

**STANDARD SPECIFICATIONS FOR  
CONSTRUCTING UTILITY FACILITIES**

**DIVISION II - DESIGN CRITERIA**

**A. GENERAL CRITERIA**

1. Daphne Utilities Standard Specifications are intended for use in both new construction and modifications/improvements to existing infrastructure. Therefore, some portions are only applicable to one type of construction. An example is project documentation defined to be performed prior to the start of construction is intended for renovation projects to existing infrastructure around established areas and not intended for new construction in undeveloped areas. If uncertain if a section is applicable to a project, contact DU for verification prior to approval/construction.
2. Permanent easement descriptions dedicated solely to the Daphne Utilities, shall be provided for all areas not in dedicated public right of ways and listed in Daphne Utilities legal name. The minimum easement width shall be twenty (20) feet. If two of Daphne Utilities infrastructure (gas, sewer, or water) are installed within an easement, a minimum thirty (30) easement width shall be provided. Pumping stations for water or wastewater and gas compressor metering and regulating stations shall have a minimum area of forty feet by forty feet. However, final size shall be approved by Daphne Utilities to ensure proper access and maintenance in the sole opinion of Daphne Utilities.
3. If proposed development changes current state of existing infrastructure or necessitates modifications to Daphne Utilities existing infrastructure, such modifications shall be submitted to Daphne Utilities for approval during design. Modifications may be necessary due to proposed changes to existing surface conditions. If modifications are approved, all costs associated with such modifications shall not be incurred by Daphne Utilities but shall be borne by the Developer/Contractor including any necessary bypass pumping and all required testing such as Go-No-Go type mandrel, television inspection, bacteriological, and pressure testing.
4. Final acceptance of facilities submitted to Daphne Utilities for ownership and maintenance shall be granted after a two year period provided the system is properly operating and the system is determined to continue to meet Daphne Utilities standards after the two-year period. Some materials require a longer warranty period that will be extended beyond the two (2) years. Any defects discovered during those warranty periods shall be replaced in-kind at no expense to Daphne Utilities.
5. Sanitary sewer system collection lines shall discharge directly into a treatment facility with a current NPDES permit and available capacity. Temporary or permanent discharging of sanitary sewer into holding tanks or facilities for intermittent transporting to treatment facilities shall not be allowed within the Daphne service area.

6. Sanitary sewers shall be separated a minimum of 5 feet clear horizontal distance from any existing or proposed water main. Where sanitary sewers are required to cross water mains a minimum of 18 inches vertical distances between the outside of the mains shall be obtained. Sewer mains at water main crossings shall be constructed with ductile iron pipe with joints at least 9 feet from the crossing centerline. If these conditions cannot be obtained, additional design considerations approved by Daphne Utilities shall be incorporated to protect both lines and prevent cross contamination.
7. Sanitary sewer collection systems for multi-customers shall be gravity systems in accordance with the standard specification parameters. Low pressure (multiple grinder pumps) systems shall not be acceptable within the City of Daphne, its planning jurisdiction, and Daphne Utilities service area unless otherwise approved by Daphne Utilities. Considerations will be given to areas where access for proper maintenance to sewer mains is impractical and cost prohibitive as determined solely by Daphne Utilities.

When approved as an acceptable system in lieu of a gravity system, low pressure systems shall be constructed to provide flow conditions that will minimize the development of corrosive and odor conditions from H<sub>2</sub>S and to prevent the development of sewage BOD<sub>5</sub> concentrations greater than 350 mg/l.

8. All new sanitary sewer and/or water distribution and/or gas facilities shall be constructed in accordance with the Daphne Utilities standard specifications, the Alabama Department of Environmental Management (ADEM) standards and design criteria for water and sanitary sewer facilities, Ten States Standards, Environmental Protection Agency (EPA) Capacity Management, Operations and Maintenance (CMOM) provisions, and U.S. Department of Transportation, Transportation of Natural and Other Gas by Pipelines, Minimum Safety Standards. When conflicts between these standards occur, the more stringent of the requirements as determined solely by Daphne Utilities shall be required. Several of the standards required by Daphne Utilities are in accordance with the Recommended Standards for Water Works "Ten States Standard".
9. The material preference under concrete pavement in dedicated right of ways is ductile iron. However, Daphne Utilities will consider other material selections that meet their standards based on specific field conditions.
10. For new developments, lateral locations shall be stamped in the curb with either an 'S' or 'W' as appropriate for the respective utility lateral. Also, as a general guidance in new development, the sewer lateral shall be located at one of the side lot lines of the parcel within the right of way and the water service line shall be located at the opposite side lot line in the right of way. The utility service location at the proposed side setback shall alternate per each parcel.
11. On all pressure sewer connections, the service lateral shall be in accordance with the Standard Drawings and Daphne Utilities current practices including ball valves. Also, on all sewer connections where water service is not provided by Daphne Utilities, a locking valve, Sewur, shall be installed in accordance with current practices on the sewer service lateral.

12. To assure that manufacturers and suppliers are aware of the use to which their equipment and products will be subjected, the Contractor/Developer shall require the manufacturer or manufacturer's representative to place the following certification on submittal data transmittals:

“This is to certify that we have examined the Plans and Specifications for this Project and have ascertained that this equipment or material is suitable for the purpose and use intended and meets Daphne Utilities current standards and practices.

\_\_\_\_\_  
Authorized Signature”

13. Also, a certification shall be provided on all materials and equipment submittals that items are in compliance with Daphne Utilities current standards and practices.

**B. SANITARY SEWER SYSTEM DESIGN CRITERIA**

DESIGN PARAMETER	DESIGN VALUE
1. MINIMUM VELOCITY (ft/sec) IN GRAVITY LINES	2.1
2. DESIGN ROUGHNESS COEFFICIENT (Manning's n/Hazen-Williams C)	0.013/130
3. FLOW DEVELOPMENT	
a. Single family dwelling (GPCD)	125
4. MINIMUM PEAK HOURLY FLOW FACTOR	2.5
5. MINIMUM SLOPE (%)	
a. 8" Sanitary Sewer Gravity Main	0.40
b. 10" Sanitary Sewer Gravity Main	0.28
c. 12" Sanitary Sewer Gravity Main	0.22
d. 16" Sanitary Sewer Gravity Main	0.13
e. 18" Sanitary Sewer Gravity Main	0.12
f. 20" Sanitary Sewer Gravity Main	0.09
g. 24" Sanitary Sewer Gravity Main	0.08
h. 30" Sanitary Sewer Gravity Main	0.07
6. MINIMUM DEPTH (inches from top of pipe to ground surface)	36
7. FORCE MAIN	
a. Pipe material of construction (Ductile Iron or PVC)	
b. Minimum depth of cover (inches)	36
c. Velocity range (FPS)	3.5 - 5.5

DESIGN PARAMETER	DESIGN VALUE
8. PUMPS	
a. Maximum pumping rate (GPM)	Peak Hourly Flow
b. Minimum number of pumps per station	2
c. Pump type	Self Priming or Submersible
9. WET-WELL (Sizing to be Confirmed w/ Owner during Review)	
a. Maximum detention time between pump run cycles (minutes)	15
b. Maximum detention time at peak flow (hours)	2
c. Minimum diameter (feet)	8
d. Grinder pump station minimum storage capacity (hours)	24
e. Grinder pump station wet well minimum diameter (feet)	6
10. SITE	
a. Fence (chain link w/ slates or wood- Owner select during review)	---
b. Roadway (paved, single lane, 12% maximum grade)	---
c. Maximum landscaped slope (%)	20
d. Design flood event	100 years
11. BUILDING	
a. Minimum height (feet)	8
b. Minimum unobstructed floor space (feet)	4
c. Ventilation requirements (air changes/hour):	
1) Continuous duty	12
2) Intermittent	30
d. Water service line (inches)	¾
e. Interior lighting (48", 4 bulb, 40W fixtures/100SF) (each)	2
f. Interior electrical receptacles (each):	
1) 110 volt	4
2) 220 volt	2
12. ELECTRICAL	
a. Incoming service:	
1) Voltage (volts)	460/230
2) Phase	3
b. Control voltage (volts)	120

**ADDITIONAL SANITARY SEWER REQUIREMENTS:**

- Gravity sanitary sewer collection mains shall be a minimum of eight (8) inches in diameter.
- Where velocities will exceed 15 fps, special provisions shall be made to protect against displacement by erosion and impact.
- Sanitary sewers shall be laid with uniform slope between manholes.
- Sanitary sewers placed on 20 percent slopes or greater shall be anchored securely with an approved method and spacing.

5. Curvilinear alignment of sanitary sewers shall not be utilized in construction.
6. Manholes shall be installed at a maximum of every 400 feet. Manholes shall also be installed at: a) all changes in grade, size, or alignment; b) all intersections; and c) the end of each line.
7. Manholes shall be a minimum of 48 inches in diameter with minimum access diameter of 22 inches.
8. An approved drop connection shall be installed at each manhole where the sanitary sewer pipe is 24 inches or more above the manhole invert.
9. Sanitary sewage system components and piping configurations shall comply with the Daphne Utilities Standard Details for sewer systems.
10. All newly installed gravity sewer mains and segments of existing sanitary sewer where connections are performed shall be videoed in accordance with DU standard specifications and practices.
11. In gravity systems where depths or at or exceed 20 feet, ductile iron pipe shall be utilized for the entire length between manhole segments regardless of varying depths along the segment.
12. New sewage pumping stations shall be equipped with either a bypass pumps or emergency standby power generator as determined by Daphne Utilities for each site. DU preference is bypass pumps; however, DU in their sole opinion, may allow for an emergency generator based on field location, size and operating and maintenance conditions. If the lift station pump motor is 5 HP or less and the station has a minimum of 12 hours of storage at average design flows, the Development/Owner may submit for consideration a request to Daphne Utilities for waiver of the bypass pump/generator equipment. The review will be on an individual basis and consider such factors as located in an environmentally sensitive area or difficult to access as determined solely by Daphne Utilities.
14. Supervisory Control and Data Acquisition (SCADA) systems in accordance with the SCADA system currently in use by Daphne Utilities sewer system for monitoring operating conditions of the pump station from remote sites shall be installed at new sewage pumping stations.
15. An approved combination air-vacuum release valve unit shall be installed at all applicable areas along a force main and in accordance with the installed valve manufacturer's recommendations.
16. Force main systems shall include clean out provisions for performing maintenance cleaning of the force main system. The distance between cleanout accesses shall not exceed one mile. Access cleanouts shall allow for inserting and retrieval of approving maintenance "pigs" without excavating or "breaking into" the force main. Access cleanouts configuration and materials shall be approved by Daphne Utilities appropriate personnel prior to installing.

17. All gravity sanitary sewer laterals shall have an approved cleanout with backflow prevention measures near the home. If a house elevation is lower than the rim of any existing or proposed manhole, a check valve shall also be installed at the house.
18. Low Pressure System Design Criteria (when permitted by Daphne Utilities):
  - a) All collector pipes shall be a minimum of two (2) inches in diameter. Force main cleanouts with valves shall be placed at dead end lines to allow for cleaning. Refer to drawing of cleanout in Standard Drawings herein.
  - b) The minimum allowable depth of cover is thirty (30) inches.
  - c) A Hazen Williams Coefficient of 130 to 140 shall be used for hydraulic analyses.
  - d) For design purposes, a velocity of 3 to 5 fps shall be obtained at least once a day.
  - e) The design conditions of the pump shall be in accordance with the pump manufacturer's guidelines and recommendations.
  - f) All systems shall have a quick disconnect, a high level alarm, and an external/remote control panel. The alarm shall have a light and auditory device.
  - g) Force mains shall not be constructed under pavement or concrete.
  - h) Air release valves, shall be located at high points in the line and shall be properly sized for the design operating conditions. Air release valves shall be either brass or stainless steel. Galvanized steel valves will not be accepted.
  - i) All sewer service laterals shall be per the current practices of DU. Developer to confirm detail in Standard Drawings is current prior to ordering materials/installation.

### **C. WATER SYSTEM DESIGN CRITERIA**

1. Pressure: All water mains, including those not designed to provide fire protection, shall be sized after a hydraulic analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi (140 kPa) at ground level at all points in the distribution system under all conditions of flow. The normal working pressure in the distribution system should be approximately 60 to 120 psi and not less than 35 psi.
2. Diameter: The minimum size of water mains for providing fire protection and serving fire hydrants shall be six (6) inch diameter. Larger size mains will be required if necessary to allow the withdrawal of the required fire flow while maintaining a minimum residual pressure of 20 psi.
3. Fire Protection: When fire protection is to be provided, system design should be such that fire flows and facilities are in accordance with the requirements of the State Insurance Services Office.

4. Hydrants: Water mains not designed to carry fire-flows shall not have fire hydrants connected to them. All fire hydrants shall have isolation valves.
5. Dead Ends:
  - a. In order to provide increased reliability of service and reduce head loss, dead ends shall not be permitted except for new construction of a single street with a cul-de-sac. All new subdivisions shall be looped feed to provide adequate fire protection.
  - b. Where dead-end mains occur, they shall be provided with a fire hydrant if flow and pressure are sufficient to meet at least minimum system hydraulic requirements, or with an approved flushing hydrant or blow-off for flushing purposes. In this case flow and pressure calculations must be provided to Daphne Utilities. Flushing devices shall be sized to provide flows which will provide a velocity of at least 2.5 feet per second in the water main being flushed. No flushing device shall be directly connected to any sewer system.
6. New water pumping stations shall be equipped with either emergency standby power generator or bypass pumps as determined by Daphne Utilities for each site. Supervisory Control and Data Acquisition (SCADA) systems in accordance with the SCADA systems currently in use by Daphne Utilities water system for monitoring operating conditions of the pump station from remote sites shall be installed at new water pumping stations.

**D. GAS SYSTEM DESIGN CRITERIA**

1. All gas main work shall conform to the applicable requirements of the U.S. Department of Transportation, Part 192, Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards, most recent edition and current building code adopted by the City of Daphne along with the requirements of Daphne Utilities. Any Contractor employee who will perform gas work shall meet the "Qualifications of Pipeline Personnel - Subpart N". Contractor's employees who fuse plastic pipe shall be certified in fusion approved by Alabama Public Service Commission Office of Pipeline Safety. Contractor's employees who connect to hot gas mains or install live taps shall be qualified in that covered task per Daphne Utilities Operator Qualification Program. Documentation of compliance of these requirements shall be provided to Daphne Utilities.
2. A construction form to the Public Service Commission Office of Pipeline Safety shall be submitted by the Contractor prior to beginning construction with a copy to Daphne Utilities.
3. Bushings shall not be permitted on any gas piping. CST piping shall not be permitted to be installed in any area except within six feet of an appliance connection.
4. Valves shall be required on every appliance, including fireplaces with a built in valve. A log lighter valve should be added a minimum of two (2) feet from the unit for external accessibility. If this is not feasible because of the location of the fireplace the valve can be placed in the attic.

5. A pressure test of new and old fuel lines shall be inspected by the City of Daphne Building Inspection Department or authorized agent of the City, i.e. Daphne Utilities. Twenty (20) pounds of pressure shall be maintained for a minimum of one (1) hour limit. The inspection authority shall be given proper notice, as detailed herein, of a request for inspection.
6. A regulator shall be installed at each appliance which is located on a pound fuel line system. A spilt gas system shall not be permitted. A spilt gas system is defined as installing a second regulator outside of the house and downstream of regulator installed by the Utility.
7. Shrubs or trees shall not be within two (2) feet of a gas meter.
8. No gas meter shall be installed inside a fenced area that prohibits access from reading or maintenance of the meter.
9. Per Part 192 Minimum Federal Pipeline Safety Standards, if the meter service valve is in the off position, it shall be locked off until it is to be turned on and used following proper inspections.
10. If any appliance or fuel line component is found to be unsafe, the appliance shall be red tagged and the customer shall be given a time frame to have it repaired. If the appliance or fuel line component cannot be isolated, the meter shall be locked off until such repair is made.
11. If a system has a natural gas leak or a carbon monoxide reading of 35 PPM or greater, the system shall be locked off until repaired.
12. If the City Building Inspection Department or authorized agent of the City determines that any part of the venting system is not within code, the system shall be locked off until repaired/corrected.
13. If a leak is found on the customer's fuel line system and if the component cannot be isolated, the meter shall be locked off until repaired and a pressure test is passed. Refer to item numbers five and eleven for further explanation.
14. If at any time a customer's fuel line system is locked off due to a leak or changes to the customer's fuel line system, it must be repaired to meet the current gas code adopted by the City of Daphne and the standards as set forth herein and as established by the Daphne Utilities Gas Department.
15. A minimum of one (1) inch diameter galvanized or black iron fuel piping shall be installed from the connection with the meter through the wall of the structure up to the attic. After the fuel piping enters the attic and is no longer within the wall of the structure, the diameter of the fuel piping may be reduced. At this reduction point, the piping shall be at an accessible location.
16. For island stove installations, a four (4) inch casing shall be required to be installed in the slab from the wall to the stove island. There shall be no joints in the fuel piping from the attic to the stove island. Also, a valve shall be installed above the floor under the stove island unit.



17. For commercial buildings, exposed external fuel piping on external walls shall be painted yellow and secured.
18. A flex hose, copper, or corrugated stainless steel flex tubing with yellow coated polymer jacket may be used from the log lighter valve to the fireplace.
19. Daphne Utilities shall only be responsible for setting the meter. The Customer's representative (i.e., plumber) shall be responsible for connecting the meter to the establishment.
20. Prior to the meter being installed, the customer or customer's representative shall provide the total BTU input to the system, type of fuel system desired, and proposed gas appliances. Daphne Utilities has an "Inspection Load" Form to assist with providing the needed information.
21. The customer's representation shall clearly indicate with taping on the fuel system piping located on the outside of the structure near the proposed meter installation as to the type of fuel system desired. Blue tape shall denote an ounce fueling system and red tape shall denote a pound fueling system.
22. All piping installed for future supply pipe shall be connected to the supply line and pressure tested at the time of installation. Also, the future connection location shall be valved and capped.
23. All gas inspections shall be scheduled with City of Daphne Building Inspection Department or the authorized agent a minimum of twenty-four (24) hours prior to the requested inspection date. It shall be the customer's or the customer's appointed representative (i.e. plumber) responsibility to schedule such inspections at the appropriate time during construction.
24. Rough piping inspections shall be scheduled and performed after all piping has been installed and before any such piping has been covered or concealed or any fixtures or gas appliances have been connected. This inspection shall also include a pressure test.
25. Final inspections shall be scheduled and performed at time of requested turn in for service.
26. If pressure test, piping, and installation are not inspected and approved by the Building Inspection Department or authorized agent, service shall not be turned on to the facility.

**E. SUMMARY AT A GLANCE OF KEY COMPONENTS**

This list is not intended to note all requirements set forth in these specifications. It is the owner’s responsibility to ensure that all work conforms to Daphne Utilities standards and requirements. Refer to Appendix for list of acceptable products and manufacturers.

	<b>Water</b>	<b>Sewer</b>	<b>Gas</b>	<b>Comments</b>
<b>Pipe Material</b>				
PVC	C900 SDR 18 or heavier for 4” or greater	SDR 35 - Gravity C900 - Force Main 4” or greater	Not Accepted	Tracer Wire and Marking Tape Required
DI	Min. 150 pressure	Class 52	Not Accepted	Polyethylene Sheath Required unless testing confirms otherwise
HDPE	SDR 11 DIPS OD	SDR 11 DIPS OD	SDR 11	Tracer Wire and Marking Tape Required
<b>Pipe Size - Minimum (Inches)</b>	6	8 - Gravity 6 - Force Main 2 - LPFM	2	
<b>Fittings Material</b>	DI	DI	HDPE	
<b>Meters</b>	5/8 - 1” -Sensus Metering Systems SR11 1.5” - 8” Sensus Metering Systems Omni	N/A		Or Current Daphne Utilities’ Standards
Size	1” to 2” - Rigid Copper 3” to 4” - DI or PVC C900 with Mechanical Joint Fittings	N/A		
Bypass	Meter 1 ½” and Larger Bypass Required	N/A		
<b>Valves</b>				
Resilient Seated Gate Valve	Mueller, American, Kennedy, Clow			Gaskets, Bolts, and Nuts shall be furnished
Check Valve	Mueller, Clow, American, DeZurick			
Air & Vacuum Valve Assembly	ARI, APCO, Val-Matic			
Tapping Valve & Sleeve	JCM, Romac, Mueller			Stainless Steel

	<b>Water</b>	<b>Sewer</b>	<b>Gas</b>	<b>Comments</b>
<b>Back Flow Preventor</b>	Ford Cat No. HHS331-323 & Mueller H14242			
<b>Thrust Restraint</b>	Required at Bends and Along Pipe Segments as Necessitated by Design Calculations for Thrust Restraint at Fittings		N/A	Both Concrete Thrust Blocks and Mechanical Joint Restraints Are Required
<b>Pigging</b>		All FM	All 4" Mains and Larger	
<b>Testing/Inspection</b>	Chlorination and Hydrostatic Testing	Internal Video Inspection, Go-no-go Mandrel, Pneumatic Testing	Pressure Tests, Holiday Detector Tests	

<p><b>Water</b></p> <ul style="list-style-type: none"> <li>• Fire Hydrants Installed Every 500 Feet</li> <li>• Gate valves shall be located a maximum of 2 feet from hydrant.</li> </ul>
<p><b>Sewer</b></p> <ul style="list-style-type: none"> <li>• Minimum Manhole Size - 48"</li> <li>• Minimum Manhole Depth - 6 Feet</li> <li>• Inflow Dish - Required at low areas unable to have an elevated manhole and/or as directed by DU, Approved manufacturer is Rainstopper.</li> <li>• Chimney Seals - Shall be installed in new or existing manholes to stop infiltration</li> <li>• Testing for Lift Stations - Vacuum Testing</li> <li>• Lining - Required for manholes that have a discharge from a force main and all lift station wet wells</li> <li>• Materials Inside Wet Well - Only PVC and Stainless Steel used in wet well</li> <li>• RTU - Mission 110</li> <li>• "Man Down" Button Required at Lift Station Control Panel</li> <li>• Automatic Transfer Switch required for bypass pumps/generators</li> <li>• Back up floats shall be provided in Lift Station</li> <li>• Hardware - Stainless Steel</li> <li>• Operation and Maintenance Manuals Required for Lift Stations</li> <li>• Testing for Lift Stations - Operational Acceptance Test, Factory System Test, Conductor Insulation Resistance Test, Ground Rod Resistance Test, and Demonstration Test</li> <li>• The standard for bypass pumps/generators shall be natural gas unless a waiver is requested and granted by Daphne Utilities.</li> <li>• Exhaust Silencer: Critical type silencer, with muffler companion flanges and flexible stainless steel exhaust fitting, suitable for horizontal orientation, sized in accordance with engine manufacturer's instructions</li> <li>• Testing for Generator - Factory Test, Functional Test, Field Quality Control Test</li> <li>• Manufacturers for Generator - Generac Power Systems, Katolight Corporation, Kohler Power Systems, Cummings, Caterpillar</li> <li>• Manufacturers for Bypass Pumps - Godwin Pumps, Cornell Pumps, Pioneer</li> </ul>
<p><b>Gas</b></p> <ul style="list-style-type: none"> <li>• Conformance with USDOT Part 192</li> </ul>

**END OF SECTION**