APPENDIX C

STANDARD SPECIFICATIONS
FOR
STREET CONSTRUCTION
FOR DEVELOPERS
CITY OF EAST BETHEL

INDEX

1.00 GENERAL REQUIREMENTS

1.01 All work shall conform to Minnesota Department of Transportation Standard Specification for Construction, 2000 Edition with all supplements except as modified herein.

1.02 All work shall be completed in a workman like manner.

1.03 All materials utilized for street construction, site drainage and site restoration as described herein shall meet all requirements as defined in each specific reference cited.

2.00 SUBMITTAL PROCEDURES AND CONSTRUCTION PLAN REQUIREMENTS

2.01 The Owner shall submit a complete set of street construction drawings together with required supplementary information for streets to be constructed within the City of East Bethel. The drawings shall be submitted with the subdivision Preliminary Plat for City review. The drawings shall be revised, if required after review by the City Engineer and City Council and resubmitted. Four sets of construction drawings shall be submitted with both the preliminary plat and final plat. Preliminary plats and final plats will not be approved until this requirement has been satisfied. The street construction drawings shall be in compliance with the requirements and standards as set forth herein.

2.02 The preliminary street construction drawings shall be complete as submitted with the Preliminary Plat. The drawings shall be on standard 22"x34" sheets. The street and storm sewer information shall be drawn on plan and profile style sheets. Street cross sections will be required for the final plat submittal only and shall be drawn on cross hatched sheets. The following minimum information shall be depicted on the street construction drawings:

1. General

   a. North arrow
   b. Scale with bar graph
   c. Date of preparation
   d. Proposed name of the subdivision in which the street is to be constructed
   e. Proposed name of all streets
   f. Name of the plan preparer, Engineer, Surveyor and Owner
   g. Seal or signature of the preparer and Licensed Engineer
   h. Street and storm sewer plan and profile shall be drawn at a max scale of 1"=50' horizontal and 1"=5' vertical
   i. Street cross sections shall be drawn at a scale of 1" = 10' horizontal and 1"=5' vertical
   j. Benchmark(s) based on USGS datum within the proposed subdivision boundary

k. Location map which shows all existing streets within 2500 feet of the proposed plat.

2. Existing conditions

a. Location, street width, right-of-way width, street name and street improvements for all streets abutting, adjacent or within 500 feet of the proposed subdivision. Bearings and distances for all existing street centerlines and right-of-ways described above shall be shown.

b. When any existing street will provide access to a proposed subdivision street, all existing access points to that street shall be shown for a distance of 500 feet on either side of the proposed intersection. The existing accesses shall be labeled as to width, type and condition.

c. Location, size, type, invert elevations, catchbasin location and condition of all storm sewers and culverts located within 500 feet of the proposed subdivision.

d. Location and size of existing sanitary sewer mains, watermains, and all other underground utilities and structures located within 100 feet of the proposed subdivision.

e. Location and size of buildings, structures, power and telephone lines and poles, and other above ground facilities within 100 feet of the proposed subdivision.

f. Natural topography including trees, water courses, wetlands, and other above ground natural features within 100 feet of the proposed subdivision.

g. Existing ground surface contours at an interval of two feet within 100 feet of the proposed subdivision. The City Engineer may require one foot contour intervals where conditions require more detailed grading information.

3. Proposed Conditions

a. Plan and profile of proposed streets showing centerlines and right-of-ways. Centerline stationing shall be shown with station 0+00 being the centerline of an accessed street. Centerline information shall include:

i. Bearings and distances of all tangent sections,

ii. Radius, degree of curvature, delta, length and stationing of the PC and PT for all curves,

iii. Vertical data including all existing and proposed grades and vertical curve information such as length of curve and superelevation requirements.

b. Cross sections of all proposed streets at 100 foot stations and other pertinent locations such as maximum cut and fill areas, through cul-de-sacs and adjacent to wetlands. Cross sections shall depict existing and proposed grades, and any existing and proposed surface and subsurface features, located at the cross section location. The cross sections shall be labeled to define the street stations from which they were taken.

c. Plan and profile of all proposed storm sewer depicting size, type, location of pipe, flow line gradients and manhole and catchbasin locations. Locations of flared end sections, riprap and other appurtenances shall be shown on the Plans.

d. Locations, sizes, types and inverts of all culverts shall be shown. Location and type of end sections shall be depicted.

e. Typical street sections, typical manhole and catchbasin details, typical ditch sections and standard riprap details shall be shown if proposed.

f. Proposed contours at two foot intervals. The City Engineer may require one foot intervals where condition requires more grade information.

4. Supplemental Information

a. A soils investigation shall be performed by a certified geotechnical engineer and a report of their findings submitted to the City Engineer. The report shall specifically address the adequacy of the existing subgrade to support the proposed street. Areas of weak soil and associated depths shall be discussed. Typical R-values of the soils shall be discussed. Estimate the seasonal high water elevations along the street and present this data in the report. Test holes shall be taken at a maximum interval of 500 feet along the proposed street centerline and to a minimum depth of 3 feet below proposed pipe inverts. Test hole data shall be included in the soils report and shall depict depth of bore, depth to water table, soil stratification and soil type within each stratification and thickness of each strata. Design recommendations for street pavement and base thickness shall be included in the report.

b. The Developer shall also provide certification per Ordinance 168 of the 23,000 S.F. buildable area 3 feet above the highest known water table, mottled soils or existing water table (whichever is the highest).

The Developer shall provide a report which includes soil boring locations and data along with an exhibit which defines the undisturbed buildable area. A minimum of two borings per lot shall be required. The exhibit must also illustrate that the buildable area will accommodate two 5,000 square foot soil treatment areas and a reasonable house pad. The exhibit shall be on standard 22" x 34" sheets with a maximum scale of 1"=100 feet. In substitution of a separate exhibit, the required information may be included on the Preliminary Plat or Grading Plan.

3.00 DESIGN CONSIDERATIONS

3.01 Street design shall be in accordance with the State of Minnesota Department of Transportation Street Design Manuals, State Aid Manual, Grading Base Manual, Bituminous Manual and Standard Plates Manual, all as amended herein.

3.02 All right-of-way widths, street widths and shoulder widths shall conform to the following minimum standards. All design information shall be subject to review by the City Engineer. Additional widths of right-of-way, street or shoulder may be required by the City Engineer, if, in his/her opinion, conditions warrant.

Local right-of-way and street requirements shall also pertain to marginal access roads, frontage roads, and cul-de-sac roads for each type (residential or commercial/industrial) of street listed. Cul-de-sac streets and turnarounds shall not be permitted in commercial/industrial districts. Streets designated as Municipal State Aid (MSA) commercial/industrial district routes shall be designed by the City Engineer in accordance with MSA standards.

URBAN DESIGN

CLASSIFICATION	R/W WIDTH	PAVED STREET WITH CURB BACK TO BACK
Collector	80'	49'
Local (residential)	66'	31'
Local (commercial/industrial)	80'	49'
Cul-de-sac turnaround (Residential)	70' radius	50' radius

RURAL DESIGN

CLASSIFICATION	R/W WIDTH	PAVEMENT WIDTH	STREET SURFACE EDGE TO EDGE
Collector	84'	40'	44'
Local (residential)	66'	24'	32'
Local (commercial/industrial)	NA	NA	NA
Cul-de-sac turnaround (Residential)	70' radius	50' radius	

3.03 Streets shall intersect at right angles or within ten degrees. Intersections having more than four corners shall be prohibited. Adequate right-of-way for future intersections and streets shall be dedicated with the Final Plat.

3.04 A minimum typical street section tangent of 100 feet shall be placed between reverse curves on all streets. A minimum typical street section tangent of 100 feet shall be placed between tangent runout portions of reverse super elevated curves. The minimum tangent distance may be increased to facilitate tangent runout for super elevated curves.

3.05 Street design speed shall be based upon the functional classification of the street. Horizontal and vertical alignment shall be designed to accommodate a minimum 55 mile per hour design speed for collector streets unless otherwise approved by the Commissioner of Transportation, and a 30 mile per hour design speed on all other streets. The minimum curve radius, without super elevation, shall be 300 feet for 30 miles per hour local streets. Where the required radius cannot be met, a maximum superelevation of 3% will be allowed.

3.06 Centerline gradients of urban street sections shall have a minimum vertical gradient of 0.6 percent and a maximum gradient of 6.0 percent. Rural street sections may have a minimum vertical gradient of 0.0 percent and a maximum gradient of 6.0 percent. Rural street section ditch inverts shall have a minimum vertical gradient of 0.5%.

3.07 Street intersection jogs with centerline offsets of less than 200 feet shall be prohibited.

3.08 Access of local streets onto collector and arterial streets shall be prohibited at less than 500 foot intervals.

3.09 Residential street intersections shall be rounded by a radius of not less than 30 feet. Corners of entrances to the turnaround portions of cul-de-sacs shall be rounded by a radius of not less than 60 feet. Corner radius to arterial and collector streets shall not be less than 50 feet.

3.10 Residential streets may be concrete curb (urban) or ditch section (rural) streets. Streets in commercial and industrial areas shall have concrete curb. The curb shall be concrete curb and gutter designed per the construction details shown in the appendix of this Specification.

3.11 Permanent cul-de-sac streets shall only be allowed where area topography or other physical site conditions warrant a cul-de-sac, dead-end design.

Where a temporary residential cul-de-sac is required, the turnaround right-of-way shall be placed adjacent to a plat boundary line and a right-of-way of the same width as the street shall be carried to said property line in such a way as to permit future extension of the street into the adjoining tract. A temporary easement equal to the additional right-of-way width over 66 feet minimum required for cul-de-sacs shall be provided by dedication and recorded as a separate instrument. At the time the street is extended and the cul-de-sac is removed, the easement may be vacated upon vacation completion process.

Cul-de-sacs shall be formed with a 2% cross slope or a 2% continual slope from the center point of the cul-de-sac. Concrete curb & gutter will be required on urban sections only, a minimum of a 0.6% flow line grade around the perimeter of the cul-de-sac shall be maintained.

4.00 DESCRIPTION AND CONSTRUCTION REQUIREMENTS

4.01 Clearing and Grubbing:

All work related to this item shall be performed in accordance with the Minnesota Department of Transportation Standard Specifications for Construction, Section 2101 as modified herein. All trees, shrubs, brush, stumps, roots, windfalls and other plant life, including dead and decayed matter, that exist within the entire street right-of-way width shall be removed from site and disposed of in accordance with Anoka County regulations. Items listed above which are specifically designated to remain as shown on the approved Plans shall be preserved.

4.02 Subgrade Preparation:

All work related to subgrade preparation shall conform to the Minnesota Department of Transportation Standard Specifications for Construction, Section 2112 as modified herein. Subgrade preparation shall consist of preparation of the street subgrade after installation of all underground work and prior to placing the design section as depicted in Appendix A of this Specification. The required density in the top two feet of the subgrade shall be a minimum 95% of modified proctor density.

Test rolling shall be applied to subgrade per Mn/DOT Specification Section 2111 except as modified in subsection 2111.2 where City Engineer may allow other suitable equipment for the test rolling.

4.03 Aggregate Base: Aggregate base shall be placed in accordance with the Minnesota Department of Transportation Standard Specifications for Construction, Section 2118 and Section 2211.

Aggregate shall be placed to the dimensions as shown on the City Standard Plates in Appendix A of this Specification. In-place density shall be a minimum of 95% modified proctor density.

4.04 Bituminous Placement: Bituminous materials shall be furnished and installed in accordance with the Minnesota Department of Transportation Standard Specifications for Construction Section 2350 as modified herein.

All bituminous mixture shall be compacted in accordance with the specified density method to not less than 95% of the Marshall density.

The thickness of all single course of pavement shall be within a tolerance of plus or minus 1/4 inch of thickness as shown on the Standard Plates in Appendix A of this Specification. Two courses of bituminous material shall be required for all paved street sections.

The Control Strip Method of compaction may be used as an alternate to the Specified Density Method with permission of the City Engineer, however cores are still required per Section 6.03.1c.

4.05 Pipe Culverts and Pipe Storm Sewers : All pipe culverts and pipe storm sewers shall be furnished and installed in accordance with the provisions of the CEAM 2621 and Minnesota Department of Transportation Standard Specifications, Section 2501 and Section 2503. Pipe culverts and pipe storm sewers shall be a minimum of 15" in diameter and sized based upon a Licensed Engineer's recommendation. All pipe culverts shall be placed with a minimum centerline camber of 0.1 feet and shall have apron or flared end sections. All pipe culverts and pipe storm sewers located within City right-of-way shall be concrete reinforced pipe.

All culverts shall have a minimum cover of 24 inches as measured from the final pavement grade to the top of the pipe.

4.06 Manholes and Catchbasins: All manholes and catch basins shall be furnished and installed in accordance with the provisions of the Minnesota Department of Transportation Standard Specification 2506 as modified herein.

4.07 Traffic Signs and Devices: Traffic signs and devices shall be furnished and installed in accordance with the Minnesota Department of Transportation Standard Specifications for Construction, Section 2564 and in accordance with the Minnesota Manual on Uniform Traffic Control Devices for Streets and Highways.

Residential plats will only require signage. All commercial and industrial plats shall include signage and epoxy pavement markings. The City Engineer will prepare the striping and signage plan. The street striping and signage will be ordered and installed by the City and charged back to the Developer.

4.08 Temporary Erosion Control: Erosion control devices shall be installed prior to construction to insure the protection of adjoining properties, wetlands, ponds, lakes and rivers. All work shall be in accordance with the Minnesota Department of Transportation Standard Specifications for Construction and Specifications, Section 2573. Erosion control devices shall remain in-place after construction until such time as the City Engineer determines that they are no longer required. At such time that the City Engineer orders the removal of the erosion control devices, they shall be removed and disposed of by the Developer. Silt accumulated shall be spread evenly or disposed of to insure the protection of wetland and drainage areas.

4.09 Riprap: Grouted riprap shall be furnished and placed in accordance with the Minnesota Department of Transportation Standard Specifications for Construction, Section 2511. Riprap shall be utilized as a protective cover for earth slopes or wherever the soil is susceptible to erosion. A geotextile fabric is required to serve as a filter layer beneath all riprap placed.

4.10 Turf Establishment: All disturbed areas not surfaced shall be topsoiled, seeded, mulched, disc anchored and fertilized in accordance with the Minnesota Department of Transportation Standard Specifications for Construction, Section 2105 and Section 2575. These areas include but are not limited to in-slopes, ditches, backslopes, boulevards, temporary construction easements and permanent construction easements. Topsoil shall be placed to a minimum four inches in-place compacted depth. All areas shall be graded to drain per the approved Plans.

4.11 Turn Lanes and Bypass Lanes: Right turn lanes will be required where plat streets access state highways, county roads, and city collector streets. Bypass lanes shall be constructed if they are warranted per MnDOT, Anoka County, or the City Engineer.

4.12 Other Work: Work not specifically described herein shall be performed in accordance with the appropriate section(s) of the Minnesota Department of Transportation Standard Specifications for Construction and Supplemental Specifications.

5.00 CONSTRUCTION MATERIALS

5.01 Aggregate Sub-base: Aggregate sub-base course shall be Class III or Class IV in accordance with Section 3138 of the Minnesota Department of Transportation Standard Specifications for Construction.

5.02 Aggregate Base: Aggregate base course shall be Class V in accordance with Section 3138 of the Minnesota Department of Transportation Standard Specifications for Construction.

5.03 Bituminous Mixture: Materials required under this section shall be in accordance with the Minnesota Department of Transportation Standard Specifications for Construction Section 2350.

Bituminous mixture for base course shall be Low Volume (LV), Non-Wear, with aggregate size 3 (¾" maximum size) and specified asphalt binder grade 58-28. Bituminous mixture for wearing courses and surfacing shall be Medium Volume (MV), Wear with aggregate size 4 (½" maximum size) and a specified asphalt binder grade 58-28. Bituminous mixture containing recycled mixture may be utilized for Non-Wearing courses only. Asphalt binder grade shall be adjusted per Specification 2350 for recycled mix. Recycled mix is not allowed for the Wear Course mixture.

A tack coat shall be applied between pavement courses and to contact surfaces between pavement and abutting concrete or bituminous edges. Bituminous material for tack coat shall be CSS-1 (emulsified asphalt) or approved equal.

5.04 Pipe Culverts and Pipe Storm Sewers: Corrugated steel pipe shall conform to Minnesota Department of Transportation Standard Specification for Construction, Section 3226 and to Minnesota Department of Transportation standard plate 3040. Pipe shall be 2–2/3" x ½" corrugation, minimum 16 gauge.

Reinforced concrete pipe shall be in accordance with Section 3236 and of the size and class on the approved construction drawing. Reinforced concrete aprons shall conform with Section 3236 and be utilized for all "daylight" situations. Pipe joint sealer materials shall be preformed rubber, Type A, in accordance with Section 3726.

Corrugated Polyethylene Pipe: Corrugated polyethylene pipe and fittings shall be manufactured from high density polyethylene (HDPE) virgin compounds. Clean reworked HDPE materials from the manufacturer's own production may be used by the manufacturer of HDPE pipe, provided that the pipe and fittings produced meet all requirements of these Special Provisions and in AASHTO M294 and Design Section 18 of the AASHTO Standard Specifications for Highway Bridges. The polyethylene compounds shall conform to the requirements of ASTM D3350 Cell Class 335420C.

Wall thickness shall be the thickness of the inner liner measured between corrugation valleys of the outer rib wall. The wall thickness shall equal or exceed the minimum wall thickness values in Table 1. The pipe stiffness shall be determined in accordance with AASHTO M294 at 5 percent deflection. The

average pipe stiffness shall equal or exceed the minimum pipe stiffness value for each size of pipe listed in Table 1.

Connections shall be made with bell and spigot joints. Clamp-on-bands shall not be allowed. Pipe couplers shall be subject to rejection upon failure to conform to any requirements of this specification. HDPE pipe shall be furnished with metal apron end sections.

5.05 Manholes and Catchbasins: Manholes and catchbasins shall conform to Minnesota Department of Transportation Standard Specifications for Construction Section 2506 and all applicable Mn/DOT or City Standard Plates.

1. Manhole inlets shall be Neenah Foundry R-1733 or equal with Type B lid with "storm sewer" inscribed.

2. Catchbasin manhole and catchbasin inlets shall be Neenah Foundry R-3250-1 with C grate or equal.

3. Off-street catchbasin manhole and catchbasin inlets shall be constructed per MnDOT Standard Plate 4143E – Stool Grate & Concrete Frame.

4. Manholes identified on the plans as box structures shall be constructed from precast reinforced concrete box sections conforming to ASTM C-789 placed on end. Wall thickness and reinforcement shall be in accordance with ASTM C-789 Table 1 for box section under earth dead load and HS-20 live load conditions. Base and cover slabs shall have thickness and reinforcement to meet MnDOT HS-20 traffic loadings.

5. All manhole and catchbasin structures with builds greater than 5.0 feet from casting to invert shall have steps. Maximum distance from top of casting to first step is 2 feet.

5.06 Riprap and Geotextile Fabric: Riprap and geotextile fabric shall conform to the Minnesota Department of Transportation Standard Specifications for Construction, Section 3601 and Section 3733. Riprap shall be Type III with a Type IV geotextile fabric. All riprap shall be grouted.

5.07 Signs and Markers: Materials required under this Section shall be in accordance with the Minnesota Department of Transportation Standard Specifications for Construction Section 3352. All signs shall be constructed of High Intensity Grade Sheeting.

5.08 Pavement Markings: Materials required under this section shall be in accordance with the Minnesota Department of Transportation Supplemental Specifications for Epoxy Resin Pavement Markings. Copies of the supplemental specifications are available from the City Engineer.

5.09 Turf Establishment: Turf establishment shall be in accordance with the Minnesota Department of Transportation Standard Specification for Construction.

A. Seed mixture shall be in accordance with Section 3876, mixture number 60B applied at the rate of 100 lbs. per acre.

B. Topsoil borrow shall be in accordance with Section 3877.

C. Sod shall be in accordance with Section 3878.

D. Commercial fertilizer shall be in accordance with Section 3881, shall have a minimum analysis of 10-10-10, and be applied at a rate of 500 lbs. per acre.

E. Mulch material shall be in accordance with Section 3882 and shall be Type I applied at the rate of two tons per acre. Mulch material shall be disc anchored.

F. Silt fence utilized for erosion control shall be in accordance with Section 3886.

5.10 All materials to be utilized for construction and not specifically detailed above shall be in accordance with the Minnesota Department of Transportation Standard Specifications for Construction and Supplemental Specifications.

6.00 CONSTRUCTION STAKING, INSPECTION AND TESTING REQUIREMENTS

6.01 Construction Staking

Construction staking shall be performed by a surveyor licensed in the State of Minnesota and contracted by the Owner to perform such work. All plat and right-of-way boundaries shall be delineated. Street centerline shall be referenced off the established plat and right-of-way boundaries. One set of slope stakes or offset hubs is required prior to construction and one set of blue tops placed either in the subgrade or gravel surface is required during construction.

Street grade hubs shall be placed at a maximum of 50 feet on center and shall be required at a maximum of 25 feet on center for all curves. The street grade hubs shall be placed along the street on each edge of pavement at the spacing stated above.

6.02 City Inspection: The City Engineer and/or his/her representative shall inspect the work to insure compliance with and conformance to City Standards and approved plan. The City Engineer shall inspect the work at the following times prior to and during construction:

1. After clearing limits are staked and prior to construction.

2. Upon completion of site clearing and grubbing.

3. Upon completion of removal of all required topsoil and unsuitable subgrade materials. The Developer's Soils Engineer shall be present to provide assurance that all unsuitable soils have been removed. Alternatively, a written communication from the Developer's Soils Engineer to the City's Engineer stating that "all unsuitable soils have been removed from the street sub-base" may be supplied by the Developer. The City Engineer may require soil borings to verify the removal of unsuitable soils.

4. Upon completion of sub-base preparation. The sub-base shall be considered complete when it has been graded and compacted to ±0.05 feet of the lines and grades as established in the approved Plans. Compaction tests will be required in embankments and cut sections by the City Engineer.

5. During placement of stormwater structures.

6. Upon completion of base course preparation. The base course shall be considered complete when it has been placed, graded and compacted to ±0.05 feet of the lines and grades established on the approved Plans. Compaction test results which verify in-place density of the base material shall be submitted to the City Engineer at this time.

7. During placement of bituminous base course and bituminous wearing course. Compaction test results for the in-place bituminous material, as required by the Minnesota Department of Transportation Standard Specifications for Construction and Supplemental Specifications, shall be submitted to the City Engineer prior to acceptance of the street by the City.

8. Upon completion of the work as shown on the approved Plans. The complete work shall meet all drainage related, street related, turfing related and other such items required by the approved Plans and Specifications as set forth herein.

The City Engineer shall be notified by the Developer 24 hours in advance to schedule inspections for the above mentioned times. The City Engineer may, at his/her discretion, perform additional site inspections. The Developer shall provide access to the site for the Engineer or his/her representative to perform his/her inspections.

6.03 Construction Materials Testing

1. The cost of all materials testing shall be born by the Owner including costs related to secure and maintain an independent soils testing firm to provide testing services. The testing shall be performed to insure compliance with these standards.

a. Compaction tests shall be performed in the embankments, sub-base and the base materials. A minimum modified proctor density of 95% is required on all base materials located within the upper two feet of the proposed finished grade of the street and a modified proctor density of 90% is required on materials below this level. An in-place compaction testing rate of one test per 500 feet of street in each sub-base and base materials shall determine the minimum number of tests required. Testing shall be performed in accordance with the Minnesota Department of Transportation Grading & Base Manual at the rates indicated above.

b. Sieve analysis shall be performed on all Class V aggregate material and any other manufactured sub-base or base materials to be utilized for the project. The Owner shall provide the City Engineer with sieve analysis performed by an independent approved soils testing firm. A minimum of one test for every 350 tons of material placed shall be performed. Sampling and testing shall be in accordance to the Minnesota Department of Transportation Grading and Base Manual at the rates indicated above.

c. Core samples are required in both the Non-Wear and Wear Course and shall be taken at random location at least every 500 linear feet. The cores shall determine thickness of pavement and be used to measure density of the core by Marshall test. A minimum of 2 cores per project will be required.

d. The City reserves the right to have tests run on other materials placed on the street or in the right-of-way at the Developer's expense. Those tests may include but not be limited to topsoil analysis, horizonation of soils and seed analysis.

7.00 STANDARD CONSTRUCTION DETAILS

The Developer shall construct all streets to the section as shown on Standard Plates in Appendix A.