

CITY OF STILLWATER, MINNESOTA

STANDARD SPECIFICATIONS

DECEMBER 1997
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DRAWING STANDARDS FOR UTILITY AND STREET PLANS

- A. Full size plan sheets shall be no larger than 24" x 36". Half size plans of 11" x 17" shall also be provided.
- B. Minimum size lettering shall be 120 Leroy for existing and 140 Leroy for proposed.
- C. North shall be directed to the right or to the top of the page for all utility plan sheets.
- D. Centerline street stationing shall be from south to north or west to east.
- E. Plan and profile sheets shall have a scale of 1" = 50' horizontal and 1" = 5' vertical.
- F. Existing utilities shall be designated with a lighter dashed line, and proposed utilities shall be designated with a solid line.
- G. Construction plan sets shall consist of the following sheets:
 - 1. Title Sheet.
 - 2. Overall Layout Plan.
 - 3. Detail Page.
 - 4. Sanitary Sewer and Water Main Plan and Profile Sheets.
 - 5. Storm Sewer and Street Plan and Profile Sheets.

1. Title Sheet

- a. General Location Map.
- b. Project Area.
- c. City Project Number.
- d. Gopher State One-Call Information.
- e. Index of sheets.
- f. Developer and Engineer information.

2. Overall Layout Plan

- a. Street names.
- b. Property Lines.
- c. Lot and Block Numbers.
- d. Easements.
- e. Addresses.
- f. North Arrow and Scale (1" = 100').
- g. All existing and proposed structures including manholes, and catch basins, with proposed structures numbered accordingly.
- h. Location of main lines (sanitary sewer, storm sewer and water).
- i. Appropriate sheet numbers for construction plan and profile.
- j. Typical street cross-section.
- k. Storm sewer schedule.

3. Detail Page

- a. All City standard details with plate numbers, used as part of the project shall be shown.
- b. Any special construction shall be shown in the detail.

4. Sanitary Sewer and Water Main Sheets.

- a. Length, size, type and class of sanitary and water main.
- b. Proposed grade of sanitary sewer.
- c. Upstream and downstream invert elevation of manhole. All manholes shall have a 0.1-foot drop built in to the precast base.
- d. Street stationing of sanitary manhole with proposed casting elevation.
- e. Wye location and invert elevations of sanitary sewer stubs.
- f. Proposed crossings of storm sewer.
- g. Hydrant and valve locations.
- h. Existing and/or proposed grade over the sanitary and water main.
- i. Lot and block numbers.
- i. Street names.
- k. Existing and proposed easements.

5. Storm sewer and street construction plan sheets.

- a. Lengths, size, type and class of storm sewer pipes.
- b. Proposed grade of storm sewer.
- c. Upstream and downstream invert elevation of manhole.
- d. Street stationing of storm or catch basin manhole with proposed casting elevation.
- e. Size of manholes.
- f. Proposed crossings of sanitary and water main.
- g. Existing and proposed grade over storm sewer.
- h. Proposed street grades.
- i. Vertical curve data including length of curve, PI station, and PI elevation.
- j. Proposed centerline elevation every 50 feet and at all centerline-centerline elevations.
- k. Flow line elevations at start, middle and end radius of street intersections.
- l. Sidewalk and bituminous trail locations.
- m. Lot and Block numbers.
- n. Street names.
- o. Existing and proposed Easements.

DRAWING STANDARDS FOR GRADING AND EROSION CONTROL PLANS

- A. Full size plan sheets shall be 22" x 34" or 24" x 36".
- B. Minimum size lettering shall be 120 Leroy.
- C. North Arrow and Scale.
- D. Grading plans sheets shall have a scale no greater than 1" = 50'.
- E. Show existing and proposed lot lines, lot numbers, and street right-of ways.
- F. Silt Fence shall be clearly marked and labeled with a silt fence detail.
- G. Limits of tree removal and existing tree lines shall be clearly marked and labeled. Trees greater than four inches in diameter shall be shown and described.
- H. Rock Construction Entrance with a detail on the drawing.
- I. House pad Information:
 - 1. Building pad information with proposed garage, first floor, walkout or lookout elevation.
 - 2. House style symbol.
 - 3. Minimum basement floor elevation.
- J. Street information:
 - 1. Percent grade with directional arrows.
 - 2. Vertical PI information.
 - 3. Centerline-centerline start point elevation.
 - 4. Proposed centerline-centerline at all intersections.
 - 5. Typical street section.
- K. Retaining walls must be clearly labeled and with top and bottom elevations at the beginning and the end and at all bends.
- L. Existing and proposed contours should be clearly labeled and distinguishable. Two-foot contours are recommended. Ten-foot contour lines should stand out.
- M. Show proposed elevations at all lot corners.
- N. Show all proposed and existing storm sewer systems with rim elevations and inverts.
- O. Show the NWL, HWL outlet elevation, and emergency overflow on all ponds and wetlands.
- P. Emergency overflow swales with directional arrows.
- Q. Existing topography and contours should extend 200-foot minimum from the project boundary.
- R. Wetland delineation lines.
- S. Areas to be protected (wetland buffer strips, tree drip lines, etc.)
- T. Existing utilities, wells, septic systems, and topography.

DESIGN STANDARDS

The design and construction of public infrastructure shall be performed in accordance with the Minnesota Department of Transportation's "Standard Specifications for Highway Construction" 1988 edition as amended, the City Engineers Association of Minnesota's "Standard Utilities Specifications", the Minnesota Pollution Control Agency's "Protecting Water Quality in Urban Areas", and the "Stillwater Subdivision Code" adopted February 18, 1997 or as amended herein.

GRADING AND EROSION CONTROL PLANS

Maximum grade in all maintained areas including ponds shall not exceed 3:1 slope.

Minimum slope for grassy overland flow shall be 1.50 %.

All detention ponds must be designed to NURP standards, including vegetated strips, with no net increase in the outlet flow for 100-year design storm. Wet pond storage shall be oversized 25% to allow for siltation during grading and utility construction.

Driveway slopes shall not exceed 8.0% from the right-of-way to the garage floor elevations. Slopes exceeding 8.0% shall require approval from the engineer. In no instance shall the driveway slope be greater than 10.0%.

House pads shall be set a minimum 1.5 feet above the centerline elevation of the lot.

Minimum street grades for residential areas shall be no less than 0.6% with a maximum street grade of 8.0%. Minimum cross slope shall be 3.00%.

The lowest entry elevation for affected houses along ponds or wetlands shall be set three feet above the 100-year HWL or 1 foot if an emergency overflow is provided.

Access roads shall be provided for all pond inlets and outlets. The road shall be fifteen wide with a maximum grade of 8.00 % and a cross slope of 2.00%.

To minimize erosion at pond inlets, apron elevations shall be set at the NWL of the proposed pond.

Emergency overflow swales must be shown to a positive outflow at all low points and ponds.

Drainage of more than one lot across another will not be permitted, unless approved by the City Engineer.

SANITARY AND STORM SEWER

Storm sewer systems shall be designed for a 10 -year storm event, with an emergency overflow. Detention ponds shall be designed for a 100-year frequency storm.

Drainage calculations for the sizing of ponds and pipes, shall be submitted to the Engineer for review.

Reinforced concrete pipe shall be used for all storm sewer systems in the street .

Aprons shall be used in all areas where the storm sewer outlets into a ponding area. Aprons shall be installed at the normal water elevation. Riprap with a geotextile fabric shall be installed at all inlets to a pond. Size and amount of riprap and fabric shall follow the guidelines used in MN/Dot Standard Plate 3133C. The minimum size riprap shall be Mn/DOT 3601.2 Class III. Trash guards shall be installed on all pond aprons.

Acceptable forms of pond outlets are skimmer manholes, and submerged outlets. Other outlet structures may be allowed with approval of the City Engineer.

Storm sewers in the street shall be located on the opposite side of the street of the water main and should maintain a ten-foot horizontal separation from the sanitary sewer. Under no circumstances shall the storm sewer be installed under a concrete sidewalk.

Maximum spacing between manholes shall be 400 feet.

If the upstream and downstream pipe diameters are the same the invert elevation there shall be no drop in elevation in the manhole. If the pipe diameters are different, then the 0.80 line of the two pipes shall match at the manhole.

Sewers installed on private property shall have a minimum easement width of twenty feet on depths of less than ten feet. Sewers with depths of greater than ten feet shall have a minimum easement width equal to twice the maximum depth or as required by the Engineer. The sewer pipe shall be located in the center of the easement. Markers shall be installed at every point where a manhole is installed. Markers shall be a schedule 40 steel pipe, buried two feet below the finished elevation and encased in concrete. The marker shall extend four feet above ground. For storm sewer, the marker shall be painted yellow with "STORM SEWER" painted red in one inch high letters. For sanitary sewer, the marker shall be painted red with "SANITARY SEWER" painted yellow in one-inch high letters.

All connections into the manhole shall be core drilled prior to delivery to the construction site.

Catch basins and catch basin manholes shall be located on the tangent 3 feet from the end radius. Mid-radius catch basins will only be allowed with the approval of the Engineer.

Grates for catch basins and catch basin manholes shall be set 2.0" lower than the gutter line profile.

Storm sewer and sanitary sewer manholes shall be set ½" below the final street elevation or at grade if not in the street.

Location of the sanitary main shall generally follow the centerline of the right-of-way. Manholes shall be located in the centerline of the street. Other locations with the approval of the City Engineer will be permissible provided they are not in the wheel paths of vehicles.

Outside drop manholes are required when the pipe inverts are two feet apart or greater.

Minimum horizontal separation between the sanitary sewer and the water main shall be ten feet.

The minimum slopes for sanitary sewer shall be as follows:

<u>Size of pipe</u>	<u>Minimum Slope</u>
8"	0.40%
10"	0.28%
12"	0.22%
15"	0.15%

WATER DISTRIBUTION

Water mains shall be generally located on the west and north side of the street right-of-way. Water main shall have a minimum of 7.5' of cover over the top of pipe except in those areas where the water main crosses the sanitary or storm. At that point there shall be 18" of separation. There shall be ten feet of horizontal separation from the sanitary sewer and storm sewer.

Hydrants shall be located at every intersection. Spacing of the hydrants shall not be less than 300 feet or greater than 450 feet. Hydrants not located at the intersection shall be located on a property line. The hydrant shall be located a minimum four feet behind the face of the curb.

Valves shall be located at street intersections on the property line extended. Valves shall be located so that no more than two residential blocks would be shut down at any time. On continuous sections of water main, valves shall be located every 1000 feet. Valves shall be installed on all hydrant extensions. Valve boxes are to be installed ½" below finished street elevation.

Water main located on private property shall be installed along the centerline of a fifteen-foot easement, with a minimum of 7.5 feet of cover. Markers shall be installed at every point where a bend is installed. Markers shall be a schedule 40 steel pipe, buried two feet below the finished elevation and encased in concrete. The marker shall extend four feet above ground painted blue with "WATER MAIN" painted yellow in one-inch high letters.

New hydrants shall be installed with a 60" Hydrfinder Marker, as manufactured by Rodon Corporation.

Gate Valves boxes shall be set ½" below the final street elevation or at grade if not in the street.

STREET CONSTRUCTION

Residential streets shall be 32 feet face-to-face unless otherwise approved by the City Engineer.

Cul-de-sac's shall have a minimum turn around radius of 42.5 feet to face.

Cul-de-sac streets shall have a maximum length of 600 feet.

Roadways of street intersections shall have a minimum radius of 15 feet to face of curb, and cul-de-sac entrances shall have a minimum radius of 25 feet to face of curb.

Minimum street grade for residential streets shall be 0.60% and maximum street grade shall be 8.00%. Minimum cross slope shall be 3.00%.

If D418 curb and gutter is used on the project, all catch basins and catch basin manholes shall have B618 curb and gutter installed 3 feet on both sides of the casting with a 3 feet of transition to the D418 curb and gutter. Top of curb elevation shall remain constant.

Sag and crest vertical curves shall have a minimum length of 20 times the algebraic difference in the percent grade of the intersecting grades.

Residential streets shall be designed for a minimum seven-ton design pavement section. Flexible pavement design shall be used and be in accordance with the State of Minnesota of Minnesota Road Design Manual No. 5-291. Typical street section shall consist of 6" of Class 5 aggregate (100% crushed), 2" of 2331 of Bituminous Base (Type 31 or 32), and 2" of 2341 Bituminous Wear (Type 4 1A).

Sidewalks in residential areas shall have a minimum width of five feet, have a cross slope of ¼" per foot and have a maximum slope of eight percent. The sidewalk shall have four inches of concrete and a four-inch granular base.

Sidewalks shall be located in the public right-of-way or utility easement area.

SANITARY SERVICES AND WATER SERVICES

Sanitary services shall be installed ten feet downstream of the water service. The service stub shall terminate 10 feet beyond the property line.

The depth of the sanitary service stub shall be ten feet at the property line or have a minimum grade of 2.00%.

Sanitary services shall be constructed with 4" PVC SDR 26.

Services more than 100 feet from the main to the building shall be provided with a cleanout near the right-of-way line.

Water services shall be located in the center of the lot. They shall not be installed under driveways, or under catch basins. Water services shall be set a minimum of two feet below any storm sewer pipe, if this can not be achieved the service shall be insulated.

Water service curb boxes shall be located on the property line. A ten-foot tail shall extend from the curb box. The top of the box shall be set to proper grade with the extension at the midpoint. Water services shall be installed with a minimum depth of cover of seven and one-half feet.

STANDARD SPECIFICATIONS FOR UNDERGROUND CONSTRUCTION

REFERENCE TO SPECIFICATIONS

"The Standard Utility Specifications" prepared by the City Engineers Association of Minnesota, 1988 Edition, shall govern underground construction except as modified herein by these specifications. Minnesota Department of Transportation's "Standard Specifications for Highway Construction" 1988 edition as amended shall govern on items not mentioned in these specifications.

SANITARY AND STORM SEWER CONSTRUCTION

PIPE MATERIALS

Type of pipe for sanitary sewer used for various trench depths computed from the invert to finished grade elevation shall conform to the following chart.

<u>Depth</u>	<u>Type of Pipe</u>
0'- 17'	SDR-35
17'- 30'	SDR-26
Greater than 30'	DIP, CL. 52

Reinforced concrete pipe for storm sewer shall be of the class shown on the plans with watertight Bureau of Reclamation type R-4 joints and confined O-Ring Gasket.

MANHOLES, CATCH BASINS, AND CATCH BASIN MANHOLES

Manholes shall be constructed using precast sections conforming to ASTM C-478. Manholes shall be four feet in diameter unless otherwise noted on the plans. Manhole section joints shall be Type R-4. Precast top sections on manholes shall be eccentric cones. Catch basin manholes shall be constructed with precast bottom slab, cone sections a precast top section with a 27" diameter opening in the center of the section.

Catch basins and catch basin manholes may be constructed from precast segmental blocks and shall conform to ASTM C-139. Eight inch (8") precast segmental blocks for the lower portion of the manhole or for shallow manholes and catch basins. All block manholes shall be grouted inside and outside to insure water tightness.

Sanitary manholes shall have pre-formed inverts and be supplied with a flexible sleeve connection in 15" diameter pipe or less. The flexible connection shall be an interface boot manufactured by Elk River Concrete or Kore-N-Seal Boot manufactured by North Star Concrete or equal.

All manhole and catch basin structures shall have the casting and the adjustment rings sealed with an external rubber sealing sleeve as manufactured by INFI-SHIEL or an approved equivalent.

MANHOLE CASTINGS

Sanitary sewer manhole castings shall be Neenah R-1733 or approved equal. The cover shall be Type "B" infiltration proof, and shall have the words "SANITARY SEWER" in 2" high letters cast flush into the top surface.

Storm sewer manhole castings shall be Neenah R-1733 or approved equal. The cover shall be Type "B" infiltration proof, and shall have the words "STORM SEWER" in 2" high letters cast flush into the top surface.

Catch basins castings shall be Neenah R-3067 or approved grates. Inlet grates shall be high capacity Type "V".

MANHOLE STEPS

Manhole steps shall be cast iron, cast aluminum or polypropylene coated steel equal to Neenah R-1980-1 twelve inches wide and spaced at sixteen inches (16").

APRONS

All aprons shall be furnished with galvanized trash guards and tied to the next three upstream pipes using galvanized "U" bolt fasteners. Aprons shall be the same class strength as the pipe

WATER MAIN CONSTRUCTION

MATERIALS

DIP shall be class 52 for 6" through 12" diameter water main. Fittings shall be Class 250.

Ductile iron pipe shall be push-on joint and shall be in accordance with AWWA C 151-86 or its latest revision, and shall be manufactured by United States Pipe and Foundry Company, Clow Pipe Company, American Cast Iron Pipe Company, or approved equal.

Fittings shall conform to the requirements of AWWA C110 and AWWA C153 and shall be class 250. Mechanical joints shall be used for all stub ends and fittings adequate means for electrical conductivity shall be provided for at each gasket.

All mechanical and push-on joints shall have rubber gaskets conforming to AWWA C111.

Retainer glands shall be American, Mega-Lug or US Pipe and be designed to withstand pressures shown in Table 9-6 of American Cast Iron Pipe Company's Catalog.

HYDRANTS

All hydrants shall be Waterous WB 67 Pacer with the following requirements:

- a. Hydrants are to have a five-inch minimum valve opening. They shall be equipped with two 2-1/2" diameters and one 4-1/2" steamer connection. Outlet nozzle threads shall be National Standard threads.

- b. Hydrant barrels shall be two piece, with a 16-inch break-off traffic flange and flanged joint no more than two inches above the finished grade line and with a mechanical joint connection at the hub end. Hydrants shall have an 8.0-foot bury.
- c. All hydrants shall have a six-inch mechanical joint inlet for connecting into the six-inch branch pipe from the main. There shall be a gate valve between the hydrant and the water main.
- d. Hydrant operating mechanism shall be provided with "O" ring seals preventing the entrance of moisture and shall be lubricated through an opening in the operating nut or bonnet.
- e. Shall open to the left (counterclockwise), and be able to drain when the hydrant is closed.
- f. The size and shape of the operating nut shall be National Standard pentagon nut.
- g. Hydrant must have permanent markings showing: 1) Manufacturer's name 2) Year of Manufacture and 3) Bury depth.

GATE VALVES

Gate valves shall be resilient wedge type in accordance to AWWA C509 Specifications and have a working pressure of 200 psi. The gate valve shall have mechanical joint ends, a non-rising operating stem with "O" ring seal, a two inch (2") square nut and shall open right. Gate valves must show on the bonnet or body: 1) open indicating arrow 2) manufacturer's name 3) pressure rating 4) year of manufacture 5) size.

Gate valves boxes shall be vertical Buffalo type, cast iron shaft 5-1/4" in diameter. The valve box shall consist of three pieces with a box length to provide for 7.5 feet of cover and able to provide adjustment of at least six inches.

BUTTERFLY VALVES

Butterfly valves shall meet the requirements of ANSI/AWWA 504 and shall be designed for 150 psi. of working pressure. The valve shall be short body with mechanical joint ends, a non-rising operating stem with "O" ring seal, a two-inch (2") square nut and shall open right. Butterfly valves must show on the bonnet or body: 1) open indicating arrow 2) manufacturer's name 3) pressure rating 4) year of manufacture 5) size.

INSULATION

Insulation shall be equal to DOW chemical Company STYROFOAM HI brand plastic foam installed in accordance with the manufacturer's recommendation and at a minimum of 4" total thickness.

JOINT CONDUCTIVITY

Conductive gaskets shall be those as manufactured by American Ductile Iron Pipe Company.

Copper jumpers shall be a minimum of 1/ 16" X V2" wide flat copper strip or annealed round copper wire conforming to ASTM B 152, Type DHP.

Field application of the copper jumpers shall conform to the Burndy Method as supplied by Burndy Corporation, Norwalk, Connecticut or the Cadeweld Method by Erico Products Co., Cleveland, Ohio

Silicon bronze nuts and bolts shall be used on all bolted connections.

Welded connections shall be made on a clean metal surface, which has been ground to remove coating and oxide. The area at the connection, including the weld, shall be refinished with its original coating or other suitable protective coating specified.

WATER SERVICE PIPE AND FITTINGS

CORPORATION STOPS

Corporation stops shall be Mueller H-15000, Ford F600, or approved equal. All corporation stops shall conform to A.W.W.A. Standards with A.W.W.A threaded inlet and A.W.W.A. copper service thread outlet.

CURB STOP AND BOX

Curb stop shall be Minneapolis pattern for copper service pipe inlet and outlet, of stop design with an inverted key and shall be Mueller H-15154 Mark II Oriseal or approved equal.

The stop box shall be an extension type with stationary rod Minneapolis Pattern. Boxes shall have a 6" adjustment with an 8-foot length when fully extended. Stop boxes shall be Mueller H-10300 Ford EM2-80-56-75R or approved equal.

The lid shall be Mueller 89375 or approved equal.

WATER SERVICE PIPE

All copper tubing used for services shall be new and unused ASTM B 88 for Seamless Copper Water Tube, Type K, soft Annealed temper.

STANDARD SPECIFICATION FOR STREET CONSTRUCTION AND RESTORATION

All work shall be done in accordance with the Minnesota Department of Transportation's "Standard Specification for Highway Construction" 1988 Edition and as amended by the 1991 Supplemental Specifications and any amendments thereto, except as modified by the Stillwater Standard Specifications.

TEST ROLLING

Following completion of the utility construction and prior to the concrete curb and bituminous base construction, the street shall be test rolled to determine the general condition of the street section. This test roll shall be done in accordance with Mn/DOT 2111 except the Contractor shall furnish a tandem truck loaded with approximately 14 tons to check the street section. Areas determined by test rolling to be too unstable for normal subgrade preparation shall be repaired with suitable granular material.

A representative from the Engineering department shall be notified 24 hours prior to the test roll. At the time the representative shall review the grades with the Contractor by the string line method. The representative will certify that the subgrade is to proper grade prior to the placement of the aggregate or the bituminous base.

SUBGRADE PREPARATION

Subgrade preparation shall conform to Section 2112 of the Mn/DOT Standard Specifications for Construction.

After completion of the preliminary test roll, the contractor shall prepare the subgrade to the grade, compaction and stabilization to a depth of one foot below subgrade elevation. Subgrade preparation will be required over the length and width of the constructed roadway and one foot outside the back of curb. The subgrade shall be prepared to provide a finished surface within 0.05 feet of the prescribed elevation at all locations.

AGGREGATE BASE

Material for aggregate base shall be Mn/DOT Specifications 3138 for Class 5, 100% crushed rock. Placement and compaction shall conform to Section 2211 of the current Mn/DOT Standard Specifications. A sample aggregate gradation from an approved testing laboratory shall be submitted to the Engineer at the time of the pre-construction meeting for consideration and approval.

Prior to placement of the aggregate base, the Contractor shall furnish test results certifying that the materials meet the Mn/DOT specifications. All costs for testing and certifying the materials shall be incurred by the Contractor and considered incidental to the project.

Aggregate base shall be installed immediately following approval of the subgrade. The Contractor shall deposit only the amount of aggregate that is to be spread and compacted that same day. The aggregate base shall be compacted to 100% of the Standard Proctor Density.

PLANT MIXED BITUMINOUS PAVEMENT

The Contractor shall submit to the Engineer a copy of the job-mix formula at least one week prior to the start of any pavement operation prepared by an approved testing laboratory.

Bituminous mixtures shall be as follows: Wear Course - MVWE35035B

Base Course - MVNW35035B

Bituminous Base Course

Bituminous Trails

Bituminous surfacing shall take place only during the hours of daylight and when the road surface is dry. Base mixtures may be installed when the air temperature is 40 degrees Fahrenheit or more and rising, (50 degrees for wear) but shall not be replaced when the air temperature is 39 degrees Fahrenheit or less and falling. Mixtures shall not be installed when in the opinion of the Engineer; the weather or roadbed conditions are not favorable.

The Bituminous wear course shall not be installed during the same construction season as the bituminous base course, unless otherwise directed by the Engineer.

All variations shall be repaired before paving operations begin. Small holes and depressions shall be repaired with plant-mixed bituminous material. All other repairs shall be made by adding bituminous material if necessary, by shaping and by rolling until the desired compaction and shape is obtained. All repairs shall be at the direction and the approval of the Engineer.

CONCRETE SIDEWALKS AND DRIVEWAYS

Concrete mix for all sidewalks and driveways shall be in accordance with Mn/DOT 2461 for Structural Concrete and have a mix number of 3Y32 with Type A (Granite). The contractor shall submit to the Engineer a job-mix formula two weeks prior to the start of sidewalk construction

Concrete sidewalks and driveways shall be constructed in accordance with the Standard Plates.

SEEDING, SODDING AND RESTORATION

Turf Establishment shall be in accordance with the provisions of Mn/DOT 2575 except as modified herein:

Existing areas outside the construction limits shall be restored in kind by the Contractor at his own expense.

Following completion of curb and gutter and sidewalk installation, boulevard areas shall be graded with a minimum of 4" of topsoil, in accordance with Mn/DOT 3877, and seeded with a Mn/DOT 500 seed mixture. Seed shall be spread at a rate of 75 pounds per acre. Type I mulch material shall be used.

In areas where the seeded area fails to grow, the contractor shall be required to reseed the area at his own expense.

A minimum of three feet of sod shall be installed around all catch basins not located in the street, and along both sides of all bituminous trails. Sod shall also be installed in all areas susceptible to erosion, as determined by the Engineer. Sod placed on slopes greater than a 3:1 slope shall be staked or pegged in place and shingled.

In areas where the grade exceeds a 3:1 slope, the following seed mixture shall be applied:

SEED MIXTURE SPECIAL

SPECIES	RATE LBS/ACRE	PERCENT
Common Kentucky Bluegrass	12	15.0
Switch Grass	8	10.0
Smooth Broam Grass	12	15.0
Perennial Ryegrass	14.5	18.0
Creeping Red Fescue	14.5	18.0
Red Top	8	10.0
Birdsfoot Trefoil, Empire	7	9.0
Ditch White Clover	4	5.0
TOTAL	80	100%

Mulch shall be Type 1 applied at a rate of 2 tons per acre.

Commercial Fertilizer

Commercial fertilizer shall be measured by the weight in tons furnished and applied acceptably.

Fertilizer shall be analysis 10-10-10 applied at the rate of 0.25 ton per acre overall areas seeded.

Erosion control shall be accomplished with the use of hay or straw bales as directed by the Engineer. Erosion control shall be accomplished as detailed in the plans. No direct payment shall be made for erosion control unless shown on bid proposal.

The Contractor shall be responsible for sweeping the streets following the completion of the seeding and/or sodding. All sweeping shall be completed within one week after the seeding or sodding. Sweeping shall continue until all loose material has been picked up to the approval of the City Engineer. Catch basins shall also be cleaned within the same timeframe.

STREET LIGHTING

Street lighting is required for all residential developments. The Developer's Engineer shall work with Xcel Energy Electric Utility for an appropriate street lighting plan. This plan shall be submitted to the City for review and approval at the time of the pre-construction meeting.

Where wiring for the street lighting crosses under the street, a two-inch rigid steel conduit shall be installed.

WORK HOURS

No person may engage in or permit construction activities involving the use of any kind of electric, diesel or gas-powered machine or other power equipment except between the hours of 7:00 a.m. and 10:00 p.m. on any weekday or between the hours of 9:00 a.m. and 9:00 p.m. on any weekend or holiday.

CONSTRUCTION AND GRADING PLAN REVIEW PROCESS

Two copies of the grading plans and two copies of the specifications with bid proposal shall be submitted to the City Engineering Department

Three copies (2-22" x 34" and 1-11" x 17") of the construction plans, and two copies of the specifications with the bid proposal and contract shall be submitted to the City Engineering Department for their review.

A copy of the storm sewer calculations, pond calculations and drainage area maps shall be included with the plans. Also, a copy of the wetland mitigation plan shall be submitted, if necessary.

Review of plans and specifications shall be completed in two weeks.

If plans and specifications are approved as submitted, the Developer' Engineer will receive written notification of approval. If not approved, one set of plans and specifications will be returned with comments to the Developer's Engineer. Plans and specifications must be resubmitted to the City Engineering Department for approval.

PRECONSTRUCTION MEETING

All Pre-construction meetings shall take place at Stillwater City Hall. The Developer's Engineer shall be responsible for notifying all parties, including the prime contractor, primary subcontractor, representative from utility companies, surveyor, a City Representative, the Developer or representative and any regulatory agency.

The Developer's Engineer shall be responsible for submitting preliminary plans to the area utility companies so that they may begin their process of designing utilities.

The Developer's Engineer shall be responsible in obtaining all necessary permits and to provide copies to the City of the permit approval.

The Developer's Engineer should be prepared to submit the following items to the City at the pre-construction meeting:

1. Project timeline with bar graph.
2. List of subcontractors, and suppliers.
3. Manhole and shop drawings.
4. Concrete and bituminous mix design.
5. Testing result of aggregate base.
6. Approved permit documents.
7. Wetland Mitigation Plan and how it will be enforced.
8. Street lighting plan.
9. All approved applicable permits.

SCHEDULE OF REQUIRED TESTS

The contractor shall give the City 48 hours notice prior to the start of any test and all testing must be witnessed by a City Representative.

SANITARY SEWER

A. Leakage Tests

- i. Upon completion of the mainline, services and manhole installation.
- ii. Hydrostatic Pressure Test
- iii. Air Test Method

The following paragraphs shall be added in place of paragraph 2 to the Air Test Method listed in the Standard Utility Specifications in Appendix A:

After the temperature has been allowed to stabilize for the two-minute period, the air supply is disconnected, and the pressure is allowed to decrease to 3.5 psig. At the 3.5 psig the stopwatch is started to determine the time required for the pressure to drop to 2.5 psig.

The time shall be equal to or greater than the allowable time as follows:

<i>Pipe Size</i>	<i>Time (min.-sec)</i>
6 "	2:15
8 "	3:18
10"	3:57
12 "	5:40
15 "	7:05
18 "	8:30
21 "	9:50
24 "	11:20

B. Mandrel Test – 30 days following completion of the main line pipes.

WATER MAIN

A. Pressure and Leakage Tests

- i. Upon completion of water main, hydrants and services.
- ii. May be conducted at the same time.
- iii. Maximum amount of leakage to be one-half the volume allowed by ANSI/AWWA C-600 in accordance with the following:
$$L = \frac{SD(P)^{1/2}}{266,400}$$

B. Electrical Conductivity Test

C. Disinfection (ANSI/AWWA C-651)

SCHEDULE OF REQUIRED MATERIAL TESTING

The following tests for each material are the minimum requirements for material testing. Other test may be ordered at the discretion of the City Engineer or his representative.

AGGREGATE BASE TESTS

1. Standard Proctor Density (ASTM-698)
2. Gradation (ASTM D-422)
3. Test Rolling

Density and gradation tests shall be taken a minimum of one test per 1000 ton of aggregate placed.

CONCRETE TESTS

1. Compressive strength (ASTM C-39)
2. Slump test (ASTM C-143)
3. Air Density (ASTM C-231)

When molding cylinders for strength tests, two cylinders are to be made (ASTM C-31), one for a 7-day test and one for a 28-day test.

Concrete testing samples shall be taken for every 1000 lineal feet of concrete placed.

BITUMINOUS COURSE MIXTURE TESTS

1. Gradation (ASTM C-136)
2. Extractions (ASTM D-2172)
3. Marshall Density and Field Density (ASTM D-1559)

An independent testing laboratory shall perform testing of bituminous samples.

Cores shall be taken for every 500 ton of bituminous placed.

CONSTRUCTION RECORD REQUIREMENTS

STREET AND UTILITY CONSTRUCTION

Following completion of construction, one set of reproducible mylars (22" x 34"), one set of vellum (11" x 17"), and an electronic file, construction record drawings shall be submitted to the City. Electronic file AutoCAD Release 2004-Blocked plan sheets with all pertinent information in Washington County coordinates system and NAD 83.

Actual elevations shall be recorded to the nearest .01' and actual lengths recorded to the nearest foot. Construction record drawing should show the following:

1. Top nut elevation of each hydrant.
2. Final rim and invert elevations of all storm and sanitary manholes; gutter and invert elevations of all catch basins and catch basin manholes.
3. Invert elevations of all flared end sections.
4. Any changes in the planned location of pipe, structures, hydrants or valves shall be crossed out and the new location recorded.
5. Any changes of planned pipe grades shall be crossed out and new grade noted.
6. Service ties to all sanitary and water service stubs.
7. Lengths from the main line to the service stub.
8. Invert elevations of the sanitary sewer service.
9. Stationing of the sanitary service wyes.
10. Ties to all water main bends, tees and valves.
11. Name of the utility contractor, survey company, and inspector, and completion date of record drawing.

Note: No tie length shall be greater than 100'

GRADING CONSTRUCTION

Following completion of grading, one set of reproducible mylars (22" x 34" or 24" x 36"), and an electronic file, construction record drawings shall be submitted to the City.

Construction record drawing should show the following:

1. Final house pad elevations.
2. Final elevation of every lot corner.
3. Any changes in the grading, including street grades, drainage swales, berms, etc. shall be shown accordingly.
4. Name of the grading contractor, survey company, inspector and completion date of record drawing.

FINAL ACCEPTANCE

A final inspection of the project shall be made the following construction season after the completion of the second lift of blacktop and boulevard restoration. Representatives from the City and the utility and street contractor shall be present for the final walk through. The contractor shall be prepared to expose all structures. A punch list of any corrective work shall be given in written notice the Contractor and the Developers Engineers. After completion of the corrective punch list items, the City and the Contractor shall reinspect the project.

When final inspection reveals that all work is completed to the satisfaction of the City Engineer, the Developer's Engineer shall receive written notice of approving the final inspection. From that date of final approval, the required one-year warranty shall commence. Three months prior to the expiration of the one-year warranty, the city shall inspect the project for any construction defects. The Developer shall be responsible to correct any defects within reasonable time before the City Council will accept the project into the City.

APPENDIX