



# CITY OF GRANBURY STANDARD SPECIFICATIONS For Public Works Projects

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## STANDARD CONSTRUCTION SPECIFICATIONS FOR PUBLIC WORKS PROJECTS

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# STANDARD CONSTRUCTION SPECIFICATIONS FOR PUBLIC WORKS PROJECTS

## A. WATER DISTRIBUTION

### I. Gate Valves

1. All gate valves shall be “wedge type” with AWWA approved cast iron fittings secured with star grips or mega lugs on fittings.
2. Use square head valves. Use curb and angle stops for the two-inch (2”) and smaller pipe. All fittings to be brass.
3. Valve boxes shall be fitted with lid liners to prevent dirt and infiltration (Foam Mud Plugs are preferred). Operating nut will be centered and accessible by valve wrench.
4. All valves more than four feet (4’) deep to operating nut shall be furnished with an extension.
5. All valves shall have a “V” stamped on the adjacent curb with the point of the “V” pointed in the direction of the valve and painted blue.
6. All valves shall have a 2’ x 2’x 6” concrete pad, reinforced with #3 rebar, surrounding the top of the valve box.
7. All valve lids shall be painted with the following color for identification

In-Line	Blue
Fire Hydrants	Silver
Fire Suppression	Red
End of Line	White
8. Tees shall have three (3) set valves and crosses shall have four (4) set valves where applicable.
9. Valves shall open counter clockwise.
10. Other appurtenances such as air relief valves, blow off valves and flushing valves shall be placed as required by the city.

### II. Water Mains

1. Water mains shall be DR-18 (C-900), eight-inch (8”) minimum. Any exceptions MUST be previously authorized in writing by the Public Works Director. Minimum of forty-two inch (42”) of coverage and avoid excessive bury depths.
2. Water main piping shall be laid with the writing on the pipe facing up.
3. Water mains shall be marked under the ground surface two feet (2’) above the pipe by placing a two inch (2”) wide metalized plastic tape with the word “WATER” printed on the tape.
4. Water mains to be installed with a #12 AWG EHS-CSS (extra high strength copper clad steel conductor with 45 mil HDPE insulation) tracer wire affixed to the top of the pipe and the wire extended up to test stations at valve boxes and to meter boxes. Test stations and connectors shall be Copperhead Snakepit (LD14B) or a preapproved domestically manufactured equal. Test station cap to be installed in concrete pad around valve box.

5. All tapping sleeves will be full circle stainless steel.

**Water Main Embedment**

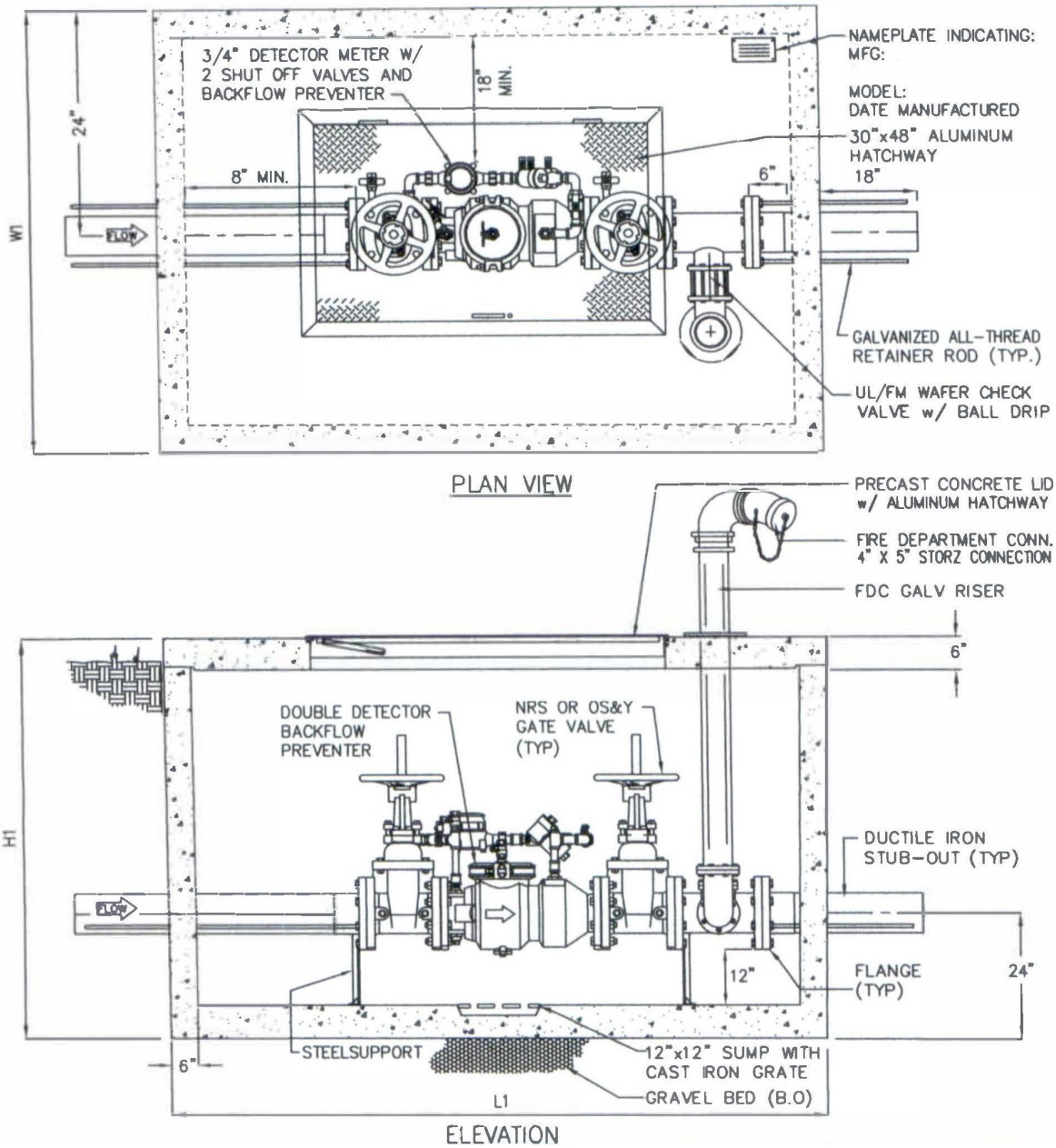
Depth below pipe	-	6" minimum
Height above pipe	-	12" minimum
Width	-	O.D. + 18"
Material	-	Cushion sand or other pre-approved material that is different in appearance from native soil
Density	-	95% standard proctor density under pavement 90% standard proctor density outside pavement

6. Excavated ditches shall remain open for inspection. Piping and tracer wire shall be inspected and approved prior to being covered. Tracer wire and locate tape shall be placed and visible for inspection prior to placement of final cover.
7. All ditches shall be compacted in a maximum of 12" inch lifts to proper density. (See Water Main Embedment criteria above).
8. All installations of water mains will require 150-psi hydrostatic test of a 4-hour duration, or 200 PSI for a minimum of two (2) hours with no pressure loss when performed against new valves and water quality testing supervised by city personnel.
9. Every 1,000' feet or portion thereof of all water mains shall have a separate water quality test.
10. All water mains running under the roadway shall be installed with an appropriate casing size, spacers, and with valves on both sides of roadway. Ends of casing need to be sealed with grout or a manufactured seal.

**III. Fire Hydrants**

1. Fire hydrants will be painted silver (Devoe, Devguard #4308) after pressure and flow testing by the contractor. In addition, the contractor will provide (pressure rated) 5 ¼" quick disconnect Storz caps for each hydrant and paint bonnet to match result of pitot test.
2. Fire hydrants shall be placed on block corners or near the center of the block in such a manner as to put every lot within 450 linear feet of a fire hydrant in residential, commercial and industrial areas. Fire hydrants shall not be installed in the bulb of cul-de-sac, and should be placed no closer than the beginning of the radius of the intersection of the cul-de-sac. Fire hydrants will be positioned in the "Parkway" approximately 24" inches from backside of curb. Minimum and maximum distances shall in all instances be no less than 18" inches or greater than thirty inches (30") from back side of curb. Contractors are encouraged to utilize "parallel hydrant tees" to achieve the above dimensions from the curb.
3. All fire hydrant assemblies shall have an isolation valve and be flanged or fitted with an approved restraint coupling.
4. The top of the fire hydrant gate valve cap shall be painted silver like the fire hydrants.
5. Fire hydrants shall be manufactured by Mueller or previously approved equal.
6. Fire hydrants shall be located away from all drive approaches and street radius as practical.

7. Fire hydrants shall have a minimum of eighteen inches (18") clearance from the bottom of the cap nut to ground level. Grade and landscaping changes should maintain this clearance.
8. The color of the bonnet shall be determined by the pitot test results.



**Specifications**

**CONCRETE:** Class I/II concrete with design strength of 4500 PSI at 28 days. Unit is of monolithic construction at floor and first stage of wall with sectional riser to required depth.

**REINFORCEMENT:** Grade 60 reinforced. Steel rebar conforming to ASTM A615 on required centers or equal.

**HATCHWAY:** 1/4" aluminum diamond plate cover with extruded aluminum frame. Hatch to be furnished with 316 stainless steel snap lock hinges.

**Engineering Data**

The backflow assembly shall be factory assembled in vault & hydrostatically tested prior to delivery. Field excavation & preparation shall be complete prior to delivery. Pipe, valves and fittings of the assembly shall be approved by one or more of the following associations:

#### **IV. Service Lines**

1. The location of water services shall be stamped on the adjacent curb with a "W" and painted blue in color.
2. Meter boxes shall be circular plastic, black on the outside, ¾", 1" & 2" meters, use DFW-2418-1BA, with 3" inches of pea gravel to be included in the bottom of the meter box and 6" of clearance to the meter stud. Approved vaults shall be used for larger meters.
3. Residential meter boxes shall be located in the parkway approximately three feet (3') feet from back of curb and clear of sidewalk and driveway approach.
4. Commercial meter boxes shall be located in the parkway approximately three feet (3') behind the sidewalk.
5. All fittings shall be compression type. No flared fittings shall be used.
6. All U branches / Bull Heads will have a one inch (1") ball valve in line immediately before U-branch.
7. All water service lines running under the street will be encased in PVC pipe (4" minimum), four inch (4") services and larger requires spacers.
8. Each lot shall have a minimum 1" soft copper "K" service line.
9. All single services shall be reduced down to ¾" meter unless directed otherwise by the Director of Public Works.
10. All single services shall have brass or bronze compression type curb stops / angle stops with locks. (Ford #KV43-332W-G or #KV43-342W-G or equivalent)
11. All service lines shall be installed using a double strap bronze tapping saddle with corporation stop. No epoxy coated steel saddles allowed.
12. All two inch (2") and larger service lines shall have square head gate valves installed as close to the main as is practical. Brass nipples and fittings shall be used.

#### **V. Vaults**

1. Place a minimum of eight inches (8") of washed rock under all concrete vaults. Install one inch (1") diameter deep holes in concrete base to drain seepage.
2. All vault lids in unpaved areas shall be outfitted with welded hasps for locking.
3. All fire protection service lines require double check valves contained in a vault at the connection to the city main. Resilient wedge valves shall be placed on the main side of the vault, outside the vault.

## **B. WASTEWATER COLLECTION**

### **I. Man Holes**

1. All manholes shall be concrete cast in place with approved Epoxy Manhole liner (125 mil minimum thickness).
2. Spacing shall be five hundred feet (500') maximum, with manholes at changes in pipe size, direction and grade. (TCEQ requirements)
3. All manholes shall have a 60" x 60" x 6" concrete pad constructed around it. Pads shall be reinforced with #3 bars on six inch (6") centers.
4. All manholes shall be outfitted with an inflow protection lid liner.
5. All manholes shall have a minimum thirty-two inch (32") man way opening.
6. All manhole rings and lids will be of corrosion proof composite construction of approved manufacture.

### **II. Lift Stations**

1. All lift stations having a wet well depth greater than (6) six feet shall have a strong, rigid aluminum safety grate installed under the access cover.

### **III. Sewer Mains**

1. Sanitary Sewer mains shall be SDR26 eight-inch (8") minimum.
2. Sanitary Sewer Embedment

Depth below Pipe	-	6" min.
Height above Pipe	-	12" min.
Width	-	O.D. + 18"
Material	-	Coarse Crushed Rock or Natural Gravel with landscaping fabric above
Density	-	95% Standard Proctor Density under Pavement
	-	90% Standard Proctor Density outside Pavement
3. Sewer mains shall be marked under the ground surface two-feet (2') above pipe by placing two inch (2") metalized tape with the word 'SEWER' printed on the tape at regular intervals.
4. Sewer mains to be installed with a #12 AWG EHS-CSS (extra high strength copper clad steel conductor wire with 45 mil HDPE insulation) (stranded #12 AWG THWN or THHN Gas and Oil Resistant) tracer wire attached to the pipe and the wire shall be extended up each service to the property line cleanout and up the outside of all manholes and stubbed out through the non-shrink grout under the ring.
5. Excavated ditches shall remain open for inspection. Piping and tracer wire shall be inspected and approved prior to being covered. Tracer tape shall be placed and visible for inspection prior to placement of final cover.
6. All ditches shall be compacted in a minimum of twelve inch (12") lifts to proper density. (see sanitary sewer embedment criteria above)

7. Cleanouts installed at end of mains shall have approved cast iron box with lid and an 18" x 18" x 6" concrete pad around the lid. Pad shall be reinforced with #3 bars on six inch (6") centers.

#### **IV. Sewer Services**

1. All sanitary sewer services are four inch (4") minimum schedule 40 PVC and shall have two way cleanouts installed at the property line on services less than six feet (6') deep. On services deeper than 6 feet, stacks consisting of a sweeping ell at the bottom and a cleanout cap fitting at the top, shall be installed. Upon completion of construction, threaded cleanout caps shall be installed and terminated approximately six inches (6") below the finished grade in city approved vault or box in unpaved areas. Cleanouts located in paved areas shall be capped with a traffic rated bolt on cleanout cap installed at grade.
2. The location of sanitary sewer services shall be stamped on the adjacent curb with an "S" and painted green in color. A dimension from the back of curb to the property line cleanout shall be recorded precisely on construction as-builts.

#### **V. Sewer Service Testing**

1. Required testing to include, camera, pressure, mandrel and vacuum test of the manholes. Camera recorded footage shall be of good clarity and shall show line identification coinciding with the project plans, footage, date and time. One (1) compact disc recording must be provided sewer wastewater improvement: Recording must be in mpeg 1 format or MP4 with H264 compression. **(Must be approved prior to final acceptance)**

### **C. STREETS**

#### **I. Concrete Paving**

1. Concrete paving operations shall be performed by a slip form machine method. (Exceptions to this shall require special permission of the city and only for irregular paving areas not able to be poured by a slip form machine and areas deemed too small for a slip form operation).
2. Concrete paving shall adhere to the TXDOT specifications.
3. Concrete compressive strength for all city paving and infrastructure shall meet or exceed 3,600 psi.
4. All concrete pours other than slip form machine pours shall have one (1) sack of cement per cubic yard added in addition to the mix design.
5. Concrete shall not be placed when the temperature is 40° F and falling. Concrete may be placed when the temperature is 35° F and rising, and the concrete must be protected at a minimum temperature of 35° F for seventy-two (72) hours. Concrete shall not be placed when the temperature of the concrete exceeds 95° F.
6. Approved mechanical vibrators will be utilized in front of all screed and/or finishing machines. Concrete paving will incorporate a "tine" grooved surface finish, with grooves perpendicular to the flow of traffic, spaced one inch (1") apart, and penetrating to a depth of at least 1/8" into the concrete.
7. Curing compound shall be applied immediately after finishing operations



**II. Expansion Joints**

1. All expansion joints will incorporate lubricated smooth dowels with caps supported by wire “street baskets.”
2. Saw cut grooves in concrete paving will be filled with a low modulus polyurethane based elastomeric sealant such as Sika Sikaflex – 15LM or approved silicone equivalent. Asphalt sealant or hot poured rubber is not allowed.
3. Transverse contraction or dummy joints on concrete pavement shall be placed at the intervals shown below:

<u>Pavement Thickness</u>	<u>Joint Spacing</u>
5" & 6"	12' - 0"
7" & 8"	15' - 0"

4. All sawing operations shall be conducted and completed within that period of time from 5 – 12 hours after the concrete slab has been poured, including the sealing operations.
5. Tooled or dummy joints on curb and gutter shall be spaced at 5' - 0" intervals.

**III. ADA Ramps / Sidewalks**

1. ADA ramps will be constructed in accordance with the latest published addition of “Technical Requirements” of the Texas Accessibility Standards” (TAS). The following parameters affecting slope accessibility routes shall be maintained unless otherwise directed:
  - a. Cross slope at walking surfaces maximum ¼” per foot.
  - b. Slope of curb ramps in direction of travel maximum 1” per 12”.
  - c. Slope of flared edges of curb ramps maximum 1” per 10”.
  - d. Ramps shall be a minimum of thirty-six (36”) wide with truncated domes extending the entire width of the ramp.
2. Show the location of sidewalks and access ramps on construction plans.
3. Sidewalks shall be “flagged” at intervals equal to the width of the walk with a marking tool. When the sidewalk is against the curb, expansion joints and tooled grooves shall match those in the curb.

**IV. Storm Drains**

1. The minimum size storm drain is 18” RCP.
2. All storm drain RCP will be installed a minimum of eighteen inches (18”) below the top of curb or existing grade.
3. Embedment shall be washed gravel, washed crushed stone or washed crushed gravel.

**Storm Drain Embedment**

Depth below pipe	-	6” minimum
Height above flow line	-	¾ of pipe O.D.
Width	-	O.D. + 18”
Material	-	Washed Gravel, Washed Crushed Stone or Washed Crushed Gravel
Density	-	95% Standard Proctor Density under Pavement
	-	90% Standard Proctor Density outside Pavement

4. All storm drain rings and lids will be manufactured by Bass and Hayes or approved equal. No imports allowed.
5. Excavated ditches shall be left open for inspection of all storm sewer piping and infrastructure prior to covering.

#### **V. Storm Drain Testing**

2. Required testing to include camera of lines **Public and Private**. Camera recorded footage shall be of good clarity and shall show line identification coinciding with the project plans, footage, date and time. One (1) compact disc recording must be provided for Storm Drain improvement: Recording must be in mpeg 1 format or MP4 with H264 compression. **(Must be approved prior to final acceptance)**

#### **VI. Miscellaneous Requirements**

1. Rehabilitated streets milled for new flex base and HMAC will require marking of all valve boxes, clean-outs, and manholes within the street. It will be the contractor's responsibility to inspect these components for damage prior to installation of concrete pads. All manholes will be properly aligned and valve boxes clean of debris with adjusting tool accessibility.
2. All sub grades shall be compacted in six inch (6") lifts to a density of 95% +/- standard proctor, as verified by lab results.
3. Street light support structure shall be installed in the parkway approximately 1' to 3' in back of curb. Excavation for street light pole installation shall remain clear of "parkway" utilities. Damage to any underground utility will be the contractor's responsibility.
4. Water and/or Wastewater facilities and appurtenances shall be constructed at the locations and to the line and grade established in the approved final construction plans. It is the responsibility of the developer and his contractors to perform all construction in accordance with the approved construction plans and specifications. Any change in design required during construction shall be made by the Engineer whose seal and signature are shown on the plans. All changes shall be approved by the Director of Public Works.