SERVICE CONNECTION SPECIFICATIONS C150

Rochester, MN

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Section 1 GENERAL REQUIREMENTS

C150.101 Description

These specifications shall apply to the construction and repair of water service, sanitary sewer service, storm sewer service and sub-drain service connections between public and private utility mains and buildings located outside the right of way.

C150.102 Reference Documentation

Provisions of the General Conditions of the Specifications for Public Improvements and Standard Specifications for Trench Excavation & Surface Restoration shall apply to this work. The Contractor shall abide by the applicable provisions of state, federal and local laws and ordinances.

Reference Documentation shall be the latest edition, including amendments and published updates, issued prior to the date of advertisement for bids or the date of request for quotations.

1. Minnesota Department of Transportation (Mn/DOT) Standard Specifications for Construction.
2. City of Rochester, Standard Specifications for Street and Utility Construction.
3. Standard Utility Specifications for Watermain and Service Line Installation and Sanitary Sewer and Storm Sewer Installation, City Department of Public Works Association of Minnesota.
4. City of Rochester Ordinance Title 12 - Utilities and Other Public Services.
5. Rochester Public Utilities 'Water Service Rules and Regulations".
6. City of Rochester Ordinance Title 9 - Streets, Sidewalks and Other Public Places.

Permits and Licenses

1. Contractors doing service connection within the City of Rochester shall be a Licensed Sewer and Drain Contractor pursuant to local ordinance requirements.
2. Contractors doing service connection work which is not a part of a City Contract shall obtain permits in accordance with the following:
   (a) Obtain a Street Opening Permit from City Department of Public Works.
   (b) Obtain a Permit for Water Tap Service Connection from City Department of Public Works.
   (c) Obtain a Permit for Sanitary Sewer Connection Service from City Department of Public Works.
   (d) Obtain a Permit for Storm Sewer and Drain Connection Service from City Department of Public Works.
   (e) In addition to the City permits, Work in State right of way requires a Permit for Installation of Utilities from Minnesota Department of Transportation.
   (f) In addition to the City permits, Work in County right of way requires Permit for Work in Right of Way from Olmsted County Engineer.

C150.103 Easements

Easement shall be required and shall be recorded for any service connection that:

1. Crosses another private property, or
2. Is a common or shared use connection.

C150.104 Public Infrastructure Work

All public infrastructure work accomplished as a part of private service connection must be accomplished under a City-Owner Contract process and is subject to all oversight, inspection, testing and acceptance requirements.

C150.105 Maintenance and Repair

The Contractor shall guarantee all work relating to the Specifications for a period of at least two (2) years from the date of installation. The Contractor shall make all needed repairs arising out of defective workmanship or materials that, in the judgment of the City, become necessary during such period. Final acceptance and termination of the maintenance obligation shall occur on the date two (2) years after initial installation. The maintenance obligation shall otherwise continue until all defects, including defective equipment installed therein, have been corrected.

At any time during which the maintenance obligation is in effect, the City may demand that the Contractor make any needed corrections to the work. If Contractor fails to undertake corrective action within ten days after the mailing of a notice, the City may make the corrections itself and recover the cost from the Contractor.

Section 2 MATERIALS

C150.201 General

Upon the City Engineer's request, representatives of the City shall not be denied access to the manufacturing or processing plants for the purpose of making appropriate inspections and tests.

At the City Engineer's request, the Contractor shall furnish manufacturer's certificate that the pipe, fittings, and other specified material meet the specified standards.

C150.202 Water Service

A. Piping Material within Public Right of Way

Water pipe and fittings for services larger than 2 inches inside diameter shall be designed and installed in accordance with the City of Rochester Standard Specifications for Watermain Construction.

Water service pipe shall be 1 inch, 1-1/2 inch or 2 inch inside diameters only and shall conform to the requirements of ASTM B88 for Seamless Copper Water Tube, Type K, Soft Annealed Temper. Water service pipe of 3/4 inch and 1-1/4 inch diameter shall conform to the requirements of ASTM B88 for Seamless Copper Water Tube, Type K, Soft Annealed Temper and may only be used for repairs to copper services of 3/4 inch and 1-1/4 inch diameter.

B. Piping Material outside Public Right of Way

Water piping and fittings for building supply and water distribution (any size) shall comply with Minnesota Plumbing Code (latest edition). When nonconductive piping (plastic piping) is used for a water service line, the contractor must install an electrically continuous tracer wire per MN Plumbing Code 604.10.1. Tracer wire shall be a minimum of 14 AWG, corrosion-resistance blue insulated copper tracer wire, or other approved conductor installed adjacent to the piping. Tracer wire shall terminate above ground at each end of the plastic piping. Tracer wire should terminate at grade level in approved tracer wire access box with a Copperhead SnakePit Bracket (or approved equal). All access box lids shall be colored blue or otherwise marked to indicate water.

The following access boxes are acceptable:

(a) Copperhead Industries SnakePit®
   1. Light Duty (LD14*TP)
   2. Light Duty XL (LD36*TP-ADJ)
   3. Concrete/Driveway (CD14*TP)
   4. Boabox 150

(b) Approved Equal (To request an alternate, the Contractor shall submit cut sheet to City Engineer for approval.)

If a splice in the tracer wire is required all connections shall be made with connectors approved for direct bury wire, shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure. Non-locking friction fit, twist on or taped connectors will not be allowed.

1. Testing of Tracer Wire System

As part of the utility connection permit process, the City will trace the wire to ensure it is electronically continuous from the access box to the building. The verification shall be performed upon the completion of backfilling and rough grading, prior to acceptance of the project.

2. Replacement of Existing Water Services

Per Minnesota Plumbing Code, replacement of an existing metallic water service with nonmetallic piping shall not be performed unless a replacement electrical grounding system has been installed, inspected and approved by the electrical inspector.

C. Curb Stop and Box

1. Curb stop valves shall be domestic, of the compression type fitting, and shall be one of the following and specifically for the use with copper inlet and outlet service pipe. All curb stop valves shall be threaded and conform to the Minneapolis Pattern.

(a) Mueller H-15155, or Mueller B-25155.
(b) McDonald 6104-Q, A.Y. McDonald Lead-Free Repair Cut-in Curb Stop Valve, Minneapolis Pattern, 1"x1" CTS McQuick Compression, 76104REPQ 1X10.50.
(c) Ford B44-444MW (1 inch), Ford B44-666MQ (1-1/2 inch), Ford B44-777MQ (2 inch).
(d) Curb box shall be Mueller H-10300, McDonald 5614 or 5615, or equal, which can be extended from 72 inches to 84 inches in height and shall conform to the Minneapolis Pattern.

2. Where curb boxes are placed in paved areas, a curb box cover per Detail Plate 1-10 shall be installed.

D. Corporation Stop

1. Corporation Stops shall be of the compression type fittings and shall be one of the following, or approved equal:

2. Mueller B-25008, or Mueller H-15013 (1-1/2 inch & 2 inch)

3. Ford F-1000-4-Q (1 inch), FB-1000-6-Q (1-1/2 inch), or FB-1000-6-Q (2 inch)

4. McDonald 4701-BQ

E. Service Saddles for 1-1/2 inch & 2 inch Services

1. Service saddles shall be double strap ductile iron saddles with nitrile or EPDM ring gaskets. The saddles shall be Mueller DR2A, Smith Blair 313, Ford-202 or approved equal.

F. Meter Stop Valves

1. 1-inch Meter Stop Valves shall be Mueller B-24258, Ford BA43-444W-Q, McDonald 4602BQ, or equal, ball angle stop for use with compression connection for copper inlet water service pipe and 3/4 inch meter swivel nut for outlet.

2. 1-1/2 inch and 2 inch Meter Stop Valves shall be Mueller B-24276, McDonald 4602BQ, Stockman, or Nibco, 125-psi full flow ball valves.

3. 3 Piece Brass Couplings

1 inch, 1-1/2 inch, and 2 inch couplings shall be compression type fittings. Couplings shall be one of the following or equal:

(a) Mueller H-15403
(b) Ford C44-Q Series
(c) McDonald 4758-Q

G. Irrigation System Cabinet

1. Irrigation System Cabinet shown on Detail Plate 6-12 for Outdoor Small Metering shall completely enclose and secure the irrigation system. The 12-gauge steel cabinet shall have a hinged lid and latch for locking, bolted to the concrete slab, primed and painted utility box green.

C150.203 Sanitary Sewer Service Material

1. Sewer Service Pipe and fittings shall conform to the current Minnesota Plumbing Code, typical allowable materials include:
   (a) Polyvinyl Chloride (PVC) Schedule 40 conforming to ASTM D 1785 and D2665, with ASTM D2665 or ASTM F1866 fittings. For use outside the Public R/W only.
   (b) Polyvinyl Chloride (PVC) SDR 26 conforming to ASTM D 3034, with ASTM D 3034 fittings (not permitted within 2 feet of footing or within 10 feet horizontally of a water service, unless water service is 12 inches vertically above and 12 inches horizontally of the sewer on a solid trench shelf).
   (c) Cast iron soil pipe and fittings shall be the "Service Weight, Centrifugally Spun" grade and shall conform to ASTM A74-75. For use within the Public R/W.
2. Joints
   (a) PVC Schedule 40 joints shall be solvent cement joints using purple primer ASTM F656 and solvent cements per ASTM D2564.
   (b) PVC ASTM D3034 joints shall be gasketed and shall be water tight.
3. Connections to mains or risers shall be made using factory made fittings or commercial adapters. Bends shall be one-eighth (45 degree bends or less.
4. Sanitary sewer service connections shall be plugged at the end of the service connection. Plugs shall withstand the air test pressures. DIP plugs shall not be sealed with adhesives. Plugs shall be placed at the property line or at the building site and shall be as follows:
   (a) For 4 inch DIP or CIP Service, use 4 inch Moeller Twis-Tite with brass tee or 4 inch Expandable Dollar Plug
   (b) For 4 inch PVC Service, use 4 inch Expandable Dollar Plug or 4 inch plastic PVC cap
   (c) For 6 inch DIP or CIP Service, use 6 inch C.I. Blind Plug with rubber gasket
   (d) For 6 inch PVC, use 6 inch PVC cap.
5. Suitable adapters shall be used for joining dissimilar materials or for repair of similar materials and shall be the shear banded coupling type. The adapters shall be manufactured of material generally conforming to the material requirements of ASTM C-425 and the bands shall be stainless steel. Shear bands are not required to connecting dissimilar pipe materials for which shear-banded couplings are not normally manufactured and in these cases the adapter shall be encased in a concrete collar. The adapter inserts and couplings shall be as manufactured by Fernco or Can-Tex or equal. Adapters shall be listed for the specific transition intended to be used.
6. Service saddles shall be Powerseal Model EL with a single adjustable stainless-steel band or approved equal.

C150.204 Sanitary Sewer, Storm Sewer and Drain Pipe Retrofitting Material

This material is only approved for repair/replacement of existing sewer services.

Sanitary sewer service pipe bursting material shall conform to the requirements of solid wall HDPE, SDR 17.

Sanitary sewer service pipe lining material shall conform to the requirements of ASTM F2561 One Piece Main and Lateral Cured-in-Place Liner (MLCIPL), and ASTM D5813 Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems

C150.205 Storm Sewer and Drain Service Material

Storm sewer and drain service pipe located within 10 feet of water service or watermain shall meet the Sanitary Sewer Service material specifications. Subservice edge drain services shall be a minimum of four (4) inch solid wall PVC. Schedule 40 PVC is required if installed within a common trench with the water and sanitary sewer services. SDR 35 PVC can be used if installed outside of the common trench with the water and sanitary sewer services.

C150.206 Backfill Material

Granular backfill shall comply with Mn/DOT section 3149.2D.1 except that in addition not more than 50% of the material shall pass the No. 40 sieve.

Select Material for Backfill shall be sandy loam, sand, or gravel material approved by the Department of Public Works.

Aggregate for pipe foundation shall comply with Mn/DOT Section 3137 ASTM #67.

Fine filter aggregate shall comply with Mn/DOT Section 3149.2I.2.

Bedding and embedment aggregate shall comply with Mn/DOT Section 3138, Table 3138.2-1, Class 2 or 5; recycled aggregates are not allowed.

Any other miscellaneous material required in the work, but which is not specifically mentioned in these specifications, shall be new material, approved by the Engineer prior to its use.

Section 3 CONSTRUCTION REQUIREMENTS

C150.301 Public Utilities

The Contractor shall be responsible to protect any existing utility from damage caused by or occurring during their operations. If the work requires excavation, the Contractor shall notify all utility owners by requesting on site utility locations using the state 'Gopher One-call' system. Repair of damaged utilities shall be at the Contractor's expense.

The locations of underground facilities shown on the plans are approximate only, and are shown only for the Contractor's general information. The Contractor shall verify elevations downstream and upstream prior to any connection and notify the City of any inconsistencies in the sewer system. The City does not assume responsibility for showing all utilities on the plans. The Contractor shall use suitable precautions to prevent damage to pipes, conduits, and other underground or overhead structures.

The construction shall provide for the continued flow of all watercourses, sewers, gutters, and drains, in a manner subject to the approval of the City Engineer, during the service connection work.

C150.302 Limits of Excavation and Restoration

The Contractor shall disturb only that portion of the street and public or private property necessary for the prosecution of the work and consistent with the Street Opening Permit conditions.

The Contractor shall cause a minimum of inconvenience to persons residing near the improvement. The Contractor shall protect all excavations by barricades, lights and other warning devices. All warning devices shall be placed and conform to the Minnesota Manual on Uniform Traffic Control Devices.

Within the City's right of way, the Contractor shall not disturb or damage any shade trees or hedges, except by specific written order of the City Engineer. On private property, the Contractor shall not disturb or damage any shade trees or hedges, except with written authorization of the property owner. The setting and marking of stakes shall not be considered such order.

When service connections are installed prior to rough grading, a minimum of 4 feet of earth fill shall be placed over the pipe. The final earth cover shall be not less than 7 feet for water services and 8 feet for sanitary sewer services.

Upon completion of the service connections, the public and private property shall be restored to the equal or better condition than prior to commencing work.

The maximum length of open trench will be the distance necessary to accommodate the amount of pipe installed in a single day. To the extent practical, trenches shall be fully backfilled each day. At any time a trench is unattended, the entire trench shall be protected with a minimum of 4 foot high construction fence.

C150.303 Trench Excavation

Contractor is responsible to comply with current provisions of the United States Department of Labor and Industry Occupational Safety and Health Rules.

The trench shall be opened along the lines laid out and to a depth necessary for the laying of pipe at the grades shown on the Plans or approved by the City Engineer. The width of trenches shall provide adequate space for workmen to place and joint the pipe properly and to compact the earth below the haunches of the pipe. The width of the trench, measured at the top of the pipe, shall be no wider than 36 inches.

Solid rock shall be defined as ledge rock or other rock or boulders exceeding 1/3 cubic yard in volume which requires blasting or other extraordinary methods for its removal. Whenever solid rock is encountered in the trench, the City Engineer shall be notified immediately so that the contour of the rock can be determined before its removal. The classification and calculation of the amount of rock excavated shall be determined by the City Engineer and their decision in the matter shall be final. Rock shall be excavated to provide a clearance of at least 6 inches below all parts of the pipe. The rock excavation width for a common water and sanitary sewer service shall be 36 inches.

Whenever the trench is excavated below the designated pipe bedding grade, whether in rock or otherwise, special backfill is required. All depressions below grade shall be backfilled with approved material and thoroughly compacted before the pipe is laid.

The Contractor shall provide suitable means for the removal of ground water and surface water. In no case shall this water be allowed to flow into the sanitary sewer pipe. Storm sewer may be used for ground water and surface water with the permission of the City Engineer. When quicksand or other unsatisfactory foundation soils are encountered, the Contractor shall immediately notify the City Engineer.

Sheeting and bracing shall be provided in all trenches whenever it is necessary for compliance with OSHA requirements, for the safety of the workmen, or for the protection of the work in-place, or when specified by the Plans or Special Provisions.

C150.304 Bedding and Encasement

Bedding for service connections shall be full encasement extending not less than 4 inches below the pipe and 12 inches above the top of the pipe. Bedding and encasement material shall be accurately shaped by means of a template to fit the lower part of the pipe exterior for at least 60% of the outside diameter or span of the pipe before placing the pipe.

If the foundation at the established grade for the bottom of the pipe or structure is unstable, the trench shall be subcut to a depth designated by the City Engineer. The side slopes of the trench below invert grade shall be excavated as nearly vertical as practicable. The subcut shall be backfilled to the invert of the pipe using Aggregate for Pipe Foundation.

Subcut backfill shall be placed in layers not to exceed 12 inches and thoroughly compacted.

Class "A" bedding shall consist of continuous concrete cradle having a minimum thickness under the pipe of 1/4 the normal inside diameter or span and extending up the sides of the pipe for a height equal to 1/4 the outside diameter or rise. The cradle shall have a width at least equal to the outside diameter or span of the pipe plus 8 inches and shall be constructed monolithically. Concrete for Class "A" bedding shall be as indicated on the Plans or in the Special Provisions.

For Perforated Pipe the bedding material will conform to the requirements for fine filter aggregate and shall be placed to 24 inches above the top of the pipe.

Ductile Iron pipe shall be bedded on a soil foundation shaped to fit the lower part of the exterior of the pipe for a width of at least 50% of the outside diameter of the pipe.

C150.305 Sanitary Sewer, Storm Sewer and Drain Pipe Installation

Installation of sanitary sewer pipe and fittings shall conform to the current Minnesota Plumbing Code.

A. Grading and Aligning Pipe

1. Service connection pipe shall be laid to line and grade and in the location shown on the Plans or as determined by the City Engineer.
2. Work done without proper location from base lines, offset stakes, benchmarks, or other basic reference such as provided by modern line and grade control equipment shall be removed and replaced at the Contractor's expense.
3. Dropping, jolting, striking, or other such methods of manipulating pipe to proper grade and alignment will not be permitted.
4. Sanitary sewer service pipe shall have a fall of not less than 1/4 inch per foot for 4 inch pipe and 1/8 inch per foot for 6 inch pipe and a maximum pipe slope of 5%, except as specifically approved by the City Engineer.
5. A 4"x4" wooden post, extending one (1) foot above grade, shall be placed by the pipe invert plug to mark the location of the pipe, when installed at a separate location from the water service.

B. Placing Sewer Pipe

1. Each section of service connection pipe (sanitary sewer, storm sewer, or drain) shall have a firm and uniform bearing throughout its entire length.
2. The ends of sewer service connections shall be sealed with a plug conforming to the requirements of Section C150.203 in this specification. Sub-drains will be plugged with a 4 inch detectable PVC cap. Pipe shall be laid with the bell or grooved end upgrade.
3. Installing PVC Pipe
   (a) PVC pipe shall be bedded and encased using specified materials. Pipe placement shall be in accordance with the pipe manufacturer's recommendations.
   (b) The maximum allowable radial deflection shall be 5% of the diameter of the pipe.
   (c) PVC sub-drain pipe shall be laid with the perforation down.
4. The sanitary sewer service pipe risers shall be constructed in accordance with the City Standard Detail Plates. Risers shall be installed at the main.
5. Cleanouts shall be placed at a maximum 100 foot intervals in straight runs and for each aggregate horizontal and/or vertical change in direction greater than or equal to 90 degrees. As-built location coordinates shall be verified for all cleanouts.
6. Connections with Mains or Structures
   (a) Sanitary Sewer Service connections shall be core drilled or, made at the main using tees, wyes. For clay pipes, the City shall install the tap. Manhole connections will be permitted only where approved by the City Engineer.
7. Storm Sewer Connections
   (a) Connections to storm sewers shall be made with manholes, junction boxes, tees or cut-ins in accordance with the applicable standard detail plates of the City of Rochester.
   (b) Near a tee or wye, where compression joint cannot be made with a commercial adapter, the connection shall be made by tapping the main. The existing connection shall be abandoned by plugging within 5 feet of the main.
   (c) Sewer services to be abandoned in place shall be disconnected and plugged with a pressure plug or the end filled with concrete at the property line. A compression plug shall be used when disconnecting at the wye or tee connection.

C150.306 Sanitary Sewer, Storm Sewer and Drainpipe Retrofitting

A. Pipe Bursting

1. Retrofitting existing sewer services by the Pipe Bursting Method shall follow the manufacturer’s guidelines for installation.
2. Any damages to existing pipe main or structures shall be included in the retrofit.

B. Lining

1. Cured in place lining systems shall be installed in accordance with ASTM F1216
2. Liner area shall be at least 75% of theoretical areas, offsets must be less than 25% of diameter, and flow line jumps shall be less than 10% of diameter.
3. The one piece MLCIPL shall be pressed against the host pipe by pressurizing a bladder and held in place until the thermoset resins have cured.
4. Full service lateral length internal TV inspection shall be provided and approved by Public Works before and after lining including the detailed record of liner length, diameter, and all connections or appurtenances.

C150.307 Water Service Installation/Abandonment

A. Grading and Aligning Pipe

1. Service connection pipe shall be laid to line and grade and in the location shown on the Plans or as determined by the City Engineer.
2. Work done without proper location from base lines, offset stakes, benchmarks, or other basic reference such as provided by modern line and grade control equipment shall be removed and replaced at the Contractor's expense.
3. Dropping, jolting, striking, or other such methods of manipulating pipe to proper grade and alignment will not be permitted.

B. Copper Water Service

Copper Water Service pipe may be spliced only with a brass union. Copper Water Service pipe shall not be spliced except as follows:

1. When the length of 1 inch water service between the curb stop and the water meter connection exceeds 100 feet. Only one splice will be permitted for each additional 100 feet of service.
2. When the length of 1-1/2 inch water service between the curb stop and the water meter connection exceeds 60 feet. Only one splice will be permitted for each additional 60 feet of service.
3. When the length of 2 inch water service between the curb stop and the water meter connection exceeds 40 feet. Only one splice will be permitted for each additional 40 feet of service.
4. When a copper service is repaired, a minimum number of splices will be permitted.
5. During watermain replacements, one splice will be permitted on services running to the side of the new water main on which the existing watermain lies.

Water service taps on watermains shall be tapped at 45 degrees on the appropriate upper quadrant of the main. A distance of at least 18 inches shall separate taps and no tap shall be made within 18 inches of a pipe joint. Corporation threads shall be wrapped with double wrap of three mills Teflon before installation. 1-1/2 inch and 2 inch service pipe shall have a 45 degree bend connected to the corporation stop to facilitate the downward expansion loop. Corporation stops for 1-1/2 inch and 2 inch services shall be connected to the main with a double strap ductile iron service saddle. Immediately after the water service connection has been placed from the main to the curb stop and the curb stop installed, it shall be flushed with water from the main by having the curb stop valve in the fully opened position.

Small lead, galvanized iron or copper water services to be abandoned shall be disconnected by closing the corporation stop at the main. The pipe shall be cut off one (1) foot from the corporation stop, pinched closed, and the curb box riser section removed. Larger cast iron or ductile iron services shall be abandoned as follows: tapping sleeves and lead caulked joint tees shall be cut out and replaced with a new section of watermain; for mechanical joint type tees, the service pipe shall be removed and a mechanical joint plug installed.

C. Water Service Appurtenances

1. Curb Box
   (a) Curb boxes shall be set in the collapsed position 1 foot below finished grade in areas where finish grading is yet to be completed. After completion of the finished grading, the upper box section shall be raised and the curb box operated to verify proper alignment.
   (b) In areas where the finished grade is established the curb box shall be adjusted to the Extended position and set to finished grade and the curb box operated to verify proper alignment.
   (c) Prior to setting of curb box the metal stops of curb box upper section shall be removed and the split-locking ring in base section shall also be removed.
   (d) A 4"x4" wooden post, extending one (1) foot above grade, shall be placed by the curb box to mark the location of the box.
2. Curb Stop
   (a) A concrete brick shall be placed immediately below the curb stop for it to rest on.
   (b) Where the water service is not being extended to the building immediately, the open end of the curb stop shall be protected per Detail Plate 4-01. Alternate cap methods require approval of the City Engineer and must prevent soil from entering the copper pipe and minimize the water

leak should the curb stop be accidentally opened.

C150.308 Record Location

The Contractor must keep accurate record of wye; curb box and corporation stop locations. Upon completion of service construction the sheet must be submitted to the City Engineer.

C150.309 Trench Backfilling

All trenches shall be backfilled as soon as practicable. Compaction by "Compacted Trench Backfill" method, as specified below, will be required on all service connection construction.

When suitable material is not available from project excavations the City Engineer may order the procurement of select material for backfilling or for blending with existing material. The quantity and quality of the imported selected material shall be subject to the approval of the City Engineer.

Placing and compacting of trench backfill including blending of materials, adding moisture or drying of materials, and procuring suitable materials from excavations within the project shall be considered as incidental to trench excavation or to the items for pipe.

C150.310 Compacted Trench Backfill

Bedding and encasement material shall be carefully placed by hand methods and tamped around and over the sewer and water connection to a depth 1 foot above the top of the pipe. The remainder of the backfill shall be placed in layers of uniform depth not exceeding 12 inches per layer and compacted to City Standards.

Backfill material shall be Select Material for Backfill as defined in Backfill Material Section of this specification, except that whenever a ‘street cut’ is required, Granular Backfill Material shall be used in and within 3 feet of the right of way line.

Backfill material placed within 3 feet of subgrade shall be compacted to a density of not less than 100% of maximum density and the relative moisture content shall be not more than 102% of optimum moisture content. Subgrade shall be defined for this section as the elevation of the bottom of any aggregate material placed for pavement or sidewalk or the bottom of the topsoil for turf establishment.

Backfill material placed more than 3 feet below the subgrade shall be compacted to a density of not less than 95% of maximum density and the relative moisture content shall be not more than 115% of optimum moisture content.

Maximum density and optimum moisture shall be determined using the methods described in the current edition of the Mn/DOT Grading and Base Manual.

C150.311 Resurfacing and Restoration of Public and Private Property

A. Street and Alley Resurfacing and Restoration

1. The terms and requirements indicated in the City Street Opening Permit, issued for this project shall govern. The following requirements shall apply except if in direct conflict with the listed permit conditions.

2. Adequate protection shall be afforded to ensure the safe prosecution of the work with minimum of inconvenience to safe public vehicular and pedestrian traffic. Barricades, warning lights, and other traffic control signs and devices shall be placed and maintained in accordance with the Manual of Uniform Traffic Control Devices and as directed by the City Traffic Engineer. At least one lane of traffic shall be maintained at all times unless specific authorization is received from the City Traffic Engineer. Any time traffic is closed to one lane, the Contractor shall provide flaggers to direct the flow of traffic.

3. All streets and alleys shall be restored in-kind with aggregate base and pavement to match existing conditions before work commenced or as described below, whichever is more substantial.

4. Any off site material needed to backfill the trenches, to re-fill settlements, or to properly restore the original condition of the streets, alleys, public or private property shall be furnished by the Contractor.

5. All restoration work shall be done according to the following schedule:

(a) Gravel surfaced areas

1. Shall be restored using a minimum of 6 inches of aggregate surfacing. The crushed rock shall be compacted to 100% of Standard Proctor Density and graded to the shape of the existing surface.

(b) Bituminous Surfaced Streets

1. Patches in multi-layer bituminous streets shall be the same number and compacted thickness of the layers found in the original construction with no layer exceeding 2-1/2 inches in compacted thickness.
2. Unless otherwise directed by the City Engineer, a tack coat shall be applied at a rate directed by the City Engineer but not to exceed 0.05 gallons per square yard between successive layers of the bituminous patch.
3. The City Engineer shall delineate the limits of the area of bituminous surface to be removed. Sawing along the final removal line shall be required.
4. Bituminous surfaced streets shall be restored to their cross section using aggregate base material and bituminous mixtures consistent with the City's Standard Specifications for Bituminous Pavement. The minimum thickness of the bituminous portion of the restoration shall be 4 inches placed in two lifts, but in no case shall the thickness be less than the abutting pavement. The minimum compacted thickness of the aggregate base in the trenched area shall be 6 inches, but in no case less than the existing aggregate base.
5. The finished surface of the patch shall be uniform, smooth, and shall conform to the adjacent surface. Bituminous patches shall be left approximately 1/4 inch above the edges of other fixed surfaces, structures, and installations such as concrete gutter, slabs, etc.

(c) Concrete Surfaced Streets

1. The provisions of this section shall apply to repairs of concrete surfaced streets, alleys and driveway approaches and to the repairs of the concrete base under other types of surfacing.
2. A Contractor licensed by the city to conduct concrete work within the public right-of-way shall complete patching of street openings in concrete paved streets.
3. The limits of concrete surfacing to be removed shall be delineated by the City Engineer and shall generally be full panel replacement. The edges of the replacement panel shall be doweled or tied as directed by the City Engineer.
4. Where the subgrade, sub-base or base is found to be unstable or yielding, the unstable material shall be removed and replaced with stable material to a depth of not less than 12 inches. The replacement subgrade material shall be 'Stabilizing Aggregate' material and have a moisture content between 65% and 102% of optimum and shall be compacted to 100% Standard Proctor density.
5. The base shall be restored to their original thickness, but not less than 6 inches, using aggregate base material. Immediately prior to placing the concrete, the base material and the exposed edges of the existing concrete shall be moistened.
6. The concrete mixture shall be Mn/DOT Mix No. 3F52 or Mix No. 3HE52 for driveway approaches and Mn/DOT Mix No. 3A41 or 3A41HE for streets and alleys. High early mix shall only be used as directed by the City Engineer. Concrete shall contain 5% to 8.5%

entrained air and produced in accordance with Mn/DOT 2461 and Mn/DOT 2301 by a certified Ready Mix Plant.

7. The concrete shall be placed and struck off to proper grade. The concrete shall be finished to match the surrounding concrete.
8. Joints shall be constructed and sealed in accordance with Mn/DOT 2301.3H and 2301.3N.
9. Curing shall be performed by application of a full coverage of Membrane Curing Compound meeting Mn/DOT Section 3754 with white pigment.

(d) In turfed areas

1. The top 6 inches of backfill shall be topsoil material. Any mowed grass area disturbed by the construction shall be replaced with 'Lawn Sod' meeting Mn/DOT Section 3878. Areas not regularly mowed shall be seeded in accordance with Mn/DOT Section 2575 as follows:
2. Seed Mixture Number 25-131 applied at 220 pounds per acre.
3. Mulch Material Type 5 Wood cellulose fibers applied at 1500 pounds per acre.
4. Commercial fertilizer 22-5-10 applied at 500 pounds per acre.

6. The Contractor shall protect trees, shrubs, or any private, public, or park property. The Contractor shall, without cost to the City, replace any damaged shrubs and trees, unless they have been designated and marked for removal by the City Forester.

7. The Contractor shall repair, relay, or replace all sidewalks, curbs or other street structures displaced or damaged because of the work done under these Specifications. All work of this nature shall be done in accordance with the Standard Specifications covering the particular work involved.

Section 4 METHOD OF MEASUREMENT

C150.401 Description

Services shall be measured by physical count (each). Services shall include all materials, equipment and labor needed to install the service as shown in the Detail Plates. The length of the service, is dependent upon the right-of-way (R/W) widths on that project. The right of way widths are stated in the Proposal or shown on the plan set.

C150.402 Trench and Rock Excavation

Where an unstable trench bottom is encountered necessitating additional trench excavation in order to prepare the pipe foundation with stabilizing materials, the cost of such additional trench excavation shall be considered as incidental, with no direct compensation therefore. The stabilizing materials placed will be paid for in accordance with the applicable provisions of the Specifications and Proposal covering those items.

All solid rock encountered and removed within the specified limits of the trench shall be measured by volume (cubic yard) in place, and paid for within the following limits:

1. Six (6) inches below the bottom of the pipe when laid to grade,
2. Eight (8) inches on each side of the outside of the pipe, with a minimum trench width of 36 inches, said width extending vertically to the top of rock profile.

Where material is encountered which has physical characteristics (relative to difficulty of removal) lying between those of earth trench excavation and solid rock excavation, the engineer will determine and allow the Contractor payment for a percentage of the actual measured volume of such material at the contract unit price per cubic yard of Solid Rock Excavation. Such percentage will be based on the relative cost of removal of the two materials.

C150.403 Granular Materials

Granular materials furnished and placed as special foundation, bedding, encasement, or backfill construction will be measured by volume (cubic yard) of material furnished by the Contractor from outside sources and placed within the limits defined. Unless otherwise specified, volume will be determined by vehicular measure (loose volume) at the point of delivery. Measurements will not include any materials required to be placed as a component part of other Contract Items as may be specified.

C150.404 Sheeting

Sheeting shall be measured on a square foot basis. Sheeting ordered left in place will be measured and paid for by the square foot of the overall area of the front face of the sheeting including the cut-off sections, if any.

C150.405 Reconnect Existing Water Service

Reconnect Water Services shall be measured by physical count (each). They shall include all materials, equipment and labor needed to reconnect the water service, as shown in the Plans. Bid item includes but is not limited to: corporation stop, and up to 8 feet of new service regardless of service size, (generally 1 inch services), for each reconnection. Service sizes if shown on the plans are approximate and no additional compensation will be made if services are of a different size.

C150.406 Reconstruct Existing Water Service Connections

Reconstruct Water Services shall be measured by physical count (each). They shall include all materials, equipment and labor needed to reconstruct the water service through the curb box, unless otherwise shown in the Plans. Bid item includes but is not limited to: corporation stop, copper tubing, curb box and all

necessary fittings and adapters.

C150.407 Reconnect Existing Sewer Service Connections

Reconnect Sewer Services shall be measured by physical count (each). They shall include all materials, equipment and labor needed to needed to reconnect the sanitary sewer service, as shown in the Plans. Bid item includes but is not limited to: sleeves, wye, tee, bends and up to 8 feet of new service, regardless of service size, (generally 4 inch services), for each reconnection. Service sizes if shown on the plans are approximate and no additional compensation will be made if services are of a different size.

C150.408 Reconstruct Sewer Services Connections

Reconstruct Sewer Services shall be measured by physical count (each). They shall include all materials, equipment and labor needed to reconstruct the sanitary sewer service to the boulevard, unless otherwise shown in the Plans. Bid item includes but is not limited to: sleeves, wye, tee, bends, trenching and 4 inch sewer pipe, for each reconstruction.

Section 5 BASIS OF PAYMENT

C150.501 Description

Payment for construction of (Water, Sanitary, Storm, and Sub-Drain) Service Connections shall include all costs for trenching in earth, furnishing and installing service connections from public mains to boulevard, including corporation stop and tapping for same, curb stop and box, plugs, fittings, and adapters, compacted trench backfill, and replacement of surfacing.

Payment will be made for solid rock at the price per cubic yard contained in the Proposal for all rock excavated to the width and depth required by the Plans and Specifications and shall include the cost of refilling the rock sections with approved material to the proper grade for laying pipe.

Granular materials furnished for foundation, bedding, cover, or backfill placement as specified in connection with service items will only be paid for as separate Contract Items to the extent that the Proposal contains specific Pay Items. Otherwise the furnishing and placing of granular materials as specified shall be incidental to the service item without any direct compensation being made.

In the absence of special payment provisions:

1. All costs of furnishing, placing and removing sheeting, shoring, and bracing materials, including the value of materials left in place as required by the Contract, shall be included in the prices bid for pipe installation and will not be compensated for separately.
2. All costs of restoring surface improvements as required, disposal of surplus or waste materials, maintenance and repair of completed work, and final cleanup operations shall be incidental to the Contract Items under which the costs are incurred.

C150.502 Items List

Payment for construction of (Water, Sanitary, Storm, and Sub-Drain) Service Connections will be made on the basis of the following schedule:

ITEM NO	ITEM	UNIT
C150.501	__IN SANITARY SEWER & 1__IN WATER SERVICE CONNECTION	EACH
C150.502	__IN SANITARY SEWER, __IN WATER SERVICE & __IN SUBDRAIN CONNECTION	EACH
C150.503	__IN SANITARY SEWER SERVICE CONNECTION	EACH
C150.503	__IN SANITARY SEWER SERVICE (DIRECTIONAL DRILL)	EACH
C150.503	__IN SHARED SANITARY SEWER SERVICE CONNECTION	EACH
C150.503	__IN SANITARY SEWER SERVICE CONNECTION	LIN FT
C150.503	__IN SANITARY SEWER SERVICE (DIRECTIONAL DRILL)	LIN FT
C150.503	__IN SHARED SANITARY SEWER SERVICE CONNECTION	LIN FT
C150.504	__IN WATER SERVICE CONNECTION	EACH
C150.504	__IN WATER SERVICE CONNECTION (DIRECTIONAL DRILL)	EACH
C150.504	__IN WATER SERVICE CONNECTION	LIN FT
C150.504	__IN WATER SERVICE CONNECTION (DIRECTIONAL DRILL)	LIN FT
C150.505	__IN SUBDRAIN SEWER SERVICE CONNECTION	EACH
C150.506	TRENCH DEWATERING	LIN FT
C150.507	SOLID ROCK EXCAVATION	CU YD
C150.508	SHEETING LEFT INPLACE	SQ FT
C150.509	SELECT MATERIAL FOR BACKFILL (__)	CU YD
C150.510	GRANULAR MATERIAL FOR BACKFILL (__)	CU YD
C150.511	AGGREGATE FOR PIPE FOUNDATION GRADATION __ (__)	CU YD
C150.515	CONCRETE CRADLE	CU YD
C150.548	FURNISH & INSTALL CURB BOX COVER	EACH
C150.550	__IN CURB STOP AND BOX	EACH
C150.551	__IN CORPORATION STOP	EACH
C150.564	REMOVE EXISTING _____ SERVICE CONNECTION	EACH
C150.568	REBUILD EXISTING _____ SERVICE CONNECTIONS	EACH
C150.569	RECONNECT EXISTING _____ SERVICE CONNECTIONS	EACH
C150.570	RECONSTRUCT EXISTING _____SERVICE CONNECTIONS	EACH
C150.570	RECONSTRUCT EXISTING WATER SERVICE CONNECTIONS	EACH
C150.585	RESTORATION	LUMP SUM
C150.585	RESTORATION	SQ YD
C150.585	BITUMINOUS TRAIL RESTORATION	LIN FT