.60	C=120	0.000152	40'-0½	Pf 0.012
158	18'-9¼			26.138		37'-8¾	Pe -0.000
316	18'-9¼			26.150	T(37'-8¾)	77'-9	Pv
••••• Route 4 •••••							
UG	7.9800	Q=57.03	0.37	C=150	0.000031	1129'-3½	Pf 0.039
16	-5'-0			39.552		134'-3¾	Pe
5	-5'-0			39.590	3E(27'-2), T(52'-9¾)	1263'-7¼	Pv
••••• Route 5 •••••							
CM	4.2600	Q=59.76	1.35	C=120	0.001071	10'-0	Pf 0.011
121	18'-9¼			26.030			Pe -0.000
120	18'-9¼			26.040		10'-0	Pv
CM	4.2600	Q=59.76	1.35	C=120	0.001071	30'-0	Pf 0.032
120	18'-9¼			26.040			Pe 0.000
117	18'-9¼			26.072		30'-0	Pv
CM	4.2600	Q=59.76	1.35	C=120	0.001071	10'-0	Pf 0.011
117	18'-9¼			26.072			Pe -0.000
116	18'-9¼			26.083		10'-0	Pv
CM	4.2600	Q=59.76	1.35	C=120	0.001071	42'-1	Pf 0.045
116	18'-9¼			26.083			Pe -0.000
146	18'-9¼			26.128		42'-1	Pv
••••• Route 6 •••••							
CM	4.2600	Q=59.76	1.35	C=120	0.001071	137'-5	Pf 0.204
330	18'-9¼			25.826		52'-8	Pe -0.000
121	18'-9¼			26.030	2T(26'-4)	190'-1	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

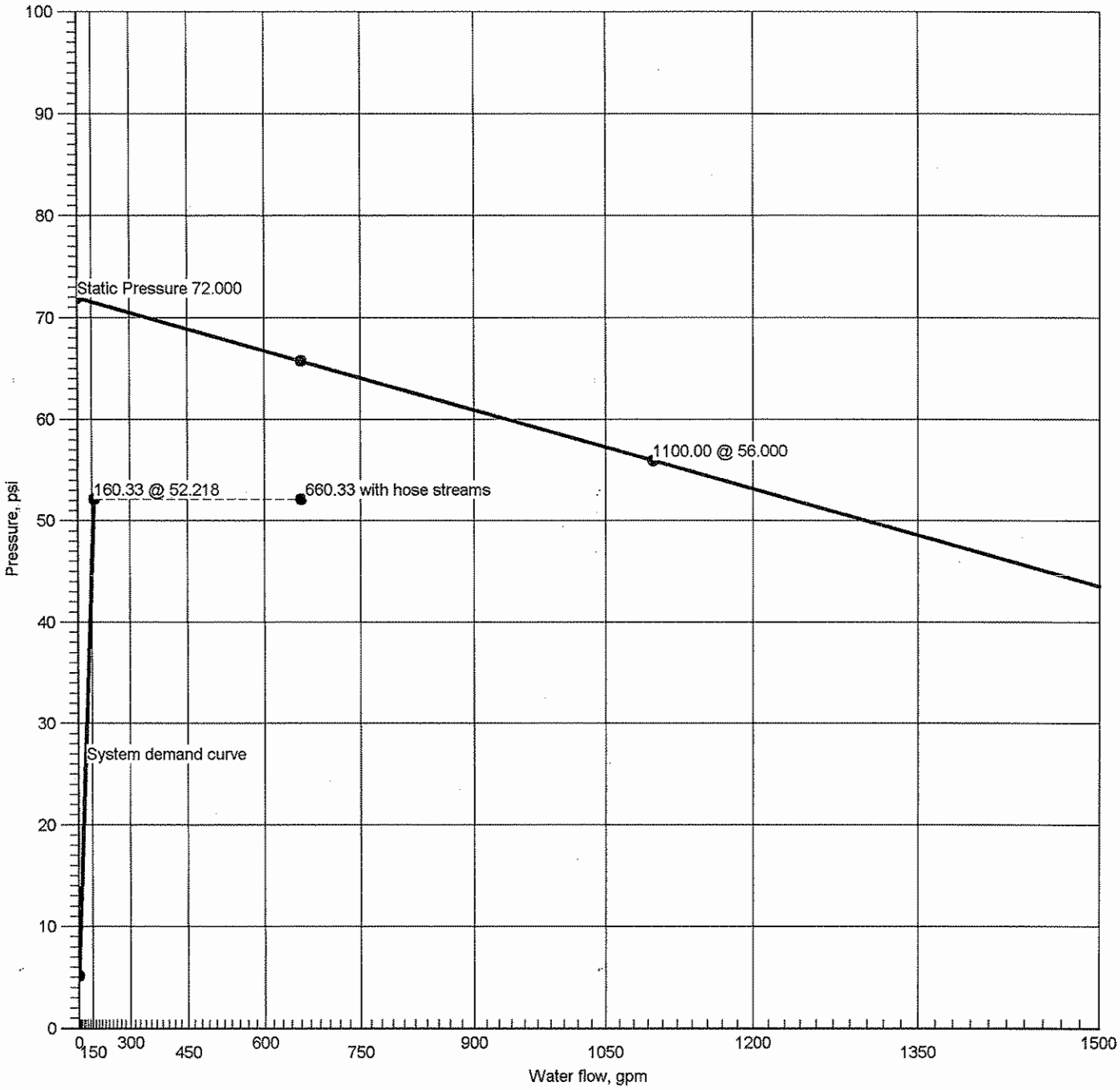
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

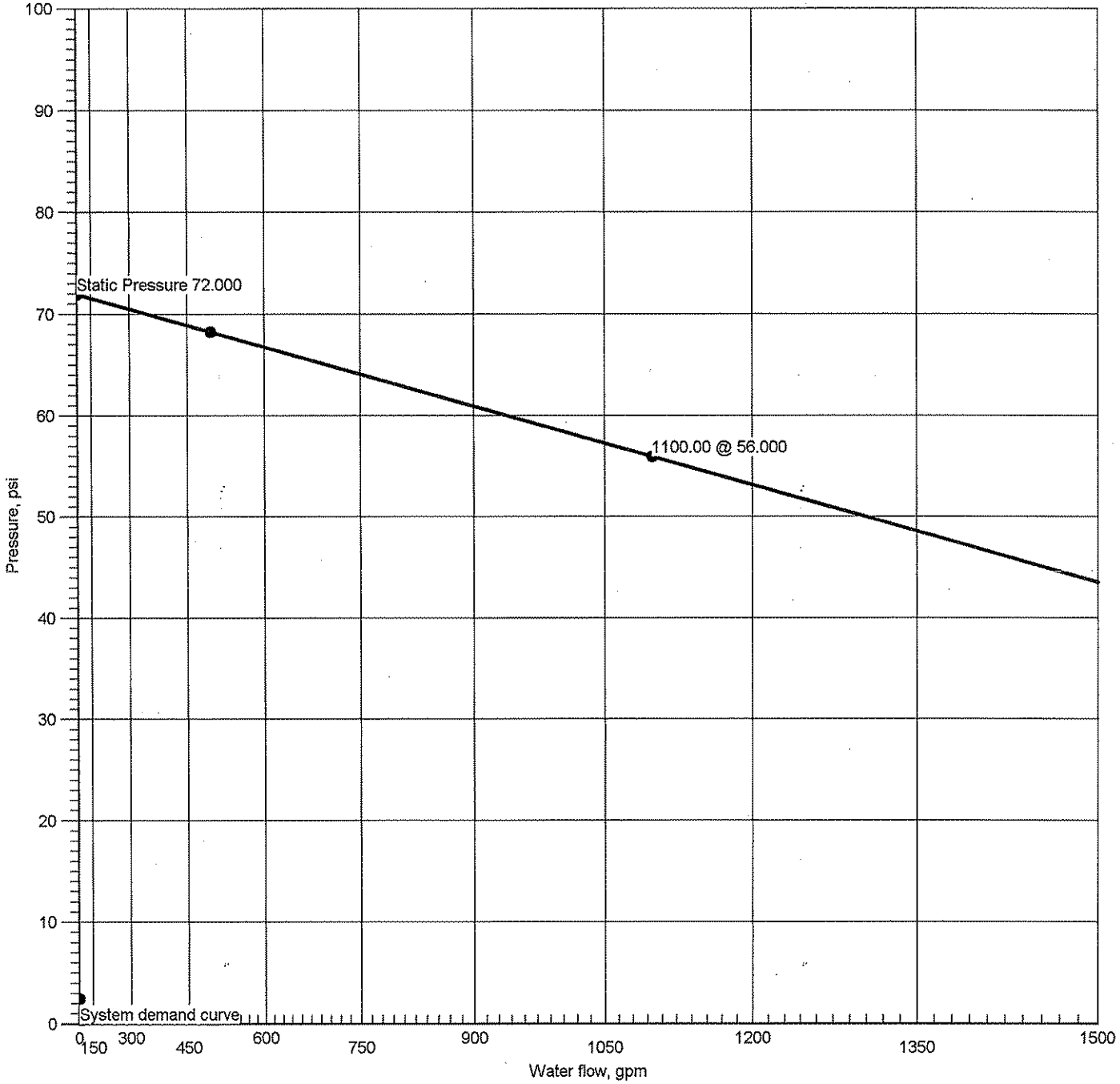
ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



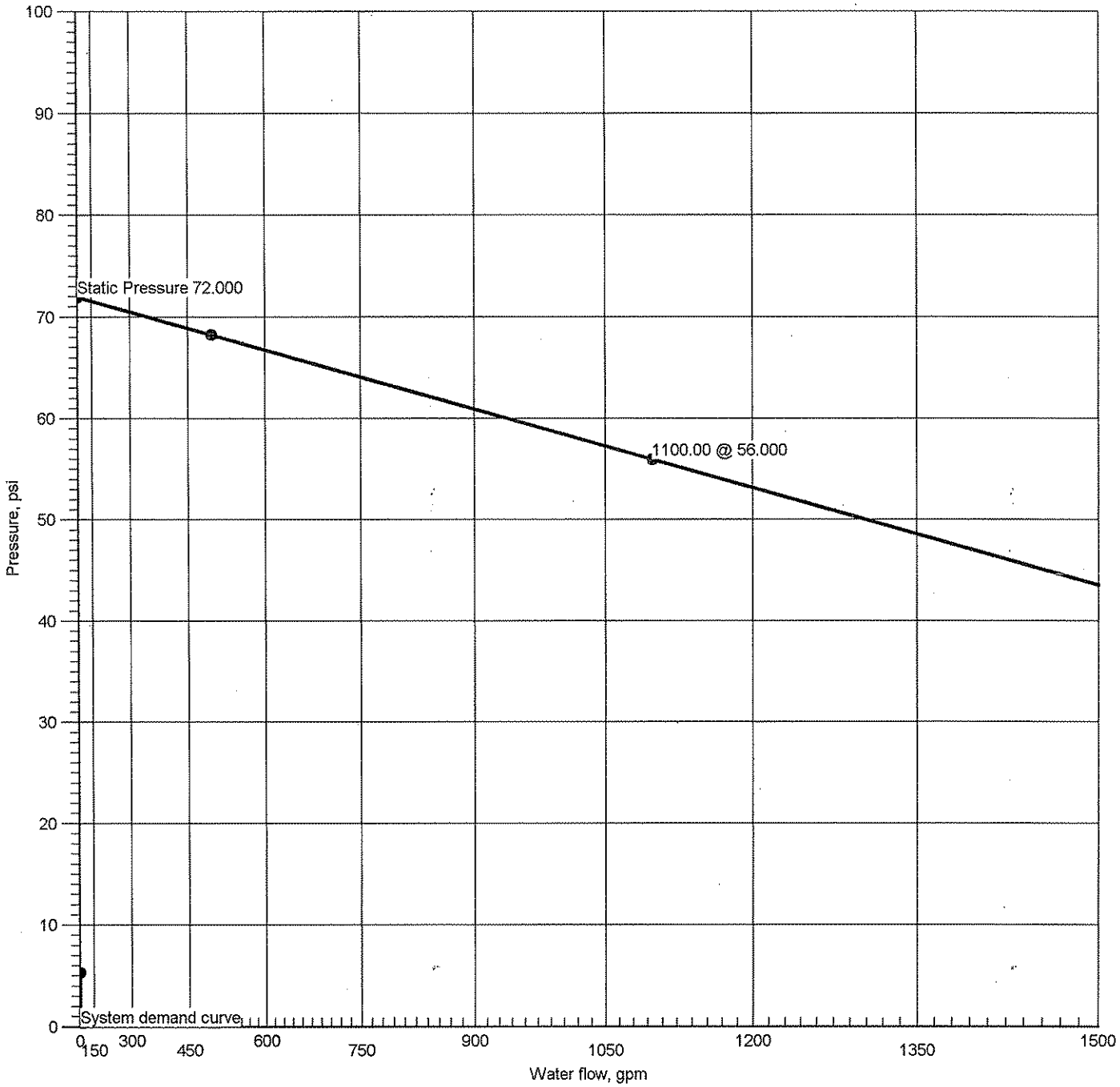
Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available PressureTime of Test	65.776 @ 660.33
System Demand	160.33 @ 52.218
System Demand (Including Hose Allowance)	660.33 @ 52.218

BOR



Hydraulic Graph	BOR
Static Pressure	N/A
Residual Pressure	N/A
Available PressureTime of Test	13.557 @ 0.00
System Demand	0.00 @ 0.000
System Demand (Including Hose Allowance)	N/A @ 0.000

BOR



Hydraulic Graph	BOR
Static Pressure	N/A
Residual Pressure	N/A
Available PressureTime of Test	13.557 @ 0.00
System Demand	0.00 @ 0.000
System Demand (Including Hose Allowance)	N/A @ 0.000

Hydraulic Overview

Job

Job Number: 2441 MAINT	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2441 BOAT MAINTENANCE	Phone: / FAX:
Address 1: MAINTENANCE BLDG	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site: DEMAND WITH 500 GPM HOSE ALLOWANCE

System

Density: 0.200gpm/ft²	Area of Application: 3900.00ft² (Actual 3915.38ft²)
Most Demanding Sprinkler Data: 8 K-Factor 21.17 at 7.000	Hose Streams: 500.00
Coverage Per Sprinkler: 104.17ft²	Number Of Sprinklers Calculated: 38
System Pressure Demand: 54.532	System Flow Demand: 956.82
Total Demand: 1456.82 @ 54.532	Pressure Result: -9.437 (-17.3%)

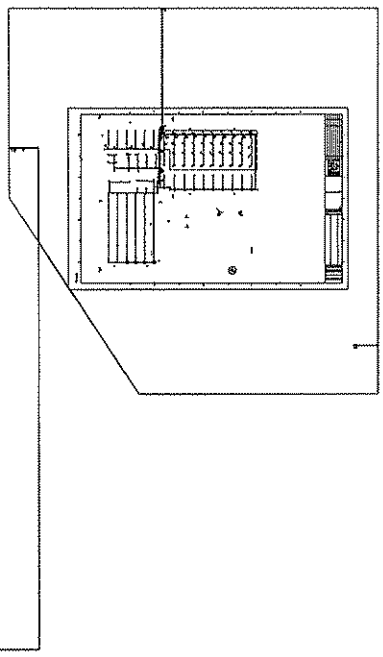
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	500.00	72.000	56.000

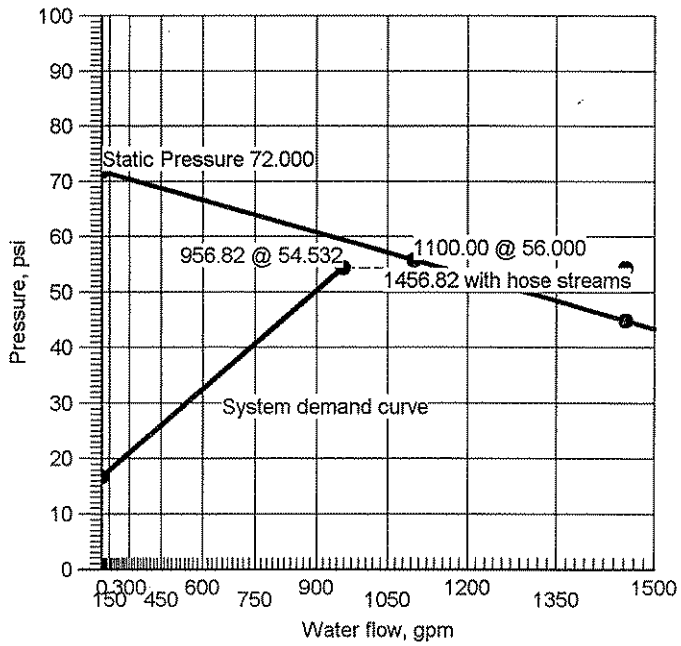
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)

FP-3 BLDG 2440 2441 1st Floor R5



Supply at Node 1 (1100.00, 500.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 2441 MAINT	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2441 BOAT MAINTENANCE	State Certification/License Number:
Address 1: MAINTENANCE BLDG	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site: DEMAND WITH 500 GPM HOSE ALLOWANCE
City: STENNIS, State: MS, Zip Code:	Drawing Name: FP-3 BLDG 2440 2441 1st Floor R5

System

Most Demanding Sprinkler Data: 8 K-Factor 21.17 at 7.000

Hose Allowance At Source: 500.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 500.00

System Flow Demand: 956.82

Total Water Required (Including Hose Allowance): 1456.82

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 15.52 between nodes 262 and 123

Maximum Velocity Under Ground: 6.14 between nodes 1 and 12

Volume capacity of Wet Pipes: 6939.58gal

Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Ordinary Group II

Density: 0.200gpm/ft²

Area of Application: 3900.00ft² (Actual 3915.38ft²)

Number Of Sprinklers Calculated: 38

Coverage Per Sprinkler: 104.17ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Right: 52.539

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @	Flow (gpm)	Available (psi) @	Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	500.00	72.000	56.000	1100.00	45.094	1456.82	54.532	-9.437

Contractor

	Contractor Number:	Contact Name:	Contact Title:
Contractor Name: SIMPLEXGRINNELL		Phone:	Extension:
Address 1: 5800 JEFFERSON HWY		FAX:	
Address 2: SUITE A		E-mail:	
City: HARAHAN, State: LA, Zip Code: 70123		Web-Site:	

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	338	31.42	24.70	8	15.423		
Sprinkler	336	29.30	20.87	8	13.418		
Sprinkler	332	28.73	20.87	8	12.900		
Sprinkler	328	28.34	20.87	8	12.553		
Sprinkler	324	28.11	20.87	8	12.342		
Sprinkler	320	27.98	20.87	8	12.235		
Sprinkler	312	27.94	20.87	8	12.198		
Sprinkler	304	27.94	20.87	8	12.196		
Sprinkler	308	27.95	20.87	8	12.209		
Sprinkler	316	28.03	20.87	8	12.273		
Sprinkler	337	29.75	24.70	8	13.825		
Sprinkler	335	27.03	20.87	8	11.420		
Sprinkler	331	26.44	20.87	8	10.925		
Sprinkler	327	26.04	20.87	8	10.593		
Sprinkler	323	25.79	20.87	8	10.391		
Sprinkler	319	25.66	20.87	8	10.289		
Sprinkler	311	25.62	20.87	8	10.254		
Sprinkler	802	25.61	20.87	8	10.252		
Sprinkler	307	25.63	20.87	8	10.264		
Sprinkler	315	25.71	20.87	8	10.325		
Sprinkler	334	24.91	20.87	8	9.698		
Sprinkler	330	24.28	20.87	8	9.214		
Sprinkler	326	23.85	20.87	8	8.889		
Sprinkler	322	23.59	20.87	8	8.692		
Sprinkler	318	23.45	20.87	8	8.592		
Sprinkler	310	23.40	20.87	8	8.558		
Sprinkler	302	23.40	20.87	8	8.556		
Sprinkler	306	23.42	20.87	8	8.567		
Sprinkler	314	23.50	20.87	8	8.627		
Sprinkler	333	22.82	20.87	8	8.135		
Sprinkler	329	22.13	20.87	8	7.654		
Sprinkler	325	21.66	20.87	8	7.331		
Sprinkler	321	21.37	20.87	8	7.136		
Sprinkler	317	21.22	20.87	8	7.036		
Sprinkler	309	21.17	20.87	8	7.002		
⇨ Sprinkler	301	21.17	20.87	8	7.000		
Sprinkler	305	21.18	20.87	8	7.012		
Sprinkler	806	21.27	20.87	8	7.071		

⇨ Most Demanding Sprinkler Data

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
3	-5'-0	T(59'-4½)	35.787		
7	1'-0		32.055		
84	4'-0¼	CV(16'-0)	30.361		
161	8'-3		26.721		
163	15'-0	LtE(11'-3¾)	23.621		
141	22'-0	LtE(3'-8¼)	15.675		
142	22'-0	LtE(3'-8¼)	13.747		
143	22'-0	LtE(3'-8¼)	13.224		
144	22'-0	LtE(3'-8¼)	12.873		
145	22'-0	LtE(3'-8¼)	12.660		
146	22'-0	LtE(3'-8¼)	12.552		
147	22'-0	LtE(3'-8¼)	12.515		
148	22'-0	LtE(3'-8¼)	12.513		
149	22'-0	LtE(3'-8¼)	12.526		
150	22'-0	LtE(3'-8¼)	12.590		
261	15'-0	T(37'-8¾)	22.927		
262	17'-8		21.203		
123	18'-3	PO(12'-3¾)	17.917		
124	18'-3	PO(12'-3¾)	17.016		
125	18'-3	PO(12'-3¾)	16.421		
126	18'-3	PO(12'-3¾)	16.022		
127	18'-3	PO(12'-3¾)	15.780		
128	18'-3	PO(12'-3¾)	15.657		
129	18'-3	PO(12'-3¾)	15.615		
130	18'-3	PO(12'-3¾)	15.612		
131	18'-3	PO(12'-3¾)	15.627		
132	18'-3	PO(12'-3¾)	15.700		
284	15'-0		22.927		
5	-5'-0	2T(52'-9¾)	36.787		
11	-5'-0	LtE(19'-7½)	36.908		
12	-6'-0	LtE(22'-0¾)	49.759		
164	8'-4	PO(6'-0)	0.000		
166	8'-4	PO(6'-0)	0.000		
168	8'-4	PO(6'-0)	0.000		
170	8'-4	PO(6'-0)	0.000		
173	8'-4	PO(6'-0)	0.000		
175	8'-4	PO(6'-0)	0.000		
358	8'-4	PO(5'-0)	25.563		
198	15'-0	PO(16'-5¾)	22.676		
479	7'-10	T(5'-0)	25.461		
480	10'-7¾	PO(5'-0)	24.241		
482	10'-7¾		24.241		
297	15'-0	PO(20'-2)	22.354		
530	10'-0	PO(5'-0)	24.301		
313	15'-0	T(26'-4)	22.133		
338	22'-5¾	Spr(-15.423)	15.423	31.42	
336	22'-5¾	Spr(-13.418)	13.418	29.30	
332	22'-5¾	Spr(-12.900)	12.900	28.73	
328	22'-5¾	Spr(-12.553)	12.553	28.34	
324	22'-5¾	Spr(-12.342)	12.342	28.11	
320	22'-5¾	Spr(-12.235)	12.235	27.98	
312	22'-5¾	Spr(-12.198)	12.198	27.94	
304	22'-5¾	Spr(-12.196)	12.196	27.94	
308	22'-5¾	Spr(-12.209)	12.209	27.95	
316	22'-5¾	Spr(-12.273)	12.273	28.03	
337	25'-11½	Spr(-13.825)	13.825	29.75	
335	25'-11½	Spr(-11.420)	11.420	27.03	
331	25'-11½	Spr(-10.925)	10.925	26.44	
327	25'-11½	Spr(-10.593)	10.593	26.04	
323	25'-11½	Spr(-10.391)	10.391	25.79	
319	25'-11½	Spr(-10.289)	10.289	25.66	
311	25'-11½	Spr(-10.254)	10.254	25.62	
802	25'-11½	Spr(-10.252)	10.252	25.61	
307	25'-11½	Spr(-10.264)	10.264	25.63	
315	25'-11½	Spr(-10.325)	10.325	25.71	
334	29'-5¼	Spr(-9.698)	9.698	24.91	
330	29'-5¼	Spr(-9.214)	9.214	24.28	
326	29'-5¼	Spr(-8.889)	8.889	23.85	
322	29'-5¼	Spr(-8.692)	8.692	23.59	
318	29'-5¼	Spr(-8.592)	8.592	23.45	
310	29'-5¼	Spr(-8.558)	8.558	23.40	
302	29'-5¼	Spr(-8.556)	8.556	23.40	
306	29'-5¼	Spr(-8.567)	8.567	23.42	
314	29'-5¼	Spr(-8.627)	8.627	23.50	
333	32'-11	Spr(-8.135)	8.135	22.82	
329	32'-11	Spr(-7.654)	7.654	22.13	
325	32'-11	Spr(-7.331)	7.331	21.66	

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
321	32'-11	Spr(-7.136)	7.136	21.37	
317	32'-11	Spr(-7.036)	7.036	21.22	
309	32'-11	Spr(-7.002)	7.002	21.17	
301	32'-11	Spr(-7.000)	7.000	21.17	
305	32'-11	Spr(-7.012)	7.012	21.18	
806	32'-11	Spr(-7.071)	7.071	21.27	
1	-6'-0	S	54.532	956.82	

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
• • • • • Route 1 • • • • •							
CM	2.1570	Q=21.17	1.86	C=120	0.004318	11'-0	Pf 0.047
301	32'-11	q=21.17	K=8	7.000	Spr(-7.000)		Pe 1.508
302	29'-5¼			8.556		11'-0	Pv
CM	2.1570	Q=44.57	3.91	C=120	0.017118	11'-0	Pf 0.188
302	29'-5¼	q=23.40	K=8	8.556	Spr(-8.556)		Pe 1.508
802	25'-11½			10.252		11'-0	Pv
CM	2.1570	Q=70.18	6.16	C=120	0.039656	11'-0	Pf 0.436
802	25'-11½	q=25.61	K=8	10.252	Spr(-10.252)		Pe 1.508
304	22'-5¾			12.196		11'-0	Pv
CM	2.1570	Q=98.12	8.61	C=120	0.073713	1'-6	Pf 0.111
304	22'-5¾	q=27.94	K=8	12.196	Spr(-12.196)		Pe 0.206
148	22'-0			12.513		1'-6	Pv
RN	2.1570	Q=98.12	8.61	C=120	0.073713	3'-11½	Pf 1.471
148	22'-0			12.513	LtE(3'-8¼)	16'-0	Pe 1.628
130	18'-3			15.612	PO(12'-3¾)	19'-11½	Pv
CM	4.2600	Q=27.27	0.61	C=120	0.000251	10'-0	Pf 0.003
130	18'-3			15.612			Pe
129	18'-3			15.615		10'-0	Pv
CM	4.2600	Q=125.40	2.82	C=120	0.004219	10'-0	Pf 0.042
129	18'-3			15.615			Pe
128	18'-3			15.657		10'-0	Pv
CM	4.2600	Q=223.71	5.04	C=120	0.012313	10'-0	Pf 0.123
128	18'-3			15.657			Pe
127	18'-3			15.780		10'-0	Pv
CM	4.2600	Q=322.56	7.26	C=120	0.024230	10'-0	Pf 0.242
127	18'-3			15.780			Pe
126	18'-3			16.022		10'-0	Pv
CM	4.2600	Q=422.45	9.51	C=120	0.039913	10'-0	Pf 0.399
126	18'-3			16.022			Pe
125	18'-3			16.421		10'-0	Pv
CM	4.2600	Q=524.04	11.80	C=120	0.059465	10'-0	Pf 0.595
125	18'-3			16.421			Pe
124	18'-3			17.016		10'-0	Pv
CM	4.2600	Q=628.11	14.14	C=120	0.083138	10'-10	Pf 0.901
124	18'-3			17.016			Pe
123	18'-3			17.917		10'-10	Pv
CM	4.2600	Q=689.28	15.52	C=120	0.098732	4'-4¾	Pf 3.034
123	18'-3			17.917		26'-4	Pe 0.253
262	17'-8			21.203	T(26'-4)	30'-8¾	Pv
CM	6.3570	Q=689.28	6.97	C=120	0.014055	2'-8	Pf 0.568
262	17'-8			21.203		37'-8¾	Pe 1.156
261	15'-0			22.927	T(37'-8¾)	40'-4¾	Pv
CM	6.3570	Q=956.82	9.67	C=120	0.025784	4'-3½	Pf 0.694
261	15'-0			22.927		22'-7½	Pe -0.000
163	15'-0			23.621	2LtE(11'-3¾)	26'-11	Pv
FR	6.3570	Q=956.82	9.67	C=120	0.025784	6'-9	Pf 0.174
163	15'-0			23.621			Pe 2.926
161	8'-3			26.721		6'-9	Pv
MS	6.3570	Q=956.82	9.67	C=120	0.025784	1'-1	Pf 1.802
161	8'-3			26.721		68'-9¾	Pe 1.838
84	4'-0¼			30.361	2f(-0.000), CV(40'-2¾), BV(12'-7), CV(16'-0)	69'-10¾	Pv
FR	6.0650	Q=956.82	10.63	C=120	0.032419	2'-0	Pf 0.389
84	4'-0¼			30.361		10'-0	Pe 1.305
7	1'-0			32.055	BV(10'-0)	12'-0	Pv
UG	8.3900	Q=956.82	5.55	C=140	0.005019	135'-2½	Pf 1.130
7	1'-0			32.055		89'-11	Pe 2.601
3	-5'-0			35.787	E(30'-6½), T(59'-4½)	225'-1½	Pv
UG	7.9800	Q=630.97	4.05	C=150	0.002610	303'-2¾	Pf 1.000
3	-5'-0			35.787		79'-11¾	Pe
5	-5'-0			36.787	E(27'-2), T(52'-9¾)	383'-2½	Pv
UG	7.9800	Q=956.82	6.14	C=150	0.005638	1'-11	Pf 0.121
5	-5'-0			36.787		19'-7½	Pe
11	-5'-0			36.908	LtE(19'-7½)	21'-6½	Pv
UG	8.3900	Q=956.82	5.55	C=140	0.005019	17'-0	Pf 12.417
11	-5'-0			36.908		66'-2	Pe 0.434
12	-6'-0			49.759	3LtE(22'-0¼), BFP(-12.000)	83'-2	Pv
UG	7.9800	Q=956.82	6.14	C=150	0.005638	727'-3	Pf 4.773
12	-6'-0			49.759		119'-2½	Pe
1	-6'-0			54.532	2E(27'-2), 2GV(6'-0½), T(52'-9¾), S	846'-5¾	Pv
• • • • • Route 2 • • • • •							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.1570	Q=21.17	1.86	C=120	0.004319	11'-0	Pf 0.048
309	32'-11	q=21.17	K=8	7.002	Spr(-7.002)		Pe 1.508
310	29'-5¼			8.558		11'-0	Pv
CM	2.1570	Q=44.57	3.91	C=120	0.017122	11'-0	Pf 0.188
310	29'-5¼	q=23.40	K=8	8.558	Spr(-8.558)		Pe 1.508
311	25'-11½			10.254		11'-0	Pv
CM	2.1570	Q=70.19	6.16	C=120	0.039665	11'-0	Pf 0.436
311	25'-11½	q=25.62	K=8	10.254	Spr(-10.254)		Pe 1.508
312	22'-5¾			12.198		11'-0	Pv
CM	2.1570	Q=98.13	8.62	C=120	0.073729	1'-6	Pf 0.111
312	22'-5¾	q=27.94	K=8	12.198	Spr(-12.198)		Pe 0.206
147	22'-0			12.515		1'-6	Pv
RN	2.1570	Q=98.13	8.62	C=120	0.073729	3'-11½	Pf 1.471
147	22'-0			12.515	LtE(3'-8¼)	16'-0	Pe 1.628
129	18'-3			15.615	PO(12'-3¾)	19'-11½	Pv
Route 3							
CM	2.1570	Q=21.18	1.86	C=120	0.004324	11'-0	Pf 0.048
305	32'-11	q=21.18	K=8	7.012	Spr(-7.012)		Pe 1.508
306	29'-5¼			8.567		11'-0	Pv
CM	2.1570	Q=44.60	3.92	C=120	0.017142	11'-0	Pf 0.189
306	29'-5¼	q=23.42	K=8	8.567	Spr(-8.567)		Pe 1.508
307	25'-11½			10.264		11'-0	Pv
CM	2.1570	Q=70.23	6.17	C=120	0.039707	11'-0	Pf 0.437
307	25'-11½	q=25.63	K=8	10.264	Spr(-10.264)		Pe 1.508
308	22'-5¾			12.209		11'-0	Pv
CM	2.1570	Q=98.18	8.62	C=120	0.073802	1'-6	Pf 0.111
308	22'-5¾	q=27.95	K=8	12.209	Spr(-12.209)		Pe 0.206
149	22'-0			12.526		1'-6	Pv
RN	2.1570	Q=98.18	8.62	C=120	0.073802	3'-11½	Pf 1.473
149	22'-0			12.526	LtE(3'-8¼)	16'-0	Pe 1.628
131	18'-3			15.627	PO(12'-3¾)	19'-11½	Pv
CM	4.2600	Q=169.04	3.80	C=120	0.007331	10'-0	Pf 0.073
131	18'-3			15.627			Pe
132	18'-3			15.700		10'-0	Pv
CM	4.2600	Q=267.54	6.02	C=120	0.017143	171'-11	Pf 5.024
132	18'-3			15.700		121'-1¾	Pe 1.409
313	15'-0			22.133	4T(26'-4), 2LtE(7'-10¾)	293'-0½	Pv
CM	4.2600	Q=262.59	5.91	C=120	0.016562	13'-4	Pf 0.221
313	15'-0			22.133			Pe 0.000
297	15'-0			22.354		13'-4	Pv
CM	4.2600	Q=262.38	5.91	C=120	0.016537	19'-6	Pf 0.322
297	15'-0			22.354			Pe
198	15'-0			22.676		19'-6	Pv
CM	4.2600	Q=267.54	6.02	C=120	0.017143	14'-7½	Pf 0.251
198	15'-0			22.676			Pe
284	15'-0			22.927		14'-7½	Pv
DY	6.3570	Q=267.54	2.70	C=120	0.002441	0'-0	Pf 0.000
284	15'-0			22.927			Pe 0.000
261	15'-0			22.927		0'-0	Pv
Route 4							
CM	2.1570	Q=21.22	1.86	C=120	0.004338	11'-0	Pf 0.048
317	32'-11	q=21.22	K=8	7.036	Spr(-7.036)		Pe 1.508
318	29'-5¼			8.592		11'-0	Pv
CM	2.1570	Q=44.67	3.92	C=120	0.017192	11'-0	Pf 0.189
318	29'-5¼	q=23.45	K=8	8.592	Spr(-8.592)		Pe 1.508
319	25'-11½			10.289		11'-0	Pv
CM	2.1570	Q=70.33	6.18	C=120	0.039813	11'-0	Pf 0.438
319	25'-11½	q=25.66	K=8	10.289	Spr(-10.289)		Pe 1.508
320	22'-5¾			12.235		11'-0	Pv
CM	2.1570	Q=98.31	8.63	C=120	0.073985	1'-6	Pf 0.111
320	22'-5¾	q=27.98	K=8	12.235	Spr(-12.235)		Pe 0.206
146	22'-0			12.552		1'-6	Pv
RN	2.1570	Q=98.31	8.63	C=120	0.073985	3'-11½	Pf 1.476
146	22'-0			12.552	LtE(3'-8¼)	16'-0	Pe 1.628
128	18'-3			15.657	PO(12'-3¾)	19'-11½	Pv
Route 5							
CM	2.1570	Q=21.27	1.87	C=120	0.004358	11'-0	Pf 0.048
806	32'-11	q=21.27	K=8	7.071	Spr(-7.071)		Pe 1.508
314	29'-5¼			8.627		11'-0	Pv
CM	2.1570	Q=44.77	3.93	C=120	0.017264	11'-0	Pf 0.190
314	29'-5¼	q=23.50	K=8	8.627	Spr(-8.627)		Pe 1.508
315	25'-11½			10.325		11'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.1570	Q=70.48	6.19	C=120	0.039966	11'-0	Pf 0.440
315	25'-11½	q=25.71	K=8	10.325	Spr(-10.325)		Pe 1.508
316	22'-5¾			12.273		11'-0	Pv
CM	2.1570	Q=98.50	8.65	C=120	0.074247	1'-6	Pf 0.112
316	22'-5¾	q=28.03	K=8	12.273	Spr(-12.273)		Pe 0.206
150	22'-0			12.590		1'-6	Pv
RN	2.1570	Q=98.50	8.65	C=120	0.074247	3'-11½	Pf 1.482
150	22'-0			12.590	LtE(3'-8¼)	16'-0	Pe 1.628
132	18'-3			15.700	PO(12'-3¾)	19'-11½	Pv
Route 6							
CM	2.1570	Q=21.37	1.88	C=120	0.004395	11'-0	Pf 0.048
321	32'-11	q=21.37	K=8	7.136	Spr(-7.136)		Pe 1.508
322	29'-5¼			8.692		11'-0	Pv
CM	2.1570	Q=44.96	3.95	C=120	0.017396	11'-0	Pf 0.191
322	29'-5¼	q=23.59	K=8	8.692	Spr(-8.692)		Pe 1.508
323	25'-11½			10.391		11'-0	Pv
CM	2.1570	Q=70.74	6.21	C=120	0.040247	11'-0	Pf 0.443
323	25'-11½	q=25.79	K=8	10.391	Spr(-10.391)		Pe 1.508
324	22'-5¾			12.342		11'-0	Pv
CM	2.1570	Q=98.85	8.68	C=120	0.074731	1'-6	Pf 0.112
324	22'-5¾	q=28.11	K=8	12.342	Spr(-12.342)		Pe 0.206
145	22'-0			12.660		1'-6	Pv
RN	2.1570	Q=98.85	8.68	C=120	0.074731	3'-11½	Pf 1.491
145	22'-0			12.660	LtE(3'-8¼)	16'-0	Pe 1.628
127	18'-3			15.780	PO(12'-3¾)	19'-11½	Pv
Route 7							
CM	2.1570	Q=21.66	1.90	C=120	0.004506	11'-0	Pf 0.050
325	32'-11	q=21.66	K=8	7.331	Spr(-7.331)		Pe 1.508
326	29'-5¼			8.889		11'-0	Pv
CM	2.1570	Q=45.51	4.00	C=120	0.017797	11'-0	Pf 0.196
326	29'-5¼	q=23.85	K=8	8.889	Spr(-8.889)		Pe 1.508
327	25'-11½			10.593		11'-0	Pv
CM	2.1570	Q=71.55	6.28	C=120	0.041099	11'-0	Pf 0.452
327	25'-11½	q=26.04	K=8	10.593	Spr(-10.593)		Pe 1.508
328	22'-5¾			12.553		11'-0	Pv
CM	2.1570	Q=99.89	8.77	C=120	0.076199	1'-6	Pf 0.114
328	22'-5¾	q=28.34	K=8	12.553	Spr(-12.553)		Pe 0.206
144	22'-0			12.873		1'-6	Pv
RN	2.1570	Q=99.89	8.77	C=120	0.076199	3'-11½	Pf 1.521
144	22'-0			12.873	LtE(3'-8¼)	16'-0	Pe 1.628
126	18'-3			16.022	PO(12'-3¾)	19'-11½	Pv
Route 8							
CM	2.1570	Q=22.13	1.94	C=120	0.004689	11'-0	Pf 0.052
329	32'-11	q=22.13	K=8	7.654	Spr(-7.654)		Pe 1.508
330	29'-5¼			9.214		11'-0	Pv
CM	2.1570	Q=46.42	4.08	C=120	0.018456	11'-0	Pf 0.203
330	29'-5¼	q=24.28	K=8	9.214	Spr(-9.214)		Pe 1.508
331	25'-11½			10.925		11'-0	Pv
CM	2.1570	Q=72.86	6.40	C=120	0.042500	11'-0	Pf 0.467
331	25'-11½	q=26.44	K=8	10.925	Spr(-10.925)		Pe 1.508
332	22'-5¾			12.900		11'-0	Pv
CM	2.1570	Q=101.59	8.92	C=120	0.078612	1'-6	Pf 0.118
332	22'-5¾	q=28.73	K=8	12.900	Spr(-12.900)		Pe 0.206
143	22'-0			13.224		1'-6	Pv
RN	2.1570	Q=101.59	8.92	C=120	0.078612	3'-11½	Pf 1.569
143	22'-0			13.224	LtE(3'-8¼)	16'-0	Pe 1.628
125	18'-3			16.421	PO(12'-3¾)	19'-11½	Pv
Route 9							
CM	2.1570	Q=22.82	2.00	C=120	0.004961	11'-0	Pf 0.055
333	32'-11	q=22.82	K=8	8.135	Spr(-8.135)		Pe 1.508
334	29'-5¼			9.698		11'-0	Pv
CM	2.1570	Q=47.73	4.19	C=120	0.019435	11'-0	Pf 0.214
334	29'-5¼	q=24.91	K=8	9.698	Spr(-9.698)		Pe 1.508
335	25'-11½			11.420		11'-0	Pv
CM	2.1570	Q=74.77	6.56	C=120	0.044581	11'-0	Pf 0.490
335	25'-11½	q=27.03	K=8	11.420	Spr(-11.420)		Pe 1.508
336	22'-5¾			13.418		11'-0	Pv
CM	2.1570	Q=104.07	9.14	C=120	0.082196	1'-6	Pf 0.123
336	22'-5¾	q=29.30	K=8	13.418	Spr(-13.418)		Pe 0.206
142	22'-0			13.747		1'-6	Pv
RN	2.1570	Q=104.07	9.14	C=120	0.082196	3'-11½	Pf 1.640
142	22'-0			13.747	LtE(3'-8¼)	16'-0	Pe 1.628
124	18'-3			17.016	PO(12'-3¾)	19'-11½	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
Route 10								
CM	2.1570	Q=29.75	2.61	C=120		0.008103	11'-0	Pf 0.089
337	25'-11½	q=29.75	K=8	13.825		Spr(-13.825)		Pe 1.508
338	22'-5¾			15.423			11'-0	Pv
CM	2.1570	Q=61.16	5.37	C=120		0.030748	1'-6	Pf 0.046
338	22'-5¾	q=31.42	K=8	15.423		Spr(-15.423)		Pe 0.206
141	22'-0			15.675			1'-6	Pv
RN	2.1570	Q=61.16	5.37	C=120		0.030748	3'-11½	Pf 0.614
141	22'-0			15.675		LtE(3'-8¼)	16'-0	Pe 1.628
123	18'-3			17.917		PO(12'-3¾)	19'-11½	Pv
Route 11								
CM	2.6350	Q=0.22	0.01	C=120		0.000000	0'-11	Pf 0.000
482	10'-7¾			24.241				Pe -0.000
480	10'-7¾			24.241			0'-11	Pv
BL	1.0490	Q=0.22	0.08	C=120		0.000030	2'-9¾	Pf 0.000
480	10'-7¾			24.241		PO(5'-0)	10'-0	Pe 1.219
479	7'-10			25.461		T(5'-0)	12'-9¾	Pv
BL	1.0490	Q=5.16	1.92	C=120		0.010616	20'-0	Pf 0.318
479	7'-10			25.461			10'-0	Pe -0.217
358	8'-4			25.563		T(5'-0), PO(5'-0)	30'-0	Pv
CM	2.6350	Q=5.16	0.30	C=120		0.000120	8'-1¾	Pf 0.004
358	8'-4			25.563			21'-11½	Pe -2.890
198	15'-0			22.676		LtE(5'-6), PO(16'-5¾)	30'-1¼	Pv
Route 12								
UG	7.9800	Q=325.85	2.09	C=150		0.000769	1167'-0	Pf 1.000
3	-5'-0			35.787			134'-3¾	Pe
5	-5'-0			36.787		2E(27'-2), 2EE(13'-7), T(52'-9¾)	1301'-3¾	Pv
Route 13								
CM	4.2600	Q=70.85	1.59	C=120		0.001468	10'-0	Pf 0.015
130	18'-3			15.612				Pe
131	18'-3			15.627			10'-0	Pv
Route 14								
BL	1.0490	Q=4.95	1.84	C=120		0.009811	15'-6	Pf 0.221
530	10'-0			24.301		PO(5'-0)	7'-0	Pe 0.939
479	7'-10			25.461		E(2'-0)	22'-6	Pv
Route 15								
CM	3.2600	Q=0.22	0.01	C=120		0.000000	4'-4¼	Pf 0.000
297	15'-0			22.354		PO(20'-2)	26'-10½	Pe 1.888
482	10'-7¾			24.241		LtE(6'-8¾)	31'-2¾	Pv
Route 16								
CM	4.2600	Q=4.95	0.11	C=120		0.000011	6'-5¾	Pf 0.000
313	15'-0			22.133		T(26'-4)	34'-2¾	Pe 2.168
530	10'-0			24.301		LtE(7'-10¾)	40'-8½	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

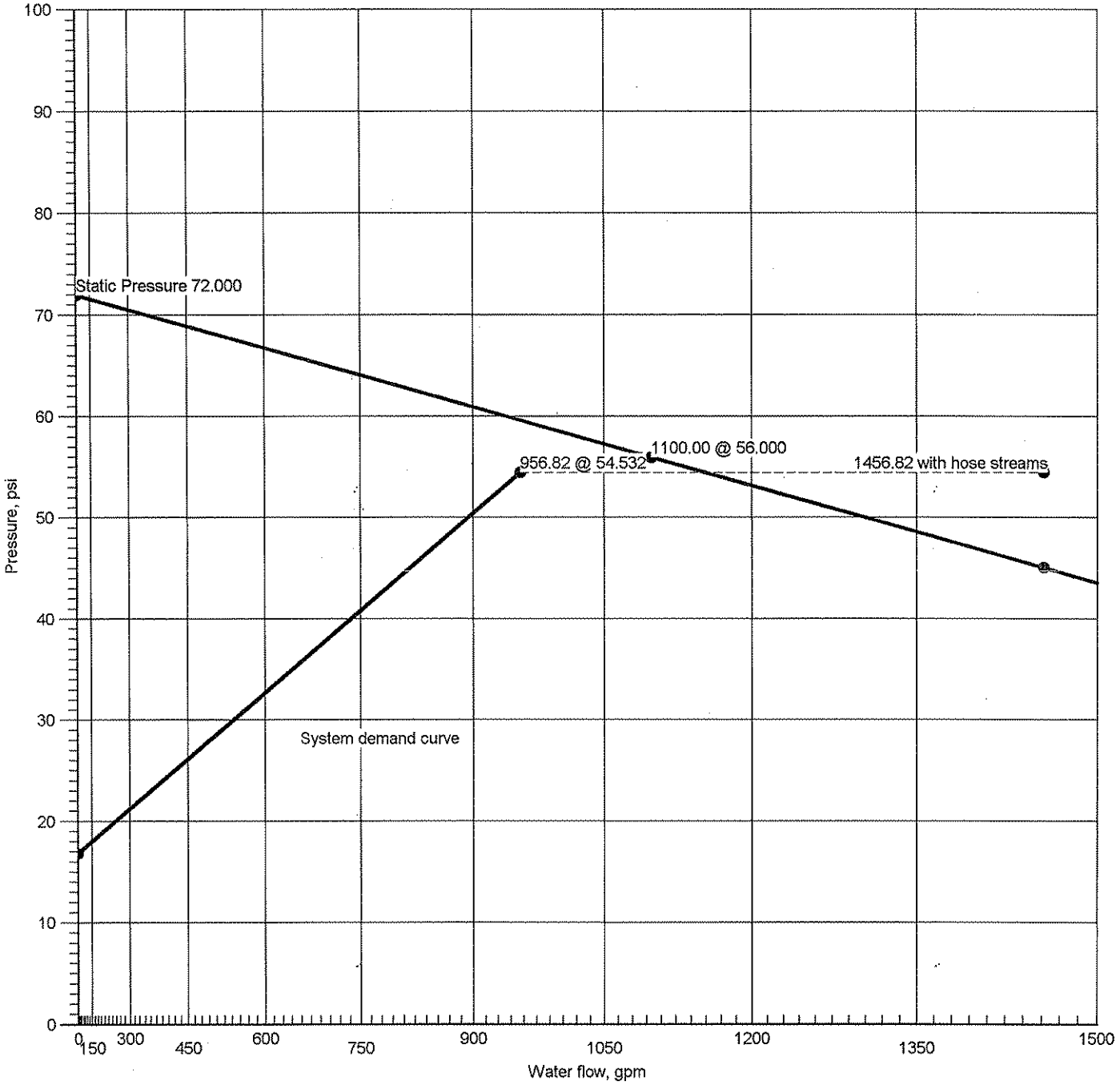
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available PressureTime of Test	45.094 @ 1456.82
System Demand	956.82 @ 54.532
System Demand (Including Hose Allowance)	1456.82 @ 54.532

Hydraulic Overview

Job

Job Number: 2440 CAGES	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2440 CAGES	Phone: / FAX:
Address 1: OPERATIONS BLDG	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site: DEMAND WITH 500 GPM HOSE ALLOWANCE

System

Density: 0.150gpm/ft²	Area of Application: 3000.00ft² (Actual 3073.29ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 19.00 at 11.511	Hose Streams: 500.00
Coverage Per Sprinkler: 120.00ft²	Number Of Sprinklers Calculated: 25
System Pressure Demand: 46.889	System Flow Demand: 485.39
Total Demand: 985.39 @ 46.889	Pressure Result: +12.057 (20.5%)

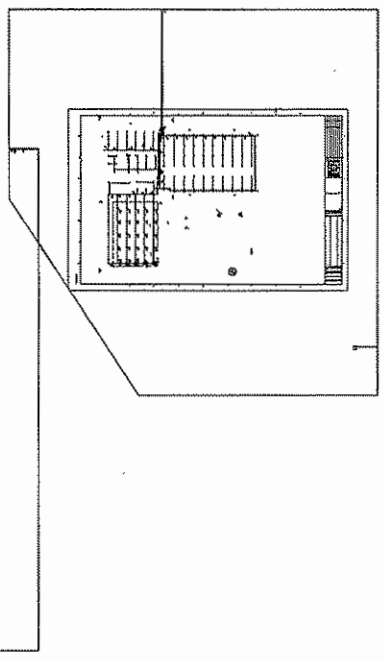
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	500.00	72.000	56.000

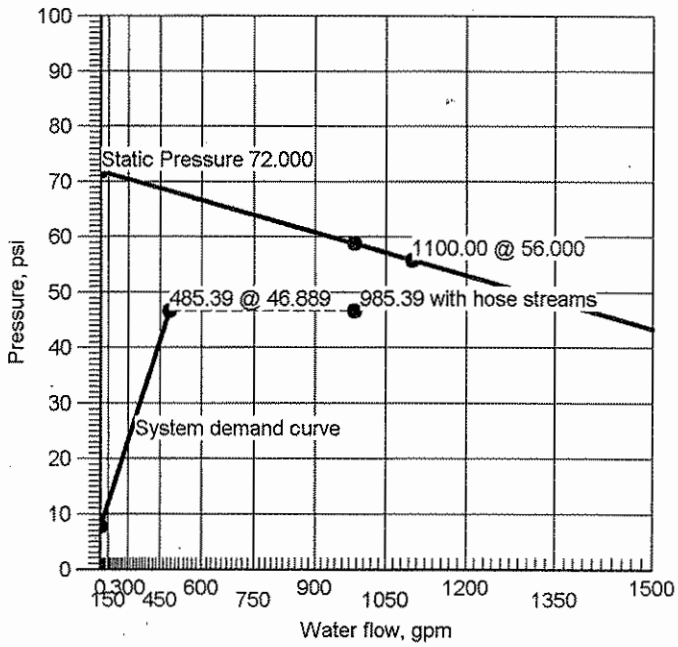
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)

FP-3 BLDG 2440 2441 1st Floor R5



Supply at Node 1 (1100.00, 500.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 2440 CAGES	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2440 CAGES	State Certification/License Number:
Address 1: OPERATIONS BLDG	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site: DEMAND WITH 500 GPM HOSE ALLOWANCE
City: STENNIS / State: MS / Zip Code:	Drawing Name: FP-3 BLDG 2440 2441 1st Floor R5

System

Most Demanding Sprinkler Data: 5.6 K-Factor 19.00 at 11.511

Hose Allowance At Source: 500.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 500.00

System Flow Demand: 485.39

Total Water Required (Including Hose Allowance): 985.39

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 21.09 between nodes 375 and 370

Maximum Velocity Under Ground: 3.11 between nodes 1 and 12

Volume capacity of Wet Pipes: 6939.58gal

Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Ordinary Group I

Density: 0.150gpm/ft²

Area of Application: 3000.00ft² (Actual 3073.29ft²)

Number Of Sprinklers Calculated: 25

Coverage Per Sprinkler: 120.00ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @ Flow (gpm)		Available (psi) @ Total Demand (gpm)		Required (psi)	Safety Margin (psi)
1	500.00	72.000	56.000	1100.00	58.947	985.39	46.889	12.057

Contractor

	Contractor Number:	Contact Name:	Contact Title:
Contractor Name: SIMPLEXGRINNELL		Phone:	Extension:
Address 1: 5800 JEFFERSON HWY		FAX:	
Address 2: SUITE A		E-mail:	
City: HARAHAN / State: LA / Zip Code: 70123		Web-Site:	

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
Sprinkler	113	19.29	19.00	5.6	11.860		
Sprinkler	115	19.39	19.00	5.6	11.987		
Sprinkler	118	19.65	19.00	5.6	12.314		
Sprinkler	133	20.20	19.00	5.6	13.009		
Sprinkler	135	21.16	19.00	5.6	14.282		
Sprinkler	106	19.09	19.00	5.6	11.619		
Sprinkler	110	19.16	19.00	5.6	11.703		
Sprinkler	114	19.33	19.00	5.6	11.915		
Sprinkler	120	19.69	19.00	5.6	12.362		
Sprinkler	134	20.36	19.00	5.6	13.225		
Sprinkler	105	19.07	19.00	5.6	11.600		
Sprinkler	109	19.12	19.00	5.6	11.655		
Sprinkler	112	19.22	19.00	5.6	11.786		
Sprinkler	116	19.43	19.00	5.6	12.044		
Sprinkler	122	19.86	19.00	5.6	12.577		
⇨ Sprinkler	101	19.00	19.00	5.6	11.511		
Sprinkler	103	19.03	19.00	5.6	11.554		
Sprinkler	108	19.11	19.00	5.6	11.640		
Sprinkler	111	19.21	19.00	5.6	11.772		
Sprinkler	117	19.44	19.00	5.6	12.055		
Sprinkler	102	19.01	19.00	5.6	11.524		
Sprinkler	104	19.04	19.00	5.6	11.558		
Sprinkler	107	19.10	19.00	5.6	11.636		
Sprinkler	854	19.16	19.00	5.6	11.709		
Sprinkler	855	19.26	19.00	5.6	11.823		

⇨ Most Demanding Sprinkler Data

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
3	-5'-0	T(59'-4½)	32.657		
7	1'-0		29.734		
84	4'-0¼	CV(16'-0)	28.318		
161	8'-3		25.967		
163	15'-0	LtE(11'-3¾)	22.991		
261	15'-0	T(37'-8¾)	22.793		
262	17'-8		21.617		
123	18'-3	PO(12'-3¾)	21.259		
124	18'-3	PO(12'-3¾)	21.222		
125	18'-3	PO(12'-3¾)	21.187		
126	18'-3	PO(12'-3¾)	21.153		
127	18'-3	PO(12'-3¾)	21.118		
128	18'-3	PO(12'-3¾)	21.084		
129	18'-3	PO(12'-3¾)	21.050		
130	18'-3	PO(12'-3¾)	21.015		
131	18'-3	PO(12'-3¾)	20.981		
132	18'-3	PO(12'-3¾)	20.947		
284	15'-0		22.793		
5	-5'-0	2T(52'-9¾)	32.942		
11	-5'-0	LtE(19'-7½)	32.977		
12	-6'-0	LtE(22'-0¾)	45.529		
164	8'-4	PO(6'-0)	0.000		
166	8'-4	PO(6'-0)	0.000		
168	8'-4	PO(6'-0)	0.000		
170	8'-4	PO(6'-0)	0.000		
173	8'-4	PO(6'-0)	0.000		
175	8'-4	PO(6'-0)	0.000		
358	8'-4	PO(5'-0)	25.209		
198	15'-0	PO(16'-5¾)	22.329		
479	7'-10	T(5'-0)	24.556		
480	10'-7¾	PO(5'-0)	23.622		
482	10'-7¾		23.622		
297	15'-0	PO(20'-2)	21.737		
530	10'-0	PO(5'-0)	21.546		
313	15'-0	T(26'-4)	21.348		
360	10'-0	PO(12'-3¾)	14.621		
362	10'-0	PO(12'-3¾)	14.643		
364	10'-0	PO(12'-3¾)	14.927		
366	10'-0	PO(12'-3¾)	15.655		
370	10'-0	PO(12'-3¾)	17.183		
375	10'-0		19.781		
377	10'-0	PO(12'-3¾)	19.803		
390	11'-2¾	PO(5'-0)	12.966		
391	11'-2¾	PO(5'-0)	13.100		
392	11'-2¾	PO(5'-0)	13.445		
393	11'-2¾	PO(5'-0)	14.179		
394	11'-2¾	PO(5'-0)	15.522		
401	11'-2¾	PO(5'-0)	12.711		
402	11'-2¾	PO(5'-0)	12.800		
403	11'-2¾	PO(5'-0)	13.023		
404	11'-2¾	PO(5'-0)	13.496		
405	11'-2¾	PO(5'-0)	14.406		
408	11'-2¾	PO(5'-0)	12.611		
409	11'-2¾	PO(5'-0)	12.669		
410	11'-2¾	PO(5'-0)	12.806		
411	11'-2¾	PO(5'-0)	13.079		
412	11'-2¾	PO(5'-0)	13.641		
414	11'-2¾	PO(5'-0)	12.598		
415	11'-2¾	PO(5'-0)	12.642		
416	11'-2¾	PO(5'-0)	12.733		
417	11'-2¾	PO(5'-0)	12.873		
418	11'-2¾	PO(5'-0)	13.171		
420	11'-2¾	PO(5'-0)	12.611		
421	11'-2¾	PO(5'-0)	12.647		
422	11'-2¾	PO(5'-0)	12.729		
667	11'-2¾	PO(5'-0)	12.806		
668	11'-2¾	PO(5'-0)	12.926		
671	10'-0	2PO(16'-5¾)	13.415		
674	10'-0	PO(12'-3¾)	13.299		
678	10'-0	PO(12'-3¾)	13.296		
681	10'-0	PO(12'-3¾)	13.306		
685	10'-0	PO(12'-3¾)	13.335		
688	10'-0	2PO(16'-5¾)	13.401		
113	12'-1½	Spr(-11.860)	11.860	19.29	
115	12'-1½	Spr(-11.987)	11.987	19.39	
118	12'-1½	Spr(-12.314)	12.314	19.65	
133	12'-1½	Spr(-13.009)	13.009	20.20	

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
135	12'-1½	Spr(-14.282)	14.282	21.16	
106	12'-1½	Spr(-11.619)	11.619	19.09	
110	12'-1½	Spr(-11.703)	11.703	19.16	
114	12'-1½	Spr(-11.915)	11.915	19.33	
120	12'-1½	Spr(-12.362)	12.362	19.69	
134	12'-1½	Spr(-13.225)	13.225	20.36	
105	11'-11¾	Spr(-11.600)	11.600	19.07	
109	11'-11¾	Spr(-11.655)	11.655	19.12	
112	11'-11¾	Spr(-11.786)	11.786	19.22	
116	11'-11¾	Spr(-12.044)	12.044	19.43	
122	11'-11¾	Spr(-12.577)	12.577	19.86	
101	12'-1½	Spr(-11.511)	11.511	19.00	
103	12'-1½	Spr(-11.554)	11.554	19.03	
108	12'-1½	Spr(-11.640)	11.640	19.11	
111	12'-1½	Spr(-11.772)	11.772	19.21	
117	12'-1½	Spr(-12.055)	12.055	19.44	
102	12'-1½	Spr(-11.524)	11.524	19.01	
104	12'-1½	Spr(-11.558)	11.558	19.04	
107	12'-1½	Spr(-11.636)	11.636	19.10	
854	12'-1½	Spr(-11.709)	11.709	19.16	
855	12'-1½	Spr(-11.823)	11.823	19.26	
1	-6'-0	S	46.889	485.39	

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
••••• Route 1 •••••								
SP	1.0490	Q=19.00	7.05	C=120		0.118351	0'-10¾	Pf 0.698
101	12'-1½	q=19.00	K=5.6	11.511		Spr(-11.511)	5'-0	Pe 0.388
414	11'-2¾			12.598		PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=9.43	0.83	C=120		0.000968	13'-5	Pf 0.013
414	11'-2¾			12.598				Pe
408	11'-2¾			12.611			13'-5	Pv
CM	2.1570	Q=28.50	2.50	C=120		0.007488	13'-5	Pf 0.100
408	11'-2¾			12.611				Pe
401	11'-2¾			12.711			13'-5	Pv
CM	2.1570	Q=47.59	4.18	C=120		0.019330	13'-2	Pf 0.255
401	11'-2¾			12.711				Pe
390	11'-2¾			12.966			13'-2	Pv
CM	2.1570	Q=66.88	5.87	C=120		0.036272	15'-6¾	Pf 1.145
390	11'-2¾			12.966			16'-0	Pe 0.533
362	10'-0			14.643		LtE(3'-8¼), PO(12'-3¾)	31'-6¾	Pv
CM	2.6350	Q=103.39	6.08	C=120		0.030638	9'-3	Pf 0.283
362	10'-0			14.643				Pe
364	10'-0			14.927			9'-3	Pv
CM	2.6350	Q=174.84	10.29	C=120		0.080974	9'-0	Pf 0.729
364	10'-0			14.927				Pe
366	10'-0			15.655			9'-0	Pv
CM	2.6350	Q=257.05	15.12	C=120		0.165190	9'-3	Pf 1.528
366	10'-0			15.655				Pe
370	10'-0			17.183			9'-3	Pv
CM	2.6350	Q=358.43	21.09	C=120		0.305559	8'-6	Pf 2.597
370	10'-0			17.183				Pe
375	10'-0			19.781			8'-6	Pv
CM	4.2600	Q=358.43	8.07	C=120		0.029449	0'-9	Pf 0.022
375	10'-0			19.781				Pe
377	10'-0			19.803			0'-9	Pv
CM	4.2600	Q=485.39	10.93	C=120		0.051606	17'-11¾	Pf 1.743
377	10'-0			19.803			15'-9½	Pe
530	10'-0			21.546		2LtE(7'-10¾)	33'-9¼	Pv
CM	4.2600	Q=468.81	10.55	C=120		0.048391	6'-5¾	Pf 1.970
530	10'-0			21.546			34'-2¾	Pe -2.168
313	15'-0			21.348		LtE(7'-10¾), T(26'-4)	40'-8½	Pv
CM	4.2600	Q=356.58	8.03	C=120		0.029168	13'-4	Pf 0.389
313	15'-0			21.348				Pe 0.000
297	15'-0			21.737			13'-4	Pv
CM	4.2600	Q=364.28	8.20	C=120		0.030345	19'-6	Pf 0.592
297	15'-0			21.737				Pe
198	15'-0			22.329			19'-6	Pv
CM	4.2600	Q=373.16	8.40	C=120		0.031728	14'-7½	Pf 0.464
198	15'-0			22.329				Pe
284	15'-0			22.793			14'-7½	Pv
DY	6.3570	Q=373.16	3.77	C=120		0.004517	0'-0	Pf 0.000
284	15'-0			22.793				Pe 0.000
261	15'-0			22.793			0'-0	Pv
CM	6.3570	Q=485.39	4.91	C=120		0.007347	4'-3½	Pf 0.198
261	15'-0			22.793			22'-7½	Pe -0.000
163	15'-0			22.991		2LtE(11'-3¾)	26'-11	Pv
FR	6.3570	Q=485.39	4.91	C=120		0.007347	6'-9	Pf 0.050
163	15'-0			22.991				Pe 2.926
161	8'-3			25.967			6'-9	Pv
MS	6.3570	Q=485.39	4.91	C=120		0.007347	1'-1	Pf 0.513
161	8'-3			25.967			68'-9¾	Pe 1.838
84	4'-0¼			28.318		2f(-0.000), CV(40'-2¾), BV(12'-7), CV(16'-0)	69'-10¾	Pv
FR	6.0650	Q=485.39	5.39	C=120		0.009237	2'-0	Pf 0.111
84	4'-0¼			28.318			10'-0	Pe 1.305
7	1'-0			29.734		BV(10'-0)	12'-0	Pv
UG	8.3900	Q=485.39	2.82	C=140		0.001430	135'-2½	Pf 0.322
7	1'-0			29.734			89'-11	Pe 2.601
3	-5'-0			32.657		E(30'-6½), T(59'-4½)	225'-1½	Pv
UG	7.9800	Q=320.09	2.05	C=150		0.000744	303'-2¾	Pf 0.285
3	-5'-0			32.657			79'-11¾	Pe
5	-5'-0			32.942		E(27'-2), T(52'-9¾)	383'-2½	Pv
UG	7.9800	Q=485.39	3.11	C=150		0.001607	1'-11	Pf 0.035
5	-5'-0			32.942			19'-7½	Pe
11	-5'-0			32.977		LtE(19'-7½)	21'-6½	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
UG	8.3900	Q=485.39	2.82	C=140	0.001430	17'-0	Pf 12.119
11	-5'-0			32.977		66'-2	Pe 0.434
12	-6'-0			45.529	3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv
UG	7.9800	Q=485.39	3.11	C=150	0.001607	727'-3	Pf 1.360
12	-6'-0			45.529		119'-2½	Pe
1	-6'-0			46.889	2E(27'-2), 2GV(6'-0½), T(52'-9¾), S	846'-5¾	Pv
••••• Route 2 •••••							
SP	1.0490	Q=19.01	7.06	C=120	0.118471	0'-10¾	Pf 0.698
102	12'-1½	q=19.01	K=5.6	11.524	Spr(-11.524)	5'-0	Pe 0.388
420	11'-2¾			12.611	PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=28.58	2.51	C=120	0.007525	4'-7¼	Pf 0.155
420	11'-2¾			12.611		16'-0	Pe 0.533
674	10'-0			13.299	LtE(3'-8¼), PO(12'-3¾)	20'-7¼	Pv
CM	2.6350	Q=36.52	2.15	C=120	0.004467	9'-6	Pf 0.116
674	10'-0			13.299		16'-5¾	Pe
671	10'-0			13.415	PO(16'-5¾)	25'-11¾	Pv
CM	2.1570	Q=36.52	3.21	C=120	0.011841	78'-5½	Pf 1.206
671	10'-0			13.415		23'-4½	Pe
360	10'-0			14.621	3LtE(3'-8¼), PO(12'-3¾)	101'-10	Pv
CM	2.6350	Q=36.52	2.15	C=120	0.004467	5'-0	Pf 0.022
360	10'-0			14.621			Pe
362	10'-0			14.643		5'-0	Pv
••••• Route 3 •••••							
SP	1.0490	Q=19.03	7.07	C=120	0.118753	0'-10¾	Pf 0.700
103	12'-1½	q=19.03	K=5.6	11.554	Spr(-11.554)	5'-0	Pe 0.388
415	11'-2¾			12.642	PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=13.78	1.21	C=120	0.001953	13'-5	Pf 0.026
415	11'-2¾			12.642			Pe
409	11'-2¾			12.669		13'-5	Pv
CM	2.1570	Q=32.90	2.89	C=120	0.009765	13'-5	Pf 0.131
409	11'-2¾			12.669			Pe
402	11'-2¾			12.800		13'-5	Pv
CM	2.1570	Q=52.06	4.57	C=120	0.022821	13'-2	Pf 0.300
402	11'-2¾			12.800			Pe
391	11'-2¾			13.100		13'-2	Pv
CM	2.1570	Q=71.45	6.27	C=120	0.040991	15'-6¾	Pf 1.294
391	11'-2¾			13.100		16'-0	Pe 0.533
364	10'-0			14.927	LtE(3'-8¼), PO(12'-3¾)	31'-6¾	Pv
••••• Route 4 •••••							
SP	1.0490	Q=19.04	7.07	C=120	0.118793	0'-10¾	Pf 0.700
104	12'-1½	q=19.04	K=5.6	11.558	Spr(-11.558)	5'-0	Pe 0.388
421	11'-2¾			12.647	PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=24.29	2.13	C=120	0.005569	4'-11¾	Pf 0.117
421	11'-2¾			12.647		16'-0	Pe 0.533
678	10'-0			13.296	LtE(3'-8¼), PO(12'-3¾)	20'-11¾	Pv
CM	2.6350	Q=16.35	0.96	C=120	0.001011	9'-0	Pf 0.009
678	10'-0			13.296			Pe
681	10'-0			13.306		9'-0	Pv
CM	2.6350	Q=30.56	1.80	C=120	0.003213	9'-3	Pf 0.030
681	10'-0			13.306			Pe
685	10'-0			13.335		9'-3	Pv
CM	2.6350	Q=26.88	1.58	C=120	0.002534	9'-6	Pf 0.066
685	10'-0			13.335		16'-5¾	Pe
688	10'-0			13.401	PO(16'-5¾)	25'-11¾	Pv
CM	2.1570	Q=26.88	2.36	C=120	0.006718	4'-11¾	Pf 0.058
688	10'-0			13.401		3'-8¼	Pe -0.533
668	11'-2¾			12.926	LtE(3'-8¼)	8'-8	Pv
CM	2.1570	Q=46.13	4.05	C=120	0.018250	13'-5	Pf 0.245
668	11'-2¾			12.926			Pe
418	11'-2¾			13.171		13'-5	Pv
CM	2.1570	Q=65.58	5.76	C=120	0.034979	13'-5	Pf 0.469
418	11'-2¾			13.171			Pe
412	11'-2¾			13.641		13'-5	Pv
CM	2.1570	Q=85.44	7.50	C=120	0.057063	13'-5	Pf 0.766
412	11'-2¾			13.641			Pe
405	11'-2¾			14.406		13'-5	Pv
CM	2.1570	Q=105.80	9.29	C=120	0.084746	13'-2	Pf 1.116
405	11'-2¾			14.406			Pe
394	11'-2¾			15.522		13'-2	Pv
CM	2.1570	Q=126.97	11.15	C=120	0.118747	15'-6¾	Pf 3.748
394	11'-2¾			15.522		16'-0	Pe 0.533
377	10'-0			19.803	LtE(3'-8¼), PO(12'-3¾)	31'-6¾	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
••••• Route 5 •••••								
SP	1.0490	Q=19.07	7.08	C=120		0.119193	0'-9	Pf 0.685
105	11'-11¾	q=19.07	K=5.6	11.600		Spr(-11.600)	5'-0	Pe 0.325
408	11'-2¾			12.611		PO(5'-0)	5'-9	Pv
••••• Route 6 •••••								
SP	1.0490	Q=19.09	7.09	C=120		0.119372	0'-10¾	Pf 0.704
106	12'-1½	q=19.09	K=5.6	11.619		Spr(-11.619)	5'-0	Pe 0.388
401	11'-2¾			12.711		PO(5'-0)	5'-10¾	Pv
••••• Route 7 •••••								
SP	1.0490	Q=19.10	7.09	C=120		0.119537	0'-10¾	Pf 0.705
107	12'-1½	q=19.10	K=5.6	11.636		Spr(-11.636)	5'-0	Pe 0.388
422	11'-2¾			12.729		PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=4.90	0.43	C=120		0.000288	13'-5	Pf 0.004
422	11'-2¾			12.729				Pe
416	11'-2¾			12.733			13'-5	Pv
CM	2.1570	Q=24.00	2.11	C=120		0.005448	13'-5	Pf 0.073
416	11'-2¾			12.733				Pe
410	11'-2¾			12.806			13'-5	Pv
CM	2.1570	Q=43.23	3.80	C=120		0.016179	13'-5	Pf 0.217
410	11'-2¾			12.806				Pe
403	11'-2¾			13.023			13'-5	Pv
CM	2.1570	Q=62.56	5.49	C=120		0.032056	13'-2	Pf 0.422
403	11'-2¾			13.023				Pe
392	11'-2¾			13.445			13'-2	Pv
CM	2.1570	Q=82.21	7.22	C=120		0.053137	15'-6¾	Pf 1.677
392	11'-2¾			13.445			16'-0	Pe 0.533
366	10'-0			15.655		LtE(3'-8¼), PO(12'-3¾)	31'-6¾	Pv
••••• Route 8 •••••								
SP	1.0490	Q=19.11	7.09	C=120		0.119571	0'-10¾	Pf 0.705
108	12'-1½	q=19.11	K=5.6	11.640		Spr(-11.640)	5'-0	Pe 0.388
416	11'-2¾			12.733		PO(5'-0)	5'-10¾	Pv
••••• Route 9 •••••								
SP	1.0490	Q=19.12	7.10	C=120		0.119715	0'-9	Pf 0.688
109	11'-11¾	q=19.12	K=5.6	11.655		Spr(-11.655)	5'-0	Pe 0.325
409	11'-2¾			12.669		PO(5'-0)	5'-9	Pv
••••• Route 10 •••••								
SP	1.0490	Q=19.16	7.11	C=120		0.120168	0'-10¾	Pf 0.708
110	12'-1½	q=19.16	K=5.6	11.703		Spr(-11.703)	5'-0	Pe 0.388
402	11'-2¾			12.800		PO(5'-0)	5'-10¾	Pv
••••• Route 11 •••••								
SP	1.0490	Q=19.16	7.11	C=120		0.120226	0'-10¾	Pf 0.709
854	12'-1½	q=19.16	K=5.6	11.709		Spr(-11.709)	5'-0	Pe 0.388
667	11'-2¾			12.806		PO(5'-0)	5'-10¾	Pv
CM	2.1570	Q=22.84	2.01	C=120		0.004971	13'-5	Pf 0.067
667	11'-2¾			12.806				Pe
417	11'-2¾			12.873			13'-5	Pv
CM	2.1570	Q=42.06	3.69	C=120		0.015377	13'-5	Pf 0.206
417	11'-2¾			12.873				Pe
411	11'-2¾			13.079			13'-5	Pv
CM	2.1570	Q=61.49	5.40	C=120		0.031052	13'-5	Pf 0.417
411	11'-2¾			13.079				Pe
404	11'-2¾			13.496			13'-5	Pv
CM	2.1570	Q=81.18	7.13	C=120		0.051913	13'-2	Pf 0.684
404	11'-2¾			13.496				Pe
393	11'-2¾			14.179			13'-2	Pv
CM	2.1570	Q=101.38	8.90	C=120		0.078306	15'-6¾	Pf 2.471
393	11'-2¾			14.179			16'-0	Pe 0.533
370	10'-0			17.183		LtE(3'-8¼), PO(12'-3¾)	31'-6¾	Pv
••••• Route 12 •••••								
SP	1.0490	Q=19.21	7.13	C=120		0.120825	0'-10¾	Pf 0.712
111	12'-1½	q=19.21	K=5.6	11.772		Spr(-11.772)	5'-0	Pe 0.388
417	11'-2¾			12.873		PO(5'-0)	5'-10¾	Pv
••••• Route 13 •••••								
SP	1.0490	Q=19.22	7.14	C=120		0.120956	0'-9	Pf 0.695
112	11'-11¾	q=19.22	K=5.6	11.786		Spr(-11.786)	5'-0	Pe 0.325
410	11'-2¾			12.806		PO(5'-0)	5'-9	Pv
••••• Route 14 •••••								
SP	1.0490	Q=19.26	7.15	C=120		0.121309	0'-10¾	Pf 0.715
855	12'-1½	q=19.26	K=5.6	11.823		Spr(-11.823)	5'-0	Pe 0.388
668	11'-2¾			12.926		PO(5'-0)	5'-10¾	Pv
••••• Route 15 •••••								

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
SP	1.0490	Q=19.29	7.16	C=120	0.121661	0'-10¾	Pf 0.717
113	12'-1½	q=19.29	K=5.6	11.860	Spr(-11.860)	5'-0	Pe 0.388
390	11'-2¾			12.966	PO(5'-0)	5'-10¾	Pv
••••• Route 16 •••••							
SP	1.0490	Q=19.33	7.18	C=120	0.122180	0'-10¾	Pf 0.720
114	12'-1½	q=19.33	K=5.6	11.915	Spr(-11.915)	5'-0	Pe 0.388
403	11'-2¾			13.023	PO(5'-0)	5'-10¾	Pv
••••• Route 17 •••••							
SP	1.0490	Q=19.39	7.20	C=120	0.122868	0'-10¾	Pf 0.724
115	12'-1½	q=19.39	K=5.6	11.987	Spr(-11.987)	5'-0	Pe 0.388
391	11'-2¾			13.100	PO(5'-0)	5'-10¾	Pv
••••• Route 18 •••••							
SP	1.0490	Q=19.43	7.21	C=120	0.123408	0'-9	Pf 0.710
116	11'-11¾	q=19.43	K=5.6	12.044	Spr(-12.044)	5'-0	Pe 0.325
411	11'-2¾			13.079	PO(5'-0)	5'-9	Pv
••••• Route 19 •••••							
SP	1.0490	Q=19.44	7.22	C=120	0.123509	0'-10¾	Pf 0.728
117	12'-1½	q=19.44	K=5.6	12.055	Spr(-12.055)	5'-0	Pe 0.388
418	11'-2¾			13.171	PO(5'-0)	5'-10¾	Pv
••••• Route 20 •••••							
SP	1.0490	Q=19.65	7.30	C=120	0.125967	0'-10¾	Pf 0.743
118	12'-1½	q=19.65	K=5.6	12.314	Spr(-12.314)	5'-0	Pe 0.388
392	11'-2¾			13.445	PO(5'-0)	5'-10¾	Pv
••••• Route 21 •••••							
SP	1.0490	Q=19.69	7.31	C=120	0.126416	0'-10¾	Pf 0.745
120	12'-1½	q=19.69	K=5.6	12.362	Spr(-12.362)	5'-0	Pe 0.388
404	11'-2¾			13.496	PO(5'-0)	5'-10¾	Pv
••••• Route 22 •••••							
SP	1.0490	Q=19.86	7.37	C=120	0.128449	0'-9	Pf 0.739
122	11'-11¾	q=19.86	K=5.6	12.577	Spr(-12.577)	5'-0	Pe 0.325
412	11'-2¾			13.641	PO(5'-0)	5'-9	Pv
••••• Route 23 •••••							
SP	1.0490	Q=20.20	7.50	C=120	0.132529	0'-10¾	Pf 0.781
133	12'-1½	q=20.20	K=5.6	13.009	Spr(-13.009)	5'-0	Pe 0.388
393	11'-2¾			14.179	PO(5'-0)	5'-10¾	Pv
••••• Route 24 •••••							
SP	1.0490	Q=20.36	7.56	C=120	0.134556	0'-10¾	Pf 0.793
134	12'-1½	q=20.36	K=5.6	13.225	Spr(-13.225)	5'-0	Pe 0.388
405	11'-2¾			14.406	PO(5'-0)	5'-10¾	Pv
••••• Route 25 •••••							
SP	1.0490	Q=21.16	7.86	C=120	0.144478	0'-10¾	Pf 0.852
135	12'-1½	q=21.16	K=5.6	14.282	Spr(-14.282)	5'-0	Pe 0.388
394	11'-2¾			15.522	PO(5'-0)	5'-10¾	Pv
••••• Route 26 •••••							
CM	4.2600	Q=112.23	2.53	C=120	0.003437	4'-4¾	Pf 0.106
123	18'-3			21.259		26'-4	Pe 0.253
262	17'-8			21.617	T(26'-4)	30'-8¾	Pv
CM	6.3570	Q=112.23	1.13	C=120	0.000489	2'-8	Pf 0.020
262	17'-8			21.617		37'-8¾	Pe 1.156
261	15'-0			22.793	T(37'-8¾)	40'-4¾	Pv
••••• Route 27 •••••							
CM	2.6350	Q=7.70	0.45	C=120	0.000251	0'-11	Pf 0.000
480	10'-7¾			23.622			Pe 0.000
482	10'-7¾			23.622		0'-11	Pv
CM	3.2600	Q=7.70	0.30	C=120	0.000089	4'-4¼	Pf 0.003
482	10'-7¾			23.622		26'-10½	Pe -1.888
297	15'-0			21.737	LtE(6'-8¾), PO(20'-2)	31'-2¾	Pv
••••• Route 28 •••••							
UG	7.9800	Q=165.30	1.06	C=150	0.000219	1167'-0	Pf 0.285
3	-5'-0			32.657		134'-3¾	Pe
5	-5'-0			32.942	2E(27'-2), 2EE(13'-7), T(52'-9¾)	1301'-3¾	Pv
••••• Route 29 •••••							
CM	4.2600	Q=112.23	2.53	C=120	0.003437	171'-11	Pf 1.007
313	15'-0			21.348		121'-1¾	Pe -1.409
132	18'-3			20.947	2LtE(7'-10¾), 4T(26'-4)	293'-0½	Pv
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-0	Pf 0.034
132	18'-3			20.947			Pe
131	18'-3			20.981		10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120	0.003437	10'-0	Pf 0.034
131	18'-3			20.981			Pe
130	18'-3			21.015		10'-0	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	4.2600	Q=112.23	2.53	C=120		0.003437	10'-0	Pf 0.034
130	18'-3			21.015				Pe
129	18'-3			21.050			10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120		0.003437	10'-0	Pf 0.034
129	18'-3			21.050				Pe
128	18'-3			21.084			10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120		0.003437	10'-0	Pf 0.034
128	18'-3			21.084				Pe
127	18'-3			21.118			10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120		0.003437	10'-0	Pf 0.034
127	18'-3			21.118				Pe
126	18'-3			21.153			10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120		0.003437	10'-0	Pf 0.034
126	18'-3			21.153				Pe
125	18'-3			21.187			10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120		0.003437	10'-0	Pf 0.034
125	18'-3			21.187				Pe
124	18'-3			21.222			10'-0	Pv
CM	4.2600	Q=112.23	2.53	C=120		0.003437	10'-10	Pf 0.037
124	18'-3			21.222				Pe
123	18'-3			21.259			10'-10	Pv
Route 30								
CM	2.6350	Q=7.94	0.47	C=120		0.000265	9'-3	Pf 0.002
678	10'-0			13.296				Pe
674	10'-0			13.299			9'-3	Pv
Route 31								
CM	2.1570	Q=3.68	0.32	C=120		0.000170	4'-11¾	Pf 0.004
685	10'-0			13.335		PO(12'-3¾)	16'-0	Pe -0.533
667	11'-2¾			12.806		LtE(3'-8¼)	20'-11¾	Pv
Route 32								
CM	2.1570	Q=14.21	1.25	C=120		0.002065	4'-11¾	Pf 0.043
422	11'-2¾			12.729			16'-0	Pe 0.533
681	10'-0			13.306		LtE(3'-8¼), PO(12'-3¾)	20'-11¾	Pv
Route 33								
CM	2.1570	Q=5.25	0.46	C=120		0.000327	13'-5	Pf 0.004
415	11'-2¾			12.642				Pe
421	11'-2¾			12.647			13'-5	Pv
Route 34								
CM	2.1570	Q=9.57	0.84	C=120		0.000994	13'-5	Pf 0.013
414	11'-2¾			12.598				Pe
420	11'-2¾			12.611			13'-5	Pv
Route 35								
BL	1.0490	Q=8.88	3.30	C=120		0.029005	20'-0	Pf 0.870
479	7'-10			24.556			10'-0	Pe -0.217
358	8'-4			25.209		T(5'-0), PO(5'-0)	30'-0	Pv
CM	2.6350	Q=8.88	0.52	C=120		0.000327	8'-1¾	Pf 0.010
358	8'-4			25.209			21'-11½	Pe -2.890
198	15'-0			22.329		LtE(5'-6), PO(16'-5¾)	30'-1¼	Pv
Route 36								
BL	1.0490	Q=7.70	2.86	C=120		0.022264	2'-9¾	Pf 0.285
479	7'-10			24.556		T(5'-0)	10'-0	Pe -1.219
480	10'-7¾			23.622		PO(5'-0)	12'-9¾	Pv
Route 37								
BL	1.0490	Q=16.59	6.16	C=120		0.092043	15'-6	Pf 2.071
530	10'-0			21.546		PO(5'-0)	7'-0	Pe 0.939
479	7'-10			24.556		E(2'-0)	22'-6	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type	Diameter	Flow	Velocity	HWC		Friction Loss	Length	Pressure
Downstream	Elevation	Discharge	K-Factor	Pt	Pn	Fittings	Eq. Length	Summary
Upstream							Total Length	

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

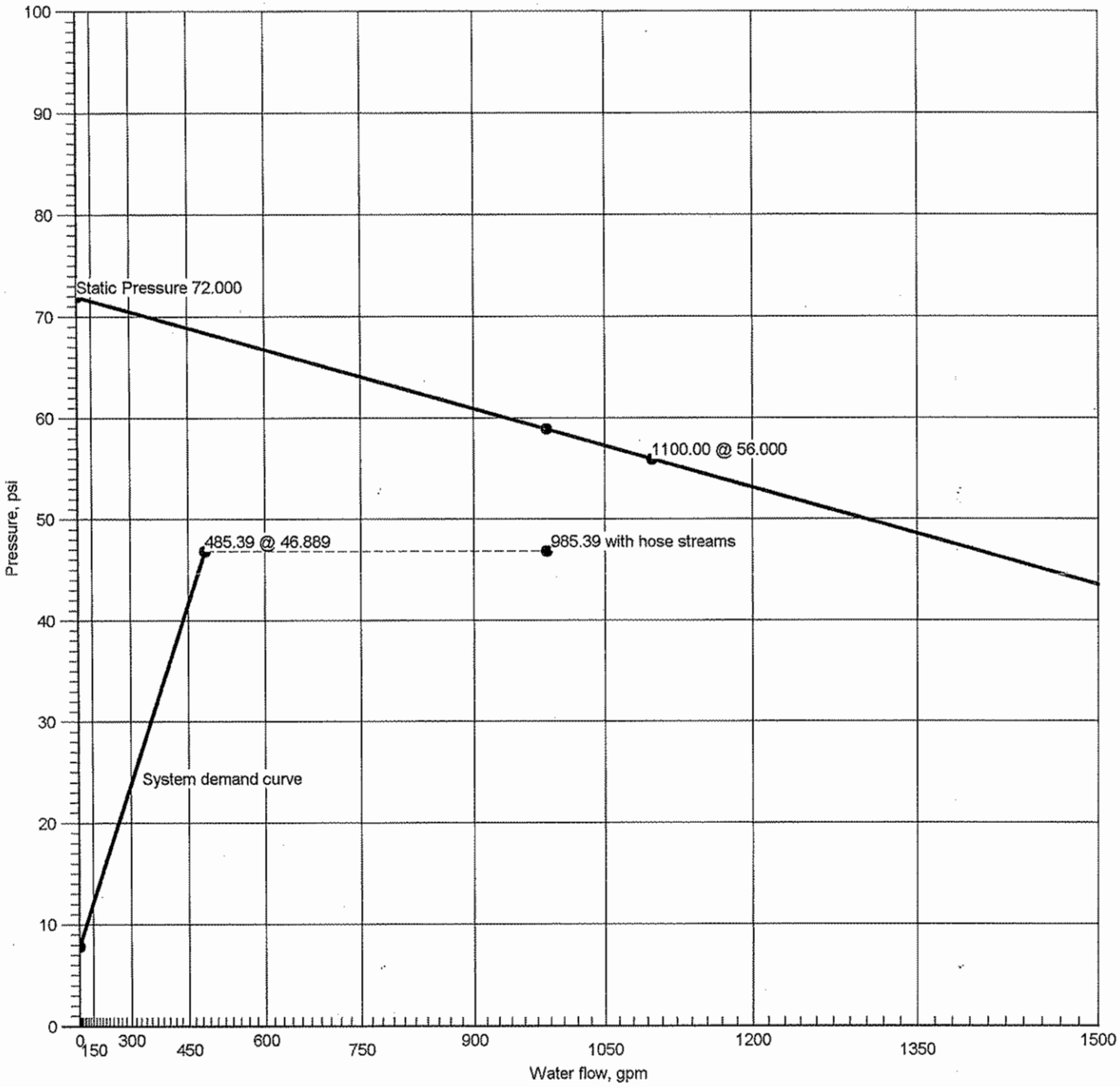
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available PressureTime of Test	58.947 @ 985.39
System Demand	485.39 @ 46.889
System Demand (Including Hose Allowance)	985.39 @ 46.889

Hydraulic Overview

Job

Job Number: 2440 ARMORY	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2440 ARMORY & MISC	Phone: / FAX:
Address 1: OPERATIONS BLDG	State Certification/License Number:
Address 2: STENNIS SPACE CENTER	AHJ:
City: STENNIS / State: MS / Zip Code:	Job Site: DEMAND WITH 500 GPM HOSE ALLOWANCE

System

Density: 0.150gpm/ft²	Area of Application: 3000.00ft² (Actual 3009.76ft²)
Most Demanding Sprinkler Data: 5.6 K-Factor 19.00 at 11.511	Hose Streams: 500.00
Coverage Per Sprinkler: 100.00ft²	Number Of Sprinklers Calculated: 34
System Pressure Demand: 48.941	System Flow Demand: 652.22
Total Demand: 1152.22 @ 48.941	Pressure Result: +5.625 (10.3%)

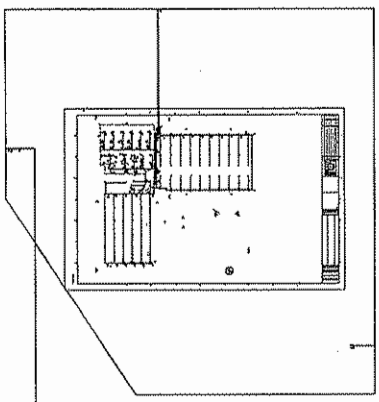
Supplies

Node	Flow(gpm)	Hose Flow(gpm)	Static(psi)	Residual(psi)
1	1100.00	500.00	72.000	56.000

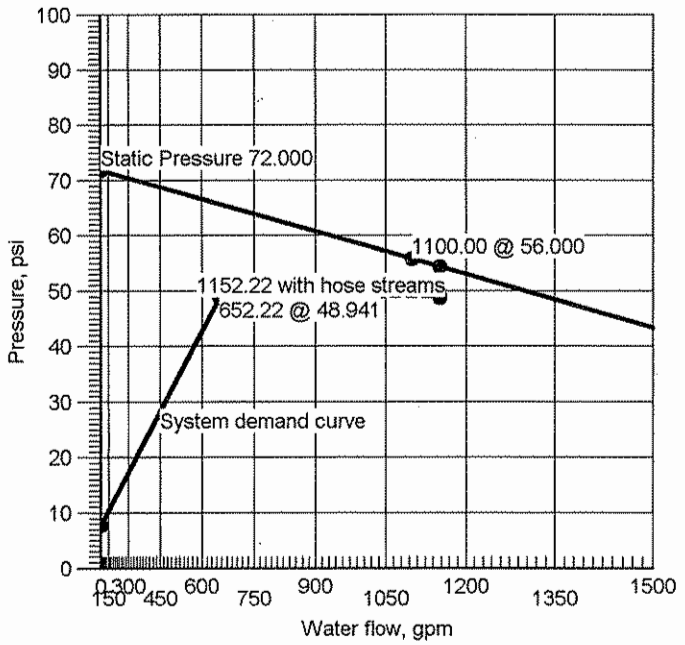
Check Point Gauges

Identifier	Pressure(psi)	K-Factor(K)	Flow(gpm)

FP-3 BLDG 2440 2441 1st Floor R5



Supply at Node 1 (1100.00, 500.00, 72.000, 56.000)



Hydraulic Summary

Job

Job Number: 2440 ARMORY	Design Engineer:
Job Name: STENNIS RIVERINE BLDG 2440 ARMORY & MISC	State Certification/License Number:
Address 1: OPERATIONS BLDG	AHJ:
Address 2: STENNIS SPACE CENTER	Job Site: DEMAND WITH 500 GPM HOSE ALLOWANCE
City: STENNIS, State: MS, Zip Code:	Drawing Name: FP-3 BLDG 2440 2441 1st Floor R5

System

Most Demanding Sprinkler Data: 5.6 K-Factor 19.00 at 11.511

Hose Allowance At Source: 500.00

Additional Hose Supplies

Node	Flow(gpm)

Total Hose Streams: 500.00

System Flow Demand: 652.22

Total Water Required (Including Hose Allowance): 1152.22

Maximum Pressure Unbalance In Loops: 0.000

Maximum Velocity Above Ground: 19.87 between nodes 480 and 295

Maximum Velocity Under Ground: 4.18 between nodes 1 and 12

Volume capacity of Wet Pipes: 6939.58gal

Volume capacity of Dry Pipes:

Remote Area(s)

Occupancy: Ordinary Group I

Density: 0.150gpm/ft²

Area of Application: 3000.00ft² (Actual 3009.76ft²)

Number Of Sprinklers Calculated: 34

Coverage Per Sprinkler: 100.00ft²

AutoPeak Results: Pressure For Remote Area(s) Adjacent To Most Remote Area

Supplies

Node	Hose Flow (gpm)	Static (psi)	Residual (psi) @ Flow (gpm)	Available (psi) @ Total Demand (gpm)	Required (psi)	Safety Margin (psi)
1	500.00	72.000	56.000 @ 1100.00	54.567 @ 1152.22	48.941	5.625

Contractor

	Contractor Number:	Contact Name:	Contact Title:
Contractor Name: SIMPLEXGRINNELL		Phone:	Extension:
Address 1: 5800 JEFFERSON HWY		FAX:	
Address 2: SUITE A		E-mail:	
City: HARAHAN, State: LA, Zip Code: 70123		Web-Site:	

Summary Of Outflowing Devices

Job Number: 2440 ARMORY
Report Description: Ordinary Group I

Device		Actual Flow (gpm)	Minimum Flow (gpm)	K-Factor (K)	Pressure (psi)		
⇨ Sprinkler	203	19.00	19.00	5.6	11.511		
Sprinkler	204	19.08	19.00	5.6	11.610		
Sprinkler	207	19.37	19.00	5.6	11.958		
Sprinkler	213	19.94	19.00	5.6	12.684		
Sprinkler	220	20.86	19.00	5.6	13.877		
Sprinkler	235	21.44	19.00	5.6	14.659		
Sprinkler	206	19.32	19.00	5.6	11.904		
Sprinkler	208	19.40	19.00	5.6	12.006		
Sprinkler	211	19.69	19.00	5.6	12.366		
Sprinkler	215	20.28	19.00	5.6	13.114		
Sprinkler	223	21.21	19.00	5.6	14.345		
Sprinkler	228	21.80	19.00	5.6	15.150		
Sprinkler	212	15.56	14.82	5.6	7.721		
Sprinkler	201	15.53	14.82	5.6	7.688		
Sprinkler	202	15.64	14.82	5.6	7.799		
Sprinkler	205	15.13	14.82	5.6	7.297		
Sprinkler	209	15.41	14.82	5.6	7.569		
Sprinkler	218	18.37	14.82	5.6	10.756		
Sprinkler	226	19.35	14.82	5.6	11.938		
Sprinkler	219	16.90	14.82	5.6	9.106		
Sprinkler	216	17.77	14.82	5.6	10.072		
Sprinkler	221	18.76	14.82	5.6	11.219		
Sprinkler	210	15.61	14.82	5.6	7.769		
Sprinkler	214	16.09	14.82	5.6	8.252		
Sprinkler	237	18.79	14.82	5.6	11.256		
Sprinkler	227	19.79	14.82	5.6	12.490		
Sprinkler	229	20.22	14.82	5.6	13.031		
Sprinkler	231	21.28	14.82	5.6	14.446		
Sprinkler	217	18.18	14.82	5.6	10.545		
Sprinkler	224	19.01	14.82	5.6	11.520		
Sprinkler	239	20.43	14.82	5.6	13.307		
Sprinkler	232	23.85	14.82	5.6	18.143		
Sprinkler	233	24.58	14.82	5.6	19.271		
Sprinkler	234	24.59	14.82	5.6	19.281		

⇨ Most Demanding Sprinkler Data

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
3	-5'-0	T(59'-4½)	33.402		
37	10'-0	PO(5'-0)	12.782		
38	10'-0	PO(5'-0)	12.886		
39	10'-0	PO(5'-0)	13.255		
40	10'-0	PO(5'-0)	14.023		
41	10'-0	PO(5'-0)	15.287		
42	10'-0	PO(5'-0)	16.113		
7	1'-0		30.244		
84	4'-0¾	CV(16'-0)	28.748		
161	8'-3		26.023		
163	15'-0	LtE(11'-3¾)	23.011		
261	15'-0	T(37'-8¾)	22.669		
262	17'-8		21.494		
123	18'-3	PO(12'-3¾)	21.141		
124	18'-3	PO(12'-3¾)	21.106		
125	18'-3	PO(12'-3¾)	21.074		
126	18'-3	PO(12'-3¾)	21.041		
127	18'-3	PO(12'-3¾)	21.008		
128	18'-3	PO(12'-3¾)	20.976		
129	18'-3	PO(12'-3¾)	20.943		
130	18'-3	PO(12'-3¾)	20.911		
131	18'-3	PO(12'-3¾)	20.878		
132	18'-3	PO(12'-3¾)	20.845		
284	15'-0		22.669		
165	10'-0	PO(5'-0)	13.198		
167	10'-0	PO(5'-0)	13.306		
169	10'-0	PO(5'-0)	13.686		
171	10'-0	PO(5'-0)	14.478		
172	10'-0	PO(5'-0)	15.781		
174	10'-0	PO(5'-0)	16.634		
5	-5'-0	2T(52'-9¾)	33.894		
11	-5'-0	LtE(19'-7½)	33.954		
12	-6'-0	LtE(22'-0¾)	46.592		
164	8'-4	PO(6'-0)	15.821		
190	10'-0	E(3'-0)	13.882		
166	8'-4	PO(6'-0)	15.944		
191	10'-0	E(3'-0)	13.996		
168	8'-4	PO(6'-0)	16.377		
192	10'-0	E(3'-0)	14.395		
170	8'-4	PO(6'-0)	17.279		
193	10'-0	E(3'-0)	15.227		
194	8'-4		18.697		
173	8'-4	PO(6'-0)	18.762		
195	10'-0	E(3'-0)	16.595		
175	8'-4	PO(6'-0)	19.732		
196	10'-0	E(3'-0)	17.490		
358	8'-4	PO(5'-0)	20.516		
198	15'-0	PO(16'-5¾)	21.740		
222	11'-2¾	2T(5'-0)	9.782		
225	11'-2¾	2T(5'-0)	8.995		
230	11'-2¾	T(5'-0)	9.818		
236	11'-2¾	T(5'-0)	10.419		
238	11'-2¾	T(5'-0)	11.704		
242	11'-2¾	T(5'-0)	9.547		
245	11'-2¾	T(5'-0)	12.063		
248	11'-2¾	T(5'-0)	13.432		
251	11'-2¾	T(5'-0)	9.586		
273	11'-2¾	T(5'-0)	14.033		
276	11'-2¾	T(5'-0)	15.601		
278	11'-2¾	T(8'-0), T(5'-0)	11.268		
280	11'-2¾	T(5'-0), T(6'-0)	12.723		
282	11'-2¾	2T(6'-0)	13.982		
289	10'-7¾	PO(8'-0)	14.372		
290	10'-7¾	PO(8'-0)	15.137		
478	10'-7¾	T(12'-3¾)	16.385		
293	10'-7¾	PO(8'-0)	16.461		
294	10'-7¾	PO(6'-0)	17.596		
295	10'-7¾	PO(6'-0)	19.498		
479	7'-10	T(5'-0)	21.699		
480	10'-7¾	PO(5'-0)	20.068		
482	10'-7¾		20.306		
297	15'-0	PO(20'-2)	21.298		
303	11'-2¾	E(2'-0)	13.635		
530	10'-0	PO(5'-0)	23.370		
313	15'-0	T(26'-4)	21.299		
360	10'-0	2PO(16'-5¾)	23.269		
362	10'-0	2PO(16'-5¾)	23.269		

Node	Elevation(Foot)	Fittings	Pressure(psi)	Discharge(gpm)	
364	10'-0	PO(12'-3¾)	23.268		
366	10'-0	PO(12'-3¾)	23.267		
396	10'-0	PO(5'-0)	23.266		
370	10'-0	PO(12'-3¾)	23.275		
399	10'-0	PO(5'-0)	23.277		
375	10'-0		23.318		
377	10'-0	PO(12'-3¾)	23.318		
497	10'-0	PO(5'-0)	23.319		
671	10'-0	PO(12'-3¾)	23.271		
674	10'-0	PO(12'-3¾)	23.272		
678	10'-0	PO(12'-3¾)	23.272		
681	10'-0	PO(12'-3¾)	23.273		
685	10'-0	PO(12'-3¾)	23.275		
688	10'-0	2PO(16'-5¾)	23.279		
203	11'-2¾	Spr(-11.511)	11.511	19.00	
204	11'-2¾	Spr(-11.610)	11.610	19.08	
207	11'-2¾	Spr(-11.958)	11.958	19.37	
213	11'-2¾	Spr(-12.684)	12.684	19.94	
220	11'-2¾	Spr(-13.877)	13.877	20.86	
235	11'-2¾	Spr(-14.659)	14.659	21.44	
206	11'-2¾	Spr(-11.904)	11.904	19.32	
208	11'-2¾	Spr(-12.006)	12.006	19.40	
211	11'-2¾	Spr(-12.366)	12.366	19.69	
215	11'-2¾	Spr(-13.114)	13.114	20.28	
223	11'-2¾	Spr(-14.345)	14.345	21.21	
228	11'-2¾	Spr(-15.150)	15.150	21.80	
212	12'-1½	Spr(-7.721)	7.721	15.56	
201	9'-0	Spr(-7.688)	7.688	15.53	
202	9'-0	Spr(-7.799)	7.799	15.64	
205	12'-1½	Spr(-7.297)	7.297	15.13	
209	12'-1½	Spr(-7.569)	7.569	15.41	
218	10'-0	Spr(-10.756)	10.756	18.37	
226	10'-0	Spr(-11.938)	11.938	19.35	
219	12'-1½	Spr(-9.106)	9.106	16.90	
216	9'-0	Spr(-10.072)	10.072	17.77	
221	9'-0	Spr(-11.219)	11.219	18.76	
210	12'-1½	Spr(-7.769)	7.769	15.61	
214	12'-1½	Spr(-8.252)	8.252	16.09	
237	10'-0	Spr(-11.256)	11.256	18.79	
227	10'-0	Spr(-12.490)	12.490	19.79	
229	10'-0	Spr(-13.031)	13.031	20.22	
231	10'-0	Spr(-14.446)	14.446	21.28	
217	9'-0	Spr(-10.545)	10.545	18.18	
224	9'-0	Spr(-11.520)	11.520	19.01	
239	9'-0	Spr(-13.307)	13.307	20.43	
232	10'-11¾	Spr(-18.143)	18.143	23.85	
233	12'-1½	Spr(-19.271)	19.271	24.58	
234	12'-1½	Spr(-19.281)	19.281	24.59	
1	-6'-0	S	48.941	652.22	

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
Route 1								
SP	1.0490	Q=19.00	7.05	C=120		0.118351	1'-2¾	Pf 0.737
203	11'-2¾	q=19.00	K=5.6	11.511		Spr(-11.511)	5'-0	Pe 0.533
37	10'-0			12.782		PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=19.00	4.08	C=120		0.031127	13'-4½	Pf 0.416
37	10'-0			12.782				Pe
165	10'-0			13.198			13'-4½	Pv
CM	1.3800	Q=38.32	8.22	C=120		0.113976	6'-0	Pf 0.684
165	10'-0			13.198				Pe
190	10'-0			13.882			6'-0	Pv
RN	1.3800	Q=38.32	8.22	C=120		0.113976	1'-8	Pf 1.216
190	10'-0			13.882		E(3'-0)	9'-0	Pe 0.723
164	8'-4			15.821		PO(6'-0)	10'-8	Pv
CM	2.1570	Q=38.32	3.36	C=120		0.012947	9'-6	Pf 0.123
164	8'-4			15.821				Pe
166	8'-4			15.944			9'-6	Pv
CM	2.1570	Q=76.81	6.74	C=120		0.046859	9'-3	Pf 0.433
166	8'-4			15.944				Pe
168	8'-4			16.377			9'-3	Pv
CM	2.1570	Q=115.86	10.17	C=120		0.100256	9'-0	Pf 0.902
168	8'-4			16.377				Pe
170	8'-4			17.279			9'-0	Pv
CM	2.1570	Q=156.09	13.70	C=120		0.173995	8'-1¾	Pf 1.417
170	8'-4			17.279				Pe
194	8'-4			18.697			8'-1¾	Pv
CM	2.6350	Q=156.09	9.18	C=120		0.065642	1'-0	Pf 0.066
194	8'-4			18.697				Pe
173	8'-4			18.762			1'-0	Pv
CM	2.6350	Q=198.16	11.66	C=120		0.102077	9'-6	Pf 0.970
173	8'-4			18.762				Pe
175	8'-4			19.732			9'-6	Pv
CM	2.6350	Q=241.40	14.20	C=120		0.147063	5'-4	Pf 0.784
175	8'-4			19.732				Pe -0.000
358	8'-4			20.516			5'-4	Pv
CM	2.6350	Q=231.99	13.65	C=120		0.136639	8'-1¾	Pf 4.114
358	8'-4			20.516			21'-11½	Pe -2.890
198	15'-0			21.740		LtE(5'-6), PO(16'-5¾)	30'-1¼	Pv
CM	4.2600	Q=543.16	12.23	C=120		0.063540	14'-7½	Pf 0.929
198	15'-0			21.740				Pe
284	15'-0			22.669			14'-7½	Pv
DY	6.3570	Q=543.16	5.49	C=120		0.009046	0'-0	Pf 0.000
284	15'-0			22.669				Pe 0.000
261	15'-0			22.669			0'-0	Pv
CM	6.3570	Q=652.22	6.59	C=120		0.012690	4'-3½	Pf 0.342
261	15'-0			22.669			22'-7½	Pe -0.000
163	15'-0			23.011		2LtE(11'-3¾)	26'-11	Pv
FR	6.3570	Q=652.22	6.59	C=120		0.012690	6'-9	Pf 0.086
163	15'-0			23.011				Pe 2.926
161	8'-3			26.023			6'-9	Pv
MS	6.3570	Q=652.22	6.59	C=120		0.012690	1'-1	Pf 0.887
161	8'-3			26.023			68'-9¾	Pe 1.838
84	4'-0¼			28.748		2f(-0.000), CV(40'-2¾), BV(12'-7), CV(16'-0)	69'-10¾	Pv
FR	6.0650	Q=652.22	7.24	C=120		0.015955	2'-0	Pf 0.191
84	4'-0¼			28.748			10'-0	Pe 1.305
7	1'-0			30.244		BV(10'-0)	12'-0	Pv
UG	8.3900	Q=652.22	3.78	C=140		0.002470	135'-2½	Pf 0.556
7	1'-0			30.244			89'-11	Pe 2.601
3	-5'-0			33.402		E(30'-6½), T(59'-4½)	225'-1½	Pv
UG	7.9800	Q=430.10	2.76	C=150		0.001284	303'-2¾	Pf 0.492
3	-5'-0			33.402			79'-11¾	Pe
5	-5'-0			33.894		E(27'-2), T(52'-9¾)	383'-2½	Pv
UG	7.9800	Q=652.22	4.18	C=150		0.002775	1'-11	Pf 0.060
5	-5'-0			33.894			19'-7½	Pe
11	-5'-0			33.954		LtE(19'-7½)	21'-6½	Pv
UG	8.3900	Q=652.22	3.78	C=140		0.002470	17'-0	Pf 12.205
11	-5'-0			33.954			66'-2	Pe 0.434
12	-6'-0			46.592		3LtE(22'-0¾), BFP(-12.000)	83'-2	Pv
UG	7.9800	Q=652.22	4.18	C=150		0.002775	727'-3	Pf 2.349
12	-6'-0			46.592			119'-2½	Pe
1	-6'-0			48.941		2E(27'-2), 2GV(6'-0½), T(52'-9¾), S	846'-5¾	Pv
Route 2								

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
SP	1.0490	Q=19.08	7.08	C=120	0.119290	1'-2¾	Pf 0.743
204	11'-2¾	q=19.08	K=5.6	11.610	Spr(-11.610)	5'-0	Pe 0.533
38	10'-0			12.886	PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=19.08	4.09	C=120	0.031374	13'-4½	Pf 0.419
38	10'-0			12.886			Pe
167	10'-0			13.306		13'-4½	Pv
CM	1.3800	Q=38.49	8.26	C=120	0.114879	6'-0	Pf 0.690
167	10'-0			13.306			Pe
191	10'-0			13.996		6'-0	Pv
RN	1.3800	Q=38.49	8.26	C=120	0.114879	1'-8	Pf 1.225
191	10'-0			13.996	E(3'-0)	9'-0	Pe 0.723
166	8'-4			15.944	PO(6'-0)	10'-8	Pv
••••• Route 3 •••••							
SP	1.0490	Q=15.13	5.62	C=120	0.077635	7'-10½	Pf 1.309
205	12'-1½	q=15.13	K=5.6	7.297	Spr(-7.297)	9'-0	Pe 0.388
225	11'-2¾			8.995	2E(2'-0), T(5'-0)	16'-10½	Pv
BL	1.3800	Q=30.53	6.55	C=120	0.074869	7'-4½	Pf 0.552
225	11'-2¾			8.995			Pe
242	11'-2¾			9.547		7'-4½	Pv
BL	1.6100	Q=46.62	7.35	C=120	0.077320	0'-6	Pf 0.039
242	11'-2¾			9.547			Pe
251	11'-2¾			9.586		0'-6	Pv
BL	1.6100	Q=62.23	9.81	C=120	0.131921	4'-9	Pf 1.682
251	11'-2¾			9.586		8'-0	Pe
278	11'-2¾			11.268	T(8'-0)	12'-9	Pv
BL	1.6100	Q=80.41	12.67	C=120	0.211975	1'-5½	Pf 2.851
278	11'-2¾			11.268		12'-0	Pe 0.253
289	10'-7¾			14.372	E(4'-0), PO(8'-0)	13'-5½	Pv
CM	2.1570	Q=80.41	7.06	C=120	0.051012	15'-0	Pf 0.765
289	10'-7¾			14.372			Pe
290	10'-7¾			15.137		15'-0	Pv
CM	2.1570	Q=149.65	13.14	C=120	0.160959	7'-9	Pf 1.247
290	10'-7¾			15.137			Pe
478	10'-7¾			16.385	T(12'-3¾)	7'-9	Pv
CM	2.6350	Q=149.65	8.80	C=120	0.060724	1'-3	Pf 0.076
478	10'-7¾			16.385			Pe
293	10'-7¾			16.461		1'-3	Pv
CM	2.6350	Q=220.01	12.94	C=120	0.123866	9'-2	Pf 1.135
293	10'-7¾			16.461			Pe
294	10'-7¾			17.596		9'-2	Pv
CM	2.6350	Q=277.37	16.32	C=120	0.190162	10'-0	Pf 1.902
294	10'-7¾			17.596			Pe
295	10'-7¾			19.498		10'-0	Pv
CM	2.6350	Q=337.80	19.87	C=120	0.273821	2'-1	Pf 0.570
295	10'-7¾			19.498			Pe
480	10'-7¾			20.068		2'-1	Pv
CM	2.6350	Q=328.41	19.32	C=120	0.259903	0'-11	Pf 0.238
480	10'-7¾			20.068			Pe 0.000
482	10'-7¾			20.306		0'-11	Pv
CM	3.2600	Q=328.41	12.62	C=120	0.092181	4'-4¼	Pf 2.879
482	10'-7¾			20.306		26'-10½	Pe -1.888
297	15'-0			21.298	LtE(6'-8¾), PO(20'-2)	31'-2¾	Pv
CM	4.2600	Q=311.17	7.00	C=120	0.022671	19'-6	Pf 0.442
297	15'-0			21.298			Pe
198	15'-0			21.740		19'-6	Pv
••••• Route 4 •••••							
SP	1.0490	Q=19.32	7.17	C=120	0.122083	1'-2¾	Pf 0.760
206	11'-2¾	q=19.32	K=5.6	11.904	Spr(-11.904)	5'-0	Pe 0.533
165	10'-0			13.198	PO(5'-0)	6'-2¾	Pv
••••• Route 5 •••••							
SP	1.0490	Q=19.37	7.19	C=120	0.122596	1'-2¾	Pf 0.764
207	11'-2¾	q=19.37	K=5.6	11.958	Spr(-11.958)	5'-0	Pe 0.533
39	10'-0			13.255	PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=19.37	4.15	C=120	0.032243	13'-4½	Pf 0.431
39	10'-0			13.255			Pe
169	10'-0			13.686		13'-4½	Pv
CM	1.3800	Q=39.06	8.38	C=120	0.118059	6'-0	Pf 0.709
169	10'-0			13.686			Pe
192	10'-0			14.395		6'-0	Pv
RN	1.3800	Q=39.06	8.38	C=120	0.118059	1'-8	Pf 1.259
192	10'-0			14.395	E(3'-0)	9'-0	Pe 0.723
168	8'-4			16.377	PO(6'-0)	10'-8	Pv
••••• Route 6 •••••							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
SP	1.0490	Q=19.40	7.20	C=120	0.123049	1'-2¾	Pf 0.766
208	11'-2¾	q=19.40	K=5.6	12.006	Spr(-12.006)	5'-0	Pe 0.533
167	10'-0			13.306	PO(5'-0)	6'-2¾	Pv
Route 7							
SP	1.0490	Q=15.41	5.72	C=120	0.080304	3'-11	Pf 1.038
209	12'-1½	q=15.41	K=5.6	7.569	Spr(-7.569)	9'-0	Pe 0.388
225	11'-2¾			8.995	2E(2'-0), T(5'-0)	12'-11	Pv
Route 8							
DR	1.0490	Q=15.53	5.76	C=120	0.081474	28'-6¾	Pf 3.060
201	9'-0	q=15.53	K=5.6	7.688	Spr(-7.688)	9'-0	Pe -0.966
222	11'-2¾			9.782	2E(2'-0), T(5'-0)	37'-6¾	Pv
BL	1.0490	Q=31.17	11.57	C=120	0.295665	6'-6	Pf 1.922
222	11'-2¾			9.782			Pe
238	11'-2¾			11.704		6'-6	Pv
BL	1.3800	Q=49.92	10.71	C=120	0.185911	6'-3	Pf 2.277
238	11'-2¾			11.704		6'-0	Pe
282	11'-2¾			13.982	T(6'-0)	12'-3	Pv
BL	1.6100	Q=70.35	11.09	C=120	0.165526	1'-5½	Pf 2.226
282	11'-2¾			13.982		12'-0	Pe 0.253
293	10'-7¾			16.461	E(4'-0), PO(8'-0)	13'-5½	Pv
Route 9							
SP	1.0490	Q=15.56	5.78	C=120	0.081791	6'-10¾	Pf 1.709
212	12'-1½	q=15.56	K=5.6	7.721	Spr(-7.721)	14'-0	Pe 0.388
230	11'-2¾			9.818	2T(5'-0), 2E(2'-0)	20'-10¾	Pv
BL	1.3800	Q=32.46	6.96	C=120	0.083833	4'-2	Pf 0.601
230	11'-2¾			9.818		3'-0	Pe
236	11'-2¾			10.419	E(3'-0)	7'-2	Pv
BL	1.3800	Q=50.23	10.77	C=120	0.188038	6'-3	Pf 2.303
236	11'-2¾			10.419		6'-0	Pe
280	11'-2¾			12.723	T(6'-0)	12'-3	Pv
BL	1.6100	Q=69.24	10.91	C=120	0.160716	1'-5½	Pf 2.162
280	11'-2¾			12.723		12'-0	Pe 0.253
290	10'-7¾			15.137	E(4'-0), PO(8'-0)	13'-5½	Pv
Route 10							
SP	1.0490	Q=15.61	5.79	C=120	0.082265	8'-4½	Pf 1.429
210	12'-1½	q=15.61	K=5.6	7.769	Spr(-7.769)	9'-0	Pe 0.388
251	11'-2¾			9.586	2E(2'-0), T(5'-0)	17'-4½	Pv
Route 11							
DR	1.0490	Q=15.64	5.81	C=120	0.082558	26'-8¾	Pf 2.950
202	9'-0	q=15.64	K=5.6	7.799	Spr(-7.799)	9'-0	Pe -0.966
222	11'-2¾			9.782	2E(2'-0), T(5'-0)	35'-8¾	Pv
Route 12							
SP	1.0490	Q=19.69	7.31	C=120	0.126451	1'-2¾	Pf 0.788
211	11'-2¾	q=19.69	K=5.6	12.366	Spr(-12.366)	5'-0	Pe 0.533
169	10'-0			13.686	PO(5'-0)	6'-2¾	Pv
Route 13							
SP	1.0490	Q=19.94	7.40	C=120	0.129459	1'-2¾	Pf 0.806
213	11'-2¾	q=19.94	K=5.6	12.684	Spr(-12.684)	5'-0	Pe 0.533
40	10'-0			14.023	PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=19.94	4.28	C=120	0.034048	13'-4½	Pf 0.455
40	10'-0			14.023			Pe
171	10'-0			14.478		13'-4½	Pv
CM	1.3800	Q=40.22	8.63	C=120	0.124660	6'-0	Pf 0.749
171	10'-0			14.478			Pe
193	10'-0			15.227		6'-0	Pv
RN	1.3800	Q=40.22	8.63	C=120	0.124660	1'-8	Pf 1.330
193	10'-0			15.227	E(3'-0)	9'-0	Pe 0.723
170	8'-4			17.279	PO(6'-0)	10'-8	Pv
Route 14							
SP	1.0490	Q=16.09	5.97	C=120	0.086987	3'-5	Pf 0.907
214	12'-1½	q=16.09	K=5.6	8.252	Spr(-8.252)	7'-0	Pe 0.388
242	11'-2¾			9.547	E(2'-0), T(5'-0)	10'-5	Pv
Route 15							
SP	1.0490	Q=20.28	7.53	C=120	0.133513	1'-2¾	Pf 0.832
215	11'-2¾	q=20.28	K=5.6	13.114	Spr(-13.114)	5'-0	Pe 0.533
171	10'-0			14.478	PO(5'-0)	6'-2¾	Pv
Route 16							
SP	1.0490	Q=16.90	6.27	C=120	0.095282	1'-4¾	Pf 0.324
219	12'-1½	q=16.90	K=5.6	9.106	Spr(-9.106)	2'-0	Pe 0.388
230	11'-2¾			9.818	E(2'-0)	3'-4¾	Pv
Route 17							

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
SP	1.0490	Q=20.86	7.74	C=120	0.140688	1'-2¾	Pf 0.876
220	11'-2¾	q=20.86	K=5.6	13.877	Spr(-13.877)	5'-0	Pe 0.533
41	10'-0			15.287	PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=20.86	4.47	C=120	0.037002	13'-4½	Pf 0.495
41	10'-0			15.287			Pe
172	10'-0			15.781		13'-4½	Pv
CM	1.3800	Q=42.07	9.02	C=120	0.135460	6'-0	Pf 0.813
172	10'-0			15.781			Pe
195	10'-0			16.595		6'-0	Pv
RN	1.3800	Q=42.07	9.02	C=120	0.135460	1'-8	Pf 1.445
195	10'-0			16.595	E(3'-0)	9'-0	Pe 0.723
173	8'-4			18.762	PO(6'-0)	10'-8	Pv
Route 18							
SP	1.0490	Q=21.21	7.87	C=120	0.145066	1'-2¾	Pf 0.904
223	11'-2¾	q=21.21	K=5.6	14.345	Spr(-14.345)	5'-0	Pe 0.533
172	10'-0			15.781	PO(5'-0)	6'-2¾	Pv
Route 19							
DR	1.0490	Q=17.77	6.60	C=120	0.104593	3'-6¾	Pf 1.314
216	9'-0	q=17.77	K=5.6	10.072	Spr(-10.072)	9'-0	Pe -0.966
236	11'-2¾			10.419	2E(2'-0), T(5'-0)	12'-6¾	Pv
Route 20							
SP	1.0490	Q=21.44	7.96	C=120	0.147999	1'-2¾	Pf 0.922
235	11'-2¾	q=21.44	K=5.6	14.659	Spr(-14.659)	5'-0	Pe 0.533
42	10'-0			16.113	PO(5'-0)	6'-2¾	Pv
CM	1.3800	Q=21.44	4.60	C=120	0.038925	13'-4½	Pf 0.520
42	10'-0			16.113			Pe
174	10'-0			16.634		13'-4½	Pv
CM	1.3800	Q=43.24	9.27	C=120	0.142491	6'-0	Pf 0.856
174	10'-0			16.634			Pe
196	10'-0			17.490		6'-0	Pv
RN	1.3800	Q=43.24	9.27	C=120	0.142491	1'-8	Pf 1.520
196	10'-0			17.490	E(3'-0)	9'-0	Pe 0.723
175	8'-4			19.732	PO(6'-0)	10'-8	Pv
Route 21							
DR	1.0490	Q=18.18	6.75	C=120	0.109128	6'-5¾	Pf 1.690
217	9'-0	q=18.18	K=5.6	10.545	Spr(-10.545)	9'-0	Pe -0.966
278	11'-2¾			11.268	2E(2'-0), T(5'-0)	15'-5¾	Pv
Route 22							
SP	1.0490	Q=21.80	8.09	C=120	0.152587	1'-2¾	Pf 0.950
228	11'-2¾	q=21.80	K=5.6	15.150	Spr(-15.150)	5'-0	Pe 0.533
174	10'-0			16.634	PO(5'-0)	6'-2¾	Pv
Route 23							
DR	1.0490	Q=18.37	6.82	C=120	0.111143	10'-6¾	Pf 1.841
218	10'-0	q=18.37	K=5.6	10.756	Spr(-10.756)	6'-0	Pe -0.533
245	11'-2¾			12.063	3E(2'-0)	16'-6¾	Pv
BL	1.0490	Q=37.15	13.79	C=120	0.409239	4'-9¾	Pf 1.969
245	11'-2¾			12.063			Pe
273	11'-2¾			14.033		4'-9¾	Pv
BL	1.3800	Q=57.37	12.31	C=120	0.240432	1'-9¼	Pf 3.310
273	11'-2¾			14.033		12'-0	Pe 0.253
294	10'-7¾			17.596	2E(3'-0), PO(6'-0)	13'-9¼	Pv
Route 24							
DR	1.0490	Q=18.76	6.96	C=120	0.115564	3'-6¾	Pf 1.452
221	9'-0	q=18.76	K=5.6	11.219	Spr(-11.219)	9'-0	Pe -0.966
238	11'-2¾			11.704	2E(2'-0), T(5'-0)	12'-6¾	Pv
Route 25							
DR	1.0490	Q=18.79	6.97	C=120	0.115919	2'-6¾	Pf 1.340
237	10'-0	q=18.79	K=5.6	11.256	Spr(-11.256)	9'-0	Pe -0.533
245	11'-2¾			12.063	2E(2'-0), T(5'-0)	11'-6¾	Pv
Route 26							
DR	1.0490	Q=19.01	7.06	C=120	0.118436	7'-3¾	Pf 2.169
224	9'-0	q=19.01	K=5.6	11.520	Spr(-11.520)	11'-0	Pe -0.966
280	11'-2¾			12.723	3E(2'-0), T(5'-0)	18'-3¾	Pv
Route 27							
DR	1.0490	Q=19.35	7.18	C=120	0.122402	10'-6¾	Pf 2.027
226	10'-0	q=19.35	K=5.6	11.938	Spr(-11.938)	6'-0	Pe -0.533
248	11'-2¾			13.432	3E(2'-0)	16'-6¾	Pv
BL	1.0490	Q=39.14	14.53	C=120	0.450627	4'-9¾	Pf 2.169
248	11'-2¾			13.432			Pe
276	11'-2¾			15.601		4'-9¾	Pv
BL	1.3800	Q=60.42	12.96	C=120	0.264654	1'-9¼	Pf 3.644
276	11'-2¾			15.601		12'-0	Pe 0.253
295	10'-7¾			19.498	2E(3'-0), PO(6'-0)	13'-9¼	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
••••• Route 28 •••••							
DR	1.0490	Q=19.79	7.35	C=120	0.127625	2'-6¾	Pf 1.476
227	10'-0	q=19.79	K=5.6	12.490	Spr(-12.490)	9'-0	Pe -0.533
248	11'-2¾			13.432	2E(2'-0), T(5'-0)	11'-6¾	Pv
••••• Route 29 •••••							
DR	1.0490	Q=20.22	7.50	C=120	0.132734	2'-6¾	Pf 1.535
229	10'-0	q=20.22	K=5.6	13.031	Spr(-13.031)	9'-0	Pe -0.533
273	11'-2¾			14.033	2E(2'-0), T(5'-0)	11'-6¾	Pv
••••• Route 30 •••••							
DR	1.0490	Q=20.43	7.58	C=120	0.135330	3'-6¾	Pf 1.294
239	9'-0	q=20.43	K=5.6	13.307	Spr(-13.307)	6'-0	Pe -0.966
303	11'-2¾			13.635	3E(2'-0)	9'-6¾	Pv
BL	1.3800	Q=20.43	4.38	C=120	0.035593	3'-9	Pf 0.347
303	11'-2¾			13.635		6'-0	Pe
282	11'-2¾			13.982	T(6'-0)	9'-9	Pv
••••• Route 31 •••••							
DR	1.0490	Q=21.28	7.90	C=120	0.146011	2'-6¾	Pf 1.688
231	10'-0	q=21.28	K=5.6	14.446	Spr(-14.446)	9'-0	Pe -0.533
276	11'-2¾			15.601	2E(2'-0), T(5'-0)	11'-6¾	Pv
••••• Route 32 •••••							
BL	1.0490	Q=23.85	8.85	C=120	0.180271	14'-4¼	Pf 4.751
232	10'-11¾	q=23.85	K=5.6	18.143	Spr(-18.143)	12'-0	Pe 0.424
497	10'-0			23.319	T(5'-0), E(2'-0), PO(5'-0)	26'-4¼	Pv
CM	4.2600	Q=73.03	1.64	C=120	0.001552	17'-7	Pf 0.052
497	10'-0			23.319		15'-9½	Pe
530	10'-0			23.370	2LtE(7'-10¾)	33'-4¾	Pv
CM	4.2600	Q=91.82	2.07	C=120	0.002371	6'-5¾	Pf 0.097
530	10'-0			23.370		34'-2¾	Pe -2.168
313	15'-0			21.299	LtE(7'-10¾), T(26'-4)	40'-8½	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	171'-11	Pf 0.955
313	15'-0			21.299		121'-1¾	Pe -1.409
132	18'-3			20.845	2LtE(7'-10¾), 4T(26'-4)	293'-0½	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
132	18'-3			20.845			Pe
131	18'-3			20.878		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
131	18'-3			20.878			Pe
130	18'-3			20.911		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
130	18'-3			20.911			Pe
129	18'-3			20.943		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
129	18'-3			20.943			Pe
128	18'-3			20.976		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
128	18'-3			20.976			Pe
127	18'-3			21.008		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
127	18'-3			21.008			Pe
126	18'-3			21.041		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
126	18'-3			21.041			Pe
125	18'-3			21.074		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-0	Pf 0.033
125	18'-3			21.074			Pe
124	18'-3			21.106		10'-0	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	10'-10	Pf 0.035
124	18'-3			21.106			Pe
123	18'-3			21.141		10'-10	Pv
CM	4.2600	Q=109.06	2.45	C=120	0.003259	4'-4¾	Pf 0.100
123	18'-3			21.141		26'-4	Pe 0.253
262	17'-8			21.494	T(26'-4)	30'-8¾	Pv
CM	6.3570	Q=109.06	1.10	C=120	0.000464	2'-8	Pf 0.019
262	17'-8			21.494		37'-8¾	Pe 1.156
261	15'-0			22.669	T(37'-8¾)	40'-4¾	Pv
••••• Route 33 •••••							
SP	1.0490	Q=24.58	9.13	C=120	0.190620	7'-1½	Pf 3.074
233	12'-1½	q=24.58	K=5.6	19.271	Spr(-19.271)	9'-0	Pe 0.921
396	10'-0			23.266	2E(2'-0), PO(5'-0)	16'-1½	Pv
CM	2.6350	Q=18.00	1.06	C=120	0.001207	7'-3	Pf 0.009
396	10'-0			23.266			Pe
370	10'-0			23.275		7'-3	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt / Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
CM	2.6350	Q=18.55	1.09	C=120	0.001276	1'-10¼	Pf 0.002
370	10'-0			23.275			Pe
399	10'-0			23.277		1'-10¼	Pv
CM	2.6350	Q=43.14	2.54	C=120	0.006082	6'-7¾	Pf 0.040
399	10'-0			23.277			Pe
375	10'-0			23.318		6'-7¾	Pv
CM	4.2600	Q=43.14	0.97	C=120	0.000586	0'-9	Pf 0.000
375	10'-0			23.318			Pe
377	10'-0			23.318		0'-9	Pv
CM	4.2600	Q=49.17	1.11	C=120	0.000747	0'-4¾	Pf 0.000
377	10'-0			23.318			Pe
497	10'-0			23.319		0'-4¾	Pv
Route 34							
SP	1.0490	Q=24.59	9.13	C=120	0.190708	7'-1½	Pf 3.075
234	12'-1½	q=24.59	K=5.6	19.281	Spr(-19.281)	9'-0	Pe 0.921
399	10'-0			23.277	2E(2'-0), PO(5'-0)	16'-1½	Pv
Route 35							
UG	7.9800	Q=222.12	1.42	C=150	0.000378	1167'-0	Pf 0.492
3	-5'-0			33.402		134'-3¾	Pe
5	-5'-0			33.894	2E(27'-2), 2EE(13'-7), T(52'-9¾)	1301'-3¾	Pv
Route 36							
CM	2.6350	Q=6.59	0.39	C=120	0.000188	2'-0	Pf 0.000
396	10'-0			23.266			Pe
366	10'-0			23.267		2'-0	Pv
CM	2.6350	Q=4.54	0.27	C=120	0.000094	9'-0	Pf 0.001
366	10'-0			23.267			Pe
364	10'-0			23.268		9'-0	Pv
CM	2.6350	Q=2.82	0.17	C=120	0.000039	9'-3	Pf 0.001
364	10'-0			23.268		16'-5¾	Pe
362	10'-0			23.269	PO(16'-5¾)	25'-8¾	Pv
CM	2.1570	Q=1.50	0.13	C=120	0.000032	73'-7	Pf 0.003
362	10'-0			23.269		19'-8¼	Pe 0.000
674	10'-0			23.272	2LtE(3'-8¼), PO(12'-3¾)	93'-3¼	Pv
CM	2.6350	Q=2.82	0.17	C=120	0.000039	9'-3	Pf 0.000
674	10'-0			23.272			Pe
678	10'-0			23.272		9'-3	Pv
CM	2.6350	Q=4.54	0.27	C=120	0.000094	9'-0	Pf 0.001
678	10'-0			23.272			Pe
681	10'-0			23.273		9'-0	Pv
CM	2.6350	Q=6.59	0.39	C=120	0.000188	9'-3	Pf 0.002
681	10'-0			23.273			Pe
685	10'-0			23.275		9'-3	Pv
CM	2.6350	Q=6.03	0.35	C=120	0.000160	9'-6	Pf 0.004
685	10'-0			23.275		16'-5¾	Pe
688	10'-0			23.279	PO(16'-5¾)	25'-11¾	Pv
CM	2.1570	Q=6.03	0.53	C=120	0.000423	73'-11½	Pf 0.040
688	10'-0			23.279		19'-8¼	Pe
377	10'-0			23.318	2LtE(3'-8¼), PO(12'-3¾)	93'-7¾	Pv
Route 37							
CM	2.6350	Q=1.31	0.08	C=120	0.000010	5'-0	Pf 0.000
362	10'-0			23.269	PO(16'-5¾)	32'-11½	Pe
360	10'-0			23.269	PO(16'-5¾)	37'-11½	Pv
CM	2.1570	Q=1.31	0.12	C=120	0.000025	78'-5½	Pf 0.003
360	10'-0			23.269		23'-4½	Pe
671	10'-0			23.271	3LtE(3'-8¼), PO(12'-3¾)	101'-10	Pv
CM	2.6350	Q=1.31	0.08	C=120	0.000010	9'-6	Pf 0.000
671	10'-0			23.271			Pe
674	10'-0			23.272		9'-6	Pv
Route 38							
CM	2.1570	Q=0.56	0.05	C=120	0.000005	73'-11½	Pf 0.001
685	10'-0			23.275	PO(12'-3¾)	32'-0	Pe
370	10'-0			23.275	2LtE(3'-8¼), PO(12'-3¾)	105'-11½	Pv
Route 39							
CM	4.2600	Q=17.23	0.39	C=120	0.000107	13'-4	Pf 0.001
297	15'-0			21.298			Pe -0.000
313	15'-0			21.299		13'-4	Pv
Route 40							
BL	1.0490	Q=9.39	3.49	C=120	0.032145	2'-9¾	Pf 0.412
480	10'-7¾			20.068	PO(5'-0)	10'-0	Pe 1.219
479	7'-10			21.699	T(5'-0)	12'-9¾	Pv
BL	1.0490	Q=18.80	6.98	C=120	0.116030	15'-6	Pf 2.610
479	7'-10			21.699		7'-0	Pe -0.939
530	10'-0			23.370	E(2'-0), PO(5'-0)	22'-6	Pv

Pipe Type / Downstream / Upstream	Diameter / Elevation	Flow / Discharge	Velocity / K-Factor	HWC / Pt	Pn	Friction Loss / Fittings	Length / Eq. Length / Total Length	Pressure Summary
Route 41								
BL	1.0490	Q=9.41	3.49	C=120		0.032227	20'-0	Pf 0.967
358	8'-4			20.516		PO(5'-0)	10'-0	Pe 0.217
479	7'-10			21.699		T(5'-0)	30'-0	Pv
Route 42								
CM	2.1570	Q=2.05	0.18	C=120		0.000057	73'-11½	Pf 0.006
366	10'-0			23.267		PO(12'-3¾)	32'-0	Pe 0.000
681	10'-0			23.273		2LtE(3'-8¼), PO(12'-3¾)	105'-11½	Pv
Route 43								
CM	2.1570	Q=1.72	0.15	C=120		0.000041	73'-11½	Pf 0.004
364	10'-0			23.268		PO(12'-3¾)	32'-0	Pe 0.000
678	10'-0			23.272		2LtE(3'-8¼), PO(12'-3¾)	105'-11½	Pv

Equivalent Pipe Lengths of Valves and Fittings (C=120 only)

$$\left(\frac{\text{Actual Inside Diameter}}{\text{Schedule 40 Steel Pipe Inside Diameter}}\right)^{4.87} = \text{Factor}$$

C Value Multiplier

Value Of C	100	130	140	150
Multiplying Factor	0.713	1.16	1.33	1.51

Pipe Type Legend

AO	Arm-Over
BL	Branch Line
CM	Cross Main
DN	Drain
DR	Drop
DY	Dynamic
FM	Feed Main
FR	Feed Riser
MS	Miscellaneous
OR	Outrigger
RN	Riser Nipple
SP	Sprig
ST	Stand Pipe
UG	Underground

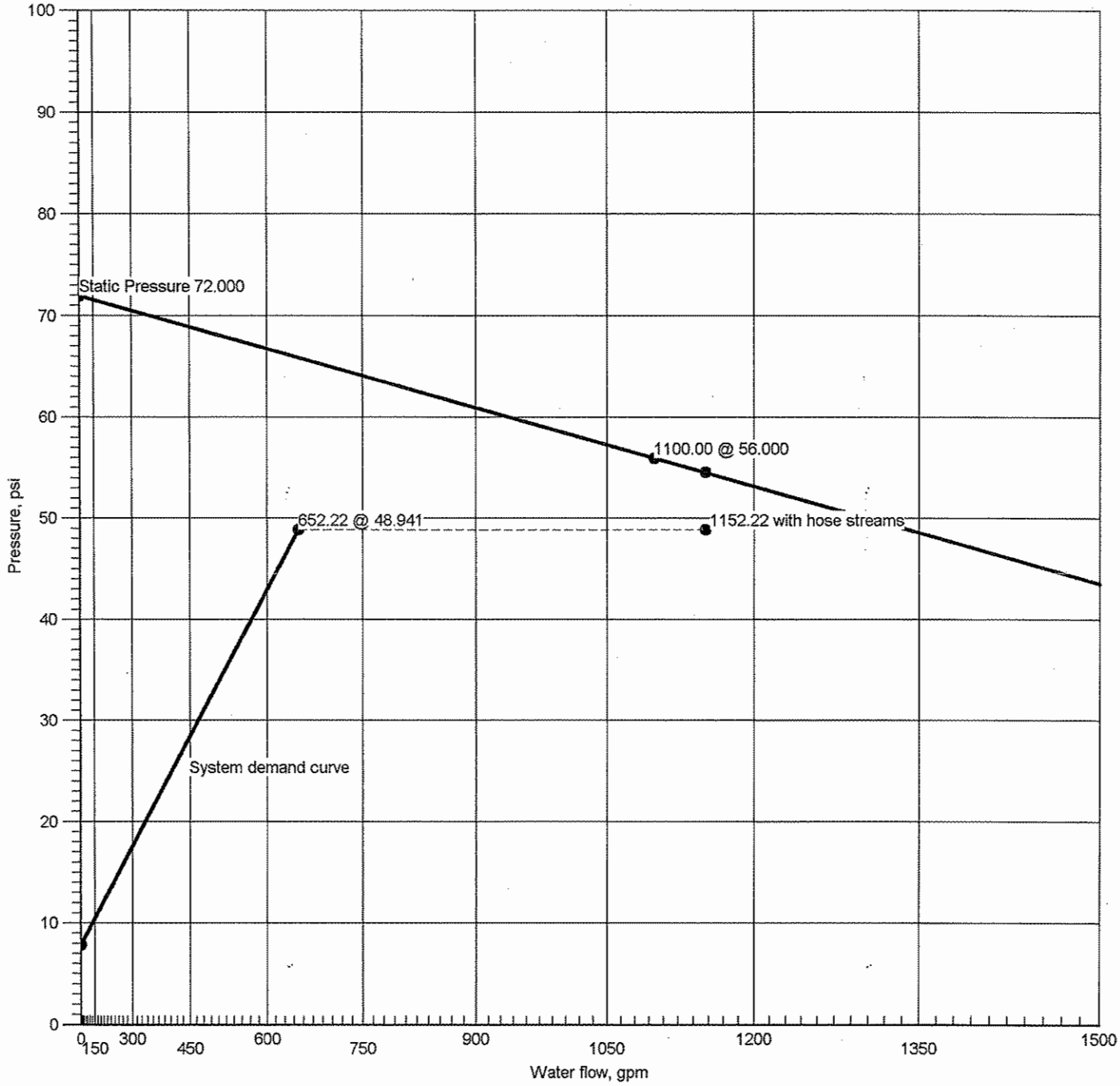
Units Legend

Diameter	Inch
Elevation	Foot
Flow	gpm
Discharge	gpm
Velocity	fps
Pressure	psi
Length	Foot
Friction Loss	psi/Foot
HWC	Hazen-Williams Constant
Pt	Total pressure at a point in a pipe
Pn	Normal pressure at a point in a pipe
Pf	Pressure loss due to friction between points
Pe	Pressure due to elevation difference between indicated points
Pv	Velocity pressure at a point in a pipe

Fittings Legend

ALV	Alarm Valve
AngV	Angle Valve
b	Bushing
BalV	Ball Valve
BFP	Backflow Preventer
BV	Butterfly Valve
C	Cross Flow Turn 90°
cplg	Coupling
Cr	Cross Run
CV	Check Valve
DelV	Deluge Valve
DPV	Dry Pipe Valve
E	90° Elbow
EE	45° Elbow
Ee1	11¼° Elbow
Ee2	22½° Elbow
f	Flow Device
FDC	Fire Department Connection
fE	90° FireLock(TM) Elbow
fEE	45° FireLock(TM) Elbow
flg	Flange
FN	Floating Node
fT	FireLock(TM) Tee
g	Gauge
GloV	Globe Valve
GV	Gate Valve
Hose	Hose
HV	Hose Valve
Hyd	Hydrant
LtE	Long Turn Elbow
mecT	Mechanical Tee
Noz	Nozzle
P1	Pump In
P2	Pump Out
PIV	Post Indicating Valve
PO	Pipe Outlet
PrV	Pressure Relief Valve
PRV	Pressure Reducing Valve
red	Reducer/Adapter
S	Supply
sCV	Swing Check Valve
Spr	Sprinkler
St	Strainer
T	Tee Flow Turn 90°
Tr	Tee Run
U	Union
WirF	Wirsbo
WMV	Water Meter Valve
Z	Cap

Supply at Node 1



Hydraulic Graph	Supply at Node 1
Static Pressure	72.000
Residual Pressure	1100.00 @ 56.000
Available PressureTime of Test	54.567 @ 1152.22
System Demand	652.22 @ 48.941
System Demand (Including Hose Allowance)	1152.22 @ 48.941

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STENNIS RIVERINE & COMBATANT TRAINING FACILITY
STENNIS SPACE CENTER
STENNIS, MS 39529

FIRE PROTECTION/ SPRINKLER SYSTEMS
OPERATIONS BUILDING 2440/2441
BOAT STORAGE BUILDING 2442

SECTION 7

SEISMIC CALCULATIONS

SIMPLEXGRINNELL
5800 JEFFERSON HWY SUITE A
HARAHAN, LA. 70123
PHONE 504-736-0104
FAX 504-736-9292

Tol-Brace Seismic Calculations

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504-613-1083

TOLCO a brand of NIBCO

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	*16'-0" (4.93m)*
Length of Brace	*7 '- 0 " (2.16m)*
Bracing Material	*1" Sch.40*
Angle from Vertical	*30° Min.*
Least Rad. of Gyration	*0.421" (11mm)*
L/R Value	*200*
Maximum Horizontal Load	*1227 lbs. (557kg.)*
Force Factor (Fp)	*0.5*

Fastener Information

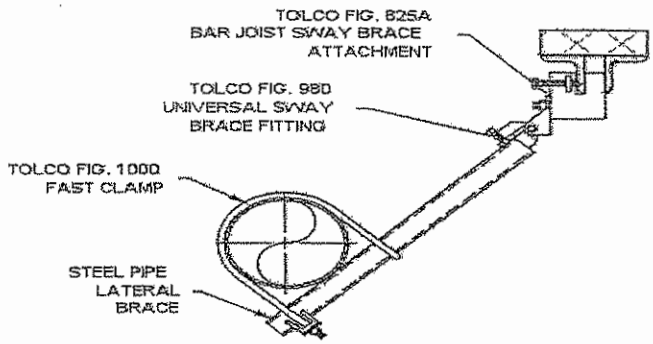
Fastener Orientation	*NFPA Type D*
Type	*Fig.825A*
Diameter	*N/A*
Length	*N/A*
Maximum Load	*632 lbs. (287kg.)*

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.1000 Clamp	*1007 lbs. (457 kg.)*
Fig.980 Universal Swivel	*1382 lbs. (627 kg.)*

**Calculation Based on CONCENTRIC Loading*
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.*

Assembly Detail



30° Min. From Vertical

Detail #3247

Brace Identification on Plans	*LAT1 2440*
Orientation of Brace	*Lateral*

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
2½"(63mm) Schedule 10 Pipe	*16 ft. (4.9m)*	*47 lbs. (22kg.)*
2"(50mm) Schedule 10 Pipe	*73 ft. (22.3m)*	*154 lbs. (70kg.)*
Percentage added for Fittings and Sprinklers	*15 %*	*30 lbs.(13.69kg.)*
Total Adjusted Load of all pipe within Zone of Influence		*231 lbs.(105kg.)*

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LAT1 2440
Brace Type (Per NFPA#13)	NFPA Type D
Spacing of Brace	16 ft.(5m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Length of Brace	7.0167ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	30°
Type of Fastener	N/A In. Fig.825A
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

2½ inch Sch. 10	16 Feet (5m)
2 inch Sch. 10	73 Feet (22m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	231 lbs.(105kg.)
Material Capacity	1227 lbs.(557kg.)
Fastener Capacity	632 lbs.(287kg.)
Fig.1000 Clamp	1007 lbs.(457kg.)
Fig.980 Universal Swivel	1382 lbs.(627kg.)
Structural Member:	BAR JOIST*

Calculations prepared by NANCY HINGLE

*The description of the Structural Member is for informational purposes only.
Tol-Brace software calculates the brace assembly only, not the structure it is attached to.
Calculated with Tol-Brace 6.0 Fire
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Tol-Brace Seismic Calculations

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Harahan, LA 70123

504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	*48'-0" (14.78m)*
Length of Brace	*7 '- 2 " (2.21m)*
Bracing Material	*1" Sch.10*
Angle from Vertical	*45° Min.*
Least Rad. of Gyration	*0.43" (11mm)*
L/R Value	*200*
Maximum Horizontal Load	*2090 lbs. (948kg.)*
Force Factor (Fp)	*0.5*

Fastener Information

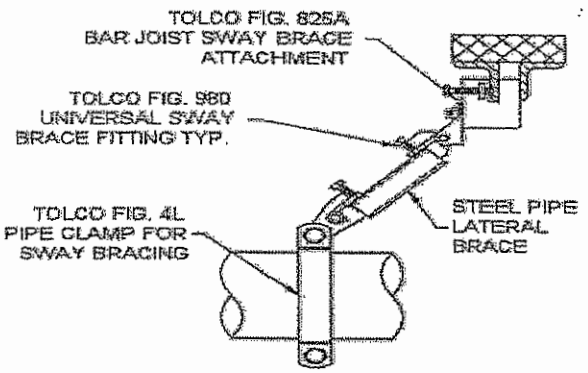
Fastener Orientation	*NFPA Type E*
Type	*Fig.825A*
Diameter	*N/A*
Length	*N/A*
Maximum Load	*894 lbs. (406kg.)*

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.4L Clamp	*1425 lbs. (646 kg.)*
Fig.980 Universal Swivel	*1955 lbs. (887 kg.)*

**Calculation Based on CONCENTRIC Loading*
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.*

Assembly Detail



45° Min. From Vertical

Detail #7247

Brace Identification on Plans	*LON1 2440*
Orientation of Brace	*Longitudinal*

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
2½"(63mm) Schedule 10 Pipe	*48 ft. (14.6m)*	*141 lbs. (65kg.)*
Percentage added for Fittings and Sprinklers	*15 %*	*21 lbs.(9.62kg.)*
Total Adjusted Load of all pipe within Zone of Influence		*163 lbs.(74kg.)*

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LON1 2440
Brace Type (Per NFPA#13)	NFPA Type E
Spacing of Brace	48 ft.(15m)
Orientation of Brace	Longitudinal
Bracing Material	1" Sch.10
Length of Brace	7.1667ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	N/A In. Fig.825A
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

2½ inch Sch. 10	48 Feet (15m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	163 lbs.(74kg.)
Material Capacity	2089.64149661651 lbs.(948kg.)
Fastener Capacity	894 lbs.(406kg.)
Fig.4L Clamp	1425 lbs.(646kg.)
Fig.980 Universal Swivel	1955 lbs.(887kg.)
Structural Member:	BAR JOISTS*

Calculations prepared by NANCY HINGLE

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Calculated with Tol-Brace 6.0 Fire
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Tol-Brace Seismic Calculations

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5800 Jefferson Hwy - Suite A
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504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	21'-0" (6.47m)
Length of Brace	7 '- 0 " (2.16m)
Bracing Material	1" Sch.40
Angle from Vertical	60° Min.
Least Rad. of Gyration	0.42" (11mm)
L/R Value	200
Maximum Horizontal Load	2124 lbs. (963kg.)
Force Factor (Fp)	0.5

Fastener Information

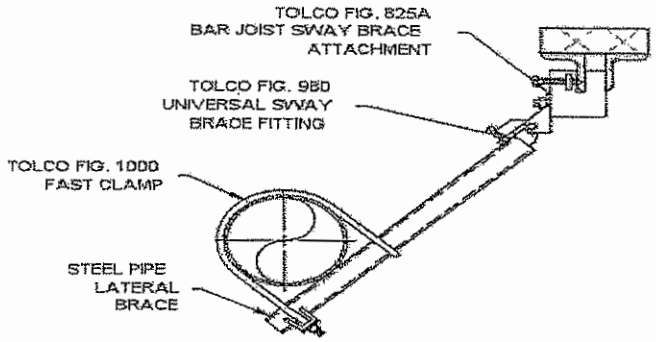
Fastener Orientation	NFPA Type F
Type	Fig.825A
Diameter	N/A
Length	N/A
Maximum Load	1096 lbs. (497kg.)

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.1000 Clamp	1745 lbs. (792 kg.)
Fig.980 Universal Swivel	2395 lbs. (1086 kg.)

*Calculation Based on CONCENTRIC Loading
*Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.

Assembly Detail



60° Min. From Vertical

Detail #3247

Brace Identification on Plans	LAT2 2440
Orientation of Brace	Lateral

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
1"(25mm) Schedule 40 Pipe	45 ft. (13.7m)	46 lbs. (21kg.)
2½"(63mm) Schedule 10 Pipe	21 ft. (6.4m)	62 lbs. (29kg.)
2"(50mm) Schedule 10 Pipe	74 ft. (22.6m)	156 lbs. (71kg.)
Percentage added for Fittings and Sprinklers	15 %	40 lbs.(17.97kg.)
Total Adjusted Load of all pipe within Zone of Influence		304 lbs.(138kg.)

(Toi-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LAT2 2440
Brace Type (Per NFPA#13)	NFPA Type F
Spacing of Brace	21 ft.(6m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Length of Brace	7ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	60°
Type of Fastener	N/A In. Fig.825A
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

2½ inch Sch. 10	21 Feet (6m)
2 inch Sch. 10	74 Feet (23m)
1 inch Sch. 40	45 Feet (14m)

Allowance for Heads and Fittings 15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	304 lbs.(138kg.)
Material Capacity	2124 lbs.(963kg.)
Fastener Capacity	1096 lbs.(497kg.)
Fig.1000 Clamp	1745 lbs.(792kg.)
Fig.980 Universal Swivel	2395 lbs.(1086kg.)
Structural Member:	BAR JOIST*

Calculations prepared by NANCY HINGLE

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Tol-Brace Seismic Calculations

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TOLCO a brand of NIBCO

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	*50'-0" (15.4m)*
Length of Brace	*7 '- 2 " (2.21m)*
Bracing Material	*1" Sch.10*
Angle from Vertical	*60° Min.*
Least Rad. of Gyration	*0.43" (11mm)*
L/R Value	*200*
Maximum Horizontal Load	*2559 lbs. (1161kg.)*
Force Factor (Fp)	*0.5*

Fastener Information

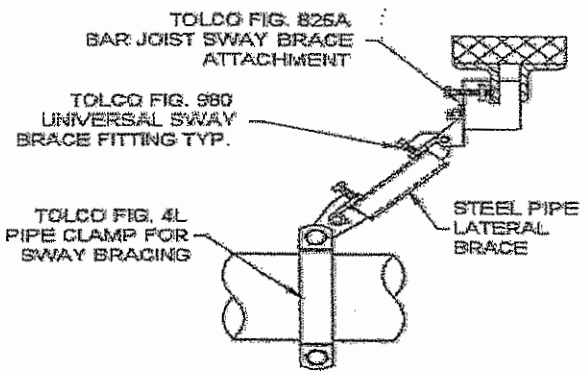
Fastener Orientation	*NFPA Type F*
Type	*Fig.825A*
Diameter	*N/A*
Length	*N/A*
Maximum Load	*1096 lbs. (497kg.)*

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.4L Clamp	*1745 lbs. (792 kg.)*
Fig.980 Universal Swivel	*2395 lbs. (1086 kg.)*

**Calculation Based on CONCENTRIC Loading*
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.*

Assembly Detail



60° Min. From Vertical

Detail #7247

Brace Identification on Plans	*LON2 2440*
Orientation of Brace	*Longitudinal*

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
2½"(63mm) Schedule 10 Pipe	*50 ft. (15.2m)*	*147 lbs. (67kg.)*
Percentage added for Fittings and Sprinklers	*15 %*	*22 lbs.(10.02kg.)*
Total Adjusted Load of all pipe within Zone of Influence		*169 lbs.(77kg.)*

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LON2 2440
Brace Type (Per NFPA#13)	NFPA Type F
Spacing of Brace	50 ft.(15m)
Orientation of Brace	Longitudinal
Bracing Material	1" Sch.10
Length of Brace	7.1667ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	60°
Type of Fastener	N/A In. Fig.825A
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

2½ inch Sch. 10	50 Feet (15m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	169 lbs.(77kg.)
Material Capacity	2559.2780968651 lbs.(1161kg.)
Fastener Capacity	1096 lbs.(497kg.)
Fig.4L Clamp	1745 lbs.(792kg.)
Fig.980 Universal Swivel	2395 lbs.(1086kg.)
Structural Member:	BAR JOIST*

Calculations prepared by NANCY HINGLE

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Tol-Brace Seismic Calculations

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504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	28'-0" (8.62m)
Length of Brace	7 '- 0 " (2.16m)
Bracing Material	1" Sch.40
Angle from Vertical	45° Min.
Least Rad. of Gyration	0.42" (11mm)
L/R Value	200
Maximum Horizontal Load	1735 lbs. (787kg.)
Force Factor (Fp)	0.5

Fastener Information

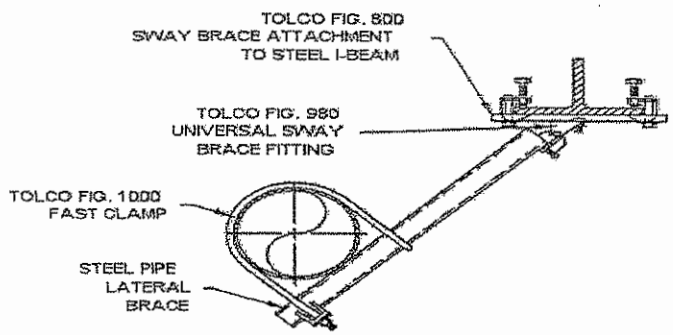
Fastener Orientation	NFPA Type B
Type	Fig.800 Across Beam
Diameter	N/A
Length	N/A
Maximum Load	1425 lbs. (646kg.)

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.1000 Clamp	1425 lbs. (646 kg.)
Fig.980 Universal Swivel	1955 lbs. (887 kg.)

*Calculation Based on CONCENTRIC Loading
*Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.

Assembly Detail



45° Min. From Vertical

Detail #3244

Brace Identification on Plans	LAT3 2440
Orientation of Brace	Lateral

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
2½"(63mm) Schedule 10 Pipe	28 ft. (8.5m)	82 lbs. (38kg.)
2"(50mm) Schedule 10 Pipe	65 ft. (19.8m)	137 lbs. (63kg.)
Percentage added for Fittings and Sprinklers	15 %	33 lbs.(14.94kg.)
Total Adjusted Load of all pipe within Zone of Influence		253 lbs.(115kg.)

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LAT3 2440
Brace Type (Per NFPA#13)	NFPA Type B
Spacing of Brace	28 ft.(9m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Length of Brace	7ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	N/A In. Fig.800 Across Beam
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

2½ inch Sch. 10	28 Feet (9m)
2 inch Sch. 10	65 Feet (20m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	253 lbs.(115kg.)
Material Capacity	1735 lbs.(787kg.)
Fastener Capacity	1425 lbs.(646kg.)
Fig.1000 Clamp	1425 lbs.(646kg.)
Fig.980 Universal Swivel	1955 lbs.(887kg.)
Structural Member:	I-BEAM*

Calculations prepared by NANCY HINGLE

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Tol-Brace software calculates the brace assembly only, not the structure it is attached to.
Calculated with Tol-Brace 6.0 Fire
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Tol-Brace Seismic Calculations

Project Address: *STENNIS RIVERINE*
STENNIS SPACE CENTER
STENNIS, MS

SimplexGrinnell
5800 Jefferson Hwy - Suite A
Harahan, LA 70123
504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	*55'-0" (16.94m)*
Length of Brace	*7 '- 2 " (2.21m)*
Bracing Material	*1" Sch.10*
Angle from Vertical	*45° Min.*
Least Rad. of Gyration	*0.43" (11mm)*
L/R Value	*200*
Maximum Horizontal Load	*2090 lbs. (948kg.)*
Force Factor (Fp)	*0.5*

Fastener Information

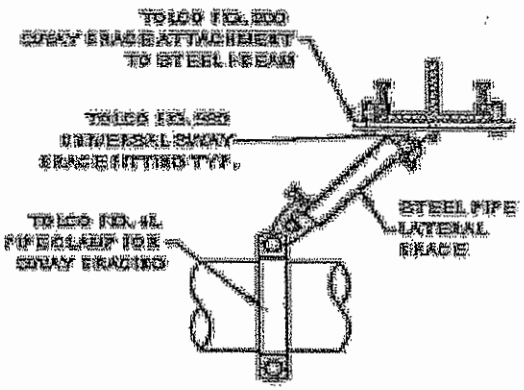
Fastener Orientation	*NFPA Type B*
Type	*Fig.800 Across Beam*
Diameter	*N/A*
Length	*N/A*
Maximum Load	*1425 lbs. (646kg.)*

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.4L Clamp	*1425 lbs. (646 kg.)*
Fig.980 Universal Swivel	*1955 lbs. (887 kg.)*

**Calculation Based on CONCENTRIC Loading*
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.*

Assembly Detail



45° Min. From Vertical

Detail #7244

Brace Identification on Plans	*LON3 2440*
Orientation of Brace	*Longitudinal*

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
2½"(63mm) Schedule 10 Pipe	*55 ft. (16.8m)*	*162 lbs. (74kg.)*
Percentage added for Fittings and Sprinklers	*15 %*	*24 lbs.(11.02kg.)*
Total Adjusted Load of all pipe within Zone of Influence		*186 lbs.(85kg.)*

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LON3 2440
Brace Type (Per NFPA#13)	NFPA Type B
Spacing of Brace	55 ft.(17m)
Orientation of Brace	Longitudinal
Bracing Material	1" Sch.10
Length of Brace	7.1667ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	N/A In. Fig.800 Across Beam
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

2½ inch Sch. 10	55 Feet (17m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	186 lbs.(84kg.)
Material Capacity	2089.64149661651 lbs.(948kg.)
Fastener Capacity	1425 lbs.(646kg.)
Fig.4L Clamp	1425 lbs.(646kg.)
Fig.980 Universal Swivel	1955 lbs.(887kg.)
Structural Member:	I-BEAM*

Calculations prepared by NANCY HINGLE

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Tol-Brace Seismic Calculations

Project Address: *STENNIS RIVERINE*
STENNIS SPACE CENTER
STENNIS, MS

SimplexGrinnell
5800 Jefferson Hwy - Suite A
Harahan, LA 70123

504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	*22'-0" (6.78m)*
Length of Brace	*7 '- 0 " (2.16m)*
Bracing Material	*1" Sch.40*
Angle from Vertical	*60° Min.*
Least Rad. of Gyration	*0.42" (11mm)*
L/R Value	*200*
Maximum Horizontal Load	*2124 lbs. (963kg.)*
Force Factor (Fp)	*0.5*

Fastener Information

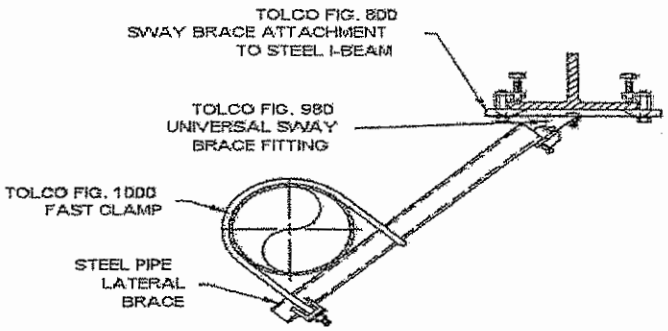
Fastener Orientation	*NFPA Type C*
Type	*Fig.800 Across Beam*
Diameter	*N/A*
Length	*N/A*
Maximum Load	*1745 lbs. (792kg.)*

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.1000 Clamp	*1745 lbs. (792 kg.)*
Fig.980 Universal Swivel	*2395 lbs. (1086 kg.)*

**Calculation Based on CONCENTRIC Loading*
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.*

Assembly Detail



60° Min. From Vertical

Detail #3244

Brace Identification on Plans	*LAT4 2440 2ND FL*
Orientation of Brace	*Lateral*

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
1"(25mm) Schedule 40 Pipe	*25 ft. (7.6m)*	*26 lbs. (12kg.)*
3"(75mm) Schedule 10 Pipe	*22 ft. (6.7m)*	*87 lbs. (40kg.)*
2"(50mm) Schedule 10 Pipe	*47 ft. (14.3m)*	*99 lbs. (45kg.)*
Percentage added for Fittings and Sprinklers	*15 %*	*32 lbs.(14.43kg.)*
Total Adjusted Load of all pipe within Zone of Influence		*244 lbs.(111kg.)*

{Tol-Brace Version 6.5.1}

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LAT4 2440 2ND FL
Brace Type (Per NFPA#13)	NFPA Type C
Spacing of Brace	22 ft.(7m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Length of Brace	7ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	60°
Type of Fastener	N/A In. Fig.800 Across Beam
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

3 inch Sch. 10	22 Feet (7m)
2 inch Sch. 10	47 Feet (14m)
1 inch Sch. 40	25 Feet (8m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	244 lbs.(111kg.)
Material Capacity	2124 lbs.(963kg.)
Fastener Capacity	1745 lbs.(792kg.)
Fig.1000 Clamp	1745 lbs.(792kg.)
Fig.980 Universal Swivel	2395 lbs.(1086kg.)
Structural Member:	RIGID FRAME*

Calculations prepared by NANCY HINGLE

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Tol-Brace Seismic Calculations

Project Address: STENNIS RIVERINE
STENNIS SPACE CENTER
STENNIS, MS

SimplexGrinnell
5800 Jefferson Hwy - Suite A
Harahan, LA 70123
504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	48'-0" (14.78m)
Length of Brace	7 '- 2 " (2.21m)
Bracing Material	1" Sch.10
Angle from Vertical	60° Min.
Least Rad. of Gyration	0.43" (11mm)
L/R Value	200
Maximum Horizontal Load	2559 lbs. (1161kg.)
Force Factor (Fp)	0.5

Fastener Information

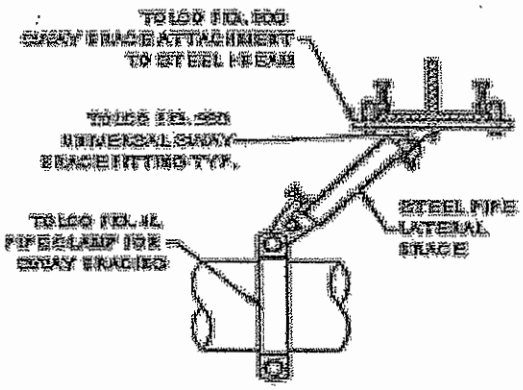
Fastener Orientation	NFPA Type C
Type	Fig.800 Across Beam
Diameter	N/A
Length	N/A
Maximum Load	1745 lbs. (792kg.)

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.4L Clamp	1745 lbs. (792 kg.)
Fig.980 Universal Swivel	2395 lbs. (1086 kg.)

*Calculation Based on CONCENTRIC Loading
*Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.

Assembly Detail



60° Min. From Vertical

Detail #7244

Brace Identification on Plans	LON4 2440 2ND FL
Orientation of Brace	Longitudinal

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
3"(75mm) Schedule 10 Pipe	48 ft. (14.6m)	191 lbs. (87kg.)
Percentage added for Fittings and Sprinklers	15 %	29 lbs.(12.97kg.)
Total Adjusted Load of all pipe within Zone of Influence		219 lbs.(100kg.)

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LON4 2440 2ND FL
Brace Type (Per NFPA#13)	NFPA Type C
Spacing of Brace	48 ft.(15m)
Orientation of Brace	Longitudinal
Bracing Material	1" Sch.10
Length of Brace	7.1667ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	60°
Type of Fastener	N/A In. Fig.800 Across Beam
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

3 inch Sch. 10	48 Feet (15m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	219 lbs.(99kg.)
Material Capacity	2559.2780968651 lbs.(1161kg.)
Fastener Capacity	1745 lbs.(792kg.)
Fig.4L Clamp	1745 lbs.(792kg.)
Fig.980 Universal Swivel	2395 lbs.(1086kg.)
Structural Member:	RIGID FRAME*

Calculations prepared by NANCY HINGLE

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Tol-Brace Seismic Calculations

Project Address: *STENNIS RIVERINE*
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SimplexGrinnell
5800 Jefferson Hwy - Suite A
Harahan, LA 70123

504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	*30'-0" (9.24m)*
Length of Brace	*7 '- 0 " (2.16m)*
Bracing Material	*1" Sch.40*
Angle from Vertical	*60° Min.*
Least Rad. of Gyration	*0.42" (11mm)*
L/R Value	*200*
Maximum Horizontal Load	*2124 lbs. (963kg.)*
Force Factor (Fp)	*0.5*

Fastener Information

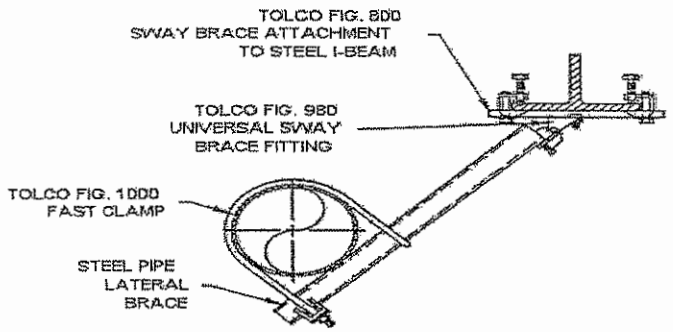
Fastener Orientation	*NFPA Type C*
Type	*Fig.800 Across Beam*
Diameter	*N/A*
Length	*N/A*
Maximum Load	*1745 lbs. (792kg.)*

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.1000 Clamp	*1745 lbs. (792 kg.)*
Fig.980 Universal Swivel	*2395 lbs. (1086 kg.)*

**Calculation Based on CONCENTRIC Loading*
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.*

Assembly Detail



60° Min. From Vertical

Detail #3244

Brace Identification on Plans	*LAT5 2441*
Orientation of Brace	*Lateral*

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
4"(100mm) Schedule 10 Pipe	*30 ft. (9.1m)*	*177 lbs. (81kg.)*
2"(50mm) Schedule 10 Pipe	*117 ft. (35.7m)*	*247 lbs. (112kg.)*
Percentage added for Fittings and Sprinklers	*15 %*	*64 lbs.(28.82kg.)*
Total Adjusted Load of all pipe within Zone of Influence		*487 lbs.(221kg.)*

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LAT5 2441
Brace Type (Per NFPA#13)	NFPA Type C
Spacing of Brace	30 ft.(9m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Length of Brace	7ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	60°
Type of Fastener	N/A In. Fig.800 Across Beam
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

4 inch Sch. 10	30 Feet (9m)
2 inch Sch. 10	117 Feet (36m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	487 lbs.(221kg.)
Material Capacity	2124 lbs.(963kg.)
Fastener Capacity	1745 lbs.(792kg.)
Fig.1000 Clamp	1745 lbs.(792kg.)
Fig.980 Universal Swivel	2395 lbs.(1086kg.)
Structural Member:	RIGID FRAME*

Calculations prepared by NANCY HINGLE

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Tol-Brace Seismic Calculations

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STENNIS SPACE CENTER
STENNIS, MS

SimplexGrinnell
5800 Jefferson Hwy - Suite A
Harahan, LA 70123
504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	50'-0" (15.4m)
Length of Brace	7 '- 2 " (2.21m)
Bracing Material	1" Sch.10
Angle from Vertical	60° Min.
Least Rad. of Gyration	0.43" (11mm)
L/R Value	200
Maximum Horizontal Load	2559 lbs. (1161kg.)
Force Factor (Fp)	0.5

Fastener Information

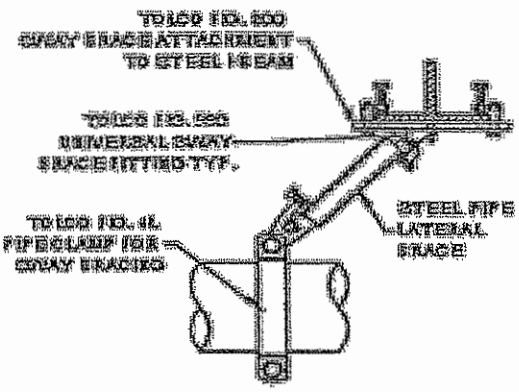
Fastener Orientation	NFPA Type C
Type	Fig.800 Across Beam
Diameter	N/A
Length	N/A
Maximum Load	1745 lbs. (792kg.)

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.4L Clamp	1745 lbs. (792 kg.)
Fig.980 Universal Swivel	2395 lbs. (1086 kg.)

*Calculation Based on CONCENTRIC Loading
*Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.

Assembly Detail



60° Min. From Vertical

Detail #7244

Brace Identification on Plans	LON5 2441
Orientation of Brace	Longitudinal

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
4"(100mm) Schedule 10 Pipe	50 ft. (15.2m)	294 lbs. (134kg.)
Percentage added for Fittings and Sprinklers	15 %	44 lbs.(20.04kg.)
Total Adjusted Load of all pipe within Zone of Influence		339 lbs.(154kg.)

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LON5 2441
Brace Type (Per NFPA#13)	NFPA Type C
Spacing of Brace	50 ft.(15m)
Orientation of Brace	Longitudinal
Bracing Material	1" Sch.10
Length of Brace	7.1667ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	60°
Type of Fastener	N/A In. Fig.800 Across Beam
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

4 inch Sch. 10	50 Feet (15m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	339 lbs.(154kg.)
Material Capacity	2559.2780968651 lbs.(1161kg.)
Fastener Capacity	1745 lbs.(792kg.)
Fig.4L Clamp	1745 lbs.(792kg.)
Fig.980 Universal Swivel	2395 lbs.(1086kg.)
Structural Member:	RIGID FRAME*

Calculations prepared by NANCY HINGLE

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Tol-Brace Seismic Calculations

Project Address: STENNIS RIVERINE
STENNIS SPACE CENTER
STENNIS, MS

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5800 Jefferson Hwy - Suite A
Harahan, LA 70123
504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	30'-0" (9.24m)
Length of Brace	7 '- 0 " (2.16m)
Bracing Material	1" Sch.40
Angle from Vertical	60° Min.
Least Rad. of Gyration	0.42" (11mm)
L/R Value	200
Maximum Horizontal Load	2124 lbs. (963kg.)
Force Factor (Fp)	0.5

Fastener Information

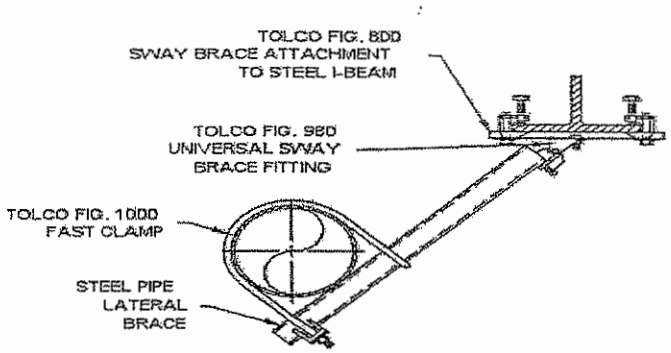
Fastener Orientation	NFPA Type C
Type	Fig.800 Across Beam
Diameter	N/A
Length	N/A
Maximum Load	1745 lbs. (792kg.)

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.1000 Clamp	1096 lbs. (497 kg.)
Fig.980 Universal Swivel	2395 lbs. (1086 kg.)

*Calculation Based on CONCENTRIC Loading
*Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.

Assembly Detail



60° Min. From Vertical

Detail #3244

Brace Identification on Plans	LAT6 2442
Orientation of Brace	Lateral

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
6"(150mm) Schedule 10 Pipe	30 ft. (9.1m)	345 lbs. (157kg.)
2"(50mm) Schedule 10 Pipe	72 ft. (21.9m)	152 lbs. (69kg.)
Percentage added for Fittings and Sprinklers	15 %	75 lbs.(33.84kg.)
Total Adjusted Load of all pipe within Zone of Influence		572 lbs.(260kg.)

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LAT6 2442
Brace Type (Per NFPA#13)	NFPA Type C
Spacing of Brace	30 ft.(9m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Length of Brace	7ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	60°
Type of Fastener	N/A In. Fig.800 Across Beam
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

6 inch Sch. 10	30 Feet (9m)
2 inch Sch. 10	72 Feet (22m)

Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	572 lbs.(259kg.)
Material Capacity	2124 lbs.(963kg.)
Fastener Capacity	1745 lbs.(792kg.)
Fig.1000 Clamp	1096 lbs.(497kg.)
Fig.980 Universal Swivel	2395 lbs.(1086kg.)
Structural Member:	RIGID FRAME*

Calculations prepared by NANCY HINGLE

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Tol-Brace Seismic Calculations

Project Address: *STENNIS RIVERINE*
STENNIS SPACE CENTER
STENNIS, MS

SimplexGrinnell
5800 Jefferson Hwy - Suite A
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504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	*30'-0" (9.24m)*
Length of Brace	*7 '- 2 " (2.21m)*
Bracing Material	*1" Sch.10*
Angle from Vertical	*60° Min.*
Least Rad. of Gyration	*0.43" (11mm)*
L/R Value	*200*
Maximum Horizontal Load	*2559 lbs. (1161kg.)*
Force Factor (Fp)	*0.5*

Fastener Information

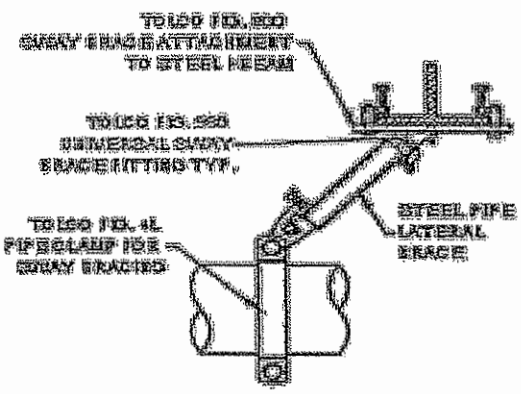
Fastener Orientation	*NFPA Type C*
Type	*Fig.800 Across Beam*
Diameter	*N/A*
Length	*N/A*
Maximum Load	*1745 lbs. (792kg.)*

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.4L Clamp	*1745 lbs. (792 kg.)*
Fig.980 Universal Swivel	*2395 lbs. (1086 kg.)*

**Calculation Based on CONCENTRIC Loading*
**Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.*

Assembly Detail



60° Min. From Vertical

Detail #7244

Brace Identification on Plans	*LON6 2442*
Orientation of Brace	*Longitudinal*

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
6"(150mm) Schedule 10 Pipe	*30 ft. (9.1m)*	*345 lbs. (157kg.)*
Percentage added for Fittings and Sprinklers	*15 %*	*52 lbs.(23.5kg.)*
Total Adjusted Load of all pipe within Zone of Influence		*397 lbs.(181kg.)*

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LON6 2442
Brace Type (Per NFPA#13)	NFPA Type C
Spacing of Brace	30 ft.(9m)
Orientation of Brace	Longitudinal
Bracing Material	1" Sch.10
Length of Brace	7.1667ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	60°
Type of Fastener	N/A In. Fig.800 Across Beam
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

6 inch Sch. 10	30 Feet (9m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	397 lbs.(180kg.)
Material Capacity	2559.2780968651 lbs.(1161kg.)
Fastener Capacity	1745 lbs.(792kg.)
Fig.4L Clamp	1745 lbs.(792kg.)
Fig.980 Universal Swivel	2395 lbs.(1086kg.)
Structural Member:	RIGID FRAME*

Calculations prepared by NANCY HINGLE

*The description of the Structural Member is for informational purposes only.
Tol-Brace software calculates the brace assembly only, not the structure it is attached to.
Calculated with Tol-Brace 6.0 Fire
visit us at www.tolco.com

Tol-Brace Seismic Calculations

Project Address: STENNIS RIVERINE
STENNIS SPACE CENTER
STENNIS, MS

SimplexGrinnell
5800 Jefferson Hwy - Suite A
Harahan, LA 70123
504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	30'-0" (9.24m)
Length of Brace	7 '- 0 " (2.16m)
Bracing Material	1" Sch.40
Angle from Vertical	60° Min.
Least Rad. of Gyration	0.42" (11mm)
L/R Value	200
Maximum Horizontal Load	2124 lbs. (963kg.)
Force Factor (Fp)	0.5

Fastener Information

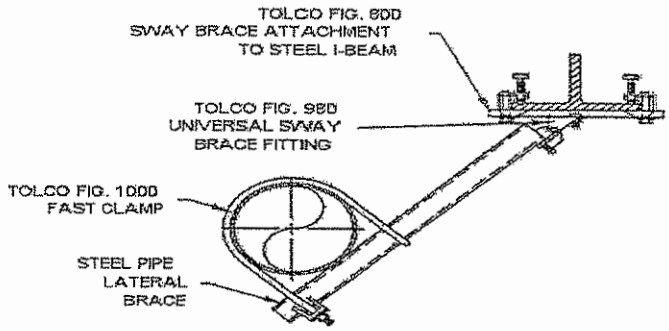
Fastener Orientation	NFPA Type C
Type	Fig.800 Across Beam
Diameter	N/A
Length	N/A
Maximum Load	1745 lbs. (792kg.)

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.1000 Clamp	1096 lbs. (497 kg.)
Fig.980 Universal Swivel	2395 lbs. (1086 kg.)

*Calculation Based on CONCENTRIC Loading
*Please Note: These calculations are for Tolco components only. Use of any other components voids these calculations and the listing of the assembly.

Assembly Detail



60° Min. From Vertical

Detail #3244

Brace Identification on Plans	LAT7 2442
Orientation of Brace	Lateral

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
6"(150mm) Schedule 10 Pipe	30 ft. (9.1m)	345 lbs. (157kg.)
2"(50mm) Schedule 10 Pipe	44 ft. (13.4m)	93 lbs. (43kg.)
Percentage added for Fittings and Sprinklers	15 %	66 lbs.(29.82kg.)
Total Adjusted Load of all pipe within Zone of Influence		504 lbs.(229kg.)

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

STENNIS RIVERINE
STENNIS SPACE CENTER
Job #269-941989101

Brace Identification	LAT7 2442
Brace Type (Per NFPA#13)	NFPA Type C
Spacing of Brace	30 ft.(9m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Length of Brace	7ft. (2m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	60°
Type of Fastener	N/A In. Fig.800 Across Beam
Length of Fastener	N/A In.
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

6 inch Sch. 10	30 Feet (9m)
2 inch Sch. 10	44 Feet (13m)
Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	504 lbs.(229kg.)
Material Capacity	2124 lbs.(963kg.)
Fastener Capacity	1745 lbs.(792kg.)
Fig.1000 Clamp	1096 lbs.(497kg.)
Fig.980 Universal Swivel	2395 lbs.(1086kg.)
Structural Member:	RIGID FRAME*

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5800 Jefferson Hwy - Suite A
Harahan, LA 70123
504-613-1083

Job # 269-941989101 Calculations based on 2007 NFPA Pamphlet #13

Brace Information

Maximum Spacing	30'-0" (9.24m)
Length of Brace	7 '- 2 " (2.21m)
Bracing Material	1" Sch.10
Angle from Vertical	60° Min.
Least Rad. of Gyration	0.43" (11mm)
L/R Value	200
Maximum Horizontal Load	2559 lbs. (1161kg.)
Force Factor (Fp)	0.5

Fastener Information

Fastener Orientation	NFPA Type C
Type	Fig.800 Across Beam
Diameter	N/A
Length	N/A
Maximum Load	1745 lbs. (792kg.)

Tolco Brace Components

Tolco Component Fig. Number	Adjusted Load
Fig.4L Clamp	1745 lbs. (792 kg.)
Fig.980 Universal Swivel	2395 lbs. (1086 kg.)

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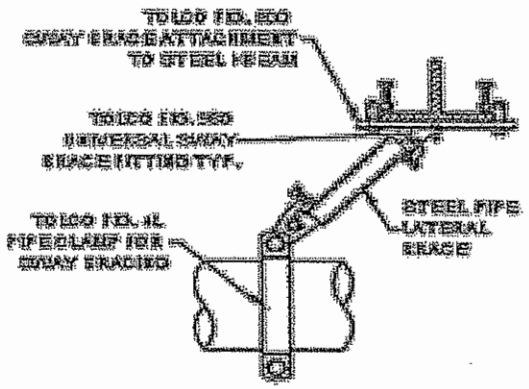
Assembly Detail



60° Min. From Vertical

Detail #7244

Brace Identification on Plans	LON7 2442
Orientation of Brace	Longitudinal

Load Information

Size and Type of Pipe	Total Length	Total Calculated Load
6"(150mm) Schedule 10 Pipe	30 ft. (9.1m)	345 lbs. (157kg.)
Percentage added for Fittings and Sprinklers	15 %	52 lbs.(23.5kg.)
Total Adjusted Load of all pipe within Zone of Influence		397 lbs.(181kg.)

(Tol-Brace Version 6.5.1)

Tol-Brace Seismic Calculations

For

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STENNIS SPACE CENTER
Job #269-941989101

TOLCO a brand of NIBCO

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Allowance for Heads and Fittings	15%

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