Standards of Infrastructure Design

City of Rochester, New Hampshire

DEPARTMENT OF PUBLIC WORKS
45 Old Dover Road
Rochester, New Hampshire

Last Revised:
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I - POTABLE WATER DESIGN STANDARDS

1. PURPOSE

These standards are intended to provide for effective potable water infrastructure to promote the health and safety of the citizens of Rochester.

2. LICENSING

Per Section 17.7 (E) of the General Ordinances of the City of Rochester, before the construction, installation, or maintenance/repair of any potable water pipe the contractor must be licensed by the City of Rochester. Water/Sewer License Applications can be obtained at the Rochester Public Works office at 45 Old Dover Rd., Rochester, NH 03867.

3. PERMITTING

Per Section 15.5 (A) of the General Ordinances of the City of Rochester, no person shall break or dig up the ground, stone or concrete in any street, lane or alley, or in any sidewalk or common in the City, without first obtaining a written permit from the City and complying with all respects and conditions that may be imposed; including record keeping, notices and traffic control regulations. Excavation Permits can be obtained at the Rochester Public Works office at 45 Old Dover Rd, Rochester, NH 03867.

4. DOCUMENTATION

During construction an accurate record shall be kept on site of the location, depth, size and material of all utility work within the City of Rochester Right-of-Way and shall be available upon request. Records shall include all private connection locations and swing-ties for all water shut-off's. Records shall be provided to the City of Rochester Department of Public Works upon request and at the completion of the project.

5. INSPECTIONS

All utilities within the City of Rochester Right-of-Way shall be inspected by the City Engineer or his/her representative, prior to backfilling of trenches or other covering of services.

6. TESTING

All potable water pipe installed shall be tested by an independent third party testing company approved by the City of Rochester. All costs associated with testing shall be assumed to be part of the work and be performed in the presence of the City Engineer or his/her representative. Potable water pipe with a diameter of inches or greater shall be tested at a length not to exceed 1500LF.

Leakage testing shall consist of the following:

A. All necessary equipment and labor for carrying out a pressure test and leakage test on the pipelines.

B. Make taps and furnish all necessary caps, plugs, etc. Taps shall be made at the end of pipe runs to allow air to escape as necessary Hydrants shall be used whenever possible to facilitate testing without unnecessary taps.

C. All pipelines shall be subjected to a hydrostatic pressure of 150 PSI or 1 ½ times the normal operating pressure, whichever is greater, and maintained for at least two hours. The leakage tests shall be conducted for a period of two hours. The test pressure shall not vary by more than 5 psi during the test.

D. Hydrant gate valves shall remain OPEN during this test as only non-draining hydrants are allowed in the system.

E. The amount of allowable leakage shall be in accordance with the following formula, or taken from AWWA C600 Table 6A:

$$L = \frac{SD\sqrt{P}}{148{,}000}$$

where: L is the allowable leakage, in gallons per hour
S is the length of the pipe tested, in feet
D is the nominal diameter, in inches
P is the average pressure during the test, in PSI gauge

7. CHLORINATION AND SAMPLING OF PIPELINES

All potable water pipe installed shall be subject to chlorination.

A. Chlorination
   1. Before being placed in service, all new water pipelines shall be chlorinated using the continuous feed method specified in AWWA C651.
   2. The location of the chlorination and sampling points shall be determined by the City Engineer or his/her representative.
   3. The chlorine solution shall remain in the pipeline for a period of 24 hours.
   4. In instances where the above method is not practical such as connections to existing mains, all fittings shall be dipped or swabbed in a chlorine bath of no less than 30 gallons with 65% HTH (High Test Hypochlorite) with 24 hours of contact time.
   5. All water lines shall be chlorinated at no less than 50 ppm.

B. Sampling
   1. Samples shall be taken in accordance to AWWA C651
   2. All water pipes subjected to the chlorination process shall be sampled and tested for E. Coli Bacteria and Total Coliform Bacteria

3. All samples shall be taken while a representative from the Public Works Department is present.
4. Samples shall be taken at a maximum of every 1500 linear feet of water main.
5. It may be requested that, split samples (one sample collected by the contractor, one sample collected by the city) be taken at least 24 hours apart for every water main after the heavily chlorinated water has been flushed.

8. GATE VALVES AND BOXES

All gate valves and gate boxes shall be installed in conformance with the City of Rochester standards as shown in Figure I-1 and shall consist of the following:

A. Gate Valves
1. Shall meet the requirements of AWWA C509.
2. Gate valves shall be rated for 250 psi working pressure and 500 psi test pressure.
3. Valve interior and exteriors shall have epoxy coatings meeting AWWA C550.
4. Resilient Wedge – Ductile iron wedge with bonded EPDM elastomer covering.
5. Stem – Manganese bronze, ASTM B584
6. Stuffing box O-rings
   a. Two O-rings, each nitrile rubber
   b. Capable of changing under pressure
7. Wedgenut – Bronze, ASTM B62
8. Bolting – stainless steel type 18-8
9. End connections – mechanical joint
10. Gate Valves shall open right (clockwise).
11. Operating nuts shall be 2-inch square.
12. UL listed and FM approved
13. Gate Box Aligner
   a. Installed under the operating nut
   b. Necessary on all gate valves
14. Acceptable manufacturers
   a. American Flow Control
   b. Clow
   c. Mueller
   d. Approved equel
15. Butterfly Valves shall be installed at the discretion of the City and only on all pipes with a diameter of 16” or greater.

B. Gate Boxes
1. Cast iron, tar coated, sliding and adjustable 3-piece units.
2. Three piece
   a. Bell end lower section suitable to fit over valve stuffing box.
   b. Upper section shall have a flange sufficiently strong such

that all weight from the street does not transmit to the valve.

c. Covers shall have the word "WATER" cast such that it is easily read.

Gate valves shall be located at all intersections at each street. Unless directed otherwise by the City Engineer, three-way intersection shall have 3 gate valves and four way intersections shall have 4 gate valves.

9. CORPORATION STOPS

All corporation stops shall be installed in conformance with the City of Rochester standards as shown in Figure I-2 and shall consist of the following:

A. Shall meet the requirements of AWWA C800
B. Constructed of lead free brass.
C. Outlet shall have a compression pack joint
D. Inlet shall have a clockwise tapered AWWA thread.
E. Ball valve type
F. Working pressure of 200 psi

10. CURB STOPS AND BOXES, COUPLINGS, SERVICE SADDLES

All curb stops and boxes shall be installed in conformance with the City of Rochester standards as shown in Figure I-2 and shall consist of the following:

A. Curb Stops
1. Shall meet the requirements of AWWA C800
2. Constructed of lead free brass.
3. Inlet and outlet shall have a compression pack joint connection.
4. Working pressure of 200 PSI shall be required.
5. Ball valve type.

B. Curb Boxes
1. Cast iron base piece, steel upper, cast iron lid, and threaded bronze plug with pentagon nut (Rope Thread).
2. Extension type and arch pattern base with 1/2 inch diameter minimum, 30-inch long stainless steel stationary rod.
3. Curb box shall be Erie type.
4. Curb box covers are to be cast with WATER label.

C. Couplings
1. Standard three part union.
2. Constructed of lead free brass.
3. Shall meet the requirements of AWWA C800.
4. Inlet and outlet shall have a compression pack joint connection.
5. Working pressure of 200 PSI shall be required.

D. Service Saddles

1. Constructed of ductile iron.
2. Double strap type with 360° contact on the main.
3. Straps shall be stainless steel.
4. Required on all taps 2" and greater on ductile iron pipe.
5. Required on all taps on PVC or HDPE pipe.
6. Threads per AWWA C800.

Curb stops shall be located at property lines and right of ways. Whenever possible curb stops shall be located away from driveways, sidewalks and other paved structures and shall be flush in elevation with surrounding grounds. Couplings shall not be used on City property or within the City right-of-way.

11. METERS

All services are to be metered. A common meter pit shall be installed for all service connections equal to or greater than 2" (excluding fire protection services). The Department of Public Works will set only one meter on any one parcel and the owner of the premises shall be liable for the entire amount of water used on the premises irrespective of leases of individual consumers..

Meters are installed for measurement of all water supplied to consumers. Customers shall provide a clean, dry, warm, safe and accessible place for installation of a meter. The location shall be easily accessible by a person in the upright position for reading, maintaining and changing. All meters shall have the ability of being read by a remote meter reading device that is to be mounted in an easily accessible exterior wall.

12. TAPPING SLEEVE & VALVE ASSEMBLIES

All tapping sleeve & valve assemblies shall be installed in conformance with the City of Rochester standards and shall consist of the following:

A. Valves: Shall be flanged by mechanical joint outlet with non-rising stem as specified in part 3.
B. Tapping Sleeves
    1. Stainless Steel
        a. Shall be used for tapping smaller pipe diameters
        b. Shall be suitable for use on cast iron, ductile iron, or PVC as applicable
        c. Working pressure of 200 psi
    2. Ductile Iron Mechanical Joint
        a. Shall be used for tapping similar pipe diameters
        b. Shall be suitable for use on cast iron, ductile iron and AC
        c. Working pressure of 200 psi
C. Gasket: Neoprene type gasket suitable for potable water.
D. Valve Boxes: As specified in part 4.

The outlet flange shall be set vertically, and sleeve shall be squarely centered on the main to be tapped. Installation shall be made under pressure and the

contractor shall furnish tapping machine.

13. HYDRANT ASSEMBLIES

All hydrant assemblies shall be installed in conformance with the City of Rochester standards as shown in Figure I-1 and shall consist of the following:

A. Dry barrel type with a 5-inch minimum valve opening. Height of upper barrel section to be determined by the City Engineer or representative.

B. Two (2) 2-1/2 inch hose connections and one (1) 4-1/2 inch steamer connection.
   1. 2-1/2 inch outlets: 60° V threads, 7-1/2 inch threads to the inch, external threads 3-1/16 inches, O.D. National Standard threads.
   2. 4-1/2 inch outlet: 4 threads to the inch, external threads 5-3/4 inches, O.D. National Standard threads.

C. 250 pounds of working pressure and 500 pounds hydrostatic test pressure.

D. Working parts shall be bronze and open clockwise.

E. Designed with standpipe breaking ring or breakable sections located no higher than 12" above grade.

F. Caps shall be attached to hydrant body by chains.

G. Only non-draining hydrants shall be accepted. If the hydrant comes with a drain, a drain plug shall be installed.

H. Valves
   1. As specified.
   2. Necessary on all hydrants

I. Hydrant Markers - Fiberglass, 3/8" diameter, high visibility, 5 feet long, bolt mounted, zinc plated carbon steel spring mounted. A Hydrant number shall be bolted to the hydrant in accordance with the DPW numbering system.

J. All barrel surfaces of hydrant shall be red. Caps and bonnet of hydrants shall be painted to match the following flow availabilities:

Available Fire Flow (gallons per minute)	Caps and Bonnets Color
≥1500gpm	Blue
1000gpm – 1499gpm	Green
500gpm – 999gpm	Orange
<500gpm	Red

K. Acceptable Manufactures
   1. American Darling – (B-84-B)
   2. Kennedy – (K-81-D)

Hydrants shall be located at least five feet from the pavement edge or on the backside of sidewalks. Hydrants shall be checked with a level to be plum vertically and horizontally. The center of the 4 ½" outlet shall be no less than 18" above finish grade. All hydrants shall have detector rods installed that extend 5' above the top of the hydrant.

14. PIPE

All potable water pipe installed underground shall be in conformance with the City of Rochester standards and shall consist of the following:

A. Pipe 2-inches and below:
   1. Copper Pipe (Type K)
      a. No two lengths of ¾" or 1" pipe shall be joined for pipe runs under 100 feet.
      b. No two lengths of 2" pipe shall be joined for pipe runs under 40 feet.
      c. Copper pipe shall remain at least five feet below elevation and have no kinks.
   2. High Density Polyethylene Pipe (HDPE)
      a. No two lengths of pipe shall be joined for runs under 100 feet regardless of pipe diameter.
      b. HDPE pipe shall remain at least five feet below elevation and have no kinks.
      c. HDPE pipe shall be SDR-9 and have a minimum pressure rating of 200psi.
      d. HDPE pipe used for potable water shall be blue in color.
      e. All HDPE shall be run with tracer wire.
   3. Fittings: As specified in Section 5

B. Pipe greater than 2-inches:
   1. Ductile Iron Pipe (Class 52) for pipe 4 inches and above in diameter:
      a. Shall conform to ANSI/AWWA C151, Class 52
      b. Pipe shall be double thickness cement lined and seal coated in accordance with ANSI/AWWA C104
      c. Factory applied bituminous coatings (in accordance with AWWA C151) shall be furnished on the exterior of all underground piping unless noted otherwise.
   2. Pipe shall be wrapped in polyethylene plastic when the groundwater and soil conditions require it. This can be determined onsite by the City Engineer, their representative, or it can be shown on the drawings. Fittings and Joints (Ductile Iron Pipe)
      a. Push-on and Mechanical Joint:
         1. The plain ends of push-on pipes shall be factory machined to a true circle and chamfered to facilitate fitting the gasket.
         2. Bolts and nuts for buried mechanical joints shall meet AWWA C-111 requirements.
         3. Provide gaskets manufactured from a composition material suitable for exposure to the fluid contained within the pipe.
      b. Joint Bracing:
         1. Pipe and fittings furnished with approved lugs or hooks cast integrally for use with socket pipe clamps, tie rods, or bridles.

2. Bridles and tie rods shall be a minimum of 3/4 inch diameter except where they replace a flange bolt of a smaller size.
3. Ductile iron gland and restraining ring (Grip-Ring) with a working pressure of 350 PSI, up to 8 inches; 250 PSI for 10 and 12 inch sizes.
4. Ductile iron gland with multiple griping action restrainer wedges (Megalug) with a working pressure of 350 PSI for up to 12 inches.

c. Fittings:
1. Pressure rating of 250 PSI
2. Flange shall be ANSI B16.1, class 152
3. Cement lined and seal coated
4. Factory applied bituminous coating shall be furnished.

C. Underground Pipe Markings
1. Detectable Warning Tape:
a. All water and sewer pipe shall be installed with detectable warning tape.
b. Warning tape shall conform in color to the APWA color standards:
1. Potable Water – Blue
2. Sewer – Green
c. Warning tape shall be installed 2' above the top of the buried pipe
2. Tracer Wire:
a. All non-metallic pipe shall be installed with tracer wire.
b. Tracer wire shall be run the entire length of the non-metallic pipe and shall be daylighted at or adjacent to the termination of the pipe run to allow for connection to the wire for detection purposes.
c. Tracer wire shall be rated for direct burial and shall have the jacket color correspond to the utility being installed.

D. Bridge crossings and other types of unique water main installations shall be subject to individual circumstances not represented within.

E. When utilities are within 18" of one another it shall be assumed that 2" of insulation shall cover all water mains.

15. BUILDING POTABLE WATER

All water pipe shall be installed with at least 5 feet of suitable cover. No two pipes shall be laid in the same trench. Water pipe must be at least 10' from any other utility. All building water shall extend to the right of way abutting each lot to be served. An accurate record or location and depth shall be provided to the City engineer or his/her representative. Such location shall be physically marked by the placement of a 2 x 4 wooden stake painted blue and labeled "WATER".

Construction of building water shall conform to Chapter 17 of the General Ordinance of the City of Rochester – Water. All domestic services shall be able to

be turned on or off from a readily accessible valve located outside of the building footprint while have no impact on any fire flows to the building. Before connecting new pipes into an existing water main, the contractor shall notify the Department of Public Works 24 hours prior to the work being performed to schedule an inspection. No work shall be done without their approval. Pipe shall be laid and backfilled as shown in figures.

16. COUPLINGS & CONNECTORS

All couplings and connectors shall be installed in conformance with the City of Rochester standards and shall consist of the following:

A. All couplings and connectors:
   1. Gasket Materials: Composition suitable for exposure to the liquids to be contained within the pipe.
   2. Diameters to properly fit the specified types of pipes on which couplings and connectors are to be installed.

B. Sleeve type couplings
   1. Buried couplings (for joining pipe of dissimilar diameters):
      a. Constructed from malleable or ductile iron
      b. Reducer with M.J. ends conforming to AWWA C110 or AWWA C153.
      c. Bolts – A558
   2. Buried couplings (for joining pipe of similar diameters):
      a. Solid Sleeve with M.J. ends
         1. Constructed ductile iron
         2. Conforming to AWWA C110 or AWWA C153.
         3. Bolts – A558
         4. Hymax 2000 Coupling

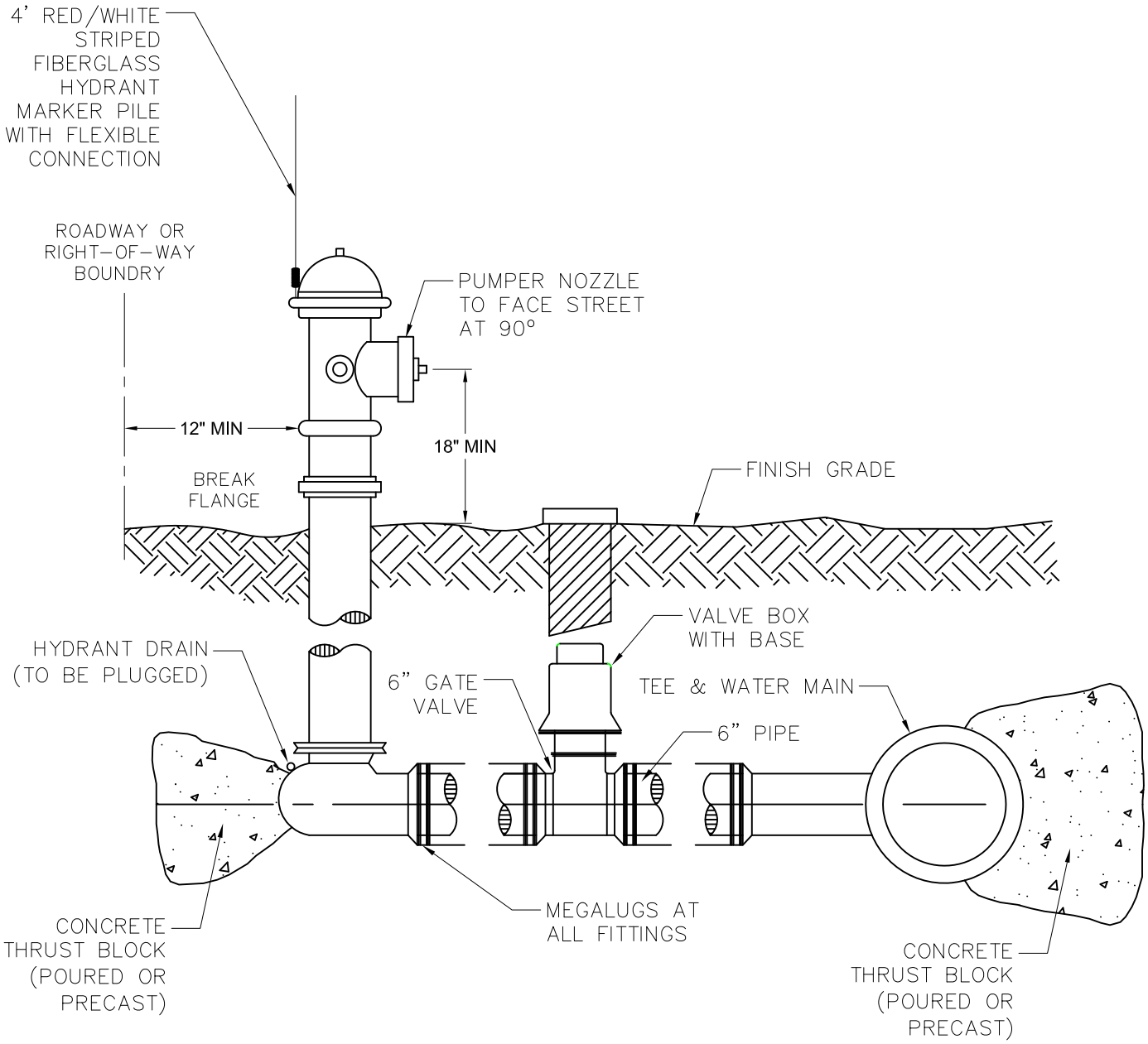
17. THRUST BLOCKS

All thrust blocks shall be installed in conformance to the City of Rochester Standards as shown in figure I-4 and shall consist of the following:

A. Pre-cast concrete thrust blocks:
   1. Designed according to AWWA M41
   2. Installed with steel hook with for ease of lifting
   4. Square or rectangular in area

B. Cast in place (poured) concrete thrust block
   1. Designed according to AWWA M41
   2. Installed with plastic wrapping around the main between the thrust block and the main
   3. Square or rectangular in area

C. The use of rocks, field stones, boulders, etc. are not permitted



NOTES:

1. FIRE HYDRANT TO BE PAINTED RED FOR LOW PRESSURE ZONES AND RED WITH YELLOW CAPS FOR HIGH PRESSURE ZONES
2. HYDRANTS TO BE EQUIPPED WITH FIBERGLASS LOCATOR
3. HYDRANTS SHALL BE KENNEDY K81D OR AMERICAN DARLING B84B
4. HYDRANTS SHALL BE OPEN RIGHT
5. ALL FITTINGS SHALL BE D.I. CLASS 350

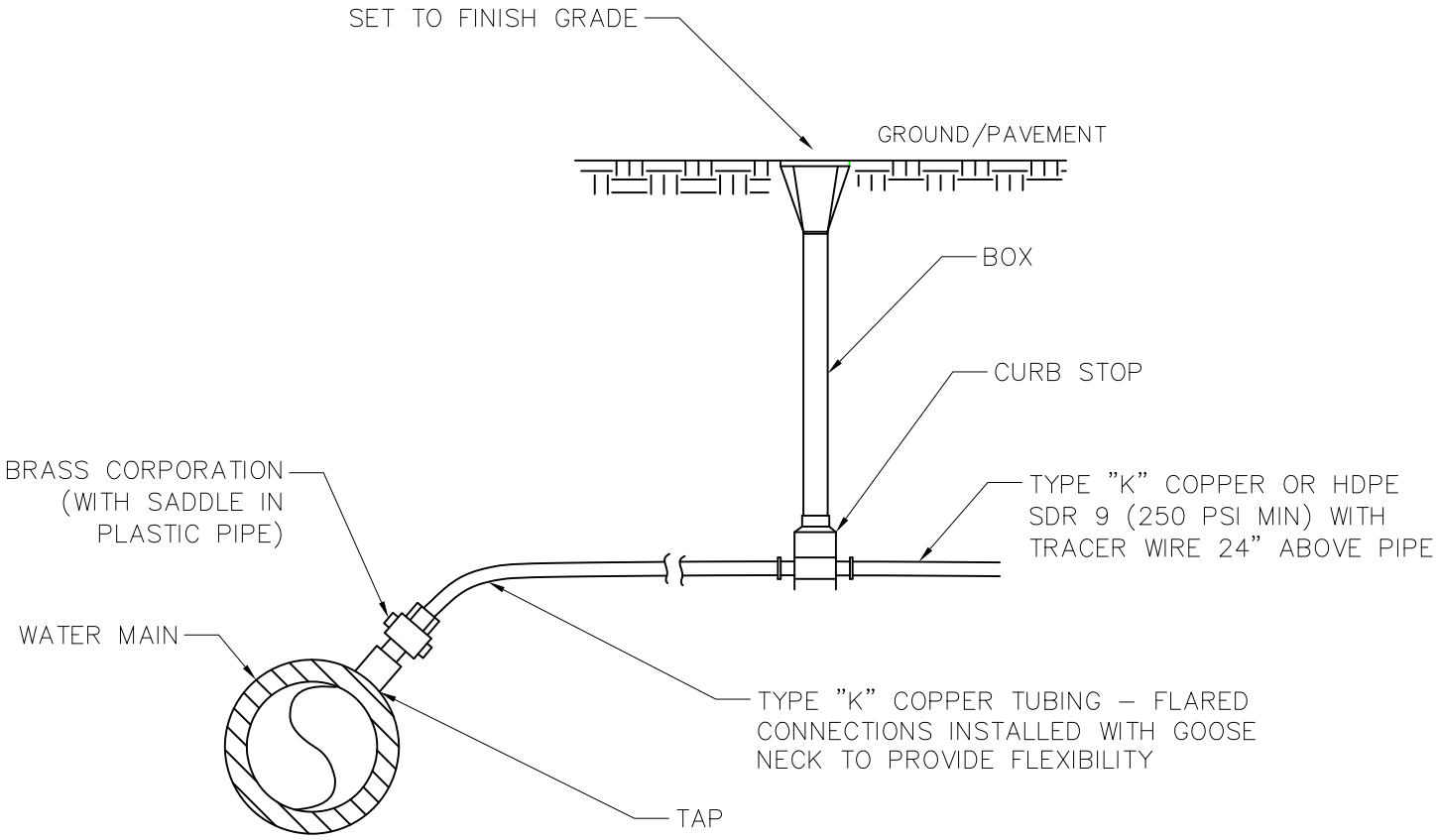
HYDRANT INSTALLATION DETAIL

NOT TO SCALE

CITY OF ROCHESTER NH

PUBLIC WORKS DEPARTMENT

REVISIONS	DATE: 6/29/2018 NOT TO SCALE
	HYDRANT
	DETAIL X-X



NOTES:

1. WHERE A WATER SERVICE CROSSES A SEWER MAIN, WATER SHALL PASS OVER THE SEWER AND MAINTAIN 18 INCHES OF SEPARATION WITH A MINIMUM COVER OF 4'
2. WHERE SEPARATION AND MINIMUM COVER CANNOT BE MAINTAINED, CONSULT WITH ROCHESTER DPW FOR DESIGN ALTERATION
3. CURB STOPS NOT TO BE SET IN DRIVEWAYS
4. END OF INSTALLED WATER SERVICE TO BE MARKED WITH 2X4

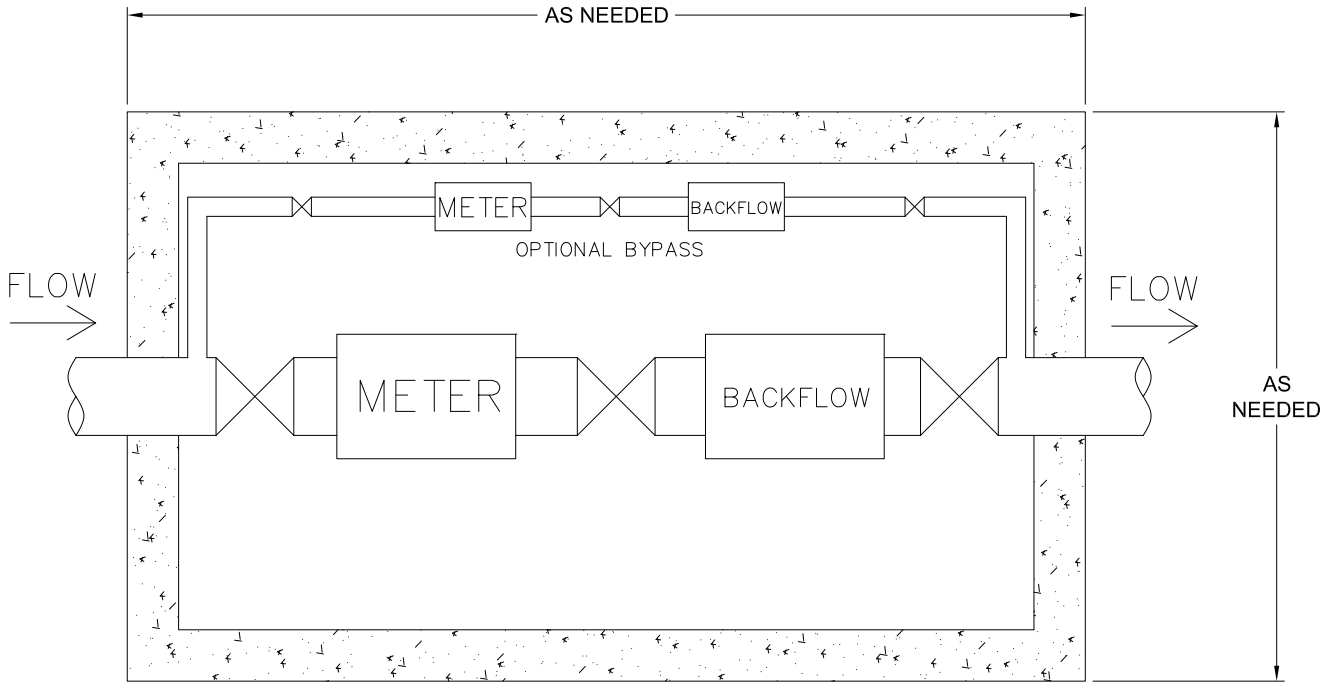
TYPICAL WATER SERVICE CONNECTION

NOT TO SCALE

CITY OF ROCHESTER NH

PUBLIC WORKS DEPARTMENT

REVISIONS	DATE: 6/29/2018 NOT TO SCALE
	WATER SERVICE
	DETAIL X–X



NOTES:

1. METER TO BE SENSUS OMNI T2 OF APPROPRIATE SIZE.
2. BACKFLOW TO BE TESTABLE DOUBLE CHECK VALVE ASSEMBLY WITH CENTER-SHAFT OR TOP HINGE CHECKS (WILKINS 350AST OR EQUAL) OF APPROPRIATE SIZE.
3. OPTIONAL BYPASS MAY BE SIZED FOR DOMESTIC SERVICE ONLY.
4. VAULT TO HAVE ADEQUATE ANTI-BOUYANCY FEATURES.
5. VAULT COVERS TO BE STAMPED WITH "WATER" AND MATCH EXISTING CITY OF ROCHESTER INFRASTRUCTURE STANDARDS.
6. ISOLATION VALVES REQUIRED AROUND EQUIPMENT FOR MAINTENANCE, TESTING AND SERVICING.

BYPASS USAGE:

1. IF OPTIONAL BYPASS LINE IS INSTALLED, WHEN MAIN FEED IS TAKEN OFFLINE AND BYPASS IS ENGAGED, OWNER SHALL CALL 330-7128 TO COORDINATE LOW FLOW CONDITION WITH ROCHESTER FIRE DEPARTMENT AND ROCHESTER PUBLIC WORKS DEPARTMENT

TYPICAL MASTER METER VAULT

NOT TO SCALE

CITY OF ROCHESTER NH

PUBLIC WORKS DEPARTMENT

REVISIONS	DATE: 6/29/2018 NOT TO SCALE
	METER VAULT
	DETAIL X-X

II - SANITARY SEWER DESIGN STANDARDS

1. PURPOSE

These standards are intended to provide for effective sanitary infrastructure to promote the health and safety of the citizens of Rochester.

2. LICENSING

Before the construction, installation, or maintenance/repair of any sanitary system the contractor must be licensed by the City of Rochester. Water/Sewer License Applications can be obtained at the Rochester Public Works office at 45 Old Dover Rd., Rochester, NH 03867.

3. PERMITTING

Per Section 15.5A of the General Ordinances of the City of Rochester, no person shall break or dig up the ground, stone or concrete in any street, lane or alley, or in any sidewalk or common in the City, or erect any staging for building, or fence off any portion of said street or sidewalk, or place or deposit any stone, brick, timber, or other building material thereon, without first obtaining a written license from the Commissionerand complying with all respects with conditions said Commissioner may impose. Excavation Permits can be obtained at the Rochester Public Works office at 45 Old Dover Rd, Rochester, NH 03867.

4. DOCUMENTATION

Developer or their representative shall maintain an accurate record of the location, depth, size and material of all sewer utility work within the City of Rochester Right-of-Way. Records shall include all private connection locations and swing-ties for all sewer service. Stamped As-Built Records shall be provided to the City of Rochester Department of Public Works upon completion of the project.

5. INSPECTIONS

All utilities within the City of Rochester Right-of-Way shall be inspected by the City Engineer or their designee prior to backfilling of trenches or other covering of services.

6. DESIGN STANDARDS

All designs shall meet the standards as laid out in the most recently updated version of the "Standards of Infrastructure Design: City of Rochester, New Hampshire" as well as New Hampshire Code of Administrative Rules; Chapter Env-Wq 700; Standards of Design and Construction for Sewerage and Wastewater Treatment Facilities, including solids handling and disposal facilities (note: pump stations and collection systems are included in these rules).

7. MANHOLES / FRAMES & COVERS

All manholes and frame & covers shall be built in conformance with the City of Rochester standards for same as shown in figures and shall consist of the following:

A. Manholes
   1. Base & Riser Sections
      a. Diameter: 4' unless otherwise noted
      b. Height: As required
      c. Wall Thickness: Not less than 5 inches
      d. Joints: Tongue-and-groove formed on machine rings to ensure accurate joint surfaces
      e. Constructed to support a H-20 wheel loading
      f. 4000 psi compressive strength or greater
   2. Tops
      a. Diameter: Eccentric cone type, 30 inches I.D. at top, 48 inches I.D. at bottom unless noted otherwise.
      b.
      c. Wall thickness: Not less than 5 inches at the base, tapering to not less than 8 inches at the top
      d. Joints: Tongue-and-groove formed on machine rings to insure accurate joint surfaces
      e. Constructed to support a H-20 wheel loading
      f. 4000 psi compressive strength or greater
   3. Flat Slab Tops
      a. Location: Where shallow installations do not permit the use of a cone-type top and where indicated on drawings.
      b. Slab thickness: Not less than 6 inches
      c. Constructed to support a H-20 wheel loading
      d. 4000 psi compressive strength or greater
   4. Openings
      a. Provide openings in the risers to receive pipes entering the manhole
      b. Pipe openings shall be created by structure manufacturer
      c. All opening shall be at least 6" from any joint.
      d. Pipe to manhole joints shall be an embedded flexible rubber boot
      e. KOR-N-SEAL or approved equal
      f. Nonshrinking mortar or grout by city engineer prior approval only
   5. Joints
      a. Shall be sealed with a double row of preformed flexible joint sealant
      b. Kent Seal No. 2 or approved equal
   6. Waterproofing
      a. The exterior surface of all manholes shall be given two coats of bituminous waterproofing material by manufacturer
      b. Waterproofing shall be applied at the application rate of 75

to 100 square feet per gallon, per coat

c. The coating shall be applied after the manholes have cured adequately and can be applied by brush or spray in accordance with the manufacturer's written instruction.

d. Sufficient time shall be allowed between coats to permit sufficient drying so the application of the second coat has no effect on the first coat.

Whenever the mathematical difference between the invert elevation of the manhole channel and the invert elevation of the sewer pipe connection to such manhole is two feet (2') or greater, an internal drop shall be provided. Such drop shall be approved by the City Engineer, or their designee, prior to installation. Outside drops are not permitted. Any pipe with a diameter, or multiple pipes with an aggregate diameter, greater than 8" used for a drop shall require a five foot (5') inside diameter manhole or larger as approved by the City Engineer, or their designee.

Unless otherwise approved by the City Engineer, the maximum distance between manholes shall not exceed three hundred feet (300') from center of manhole to center of manhole.

B. Frames & Covers

1. Frames and covers shall be hinged with "SEWER" stamped on the cover
2. Covers and frames shall be manufactured from ductile iron in accordance with ISO 1083
3. Covers to be hinged and incorporate a 90 degree blocking system to prevent accidental closure
4. Covers shall be one man operable using standard tools and shall be capable of withstanding a test load of 120,000 lbs (H20 requirement)
5. Frames shall be circular and shall incorporate a seating gasket, frame depth shall not exceed 4"(24 & 28) or 5"(32)
6. The flange shall incorporate bedding slots and bolt holes
7. All components shall be black coated

8. PIPE

All sanitary sewer pipe shall be installed in conformance with the City of Rochester standards and shall consist of the following:

A. Polyvinyl Chloride (PVC) non-pressure pipe

1. The polyvinyl chloride pipe and fittings, including those required for stubs, shall conform to ASTM standard specifications for PVC Sewer Pipe and Fittings, Designation D3034 (SDR 35) (4" to 15"), F679 (18" to 27")
2. Straight pipe shall be furnished in lengths of not less than 16 feet
3. Joints shall be push-on joints using factory installed elastometric ring gaskets

4. Joints shall conform to ASTM Specifications for Joints for Drain and Sewer Plastic Pipes using Flexible Elastometric Seals, Designation D3212-07
5. Fittings
    a. Polyvinyl Chloride (PVC) conforming to ASTM D3034
    b. Push-on Joints using factory installed elastometric ring gaskets
    c. Street fittings where possible (bell and spigot)
    d. Flexible fittings (e.g. Fernco style) shall only be used with prior approval by the City Engineer, or their designee

B. High Density Polyethylene (HDPE) pressure pipe
1. The high density polyethylene pipe shall conform to ASTM standard specifications designation F714 or ASTM D3035, whichever is applicable
2. Pipe shall be SDR21 or highest available pressure rating at the design size, whichever pressure rating is less
3. Pipe shall be furnished in the longest lengths possible to minimize the number of joints
4. Joints shall be fused or compression fittings only
5. Joints shall NOT be barbed or internal type
6. Joints shall conform to ASTM F2620
7. Pipe shall be green or have a green stripe to designate it as sewer

C. Polyvinyl Chloride (PVC) pressure pipe (for pipe sizes below 4 inches)
1. The polyvinyl chloride pipe and fittings shall conform to ASTM standard specifications for PVC Pressure-Rated Pipe (SDR series), Designation D2241 (SDR 21)
2. Joints shall be push-on joints using factory installed elastometric ring gaskets
3. Joints shall conform to ASTM D1869

D. Polyvinyl Chloride (PVC) pressure pipe (for pipe sizes 4 inches and above)
1. The polyvinyl chloride pipe and fittings shall conform to AWWA C-900 and shall be UL and FM approved
2. Fittings
    a. Shall be ductile iron
    b. Pressure rating of 250 psi

E. Reinforced Concrete Pipe (RCP): Shall be used as specified on drawings

9. CURB STOPS AND BOXES

All curb stops and boxes shall be installed in conformance with the City of Rochester standards as shown in Figure I-2 and shall consist of the following:

A. Curb Stops
1. Shall meet the requirements of AWWA C800
2. Constructed of brass.

3. Inlet and outlet shall have a compression pack joint connection.
4. Working pressure of 200 PSI shall be required.
5. Ball valve type

B. Curb Boxes
1. Cast iron base piece, steel upper, cast iron lid, and threaded bronze plug with pentagon nut (Rope Thread).
2. Extension type and arch pattern base with 5/8 inch diameter minimum, 30-inch long stationary rod.
3. Curb box shall be Erie type.
4. Curb box covers are to be painted green

Curb stops shall be located at property lines and right of ways. Whenever possible curb stops shall be located away from driveways, sidewalks and other structures and shall be flush in elevation with surrounding grounds.

10. BUILDING SEWER SERVICES

All building sewer services shall be enveloped within six inches (6") of approved granular material and shall extend to the right of way abutting each lot to be served, where they will be properly capped. An accurate record of each such building sewer service, its location and its depth at the right of way shall be kept by the developer and a copy shall be provided to the City Engineer in a digital format compatable with GIS systems. Such location of the building sewer at the right of way shall be physically marked by a stake with minimum dimensions of 2" x 4". Each stake shall be painted green and labeled "SEWER". Construction of building sewers shall conform to Chapter 200 - Sewers Ordinance. Such building sewers shall be connected to the main sanitary sewer line by the use of wyes, tee – wyes, saddles or other approved methods as determined by the Department of Public Works.

Before connecting new pipes to an existing sewer line, the contractor shall notify the Department of Public Works. No work shall be done without their approval. Unless otherwise approved, the allowable slopes for sewers shall follow Env-Wq 704.04 guidelines.

No flexible connections (e.g. Fernco) will be permitted in the City right of way unless authorized by the City Engineer or his/her representative.

11. TESTING

All sanitary sewer pipe and manholes installed in the city's right of way shall be tested. All sewer mains and manholes on private property shall be tested. Leakage testing shall consist of the following:

A. All necessary equipment and labor for carrying out leakage tests on pipes and manholes.
B. All sewer lines shall be subjected to an air pressure test conforming to ASTM standards C-828.
C. All sewer lines shall be subjected to mandrel testing for ductility conforming to ASTM E-290.
D. All manholes shall be subjected to an air vacuum conforming to ASTM

standards C-1244.

E. Video testing can be used in place of sewer line air pressure testing or mandrel testing only with prior approval by the City Engineer, or their designee.

12. GREASE INTERCEPTORS

All new and remodeled food services establishments, or other establishments that may contain grease laden wastewater, shall install an in-ground grease interceptor located outside the building envelope in addition to all required grease interceptors at fixtures inside the building. Grease trap shall be located within 50 linier feet of the building and shall contain a direct connection with limited changes in direction to prevent future clogging due to grease. The grease trap shall receive drainage from all fixtures and equipment with grease laden waste. Non-Kitchen waste (sewerage) shall exit the building separately and join the kitchen at a point downstream of the grease trap.

At a minimum must meet adopted International Plumbing Code regulations, New Hampshire Code of Administrative Rules; Chapter Env-Wq 1000 (if on septic system) and be design to meeting Sewer Use Ordinance limits.

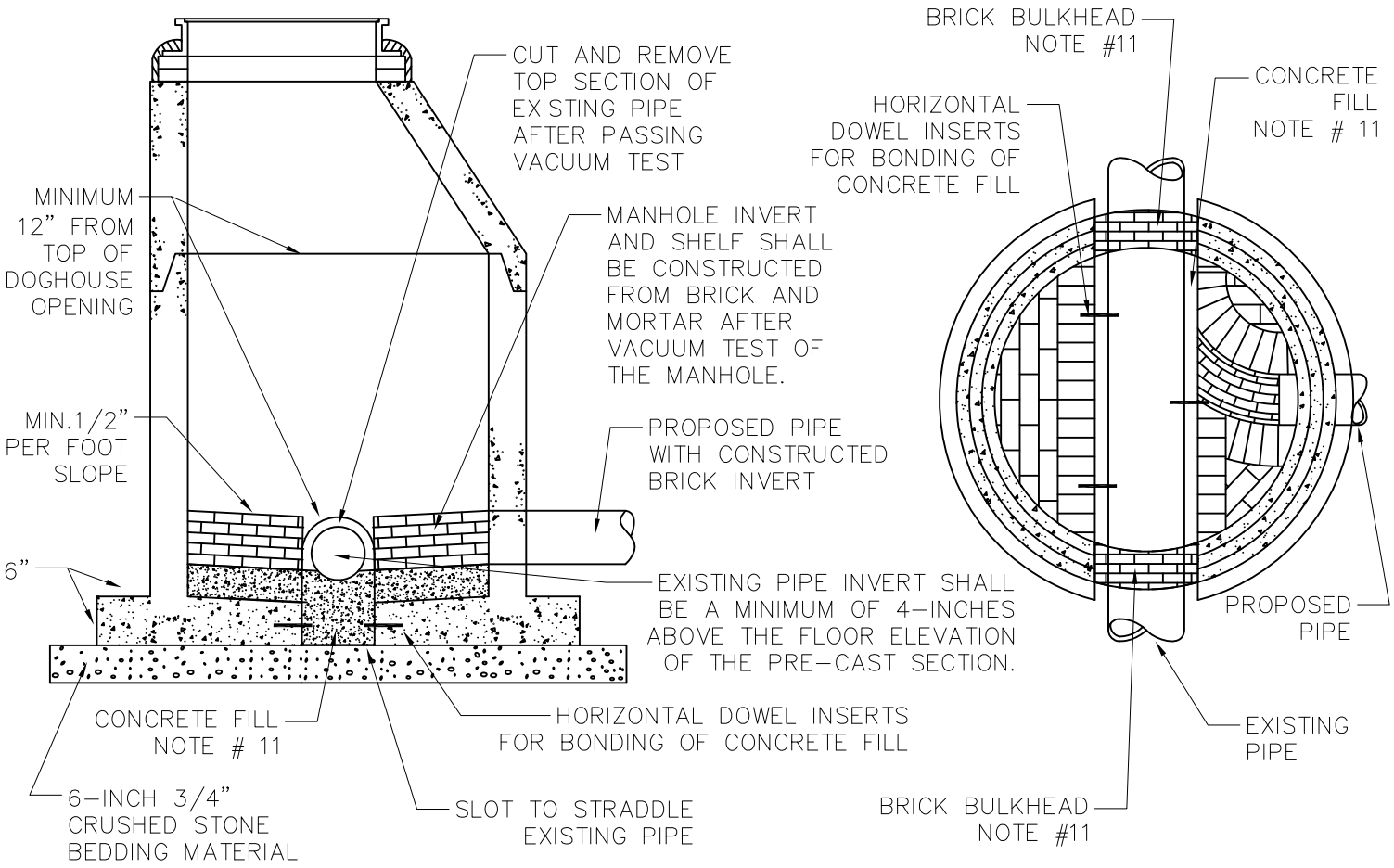
New installation or replacement - All design drawings, technical specifications, and supporting documentation submitted to the department for review and approval shall be: 1) Prepared or reviewed by a civil or sanitary engineer licensed in the state of New Hampshire pursuant to RSA-A; and 2) Stamped and signed by the engineer who prepared or reviewed them.

Minimum of at least 1,000 gallon capacity w/ two chambers, Covers must be installed to allow visual inspection and maintenance of all interior baffle tees, Baffle tees shall be made of a minimum of 6" PVC. Recommended maintenance and cleaning frequencies must be submitted with design capacity calculations. Inspection and approval required as part of Occupancy permit issuance.
Design flow, measured in gallons of wastewater discharged per day, shall be determined from Table 1008-1, Unit Design Flow Figures, contained in Part ENV-WS 1008.03 of the New Hampshire Code of Administrative Rules.

Alternative flow rates may be considered by the City Engineer, if proper documentation can be provided.
Exceptions:

A. For redevelopment projects only, when adequate in-ground space is not available outside on the lot, an automatic grease removal unit (AGRU) sized for the load may be installed inside.

B. When the City Engineer does not feel that the type of food establishment warrants such protection.



NOTES ON SANITARY SEWER DOGHOUSE MANHOLE:

1. MINIMUM 4' DIAMETER MANHOLE.
2. DOGHOUSE STYLE MANHOLE BASE SHALL ONLY BE USED WHERE SPECIFIED ON THE PLANS AND APPROVED BY WAIVER FROM NHDES. OTHERWISE, CONSTRUCTION OF THE MANHOLE SHALL COMPLY ENTIRELY ACCORDING TO THE STANDARD SEWER MANHOLE DETAIL. CONTRACTOR SHALL NOTIFY NHDES IN ADVANCE OF ANY CONSTRUCTION OR TESTING OF THIS STYLE OF MANHOLE TO CONFIRM ANY INTENTIONS TO WITNESS WORK.
3. DOGHOUSE OPENINGS IN PRECAST UNITS ARE TO BE 4" MINIMUM TO 8" MAXIMUM LARGER THAN THE OUTSIDE DIAMETER OF THE EXISTING PIPE.
4. BITUMINOUS WATERPROOF COATING TO BE APPLIED TO ENTIRE EXTERIOR OF MANHOLE.
5. SEE SANITARY MANHOLE DETAIL FOR ADDITIONAL INFORMATION.
6. MANHOLE BASE SECTION SHOWN IN DETAIL, ALL OTHER SECTION AND CONSTRUCTION DETAILS SHALL COMPLY WITH THE SEWER MANHOLE DETAIL.
7. BARREL AND SLAB SECTIONS SHALL BE PRECAST REINFORCED CONCRETE DESIGNED FOR H20 LOADING, AND CONFORMING TO ASTM C478-06 AND AASHTO M-199.
8. INVERT BRICKS SHALL BE LAID ON EDGE.
9. INVERT AND SHELF OF NEW CHANNEL(S) SHALL BE CONSTRUCTED ENTIRELY OF BRICK AND MORTAR. BRICK SHELF SHALL BE CONSTRUCTED TO THE ELEVATION OF THE HIGHEST PIPE CROWN AND SLOPED TO DRAIN TOWARD THE OUTLET.
10. REMOVE MATERIAL BELOW THE PIPE. INSTALL CRUSHED STONE BEDDING AND SET DOGHOUSE STYLE MANHOLE BASE OVER EXISING PIPE.
11. DOGHOUSE OPENINGS SHALL BE FILLED WITH BRICK AND MORTAR BULKHEADS AND NON-SHRINK GROUT. PARGE EXTERIOR OF THE BRICK BULKHEADS AND WATERPROOF WITH BITUMINOUS COATING. AFTER BULKHEADS ARE CONSTRUCTED, AREA BELOW THE PIPE IS TO BE FILLED WITH CONCRETE.
12. CIRCUMFERENTIAL REINFORCEMENT SHALL CONFORM TO ASTM A-185.
13. BOTTOM REINFORCEMENT SHALL CONFORM TO ASTM A-615 GRADE 60 AND PLACED PER ASTM C-478.
14. BRICK AND MORTAR INVERT AND SHELF TO BE PLACED ONLY AFTER PASSING VACUUM TEST OF THE MANHOLE. CUTTING AND REMOVING TOP SECTION OF EXISTING PIPE WILL ONLY BE DONE AFTER VERIFYING TIGHTNESS VIA A PASSING VACUUM TEST.
15. CARE SHALL BE TAKEN TO ENSURE THAT THE BRICK INVERT IS A SMOOTH CONTINUATION OF THE SEWER INVERT.
16. CONTRACTOR TO VERIFY NUMBER AND LOCATION OF OPENINGS WITH THE UTILITY PLANS.

TYPICAL DOGHOUSE SEWER MANHOLE

NOT TO SCALE

CITY OF ROCHESTER NH

PUBLIC WORKS DEPARTMENT

REVISIONS	DATE: 6/29/2018 NOT TO SCALE
	DOGHOUSE MANHOLE
	DETAIL X-X

III - STORM DRAIN AND HIGHWAY DESIGN STANDARDS

1. PURPOSE

These standards are intended to provide for effective storm drain infrastructure and highway construction to promote the health and safety of the citizens of Rochester.

2. MANHOLES / FRAMES & COVERS

All manholes and frame & covers shall be built in conformance with the Chapter 50 – Stormwater Management and Erosion Control Ordinance and the latest edition of the NHDOT Standards for Road and Bridge Construction, and shall at a minimum meet the following:

A. Manholes
   1. Base & Riser Sections
      a. Diameter: 4’ unless otherwise noted
      b. Length: As required
      c. Wall Thickness: Not less than 5 inches
      d. Joints: Tongue-and-groove formed on machine rings to ensure accurate joint surfaces.
      e. Constructed to support a H-20 wheel loading
      f. 4000 psi compressive strength is required
   2. Tops
      a. Diameter: Eccentric cone type, 30 inches I.D. at top, 48 inches I.D. at bottom unless noted otherwise.
      b. Length: 4 feet
      c. Wall thickness: Not less than 5 inches at the base, tapering to not less than 8 inches at the top
      d. Joints: Tongue-and-groove formed on machine rings to insure accurate joint surfaces
      e. Constructed to support a H-20 wheel loading
      f. 4000 psi compressive strength required
   3. Flat Slab Tops
      a. Location: Where shallow installations do not permit the use of a cone-type top and where indicated on drawings.
      b. Slab thickness: Not less than 6 inches
      c. Constructed to support a H-20 wheel loading
      d. 4000 psi compressive strength required
   4. Openings
      a. Provide openings in the risers to receive pipes entering the manhole
      b. Make openings at the manufacturing plant
      c. All opening shall be at least 6” from any joint.

d. Pipe to manhole joints shall be an embedded flexible rubber boot
e. KOR-N-SEAL or approved equal
f. Nonshrinking mortar or grout is not acceptable.

5. Joints
   a. Shall be a double row of preformed flexible joint sealant.
   b. Kent Seal No. 2 or approved equal

Unless otherwise approved by the City Engineer, the maximum distance between manholes shall not exceed three hundred (300') from center of manhole to center of manhole.

B. Frames & Covers
1. Frames and covers shall be PAMREX or similar approved manhole frame and cover with STORM stamped on it
2. Covers and frames shall be manufactured from ductile iron in accordance with ISO 1083
3. Covers to be hinged and incorporate a 90 degree blocking system to prevent accidental closure
4. Covers shall be one man operable using standard tools and shall be capable of withstanding a test load of 120,000 lbs (H20 requirement)
5. Frames shall be circular and shall incorporate a seating gasket, frame depth shall not exceed 4"(24 & 28) or 5"(32)
6. The flange shall incorporate bedding slots and bolt holes
7. All components shall be black coated

3. CATCH BASINS / FRAMES & GRATES

All catch basins and frame & grates shall be built in conformance with the Chapter 50 – Stormwater Management and Erosion Control Ordinance and the latest edition of the NHDOT Standards for Road and Bridge Construction, and shall at a minimum meet the following:

A. Catch Basins
1. Base and Riser Sections
   a. Diameter: 4' unless otherwise noted
   b. Length: As required
   c. Wall Thickness: Not less than 5 inches
   d. Joints: Tongue-and-groove formed on machine rings to ensure accurate joint surfaces.
   e. Constructed to support a H-20 wheel loading
   f. 4000 psi compressive strength is required
   g. Sump: four foot (4')
   h. Constructed to support an HS-20 wheel loading

2. Flat Slab Tops
    a. Field Inlet/Non curb
        1. Slab thickness: Not less than 6 inches
        2. Constructed to support a H-20 wheel loading
        3. 4000 psi compressive strength required
        4. Circular opening
    b. Curb Inlet
    a. Provide openings in the risers to receive pipes entering the manhole
    b. Make openings at the manufacturing plant
    c. All opening shall be at least 6" from any joint.
    d. Pipe to manhole joints shall be an embedded flexible rubber boot
    e. KOR-N-SEAL or approved equal
    f. Nonshrinking mortar or grout is not acceptable.

3. Joints
    a. Shall be a double row of preformed flexible joint sealant.
    b. Kent Seal No. 2 or approved equal

B. Frames & Grates

1. Frames and Grates shall be Square
    a. Ductile iron
    b. Opening shall be 24" x 24"
    c. Smooth, no sharp edges
    d. Constructed to support a H-20 wheel loading
    e. Rexus or approved equal

4. PIPE

All storm drain pipe shall be built in conformance with the Chapter 50 – Stormwater Management and Erosion Control Ordinance and the latest edition of the NHDOT Standards for Road and Bridge Construction, and shall at a minimum meet the following:

A. High Density Polyethylene (HDPE)
    1. HDPE shall have an annular corrugated exterior, smooth inner wall and built-in bell joints.
    2. Corrugated pipe and appurtenances shall be manufactured by the same company and shall meet or exceed AASHTO M-294, ASTM F667 and ASTM D2321.
    3. Strait pipe shall be furnished in lengths of no more than 20 feet.
B. Reinforced Concrete Pipe (RCP): Shall be used as specified on drawings.
C. Perforated Polyethylene
    1. Perforated polyethylene pipe shall have an annular corrugated exterior, smooth inner wall and built-in bell joints.
    2. Corrugated pipe and appurtenances shall be manufactured by the same company and shall meet or exceed AASHTO M-252 and

ASTM F405

D. Corrugated Metal Pipe (CMP) – Not Permitted

5. ROADS

All roads shall be built in conformance with the Chapter 15 – Highways, Bridges, Sidewalk and Street Lighting Ordinance and the latest edition of the NHDOT Standards for Road and Bridge Construction, and shall at a minimum meet the following:

A. Aggregate Sub-Base (NHDOT Specification 304.2)

1. Thickness: As specified
2. Aggregate sub-base shall meet all requirements of the Standard Specifications for Road and Bridge Construction, latest revisions, published by the State of New Hampshire Department of Transportation.
3. Aggregate sub-base course shall be gravel consisting of hard, durable particles that are free from vegetable matter, lumps or balls or clay and other deleterious substances.
4. Aggregate sub-base shall meet the grading requirements of the following table:

Sieve	Percent Passing
6”	100
No. 4	27-70
No. 200 (in sand portion)*	0-12

*Fraction passing the No. 4 sieve

5. Aggregate sub-base shall be tested for sufficient compaction with a nuclear densometer. Total compaction must exceed 95 percent.

B. Aggregate Base (NHDOT Specification 304.3)

1. Thickness: As specified
2. Aggregate base shall meet all requirements of the Standard Specifications for Road and Bridge Construction, latest revisions, published by the State of New Hampshire Department of Transportation.
3. Aggregate base shall be screened or crushed gravel of hard durable particles or fragments of stone and gravel, free from vegetable matter, lumps or balls of clay and other deleterious substance.
4. At least 50 percent of the material retained on the 25mm (1 inch) sieve shall have a fragmented face. The gradation of the part that passes a 3-inch sieve shall meet the grading requirements of the following table:

Sieve	Percent Passing
3 inch	100
2 inch	95-100
No. 4	27-55
No. 200 (in sand portion)*	0-12

*Fraction passing the No. 4 sieve

5. Aggregate base shall be tested for sufficient compaction with a nuclear densometer. Total compaction must exceed 95 percent.

C. Bituminous Concrete Pavement

1. Binder Course
   a. Thickness: As specified
   b. Binder course material and application shall meet all requirements in Section 401 of the Standard Specifications for Road and Bridge Construction, latest revisions, published by the State of New Hampshire Department of Transportation.

2. Wearing Course
   a. Thickness: As specified
   b. Wearing course material and application shall meet all requirements in Section 401 of the Standard Specifications for Road and Bridge Construction, latest revisions, published by the State of New Hampshire Department of Transportation.

3. Application
   a. All courses shall be spread and finished to the required thickness by approved, self-contained, self-propelled, spreading and finishing machines (pavers) with adjustable vibratory screeds and full width screw augers.
   b. Pavers shall be provided with and adjustable, activated screed and shall be capable of spreading the mixtures with a finish that is smooth, true to the required cross-section, uniform in density and texture, and free from hollows, tears, gouges, corrugations, and other irregularities.
   c. Pavers shall be capable of spreading and finishing courses of required thicknesses and lane widths.
   d. The activated screed shall be of the vibrating or tamping bar type or a combination of both and shall operate without tearing, shoving, or gouging the mixture.
   e. The paver hopper gates shall be adjusted to pass the correct amount of mix to the spreading screws so that the screws operate more or less continuously.
   f. The use of all automatic grade and slope controls shall be required on all pavers.

D. Tack Coat

1. Tack Coat materials and application shall meet all requirements in Section 410 of the Standard Specifications for Road and Bridge Construction, latest revisions, published by the State of New Hampshire Department of Transportation.

E. Pavement Markings

1. Ready-mixed white and yellow traffic pain shall conform to the requirements of AASHTO M248-74, Type N or F.
2. Glass beads used in traffic paint shall conform to the requirements of AASHTO M247-77, Type 1.
3. Pavement markings shall be applied in accordance with the latest edition of the Manual on Uniform Traffic Control Devices.
4. Paint shall be applied with a wet thickness of 15 mils.
5. Glass beads shall be applied at the rate of 6 pounds per gallon of paint.

6. SIDEWALKS

All sidewalks shall be built in conformance with the Chapter 15 – Highways, Bridges, Sidewalk and Street Lighting Ordinance and the latest edition of the NHDOT Standards for Road and Bridge Construction, and shall at a minimum meet the following:

A. Bituminous Concrete Sidewalks

1. Thickness: As specified
2. Bituminous Concrete Sidewalks and application shall meet all requirements in Section 608 of the Standard Specifications for Road and Bridge Construction, latest revisions, published by the State of New Hampshire Department of Transportation.

B. Portland Cement Concrete Sidewalks

1. Thickness: As specified
2. Portland Cement Concrete Sidewalks and application shall meet all requirements in Section 608 of the Standard Specifications for Road and Bridge Construction, latest revisions, published by the State of New Hampshire Department of Transportation.
3. Reinforcement is necessary for all Portland Cement Concrete Sidewalks. Acceptable types or reinforcement are:
    a. Welded steel wire fabric conforming to AASHTO M 55M/M 55 placed mid-depth in the sidewalk.
    b. Nylon Fibers manufactured from 100% pure, industrial grade, filamentized nylon bundles that shall be added to the concrete mix at the rate of one pound per cubic yard. The nylon fibers shall be engineered specifically for use in concrete and shall be ½ inch to ¾ inches in length. Nylon shall meet or exceed the ASTM C1116 standards for material specifications and performance requirements.

C. Detectable Warning Panels

1. Detectable Warning Panels shall be untreated cast iron and shall be set in concrete sidewalk accessible tip-down ramps.

7. CURB

All curb shall be built/installed in conformance with the Chapter 15 – Highways, Bridges, Sidewalk and Street Lighting Ordinance and the latest edition of the NHDOT Standards for Road and Bridge Construction, and shall at a minimum meet the following:

A. Granite Curb

1. The stone for curbing shall be hard, durable, quarried granite.
2. It shall be gray in color, reasonably uniform in appearance, free from seams, cracks or other structural defects and shall be of smooth splitting character.
3. Individual stones shall be furnished in minimum lengths of 3 feet or maximum lengths of 10 feet with 50 percent of sections 5 feet or greater.
4. The exposed face of the stone shall be free on indications of drill holes in the top 10 inches.
5. The top surface shall be sawed or dressed to an approximate true plane with no depression or projection on that surface of over 1/8 inch.
6. The top front arris line shall be pitched strait and true with no variations from a straight line greater than 1/8 inch.
7. The top back arris line shall meet the same requirements as the top front arris to 1 ½ inch below exposed surface, except that indentations of a maximum of ¼ inch will be allowed.
8. There shall be no projection or depression on the back face for 1 ½ inch below the surface that which would exceed 1 ½ inches.
9. The front face shall be at right angles to the top and shall be smooth split and have no projections greater than one inch or depressions greater than ½ inch, measured from the vertical plane of the face through the top arris line, for a distance down from the top 10 inches. The remainder of the face shall have no projections or depressions greater than one inch measured in the same manner.
10. The ends of the curb shall be approximately square with the planes of the top, back and face and so finished that when the sections are placed end to end with the optimum spacing of one inch shall show in the joint for the full width of the top surface and for the entire exposed front face. The remainder of the end may extend back no more than four inches from the plane of the joint.
11. The bottom surface may be sawn or split and approximately parallel to top.
12. When curbing is specified on drawings with a radius of 21 feet or less, it shall be cut on the specified radius.

B. Curb Inlets

1. Inlets used at catch basins shall conform to the applicable requirements of Vertical Curb.
2. The arris line, top front shall be straight and true with no variation form a straight line greater than 1/8 inch.
3. The arris lines at the bottom of the face shall be straight and true so that not over one inch shall show between the stone and a straightedge for the full length of the stone.
4. The ends shall be square to the length at the face and so finished that when stones are placed end to end, no space more than 1 ½ inches will show in the joint for the width of the face.

C. Joint Mortar

1. Shall consist of one part portland cement and two parts sand and mixed with sufficient water to form a plastic composition.
2. The portland cement shall conform to AASHTO M85, Type II-A.

D. Bituminous Curb

Bituminous curbing shall be installed in accordance with NHDOT standard specifications.

8. STREET SIGNS

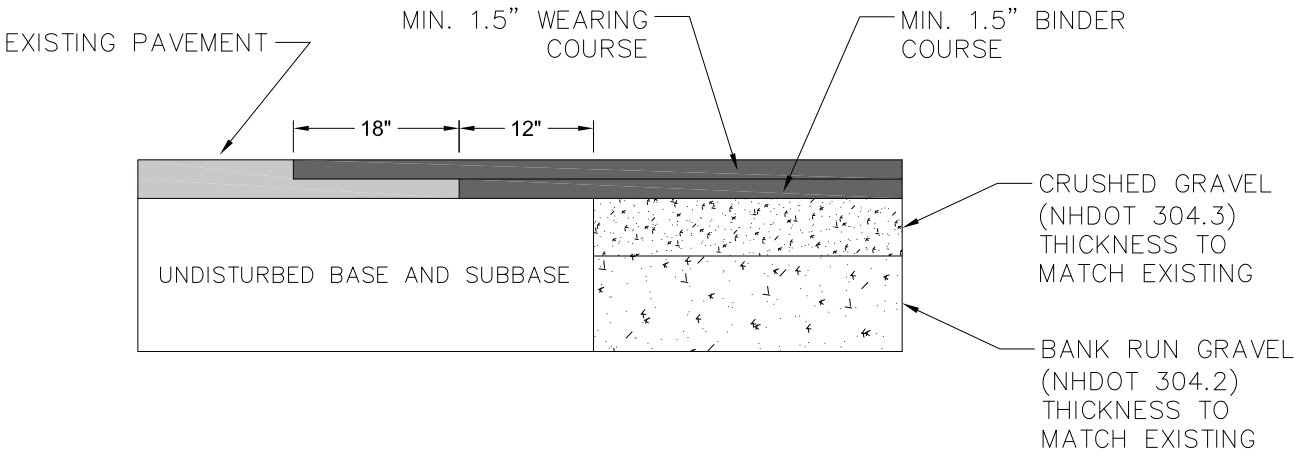
All street signs shall manufactured and installed in conformance with the City of Rochester standards and shall at a minimum meet the following:

A. Traffic Signs: All traffic signs shall conform to the standards found in the Manual on Uniform Traffic Control, Millenium Edition or latest revisions, published by the U.S. Department of Transportation Federal Highway Administration.

B. Street Name Signs: Mounting height and position shall conform to the standards found in the Manual on Uniform Traffic Control, Millenium Edition or latest revisions, published by the U.S. Department of Transportation Federal Highway Administration.

1. Street Sign:
   a. Type: Extruded
   b. Height: 9 inches
   c. Length: As Necessary
   d. Color: Green
   e. Style: Engineering Grade
2. Street Sign Letters:
   a. Name Height: 6 inches
   b. Suffix Height: 3 inches
   c. Length: As Necessary
   d. Color: White
   e. Font: Engineering Grade
3. Private/Class VI Indicator:
   a. Type: Flat
   b. Size: 4” x 8” with rounded corners

c. Sign Color: White
d. Letter Color: Green
e. Style: Engineering Grade
f. Location: Attaches to top of Street Sign via universal bracket



NOTES:

1. BINDER COURSE PAVEMENT EDGES SHALL BE DEFINED BY A STRAIGHT EDGE FORMED BY A MACHINED SAW CUT.
2. WEARING COURSE PAVEMENT EDGES SHALL BE DEFINED BY A MILLED EDGE.
3. SUBGRADE MATERIAL SHALL BE BACKFILLED WITH GRANULAR FILL AND COMPACTED TO 95% OF ITS MAXIMUM DRY DENSITY
4. BACKFILL MATERIAL TO BE USED SHALL MATCH EXISTING MATERIAL UNLESS OTHERWISE SPECIFIED BY CITY ENGINEER OR THEIR DESIGNEE.
5. ALL VERTICAL AND HORIZONTAL JOINTS BETWEEN PAVEMENTS SHALL BE TACK COATED.
6. PAVEMENT THICKNESS SHALL MATCH EXISTING BUT IN NO CASE SHALL BE LESS THAN 3" TOTAL THICKNESS.
7. PAVEMENT SHALL BE PLACED IN TWO PHASES:
   - 7.1. THE FIRST PHASE SHALL CONSIST OF CUTTING BACK THE FULL DEPTH OF PAVEMENT 12" BEYOND THE EDGES OF THE DISTURBED TRENCH AND PAVING A BINDER COURSE THE FULL DEPTH OF THE PAVEMENT AS TO BRING THE PATCH FLUSH WITH THE EXISTING ROAD SURFACE.
   - 7.2. THE SECOND PHASE SHALL BE CONDUCTED THE FOLLOWING YEAR AND SHALL CONSIST OF MILLING OVER THE EDGES OF THE PREVIOUS PATCH BY A MINIMUM OF 18" IN ALL DIRECTIONS TO A DEPTH OF 1.5". WEARING COURSE PAVEMENT SHALL BE USED TO CREATE A SMOOTH SURFACE WITH THE ROADWAY OVER THE EXTENTS OF THE MILLED AREA.
8. ANY EXCAVATION WITHIN A CITY RIGHT-OF-WAY REQUIRES PRE-APPROVAL BY DPW AND IS SUBJECT TO INSPECTION TO ENSURE COMPLIANCE WITH CITY STANDARDS.

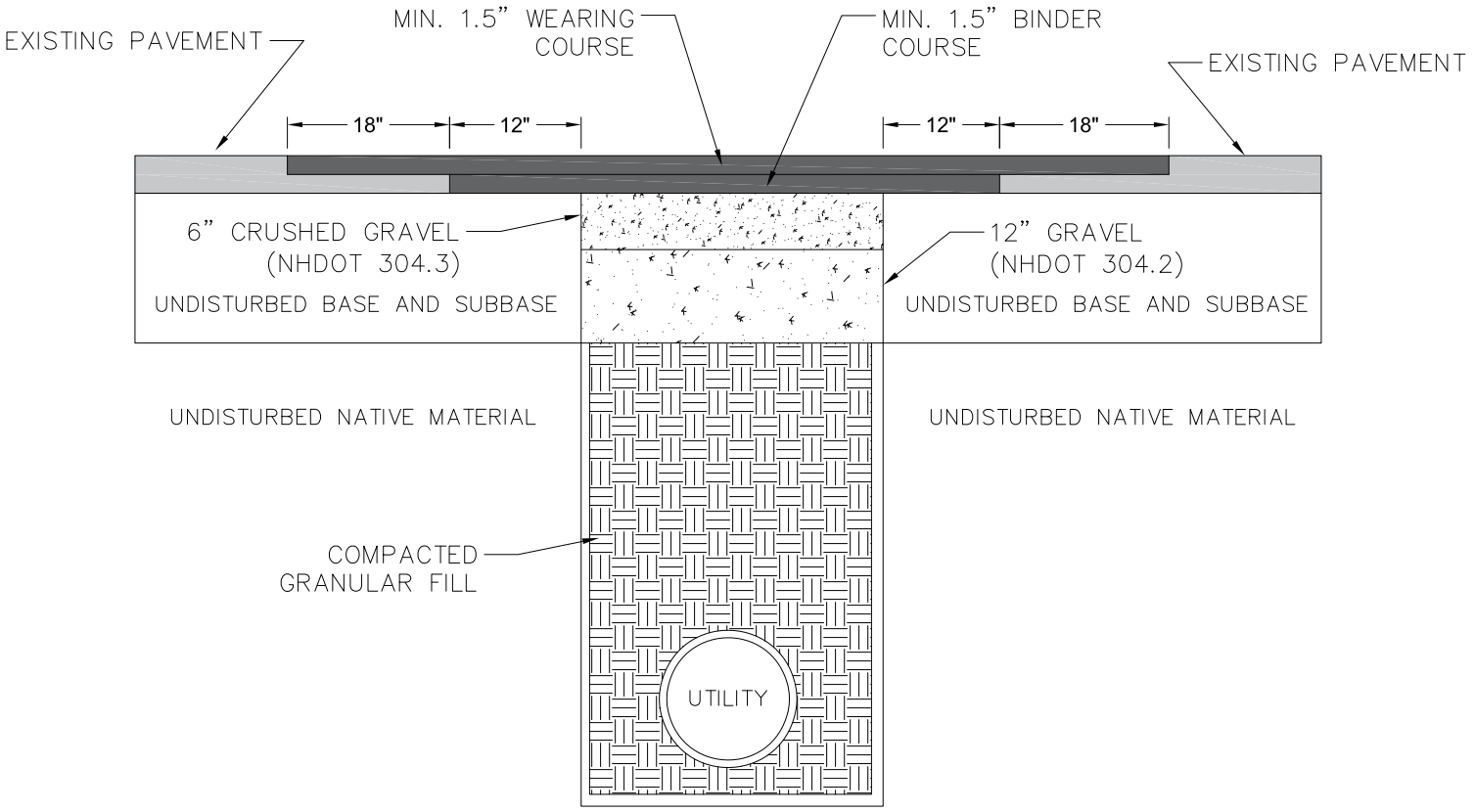
STANDARD PATCH DETAIL

NOT TO SCALE

CITY OF ROCHESTER NH

PUBLIC WORKS DEPARTMENT

REVISIONS	DATE: 6/29/2018 NOT TO SCALE
	PATCH
	DETAIL X-X



NOTES:

1. PAVEMENT EDGES SHALL BE DEFINED BY A STRAIGHT EDGE FORMED BY A MACHINED SAW CUT.
2. TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH GRANULAR FILL AND COMPACTED TO 95% OF ITS MAXIMUM DRY DENSITY
3. TOP 18" OF BACKFILL SHALL BE 6" OF COMPACTED $\frac{3}{4}$" CRUSHED GRAVEL (NHDOT 304.3) SUPPORTED BY 12" OF COMPACTED GRAVEL (NHDOT 304.2).
4. ALL VERTICAL AND HORIZONTAL JOINTS BETWEEN PAVEMENTS SHALL BE TACK COATED.
5. PAVEMENT THICKNESS SHALL MATCH EXISTING BUT IN NO CASE SHALL BE LESS THAN 3" TOTAL THICKNESS.
6. PAVEMENT SHALL BE PLACED IN TWO PHASES:
   - 6.1. THE FIRST PHASE SHALL CONSIST OF CUTTING BACK THE FULL DEPTH OF PAVEMENT 12" BEYOND THE EDGES OF THE DISTURBED TRENCH AND PAVING A BINDER COURSE THE FULL DEPTH OF THE PAVEMENT AS TO BRING THE PATCH FLUSH WITH THE EXISTING ROAD SURFACE.
   - 6.2. THE SECOND PHASE SHALL BE CONDUCTED THE FOLLOWING YEAR AND SHALL CONSIST OF MILLING OVER THE EDGES OF THE PREVIOUS PATCH BY A MINIMUM OF 18" IN ALL DIRECTIONS TO A DEPTH OF 1.5". WEARING COURSE PAVEMENT SHALL BE USED TO CREATE A SMOOTH SURFACE WITH THE ROADWAY OVER THE EXTENTS OF THE MILLED AREA.
7. ANY EXCAVATION WITHIN A CITY RIGHT-OF-WAY REQUIRES PRE-APPROVAL BY DPW AND IS SUBJECT TO INSPECTION TO ENSURE COMPLIANCE WITH CITY STANDARDS.

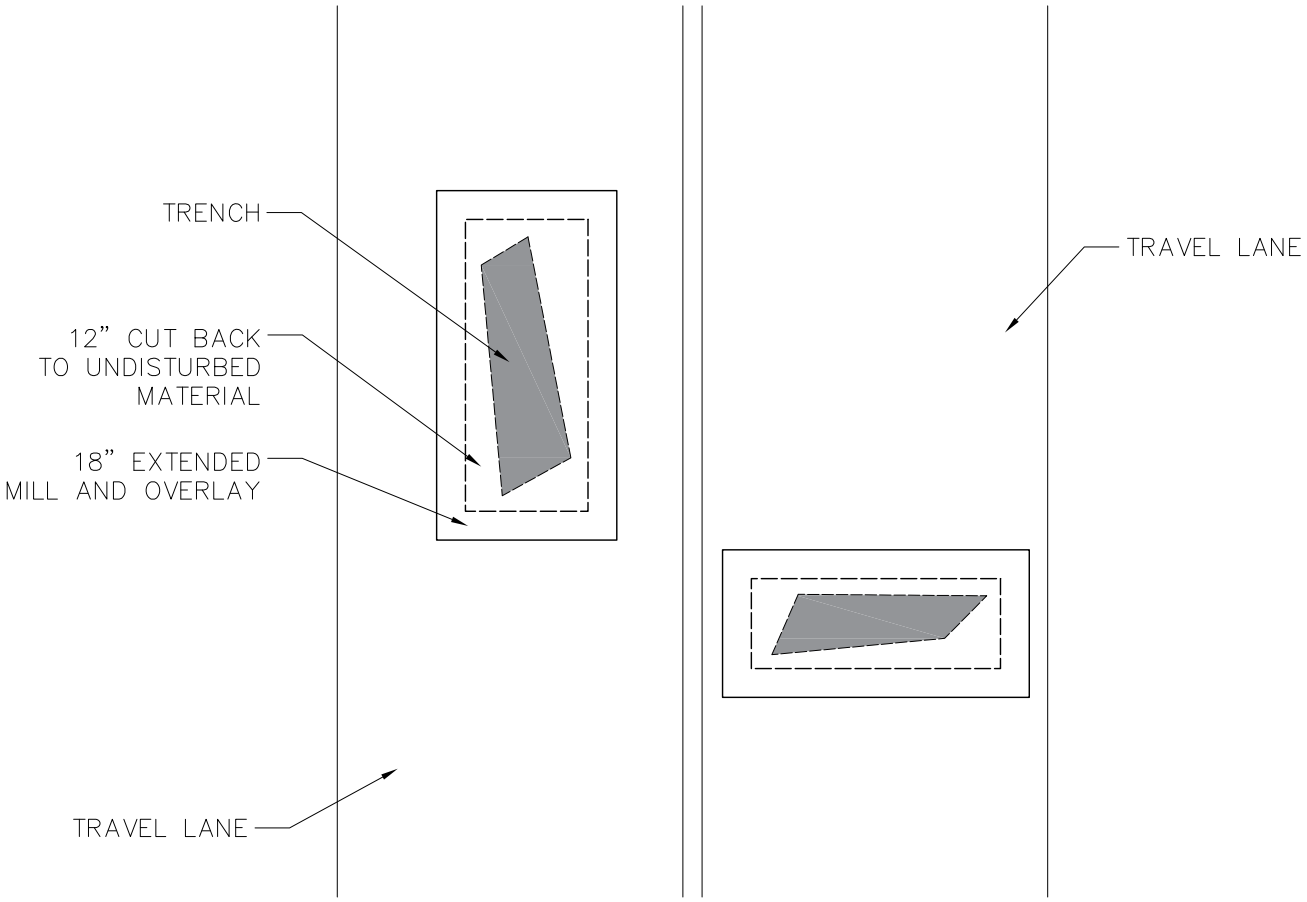
UTILITY TRENCH PATCH DETAIL – PROFILE

NOT TO SCALE

CITY OF ROCHESTER NH

PUBLIC WORKS DEPARTMENT

REVISIONS	DATE: 6/29/2018 NOT TO SCALE
	TRENCH PATCH PRO
	DETAIL X-X



NOTES:

1. PAVEMENT EDGES SHALL BE DEFINED BY A STRAIGHT EDGE FORMED BY A MACHINED SAW CUT.
2. ALL VERTICAL AND HORIZONTAL JOINTS BETWEEN PAVEMENTS SHALL BE TACK COATED.
3. PAVEMENT THICKNESS SHALL MATCH EXISTING BUT IN NO CASE SHALL BE LESS THAN 3" TOTAL THICKNESS.
4. PAVEMENT SHALL BE PLACED IN TWO PHASES:
   - 4.1. THE FIRST PHASE SHALL CONSIST OF CUTTING BACK THE FULL DEPTH OF PAVEMENT 12" BEYOND THE EDGES OF THE DISTURBED TRENCH AND PAVING A BINDER COURSE THE FULL DEPTH OF THE PAVEMENT AS TO BRING THE PATCH FLUSH WITH THE EXISTING ROAD SURFACE.
   - 4.2. THE SECOND PHASE SHALL BE CONDUCTED THE FOLLOWING YEAR AND SHALL CONSIST OF MILLING OVER THE EDGES OF THE PREVIOUS PATCH BY A MINIMUM OF 18" IN ALL DIRECTIONS TO A DEPTH OF 1.5". WEARING COURSE PAVEMENT SHALL BE USED TO CREATE A SMOOTH SURFACE WITH THE ROADWAY OVER THE EXTENTS OF THE MILLED AREA.
5. ANY EXCAVATION WITHIN A CITY RIGHT-OF-WAY REQUIRES PRE-APPROVAL BY DPW AND IS SUBJECT TO INSPECTION TO ENSURE COMPLIANCE WITH CITY STANDARDS.

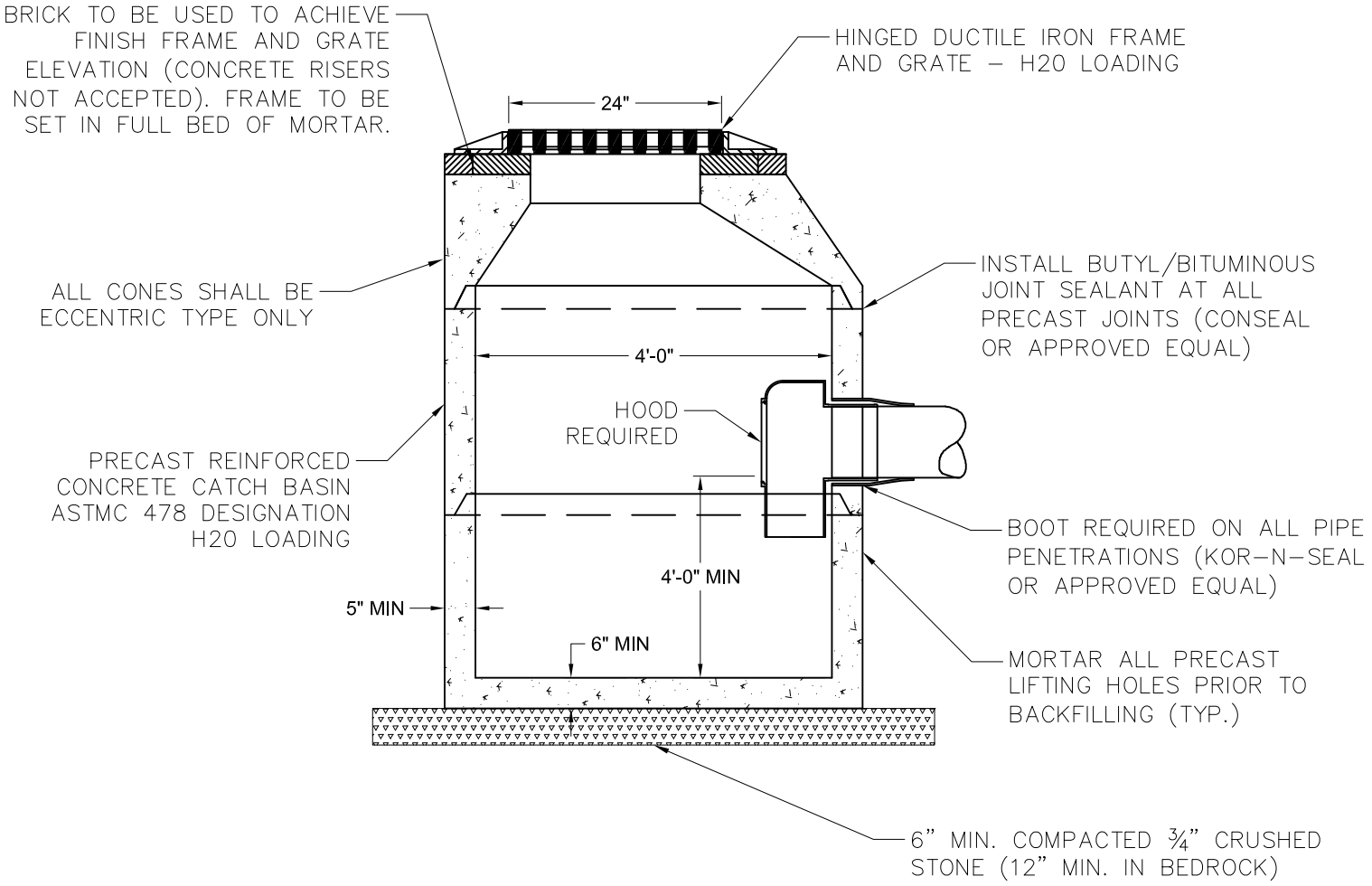
UTILITY TRENCH PATCH DETAIL - PLAN

NOT TO SCALE

CITY OF ROCHESTER NH

PUBLIC WORKS DEPARTMENT

REVISIONS	DATE: 6/29/2018 NOT TO SCALE
	TRENCH PATCH PLAN
	DETAIL X-X



STANDARD CATCH BASIN DETAIL

NOT TO SCALE

CITY OF ROCHESTER NH

PUBLIC WORKS DEPARTMENT

REVISIONS	DATE: 6/29/2018 NOT TO SCALE
	CATCH BASIN
	DETAIL X–X