HYDRA-STOP®

SUGGESTED SPECIFICATIONS FOR:
HYDRA-STOP ON CAST IRON PIPE
HYDRA-STOP HEAD (Molded Rubber Bullet)

1.0 SCOPE:

Under this item Contractor shall furnish all materials, labor and equipment to properly install and set Hydra-Stops into the existing Cast Iron Main(s) at the locations shown on the plans.

1.1 DESCRIPTION OF PROCEDURE:

The Hydra-Stopping procedure is a means of temporarily plugging a pressurized pipe without disrupting pressure or service upstream of the Hydra-Stop. A Pressure tap is first made into the main, allowing insertion of the Hydra-Stop plugging device into the main under pressure. By using a special Hydra-Stop fitting, the tapping valve can be later recovered after the plugging head has been removed from the main. The sequence consists of sixteen steps, two of which must be accomplished prior to placing orders for Hydra-Stop materials.

1.1.1 For Cast Iron Pipe-determine from City, engineering, and/or manufacturers' records: (a) make, (b) specification, (c) age, (d) cross sectional dimensions.

1.1.2 Prior to ordering material: Excavate, dewater, expose, and clean the exterior of the main at location of each Hydra-Stop. If main is heavily corroded; or if utilities will interfere with fittings, support/reaction blocking, or equipment; move location up or downstream to structurally sound pipe.

- **a.** Caliper O.D. of all mains to determine ovality.
- **b.** Verify wall thickness and interior condition.
- **c.** Backfill; restore as necessary.

1.1.3 Re-excavate; dewater. Assemble split Hydra-Stop fitting(s) around the main. Install drain nozzle(s) and saddle(s) to the main.

1.1.4 Pressure test per Engineer's specs.

1.1.5 Pour concrete support and reaction blocking. Allow to cure per Engineer's instructions.

1.1.6 Mount temporary tapping valve(s) to Hydra-Stop fitting(s) and drain nozzle(s).

1.1.7 Mount tapping machine; open valve; pressure tap; retract cutter; close temporary valve; remove tapping machine.

1.1.8 Mount Hydra-Stop machine; open temporary valve; insert Hydra-Stop plugging head into main.

- **a.** If two or more Hydra-Stops, insert downstream plugging head first.
- ***b.*** *NOTE: No flow in main greater than 0.3 fps at time plugging head is inserted into main.*

1.1.9 Test for shutdown at drain nozzle.

1.1.10 Cut downstream main. Install required fittings.

1.1.11 Retract Hydra-Stop plugging head(s), close temporary valve. Remove Hydra-Stop machine.

1.1.12 Install completion machine; open valve.

1.1.13 Insert completion plug into nozzle of Hydra-Stop fitting.

1.1.14 Remove completion machine and temporary valve.

1.1.15 Repeat Par. 1.1.12 thru 1.1.14 at other Hydra-Stop fitting(s).

1.1.16 Install blind flange(s) onto nozzle of Hydra-Stop fitting(s) and onto drain fitting(s).

1.2 INTERRUPTION OF FLOW:

The existing mains, upstream of the Hydra-Stop(s), cannot be shut down or taken out of service. To insure that the entire operation shall be accomplished without interruption of service or flow, the installation shall be accomplished by Contractor personnel skilled and experienced in the procedures specific to Hydra-Stops of this size.

1.3 REDUCTION OF PRESSURE:

The entire operation of making the Hydra-Stop shall be accomplished without reduction of water pressure in the main(s) below 100 psig. It shall be the responsibility of the Contractor to verify pressure prior to commencing the installation. The City will reduce the pressure to 100 psig or less for the duration of the installations.

1.4 DRAIN NOZZLES:

At Engineer's direction, Contractor shall provide drain pressure taps between Hydra-Stops. These pressure connections will allow quick determination of shutdown adequacy.

1.4.1 In order to remove a Hydra-Stop plugging head, no equalization will be required.

1.4.2 Because some amount of leakage may pass Hydra-Stops, (See Section 1.5, below), the minimum nominal size of the drain taps shall be 6".

1.4.3 Contractor shall have the option of recovering the drain valves by using Hydra-Stop-type tapping nozzles with completion plugs, or abandoning the valves by leaving them attached to the nozzles. In either case, the outlet of each nozzle or valve shall be sealed with a blind flange, mechanical joint plug, or a screwed pipe cap.

1.4.4 The drain tapping fitting shall consist of a saddle plate with an integral flanged nozzle to which a tapping valve can be attached in a pressure tight manner.

- **a.** The interior of the saddle plate, adjacent to and concentric with the O.D. of the nozzle, shall be grooved to retain a gasket which shall seal the saddle plate to the exterior of the cast iron main. This gasket shall constitute the only seal between the main and the fitting.
- **b.** At Contractor's option, the saddle plate shall consist of a steel weldment, in general conformity with Section 1.7, below, or a machined ductile iron casting.
- **c.** Saddle shall be clamped to main by a minimum of two "U" shaped steel strap/stud assemblies of sufficient cross section to contain a line pressure of 200 psig.

1.5 EXTENT OF SHUTDOWNS:

Shutdowns will be accomplished by using Hydra-Stops. Because of possible internal corrosion and deposits in mains, "bottle-tight" shut-downs may not occur. A satisfactory shutdown in one which allows the work to be accomplished (i.e. valve replacement, etc.) using drainage pumps to dewater excavations, with workmen wearing boots and rain gear, if necessary.

1.5.1 If leakage is excessive, Contractor and City will cooperate in using "geophones" or other listening devices to determine extent and location of leakage.

1.5.2 In the event that a Hydra-Stop location is abandoned, through no fault of the Contractor, he shall be entitled to payment for that Hydra-Stop.

1.6 PRELIMINARY FIELD INSPECTION OF MAINS:

Dimensional, specification, and other data regarding the existing mains have been taken from records, many of which are old and/or inadequate. These data have not been verified by field inspections. Many of these mains consist of very old pit cast iron pipe which may contain dimensional and structural flaws. In addition, it is anticipated that exterior main conditions, bells, service connections, or presence of adjoining utilities may require relocation of proposed Hydra-Stops.

1.6.1 It is necessary to know the exact main O.D., ovality, and bore diameter before Hydra-Stop fittings and plugging head sealing elements can be manufactured.

1.6.2 Prior to ordering material, Contractor shall excavate at each proposed locations, and caliper the header O.D. along at least four (4) diameters to determine ovality.

1.6.3 Contractor shall determine main wall thickness, uniformity, and structural integrity by means of ultrasonic testing. Data shall be taken to determine extent of internal deposits, tuberculation, etc.

- **a.** If Engineer determines that Contractor's data are not adequate, Engineer may direct Contractor to make one or more pressure taps on main to obtain test pipe coupons for Engineer's evaluation.
- **b.** Minimum size of test coupon shall be 5" diameter, drilled through a nominal 6" valve.
- **c.** Pressure tapping saddles and other materials used for inspection taps shall conform to Section 1.4, except that test coupon diameter shall be 5" as specified in Section 1.6.3b.

1.6.4 Heavy interior corrosion and/or tuberculation can be anticipated in the existing mains. See Section 1.5, above.

1.6.5 If, in Engineer's opinion, the proposed location is unsatisfactory; he will direct excavation at another site. Excavating, dewatering, inspections, backfill, and restoration will be separate pay items.

1.7 HYDRA-STOP FITTING AND ACCESSORIES, CAST IRON PIPE:

Fitting shall be full encirclement, pressure retention type split tee. It shall consist of two steel weldments; (1) an upper Hydra-Stop flange saddle plate and (2) a lower saddle plate. These two saddle plates shall be contiguous.

1.7.1 Material Drawings: Contractor shall submit to Engineer five (5) sets of drawings, furnished by manufacturers, fully and distinctly illustrated and describing the Hydra-Stop fittings proposed to be furnished.

1.7.2 Hydra-Stop Flange: The outlet of each fitting shall be machined from a 150 lb. forged steel flange (ASTM A181 or A105) or from pressure vessel quality steel plate (ASTM A285, Grade C); flat faced and drilled per ANSI B16.5). Suitable independently operated locking devices shall be provided in the periphery of the flange to secure the completion plug.

1.7.3 Hydra-Stop Nozzle: The nozzle, which lies between the saddle and the flange (Section 1.7.2), shall be fabricated from steel pipe (ASTM A234). After welding and stress relief, the nozzle shall be accurately bored a follows to accommodate the Hydra-Stop plugging head:

- **a.** Machine an internal circular shoulder to seal against the circumferential gasket carried on the plugging head (Section 2.2.2).

1.7.4 Completion Plug: The completion plug shall be machined from a stress relieved carbon steel weldment. It shall contain two (2) circumferential grooves: one to receive the locking devices from the Hydra-Stop flange, and the second to contain a compressible "O" ring to seal pressure tight against the bore of the flange.

1.7.5 Blind Flange: Each Hydra-Stop fitting shall be closed with a blind flange. Facing and drilling of the blind flange shall be compatible with that of the Hydra-Stop flange. Minimum blind flange thickness shall be that of AWWA Spec. 207, Class D.

1.7.6 Saddle Alignment Marking: Each saddle half shall be matched and marked with serial numbers, to insure proper alignment in the field.

1.7.7 Fasteners: All bolts, studs, and nuts used on Hydra-Stop and drain/equalization fittings shall be of the heavy series.

1.7.8 General: Manufacturer will exercise extreme care to insure that weldments are of adequate strength, properly shaped, securely reinforced, and free from distortion that could stress the ductile iron main during installation, pressure tapping, or Hydra-Stopping operations. All steel shall meet the requirements of ASTM A36, as a minimum. All weldments shall be braced and stress relieved.

1.7.9 Gaskets: Shall be molded from elastomer compounds that resist compression setting and are compatible with water in the 32 to 140 deg. F temperature range.

1.7.10 Upper Hydra-Stop Flange Saddle: Shall consist of a saddle plate, a Hydra-Stop flange, and a Hydra-Stop nozzle. The interior of the saddle plate, adjacent to and concentric with the O.D. of the nozzle, shall be grooved to retain a gasket which shall seal the saddle plate to the exterior of the ductile iron main. This gasket shall constitute the only seal between the main and the fitting.

- **a.** Saddle plate shall be of a minimum of 0.375" in thickness. It shall be shaped to be concentric to the outside of the ductile iron main. The smallest I.D. of the saddle and its interior rings shall exceed the O.D. of the main by a minimum of 0.250" to allow for ovality of the main.
- **b.** A Hydra-Stop nozzle of 0.375" min. wall thickness shall be securely welded to the saddle plate.
- **c.** The Hydra-Stop flange shall be securely welded to the nozzle. After welding, the assembly shall be braced, stress relieved, and bored to receive the completion plug and the circumferential gasket of the Hydra-Stop machine plugging head.
- **d.** Bolt, nut of stud, nut, and washer assemblies shall be furnished to draw the upper and lower saddles together for sealing. Bolting brackets shall be gussetted.

1.7.11 Lower Saddle Plate: Saddle plate shall be of a minimum 0.375" thickness and shall be shaped to be concentric to the outside brackets shall match upper half.

1.8 INSTALLATION OF HYDRA-STOP FITTINGS, GENERAL:

Contractor shall power wire brush and grind the exterior of the main to remove any debris, corrosion deposits, or other surface irregularities that might interfere with proper seating and sealing of each Hydra-Stop fitting against each main. Any structural defects in main, service connections, appurtenances, adjacent utilities, etc., that could interfere with the Hydra-Stop installation shall be immediately reported to Engineer.

1.8.1 Inspection: Contractor shall fit upper and lower saddle plate assemblies to main, thoroughly checking for proper fit to main.

1.8.2 Assembly to Main: Under no circumstances shall Contractor attempt to force, reshape, or bend saddle plates by excessive tightening of saddle studs while Hydra-Stop fitting is assembled around the main.

- **a.** Any retrofitting shall be accomplished with the fitting removed from the main.
- **b.** Any damage to fitting, accessories, or main shall be repaired at Contractor's expense to the satisfaction of Engineer.

1.9 ASSEMBLY OF HYDRA-STOP FITTING CAST IRON PIPE:

Note: The upper and lower saddle plates shall be bolted together.

1.9.1 Main Preparation: The entire periphery of the cast iron main shall be power ground for the entire length of the Hydra-Stop fitting.

1.9.2 Assembly of Saddle Plates: Upper and Lower saddle halves shall be drawn together by bolt assemblies (Section 1.7.10h).

a. Saddle plates shall be bolted together in the horizontal position.

2.0 THRUST AND SUPPORT BLOCKING:

Prior to mounting temporary tapping valve and pressure tapping machinery, Contractor shall install concrete thrust and support blocking as shown on the plans. Blocking shall reach a minimum cure strength specified by engineer before any valves or machinery shall be mounted onto the Hydra-Stop fitting.

2.1 CUTTING OPERATION:

Drilling equipment shall be in good condition, and equipped with power drive to insure smooth cutting, and to minimize shock and vibration. Cutting equipment shall be carbide tipped and capable of being replaced without removal from the jobsite.

2.2 HYDRA-STOP MACHINERY:

The equipment shall consist of a cylindrical plugging head that contains a flat, expandable elastomer sealing element. The plugging head is advanced into and retracted from the main by means of a linear actuator. When retracted, the plugging head and carrier are housed in an adapter, bolted pressure tight between the tapping valve and the actuator.

2.2.1 Sealing Element: The element shall be monolithically molded from a suitable polyurethane compound. The element shall be flat in a plane perpendicular to the flow in the main. Minimum thickness of the element shall be 4". The bottom of the element shall be semi-circular to conform to the bore of the main.

2.2.2 Plugging Head: The diameter of the cylindrical plugging head shall be slightly smaller than the bore of the Hydra-Stop nozzle. The plugging head shall have a suitable circumferential gasket to seal against the shoulder in the Hydra-Stop nozzle, (Section 1.7.3, above). This gasket shall also seal against the sealing element to prevent bypass flow around the Hydra-Stop.

2.2.3 Deposits in Bore of Main: The semi-cylindrical bottom of the plugging head shall be designed to break and dislodge tuberculation and other deposits in the bore of the main which might interfere with a satisfactory Hydra-Stop (Section 1.5, above).

3.0 COMPLETION:

Final closure shall be accomplished by insertion of a completion plug. (1.1.12, 1.1.13, 1.1.14)

3.0.1 Completion Plug: Test of completion plug (1.7.4) sealing shall be accomplished through bleed-off in machine housing.

3.0.2 Removal: Temporary valve shall be removed and installation of blind flange (1.7.5) shall be completed.

4.0 CONTRACTOR'S INSURANCE:

Contractor to whom the City awards these installations shall submit with his contract Certificates of Insurance showing statutory Workman's Compensation Insurance; Bodily injury, Property Damage, and Automobile Liability Insurance in the minimum amount of $1,000,000.