THE VILLAGE OF ROSCOMMON

SPECIFICATIONS FOR THE

PLAN AND PROFILE OF PROPOSED

2011 Village of Roscommon M-18 Development Water Main Project

PART OF

SECTION 7, T24N, R2W, HIGGINS TOWNSHIP, ROSCOMMON COUNTY

150 FEET OF NEW 12" WATER MAIN, VALVES AND ONE HYDRANT IN THE SOUTHEAST ¼ OF THE SOUTHEAST ¼ OF SECTION 7, HIGGINS TOWNSHIP, ROSCOMMON COUNTY

Prepared by

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Contents

GENERAL NOTES

1. Prior to beginning construction it shall be the contractors responsibility to contact the Miss Dig utility protection service (1-800-482-7171) to verify the location of all existing utilities. Miss Dig shall be notified not less than 72 hours prior to beginning construction.

2. The Contractor shall follow all safety guidelines per MiOSHA at all times, both during construction hours and regarding site safety when the site is dormant.

3. It is the contractor's responsibility to secure all permits or copies of permits and bonds prior to construction. Copies of these permits as they pertain to Right-of-way work on Local, County or State Roads, Soil Erosion Control, and MDEQ Water and Sewer Permits must be provided to The Village of Roscommon prior to the beginning of construction. For work on County Roads contact the Roscommon County Road Commission (RCRC) at (989) 366-0333, for work on State Highways contact the Michigan Department of Transportation (MDOT) at (989) 346-1802.

4. Commercial, Industrial and multi-family sewer and water connections or extensions of existing mains require sealed engineering drawings and design for approval.

5. During all operations of the CONTRACTOR in the street and roadways, the CONTRACTOR shall maintain barricades, lights, and warning signs as required by MDOT, the Village and as defined and outlined in the Michigan Manual of Uniform Traffic Control Devices.

6. Inspection of public utility (sanitary, water and storm) installation and materials is required and shall be done as directed by the engineer and the Village of Roscommon. The contractor is responsible for coordination of all third party inspection Compaction inspection is required by the engineer and shall be contracted by the owner. Inspection fees where, required shall, be paid prior to beginning the project.

7. Contractor shall notify the Village of Roscommon DPW department 24 hours prior to the start of construction. (989) 808-5002 or (989) 275-5743.

8. The Contractor shall be required to complete all work in an expeditious manner and shall not stop construction for extended periods once construction has begun. A schedule shall be established as part of the original permit. Fees will be assessed by the OWNER for projects exceeding their set schedule. An extension may be applied for from owner/engineer if required by special circumstances.

9. All major construction changes must have written approval of the consulting engineer and the owner. If changes are not pre-approved the job will be immediately shut-down until the changes have been approved.

10. The contractor shall abide by all of the Village of Roscommon DPW requirements regarding the construction of Water and Sewer mains, or other utilities, maintaining traffic barricading, boring, backfill, and restoration. There will be no additional compensation due the contractor for complying with these requirements.

11. The owner shall provide a copy of the Roscommon County Soil Erosion Control Permit and the state NPDES permit to the Contractor. The Contractor shall have permits available on-site during all construction.

12. All construction methods and materials shall conform to these standards and specifications. All materials used must be American made.

13. Prior to the start of construction the contractor shall furnish material certifications and shop drawings to the utility inspector verifying that all materials used on the project are in accordance with these standards.

14. Contractor shall maintain (as much as possible) all existing sanitary sewer, water or storm sewer service connections during construction. Any disruptions in service must be approved by the Village of Roscommon and coordinated with local users. Additional adjustments or repairs required to maintain these services shall be made by the contractor and the cost shall be incidental to construction.

15. Contractor shall verify the depth, size, material type and horizontal location of all existing utilities before any work is started. The exact location of existing utilities shall be determined by hand digging. All cost shall be incidental.

GENERAL CONSTRUCTION

A. EARTHWORK

These specifications shall be closely followed in all earthwork performed on this project. Earthwork shall mean all excavation and backfilling and shall include the removal and disposal of all materials of every sort necessary to be removed for purposes of construction; the furnishing, placing, and maintenance of all sheeting, bracing, and shoring if and where required and the care of existing structures, utilities and street surfaces.

B. EXCAVATION

All excavation, except where necessary to tunnel, bore, or jet under roads, railroads, tree roots, and other obstructions shall be open cut from the surface.

Excavation may be performed by any practical method consistent with the integrity and protection of the work and adjoining- structures and the protection of workmen and the public. If excess excavation is made or the material becomes disturbed so as to require removal, the resulting space shall be refilled with MDOT Class II material solidly tamped into place, in not more than nine (9) inch layers; to the satisfaction of the Village of Roscommon DPW, before the construction work proceeds; or may, at the direction of the Village of Roscommon DPW be filled with Class B concrete conforming to the standard concrete specifications at the CONTRACTOR's expense.

After structure excavation has been carried down to final grade where applicable, any unsuitable foundation material found at this level shall be excavated and removed until a suitable foundation material (as determined by the inspector for the project) is encountered. Unsuitable materials are organic type soils that are wet and have little stable structure. The excess excavation shall be replaced with MDOT stone or Class II material compacted in 6-inch layers or Class B concrete placed up to the excavation limits.

Excavated material not suitable for backfilling shall be removed and properly disposed of by the CONTRACTOR.

For construction of water mains trenches shall be excavated to a depth required with allowance for bedding the pipe on a minimum 4-inch layer of MDOT Class II granular material, so as to provide uniform and continuous bearing and support for the pipe over the full length between joint cuts. (Unless otherwise specified on the plans.) For gravity sanitary sewer and storm sewer, the trenches shall be excavated to a depth required with allowance for bedding the pipe on a minimum 4-inch layer of MDOT 6A or 10A stone, so as to provide uniform and continuous bearing and support for the pipe over the full length between joint cuts. The trench shall be cut wider and deeper at each pipe joint location to provide for properly completing the pipe joint and to relieve the joint of

all loadings. The bottom of the trench shall be shaped so as to conform as nearly as possible to the outside of the pipe with allowance being made for a 4-inch cushion below the pipe.

The width of trench shall be sufficient to allow the pipe to be laid and jointed properly and shall provide for a minimum net clearance of 6 inches and a maximum net clearance of 12 inches on each side of the barrel of the pipe and to allow the backfill to be placed and properly compacted. Exceptions to these clearances will occur at encasement or special construction.

Foreign materials encountered in the excavation such as wood, boulders and the like, which obstruct the excavation shall be removed. Where such obstructions occur at or near the bottom of the excavation, requiring excavation below grade for their removal, the excavation shall be brought back to grade by MDOT Class II material compacted to 95 percent of its maximum density.

Where the condition of the ground requires, the sides of excavation shall be securely held by bracing and/or sheeting which may be removed in units when the level of the backfill has reached a point where-it is safe to pull the sheeting without disturbing the protected feature.

No sheeting, bracing, or other timber shall be left in the excavation upon the completion of the work. Boxes, as required, shall be used by the CONTRACTOR, wherever the depth of the excavation is ten (10) ft or more.

Where men are required to work in excavation, all trenching, bracing, and shoring shall conform to the requirements of MIOSHA.

If crossing over or under or exposing any main or lateral sewer, sewer connections, basin connections, water main, service connections, gas mains, gas connections wire conduit or any underground improvement, the Contractor shall use all possible care in protecting same from injury or damage. The work shall be performed in such a manner as will result in the least damage or interference. The Contractor will be required to repair, replace or rebuild any such improvement that is injured or damaged by him and he shall be responsible to the department, companies, individuals or corporations controlling or owning such improvements.

Where these services are encountered and are undamaged, they shall be supported and/or protected by the contractor at his expense against later settlement and/or damage after backfill. The contractor shall consult the Village of Roscommon DPW, the Road Agency (i.e. RCRC) or utility company having jurisdiction over any duct line, gas main, etc., which may cross the excavation to determine the method of supporting such duct or pipe.

All excavated material shall be piled in a manner that will not endanger the work and

that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve manhole covers, valve boxes, curb stop boxes. Fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed, except as otherwise provided for herein on a temporary basis. Excavated materials and disturbed earth causing sedimentation in catch basins and storm sewer shall be cleaned out.

Dewatering

The Contractor shall at his own expense pump out or otherwise remove any water which may gather in the trenches or tunnels and shall form all dams, cofferdams or other works necessary for keeping the excavated trenches or tunnels clear of water during the progress of the work. In case of quicksand or other bad and treacherous ground, the work shall be proceeded with day and night without intermission, if the Engineer or Inspector so directs.

C. BACKFILLING

Standards

Density testing as identified in this specification is to be per the test method AASHTO T -180 for a modified proctor.

Indicators

Construction tape shall be placed in the trench over all utilities as they are backfilled. Tracer wire shall also be placed over all plastic water main installation.

Structural Backfilling

As soon as practical after concrete structures have set, forms, and debris have been removed, the excavated area around structures shall be carefully backfilled up to grade with MDOT Class II material, compacted in place to 95 percent of its dry density in not-to-exceed 12-inch layers. Where the overdig around new or existing structures is less than 12"wide, MDOT 6A or 10A stone must be used to backfill around the structures up to within 6" of grade. Backfilling around house basements shall be as herein specified up to within 24 inches of finished grade. Excavated material can be used to backfill 18 inches up to within 6 inches from grade, with the final 6 inches backfilled with topsoil.

Backfilling within County Road Rights-of-Way

Backfill for roadwork within street rights-of-way, under roadways, pavements, shoulders, and sidewalks shall be MDOT Class II granular material compacted to 95 percent of its dry density in not-to-exceed 9-inch layers. Materials such as soft clay, topsoil, muck, cinders, vegetable matter, refuse, boulders, and other objectionable and non-packing earth shall be excluded from the backfill and removed from the site. Stone larger than three (3) inches in any dimension shall be excluded from the backfill and removed from the site by the CONTRACTOR.

Utility and Street Backfilling

In commencing backfill for all pipe work except gravity sanitary sewer, a "cushion" of modified MDOT Class II granular material (100% passing 1 1/2" sieve) shall be thoroughly compacted by hand tamps in not-to-exceed 6-inch layers under, around, and along the sides of the pipe up to the centerline of the pipe. The sand shall be machine tamped in not-to-exceed 9-inch layers to a level a 18 inches above the crown of the pipe. Voids under the pipe joints shall be filled, tamped in place from the sides after the joint is completed. Gravity sanitary sewer shall have 6A or 10A stone surrounding the pipe up to the top of the pipe. Non-woven fabric shall be placed over the stone and modified Class-II can be used above the pipe.

Above the level of 18 inches above the crown of the pipe or the bottom of structural excavations the backfill material shall be as follows:

a) Under pavements, curb, paved or gravel driveways, gravel roads, and shoulders the remainder of the backfill shall be MDOT Class II material which shall be solidly compacted to 95 percent of its dry density by mechanical tamps in layers of not more than 9-inch loose thickness with backfilling carried up to within 9 inches of finished grade. The fill shall be brought to finished grade with surface compatible to the removed surface. For new pavement see details of pavement sections.

b) Under sidewalks the remainder of the backfill shall also by MDOT Class II material compacted to 95 percent of its dry density by mechanical tamps in layers not-to-exceed 9-inches loose thickness with backfilling carried up to subgrade.

c) In all other areas the remainder of the backfill shall be of the excavated material with the exception of those materials excluded above. The backfill shall be spread and compacted not-to-exceed thickness of 12 inches. The finished grade of this backfill shall be restored to its original condition. Compaction of backfill shall be such as to obtain 90 percent of the maximum unit density as determined at the optimum moisture content.

Clay and organic material will not be permitted as backfill material under any pavement, drive, sidewalk, or curb and gutter in the Village, and the CONTRACTOR shall furnish and place all MDOT Class II granular backfill material required, which is not available from trench excavation at his own expense.

Backfill Not in the Road Influence

All trenches between the property line and road shoulder shall be left with a sufficient mound of earth above the original surface, as is deemed necessary by the Village of Roscommon DPW, to take care of future settlement.

General Backfill Information

The CONTRACTOR shall continuously maintain all excavations and shall refill and compact to finished grade all settlement which shall occur.

After a one freeze/thaw cycle (November thru May), and if the backfill compaction is satisfactory to the Village of Roscommon DPW, MDOT or RCRC, to provide for any slight settlement, the CONTRACTOR shall retrim neatly any broken edges of pavement and replace the top surface of the backfill within the pavement area with pavement surface equal to that surface which was removed.

Headwalls, culverts, and drainage systems filled, or damaged by the CONTRACTOR during the course of his operation shall be cleaned, relaid, or rebuilt to a condition equal to the original state, at the CONTRACTOR's expense.

Where the excavation is located beside a ditch and/or where an existing ditch is filled or disturbed in the CONTRACTOR's operations, the CONTRACTOR shall clean, repair, or replace the ditch with properly pitched bottom and side slopes and of section and capacity not less than the original section. It will be the CONTRACTOR's responsibility to document the original section in advance to the appropriate road agency in sufficient detail as is acceptable to them. (via pictures, drawings, etc.)

Where excavation has been through lawn areas the Contractor shall restore the disturbed area by placing topsoil and seeding or hydroseeding over the final backfill material.

The CONTRACTOR shall remove excess dirt and other construction material from the site of the work and leave the site in a clean and neat condition.

Should any deficiency in the backfilling occur, in either quantity or quality of excavated materials taken from the trench, the Contractor shall supply the deficiency without extra charge to the Owner. No foreign or perishable material shall be used in the backfilling.

Surplus Earth

Surplus earth is understood to mean the excess of earth excavated and remaining after the required backfilling herein before specified is completed. Such surplus earth shall be loaded by the Contractor and trucked to disposal sites arranged by the contractor. Excess earth not used by the Owner shall become property of the Contractor and shall be removed from the project. The unexcavated portion of the roadway surface shall be left in its original condition, clean and free of any soil deposits. No surplus earth will be left in the road ditches.

D. WORK WITHIN ROAD RIGHTS-OF-WAY

The Contractor shall obtain permits for construction within the road right-of-way from the authority having jurisdiction over the road. All work within the road rights-of-way shall conform to the requirements of these specifications and the requirements of MDOT or the Roscommon County Road Commission. The Contractor shall put up and maintain

during the continuance of the work such barriers, caution lights and other protective devices as required by law and shall furnish a watchman so as to effectually prevent any accident in consequence of his work, and he shall be liable for all accidents and damage occasioned in any way by his acts or neglect, or by the acts or neglect of his subcontractors, agents, employees or workmen.

Where the proposed construction parallels the road, the Contractor shall protect the existing surface where possible. Any damage to the roadway shall be repaired by the Contractor.

E. REMOVAL OF PAVEMENT, CURB AND GUTTER AND SIDEWALK

Before commencement of excavating operations, the CONTRACTOR shall cut and remove from the work all pavement, curb and gutter, or sidewalk that would be damaged by his operations. Cutting of concrete pavement where permitted, shall be done with a concrete saw, in a manner meeting the approval of the Road Agency having jurisdiction. Asphalt pavements shall be cut by a tool leaving a square neat cut. Pavements shall be cut back so that pavement opening is one (1) foot wider on each side than the width of the trench, and care shall be taken during construction operations so as not to cave the banks or undermine remaining pavement. Where an existing joint in the pavement occurs within nine (9) feet or less from the top edge of the undisturbed soil, the Contractor shall remove and replace the pavement to this point. Any reinforcement encountered shall not be cut out, but shall be left protruding at least 2 ft from the face of the cut and shall be bent out of the way to be replaced later and spliced to new reinforcement.

In cutting through sidewalks, driveways, or curb and gutter, the CONTRACTOR shall remove full slabs of sidewalk or driveway or full lengths of curb and gutter to the nearest regular joint on each side of the excavation.

Broken pieces of pavement, sidewalk, or curb and gutter shall be removed from the work and disposed of by the CONTRACTOR to the satisfaction of the Village and under no circumstances shall these materials be used in backfilling any pipe trenches.

All strips of the existing pavement which are less than five (5) ft wide and which are between the cut pavement and the concrete gutter, shall be removed and replaced.

The CONTRACTOR shall exercise special precautions during construction, not to damage any remaining pavement, sidewalk, or curb and gutter and no construction equipment with traction lugs or other defacing or damaging components will be permitted on these surfaces. Where it is necessary for such equipment to travel over paved areas, the CONTRACTOR shall provide suitable planks and blocking to prevent damaging paved surfaces.

F. REPLACEMENT OF PAVEMENTS AND DRIVES

No pavement replacement is to be done during the period between November 1, and May 1, unless with the written permission of the RCRC, and/or MDOT.

Road Surface Replacement

All road surfaces removed during construction shall be repaired, unless otherwise specified, by placing 6 inches of 22A gravel, 1.5 inches of bituminous base course and 1.5 inches of bituminous wearing course, or pavement of equal thickness to the removed section, whichever is greater. Whenever a road repair is not to be immediately paved after backfilling, a temporary road repair will be required. The temporary repair will consist of 9-inches of 22A gravel brought to existing grade. For final paving, gravel equivalent in thickness to the asphalt pavement shall be removed and the remaining thickness of gravel will provide the base. Road repair may not be delayed more than 2 weeks without written permission. During delay, the Contractor shall maintain the road at his expense.

Driveway Surface Replacement

All asphalt driveways removed during construction shall be repaired, unless otherwise specified, by placing 6-inches of compacted 22A gravel and 2 inches of bituminous surface course, or pavement equal in thickness to the section removed, whichever is greater. Whenever a driveway is not to be immediately paved after backfilling, a temporary repair will be required. The temporary repair will consist of 8-inches of 22A gravel brought to existing grade. For final paving gravel equivalent in thickness to the thickness of pavement shall be removed and the remaining thickness of gravel will provide the base.

All concrete driveways removed during construction shall be repaired, unless otherwise specified, by placing 8-inches of compacted 22A gravel and 6-inches of concrete, or concrete equal in thickness to the removed section, whichever is greater. All concrete work shall be done in accordance with the best modern practice using 4,000 psi concrete. Whenever a driveway is not to be immediately paved after backfilling, a temporary repair will be required. The temporary repair will consist of 14-inches 22A gravel brought to existing grade. For final paving, crushed gravel in thickness to the concrete shall be removed and the remaining thickness of gravel will provide the base.

All gravel driveways removed during construction shall be repaired, unless otherwise specified, by placing 6-inches of 22A gravel compacted and finished to match existing grade. Whenever a driveway is not to be immediately finished to final repair after backfilling, a temporary repair will be required. The temporary repair will consist of 7-inches 22A gravel brought to just above existing grade. For final repair, the gravel shall be compacted and graded to match existing elevations.

G. CLEAN UP

All backfilled trenches shall be leveled to original grade and finished as required above. All excess material, refuse and debris removed and ditches and drainage restored not more than 500 feet behind the construction operation. Two inches of topsoil shall be deposited and fine graded on all disturbed lawn areas. Seeding of lawn areas is the responsibility of the Contractor. The clean up and restoration of each street and easement, as nearly as reasonably possible, to its original condition, shall be considered a part of the new utility construction.

H. EXCEPTIONS

Any types of construction required for the project and not specifically identified in this manual shall be done in accordance with the current MDOT specifications.

WATER MAIN CONSTRUCTION

1. SCOPE

All water main, valves and valve boxes and fire hydrants in the Village of Roscommon shall be constructed in accordance with these standards specifications.

2. MATERIALS

PVC Pipe, Gaskets and Fittings

PVC pipe 12" or less than 12" in diameter shall conform to the latest revisions on ANSI/AWWA C900-97 specifications. PVC pipe 14" through 48" in diameter shall conform to ANSI/AWWA 905-97.

Hydrants

Hydrants shall conform to the latest revisions of AWWA Specifications C502-94 for 150 pound working pressure. Hydrants shall be the compression type designated to open against the line pressure. Hydrants shall be manufactured by the East Jordon Iron Works Company and conform to the Village of Roscommon standards. EJIW Model 5BR250.

The hydrant valve openings shall be 5-1/4" for hydrants with a 6" inlet. The inlet shall conform to the Village of Roscommon DPW standards.

Hydrants shall have two, 2-1/2" National standard fire hose connections and one, 4-1/2" National standard pumper connection. All nozzles shall be on a movable head on the hydrant barrel so that they can be rotated by changing the position of the top flange without removing the barrel. All drains shall be plugged.

Hydrants shall be plainly marked with an arrow near the 1-1/2" pentagon operating nut showing the direction of left hand open. Hydrants shall be of proper length for installation in a trench depth of 5'-0". Hydrant barrel extensions, where necessary, shall be incidental to the hydrant installed. Hydrants shall also have a red & white fiberglass bolt on marker with springs.

Each hydrant shall be tested to 300 pounds hydrostatic pressure from inlet side, first with valve closed and second with valve open.

Gate Valves

Valves shall be manufactured and tested to meet the requirements of ANSI/AWWA C515. Valves shall meet or exceed the requirements of Underwriters Laboratories Standard UL262 and Factory Mutual Standard 1130.

The rated working pressure of the valve shall be 250 psi.

All valve component castings shall originate in the United States.

The body, bonnet, and seal plate shall be made of ductile iron in accordance with ASTM A536. The wedge shall be ductile iron in accordance with ASTM A536 and shall be totally encapsulated in rubber. This rubber coating shall be permanently bonded to the ductile iron wedge casting and shall meet ASTM D429 tests for rubber to metal bonding. No paint shall be allowed in the wedge and the wedge must not be hollow. Containment of the stem nut must only be on two sides, to facilitate easy removal.

The stem and stem nut shall be made of high strength manganese bronze. The stem must have an integral thrust collar. Stainless steel stems are not acceptable.

There shall be three stem seal O-rings; two in the seal plate which shall be replaceable with the valve in the full open position at rated working pressure, and one under the stem thrust collar. All gaskets shall be O-ring seals. O-rings set in a cartridge shall not be allowed. A grit seal must be present above the seal plate to prevent dirt intrusion.

Valves are to be open left (OL) or open right (OR). Operating nuts are to be painted black (OL) or painted red (OR). The NRS valves shall be provided with a 2" square operating nut.

Valves must have two polymer thrust washers — one above and one below the thrust collar. Stainless steel thrust washers are not acceptable.

All fasteners are to be 304 stainless steel. Socket head bolts shall not be allowed. If only two bolts are used to secure the seal plate, the bolts must be fastened to the bonnet with a drilled and tapped hole in the bonnet.

The body, bonnet and seal plate shall be epoxy coated in accordance with ANSI/AWWA C550 certified to NSF61. This coating shall be on the interior and the exterior of the valve. The manufacturers name, valve size, year of manufacture, pressure rating ("250W"), C515 and "DI" shall be cast on the valve.

Each valve shall be tested in accordance with ANSI/AWWA C515, UL262 and FM1130. This shall include hydrostatic pressure testing at 500 psi. A certification of manufacture and testing shall be provided at the municipality's request. All parts of valves to be considered must be manufactured, assembled and tested in the contiguous United States of America and letters of certification must accompany any and all products.

Valves shall be EJIW Flowmaster or equivalent.

Fittings
PVC fittings shall be for minimum 150 psi and conform to the latest ANSI/AWWA C907-

04 and C900-07.

Valve Boxes
Valve boxes shall be 5-1/4" diameter, three piece, adjustable screw type with No. 6 round base or No. 160 oval base as necessary for installation in a 6'-0" trench depth.

Each box shall be provided with drop cover marked with the word "Water", and installed flush w/top of proposed finish grade.

Service Leads
Pipe for service leads shall be 1" soft annealed type K copper tubing.

Curb stops for service connections shall be Mueller 300 Ball Curb Valves, compression both ends, Minneapolis top thread, catalog #B-25155.

Corporation stops shall be Mueller 300 Ball Corporation valve, compression, catalog #B-25008.

Couplings shall be straight three part union Mueller 110, flare both ends, catalog #H-15403.

Curb Boxes shall be Mueller 1-1/4" x 5' telescoping curb box, Arch pattern, with pentagon type plug with rods.

Tapping saddles shall be 2-band bronze construction for service lines larger than 1 " (all service lines).

3. Workmanship

Excavation
The excavation for the work shall be done in open trench or in tunnel as herein specified, and as shown on the plans. All work shall be done to true line and grade as established on the plans, except that unreasonable adherence to said grade will not be required for water main construction. The governing factor for water main construction shall be a minimum cover of 5' based upon future conditions when street grades are cut down for paving. The Contractor must protect the line and grade stakes and will be held responsible for any defective work occasioned by his negligence in this regard. The Contractor shall remove all rubbish or encumbrances which may be in the proposed line of the work and the cost for doing such work shall be understood as being included in the contract unit price per lineal foot of laying water main.

A trench width of at least 12 inches greater than the outside diameter of the pipe (6" min. on each side) shall be excavated. Bell holes shall be excavated at each joint and shall be made of a size and depth sufficient to permit the workmen to do their best work. The minimum width of trench shall be 20 inches.

Backfilling
Backfilling shall be done in accordance with "General Construction, C. BACKFILLING" section of this specification.

4. TURNING ON OR OFF OF VALVES AND HYDRANTS

Valves and hydrants shall not be turned either on or off without written consent and the presence of a representative from the Village of Roscommon DPW. Separate permission will be required for each time a valve is used. Valves which, when turned on or off, will effect connections to private property cannot be used unless sufficient notice has been given to allow the Village of Roscommon DPW time to notify each property owner before the written permit is issued. The date, time and duration of time shall be determined and written on the permit. Hydrants may not be used for any purposes without first attaining a permit from the Village of Roscommon DPW. The Contractor will be held responsible for all damage and breakage of valves and hydrants which he uses and shall either replace or repair damaged or broken valves or hydrants which he uses or the same will be done by others and the cost thereof billed to the Contractor.

5. MAIN CONSTRUCTION

Laying of Water Main
After the trench or tunnel has been excavated and the bottom has been graded, the Contractor shall furnish and place a 4" layer of Modified MDOT Class II sand (100% passing 1 1/2" sieve) in the trenches as a bed of cushion for the pipe. The pipe shall then be carefully laid on the sand cushion to insure positive bearing along the full length of the pipe. The Contractor then shall place a 4" vertical layer of compacted sand along the side of the pipe filling in any void space under the pipe. Additional tamped sand shall then be placed along side of the pipe to a height equal to the top of the pipe.

The interior of all pipe special castings must be thoroughly cleaned by brushing, swabbing or washing out all dirt before laying. All branches or other openings shall be stopped-up with wooden plugs or heads until either capped or connected. All pipe or special castings connecting to exiting mains, between said connection and the first valve, shall be thoroughly cleaned and swabbed with a 1:100 percent chlorine solution (100 parts per million) before laying. Jointing of the pipe and specials shall immediately follow the laying operation.

There shall be a minimum of 10-feet horizontal separation and 18-inches of vertical separation between water mains and sanitary or storm sewer.

All water main shall have 10 gauge solid core tracer wire fastened every 20 feet and will come to the surface at every hydrant and covered with a 1"x12" PVC pipe and cap.

Placement of Hydrants
All hydrants shall be set at the location and grade, as indicated in the original design. Each fire hydrant shall be set on a flat stone or concrete block not less than 18 inches square and 6- inches in thickness. Backfill material beneath and around the base of

each hydrant and extending twelve (12) inches above the drip shall consist of approved fill sand. The remainder of the excavation shall then be filled with the excavated material, well tamped around the hydrant so that no uneven pressure is brought to bear upon the stem.

No hydrant shall be set unless the Engineer or inspector is present and the hydrant setting must be approved by the inspector before being backfilled. The Contractor shall be responsible for the proper operation of all hydrants until the mains are laid and all the work formally accepted.

Valves and Fittings
All valves, gate valves, tees, curves, crosses and connections are to be laid as shown on the plans and as directed.

Valves
Valves, must be examined before installation and adjusted so that when the installation is made, they will work easily and properly and must be left with the valve closed. All nuts on valves must be checked for tightness before being lowered into the trench. Valves shall be set truly vertical so that when the valve boxes are set, the axis of the valve box will be in line with the valve stem.

In setting valve boxes, the base should rest two (2) or more inches above the flanged joints of the valve dome so that the nut of the valve is on a line with the hub or upper part of the valve box base, thereby leaving ample space all around the valve and preventing the box from touching the valve. The top of the valve box shall be adjusted to the ground level as directed by the Engineer or Inspector.

6. BLOCKING PIPE

All bends, curves and dead ends of pipe or special castings shall be blocked with concrete in accordance with the detailed plans.

7. FITTINGS

Standard fittings shall be used wherever possible. Flanged joint pipe and fittings shall be American Standard for 125 pounds steam pressure, faced and drilled. Mechanical joint fittings shall conform to A.S.A. A21.11.

8. JOINTING

All jointing shall be per ANSI/AWWA C900-07. Mechanical joint connections shall be made as follows:

1) Clean part thoroughly, then slip gland and gasket over plain end. Small side of basket and lip side of gland face bell.

2) Lubricate gasket with approved food-grade lubricant.

3) Push gasket into position making sure it is evenly seated in socket.

Pipe Cutting
Whenever it becomes necessary to cut a pipe to make a connection or closure in either old or new work, the pipe shall be cut on the shortest outside circumference. The cutting shall be sufficiently into the material that it shall break without fracturing or cracking the body of the pipe. All connections made on cut pipe shall be per ANSI/AWWA C907-04 and C900-07.

9. MAIN TAPPING AND SERVICE LEADS

Main Tap
Tapping into the main shall be done in accordance with the Village of Roscommon standards. The Contractor is responsible for the coordination of main isolation and timing of the tap. The Village of Roscommon DPW and third party inspector must be present during the tapping of the main.

Service Leads
All Service leads shall be tapped using a tapping saddle. A corp stop or curb stop shall be placed on all new service leads. Meters shall be placed at the facility utilizing the water service.

Galvanized service lines will be replaced with copper to the property line. Existing copper lines less than 5' in depth will be replaced.

When crossing a paved street, the service lead shall be jacked under the pavement. Augering and/or jacking requirements on paved streets for the installation of pipe less then 2-1/2" outside diameter shall be made by a "compactor" type machine or similar method without removing existing soil, if soil conditions permit.

10. CLEANING AND DISINFECTING

Before disinfecting, the new main shall be flushed out with potable water until water runs clear.

Chlorine Application
The chlorinating agent shall be applied at a point at the beginning of the pipe line extension, or any valved section of it and through a corporation cock inserted in the horizontal axis of the newly laid main. Water from the existing distribution system should be controlled to flow very slowly into the newly laid pipe line during the application of chlorine. The end-most valve shall be partially opened to permit the flow of water through the pipeline and to prevent the building up of water pressure in excess of twenty (20) pounds. The treatment shall be continued until the water flowing from the end of the main contains enough residual chlorine to develop a deep red color (Minimum of 25 PPM) when D.P.D. reagent is added to a sample of water. The flow of water and chlorine shall be stopped at the point of application.

The treated water shall remain in the pipe line for at least twenty-four (24) hours; after which time, the main shall be thoroughly flushed with potable water until all of the chlorinated water is removed. The Inspector or his agent will test water samples to ensure that this has been accomplished. No main shall be placed in service until bacteriological water samples, which will be collected by the contractor, have passed. This sampling will be carried out under the direct supervision of the Superintendent of Water or his agent. Samples will be transported to an approved laboratory by the contractor and a representative of the water department. Two sets of samples taken at 24 hour intervals must show "safe" results in accordance with requirements set by the U.S. Environmental Protection Agency and the Michigan Department of Public Health for safe drinking water. If, however, the results are unsafe, the whole process of chlorine application will be repeated.

11. PRESSURE LEAKAGE TEST

After the entire water main or any part of a water main contained between two gate valves has been laid, chlorinated and bacteriological tested it may be given the pressure leakage test. The pressure leakage test shall consist of the following procedure.

The completed pipe line shall be slowly filled with water until all the air has been expelled. When certain that all air has been expelled from the pipe line, the water pressure shall be raised by a pump to 150 pounds per square inch and shall be maintained at this pressure for a period of at least two hours. The amount of additional water to maintain this pressure shall be taken as the amount of leakage. The pressure on the pipe line shall be determined by a tested pressure gauge equipped with a snubber. The amount of water used shall be determined by connecting a tested water meter into the pump supply line or in the case of testing a short section of pipe line, a sterilized container may be used to supply replacement water to the pump and the amount of water calculated by direct measurement. Water main will be pressure-tested in 1500 foot sections. If longer sections are tested, the allowed leakage will be the same as for 1500 feet. Pressure testing shall be conducted in accordance with current AWWA standards C605-11. Chlorinated Water shall be used for pressure-testing.

All testing and chlorination shall be completed before connection to the existing main.