



# **Engineering Standards and Detail Specifications**

**Adopted September 20, 2011**

## **City of Scandia**

14727 209<sup>th</sup> St. N.

Scandia, Minnesota 55073

Phone: 651 433-2274 Fax: 651 433-5112

[www.ci.scandia.mn.us](http://www.ci.scandia.mn.us)

## ***PURPOSE***

This document establishes engineering standards and detail specifications for public and private improvements in new subdivisions within the City of Scandia. It has been adopted by reference in Ordinance No. 128 adopting Chapter 3 (Subdivision Regulations) of the City of Scandia Development Code.

The standards of this document supplement the Minimum Design Standards contained in the Subdivision Regulations. Adherence to these standards will help assure that new subdivisions will contribute toward and attractive orderly, stable a livable and safe community. Compliance will help assure the quality of design and construction of new streets, utilities and other infrastructure in the city of Scandia, and help prevent future problems and unnecessary maintenance expense in the future.

These guidelines will be updated from time to time to reflect new materials and practices, subject to approval by the City Council.

Specific questions about these guidelines should be directed to:

Ryan J. Goodman, PE  
Scandia City Engineer  
Stantec  
2335 Highway 36 W.  
St. Paul, MN 55113  
E-mail: ryan.goodman@bonestroo.com  
Telephone: (651) 967-4616

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## **ENGINEERING PRODUCT MATERIAL REQUIREMENTS**

The following list of items provides product material requirements for development projects in the City of Scandia. The product material requirements have been established and adopted by the City to provide consistency in the materials installed for rural and Village Core streets, storm sewer, storm sewer, sanitary sewer, and watermain. Material product requirements identify items that are consistent with today's engineering and construction practices, and provide for consistent maintenance practices.

### **STREET MATERIALS**

- Street Section (ALL)
  - Subgrade ..... minimum 12 inch Select Granular Borrow
  - Base ..... minimum 8 inch Aggregate, Cl. 5
  - Fabric ..... Type V (woven), 4.5oz/sq yd
  - Bit. Wear Course..... 1.5 inch – SPWEB240C Wearing Course
  - Bit Base Course..... 2.5 inches – SPNWB230C Non-Wearing Course
  - Drain tile .. 4” PVC/HDPE Perforated with trench rock and geotextile wrap
  - Commercial Pavement. Thickness & Mix Design..... varies
  
- Shoulder
  - Material .....4” Aggregate Base Cl.2
  
- Boulevard
  - Topsoil ..... minimum 6 inch, conforming to MnDOT Spec 3877.2A
  - Treatment – Sod.....conforming to MnDOT Spec. 3878
  - Treatment – Seed ..... conform to MnDOT Spec 3876, types vary
  
- Curb
  - Type – Concrete Curb & Gutter Design .... **B618** and Surmountable (Residential)  
.....B618 (Commercial)
  - Bituminous Curb..... Not Allowed
  
- Street Name Signs
  - 9-inch plates .....speed limits less than 40mph
  - Reflective sheeting..... Diamond Grade DG3
  
- Signing and Striping
  - Street Signs (informational and regulatory).....

### **SIDEWALK/ TRAIL MATERIALS**

- Sidewalk Section
  - Base ..... 6 inch Aggregate, Cl. 5
  - Concrete ..... 6 inch – Mix Number 3Y32A
  - Width (min).....5 foot

- Trail Section
  - Base ..... 6 inch Aggregate, Cl. 5
  - Bituminous Wear Course .....3 inch – SPWEA240B Wearing Course
  - Width (min).....10 foot

**STORM SEWER / CULVERT MATERIALS**

- Main Pipe
  - Material ..... RCP Only
  - Depth and Class ..... Varies
  - Culvert Material ..... CMP or RCP (rural driveway only) /RCP (street crossing)
  
- Manhole
  - Type .....Precast, RCP
  - HDPE Rings... 2 minimum, 8” height maximum
  - Set bottom ring in mortar, glue remaining rings
  - Chimney seal .....Infi-Shield or approved equal
  - Minimum MH depth .....3.5 feet
  - Sump Depth ..... n/a
  - Type of Casting.....R-1642-B, Stamped “Storm Sewer”
  
- Catch Basin
  - Type .....Precast, RCP
  - Concrete Rings..... 2 minimum, 8” height maximum
  - Chimney seal.. .....Infi-Shield or approved equal
  - Minimum CB Depth to Invert.....3.5 feet
  - Sump Depth ..... *2’ in CB upstream of pond*
  - Type of Casting.....R-3067-V (Standard)
  - ..... and R-3067VB (Low Points)

**SANITARY SEWER MATERIALS** (for development areas with community collection systems)

- Main Pipe
  - Material .....PVC
  - Class .....
    - Depth to 18 feet.....SDR 35
    - Depth 18 feet to 26 feet.....SDR 26
    - Depth > 26 feet.....As required by Engineer
  
- Manhole
  - Type .....Precast, RCP
  - Wrap each MH barrel joint with 12” mastic seal or ram-nek in barrel joint
  - Type of Casting..... R-1642-B Stamped “Sanitary Sewer”
  - Outside drop Material .....DR 18 DIPS C-900
  - HDPE adjustment rings..... 2 minimum, 8” height maximum
  - Set bottom ring in mortar, glue remaining rings
  - Chimney seal .....Infi-Shield or approved equal

- Service Pipe – 4 inch standard
  - Material .....PVC
  - Class .....schedule 40, 150 psi pressure rating ASTM 2241
- Cleanout / Riser Pipe - 4 inch standard
  - Material ..... PVC
  - Class .....schedule 80, 150 psi pressure rating ASTM 2241

**WATERMAIN MATERIALS** (for development areas with community supply and distribution systems)

- Main Pipe
  - Material ..... Class 52, DIP (poly wrapped)
  - Alternate Material (*Engineer review*).....PVC DR 18 DIPS C-900
  - Fittings ..... DIP, Epoxy Coated, U.S. Manufacture
  - Fitting Bolts ... .....Cor-**Blue**
  - Restraints ..... Mega-Lug
  - Tracer Wire ..... Min. No. 12 AWG - Copper Clad Steel rated to 30 volts
- Hydrant
  - Type ..... Waterous Pacer WB-67-250
  - Operating Rod ..... Heavy Duty
  - Body bolts .....Stainless Steel
- Valves
  - Type ..... Resilient Seat Gate
  - Manufacturer..
    - ..... Waterous, American Flow Control 2500 Series or approved equal
  - Valve in Box ..... 4” through 12” – **Tyler 6860 Series**
  - Gate Valve Box Adaptor Plate..... Required on all valves
  - Valve Body Bolts.....Stainless Steel
  - Extension Rod (single piece steel).....Top Nut - 2’ below finished surface
- Residential Service Pipe
  - Service Size ..... 1” to 2.5” Diameter
  - Service Material..... Type “K” Copper to curb box
    - ..... Long stainless steel saddles for PVC watermain
  - Type of Corporation Stop .....Mueller ball valve. H-25000 or approved equal
  - Type of Curb Stop..... Mueller ball valve H-25154 or approved equal
  - Type of Curb Box ..... Mueller H-10300 or approved equal
    - .....Extension rods required
  - Pigtail Length ..... 10 feet with crimped end

## ***ENGINEERING DESIGN REQUIREMENTS***

The following list of items provides engineering design requirements for development projects in the City of Scandia. The requirements have been established and adopted by the City to provide consistency with today's engineering and construction practices.

### **STREET DESIGN REQUIREMENTS**

- Street Width and Rights-of-way

- Street Widths & Rights-of-Ways are indicated in the Development Code, Chapter 3 (Subdivision) of the City of Scandia.

- Street Section (ALL)

- The Standard Street Section shall meet the minimum requirements for Local and Arterial/Collector Streets as follows:

- Local/residential low volume roadways (Urban Design and Rural Design) -
      - 1.5 inches bituminous wearing course
      - 2.5 inches bituminous non-wearing course
      - 8 inches aggregate base class 5
      - Subgrade as approved by City Engineer

- Arterial/Collector medium to high volume roadways and commercial roadways -
      - 1.5 inches bituminous wearing course
      - 2.5 inches bituminous non-wearing course
      - 10 inches aggregate base class 5
      - Subgrade as approved by City Engineer

- Additional street section requirements may be required based on traffic type and volume anticipated for the proposed roadway.

- Refer to City Detail "Typ-Rural Design", or "Typ-Urban Design", or "Typ-Arterial/Collector".

- Boulevard

- Width ..... varies
  - Sidewalk Width.....5 feet
  - Bituminous Trail Width ..... 10 feet

- Entrances (Single family residential)

- Driveway – Width ..... 12 feet – Minimum  
..... 24 feet – Maximum  
.....Cul-de-sac widths to be reviewed by City Staff  
....All driveways are to meet minimum side yard setbacks - 5 feet
  - Driveway location – 50 feet from the curb of an intersecting street
  - One access per Residential Property

- Commercial Entrances
  - Driveway width.....32 feet - Maximum  
..... Driveway location requires Engineering approval
  
- Street Miscellaneous
  - Crown ..... 2.5%
  - Minimum percent of grade..... 0.5%
  - Maximum approach grade at intersection for 50' distance ..... 2.0%
  - Maximum percent of grade ..... 6.0%
  - Diameter of Cul-de-sac (no islands allowed)..... 100 feet
  - Minimum % of grade around Cul-de-sac *Curb Flow line* ..... 0.5%
  - Minimum intersection radii for local and Arterial streets .....20 feet
  - Maximum length of Cul-de-sac ..... 600 feet Urban Development  
..... Varies for Rural Development
  - Minimum Radius for Cul-de-sac return required.....30 feet
  - Temporary Cul-de-sac at plat line..... yes
  
- Horizontal Street Alignment
  - When a horizontal street centerline deflections at any one point, by more than 10 degrees, a horizontal curve shall be introduced into the alignment with radius no less than 100 feet in length.
  
  - Street “jogs” or offsets shall be spaced at least 150 feet, centerline of street to centerline of street for minor streets. Major street intersections shall not be offset.
  
  - Intersecting streets shall have centerlines that intersect at a single point, with the angle between the intersecting street centerlines of no less than 80 degrees and no more than 100 degrees. 90 degree intersections are preferred.
  
- Vertical Street Alignment
  - Vertical street centerline alignment with different connecting gradients shall be connected with vertical curves. Minimum length, in feet, of these vertical curves shall be thirty (30) times the algebraic difference in the percent of grade of the two adjacent slopes.
  
- Sign requirements
  - All signs shall conform to the Minnesota Manual on Uniform Traffic Control Devices, May 2005 Edition and subsequent revisions, and Mn/DOT Standard Specifications for Construction, 2005 Edition, Section 2564.
  
  - Sign sheeting shall meet new Federal regulatory Retroreflectivity requirements.
  
- Mailbox requirements ..... COORDINATE LOCATIONS WITH THE POSTMASTER

All private utilities, including gas, electric, telephone, and cable television are to be constructed in a joint trench in accordance with City Detail.

## STORM SEWER DESIGN REQUIREMENTS

- Main Pipe
  - Minimum pipe diameter..... 12 inch
  - Minimum culvert diameter..... 15 inch
  - Minimum culvert length.....24 feet
  - Maximum culvert length.....30 feet
  - Apron and Trash Guard requirements..... All Culverts
  
- Manhole
  - Minimum diameter.....4 feet
  - Minimum Build height.....3.5 feet
  
- Catch Basin
  - Minimum pipe cover.....2 feet
  - Sumps ..... 2' in last CB prior to outlet
  
- Design
  - Design frequency of storms ..... 10 yr.
  - Minimum storm sewer design velocity..... 3 fps
  - Maximum storm sewer discharge velocity .....5.5 fps
  - Design frequency for detention basins..... 100 yr.
  - Design flood level below adjacent basement floor elevations .....2.0 feet
  - Emergency overflow swale below building openings ..... 1.0 foot
  - Maximum basin side slope.....3:1
  - Minimum detention basin depth .....4.0 feet
  - Maximum detention basin depth.....10.0 feet
  - Minimum swale grade..... 2.0%

## SANITARY SEWER DESIGN REQUIREMENTS

- Manhole
  - Maximum Manhole Spacing .....400 feet
  - Maximum inlet/outlet elevation difference .....2 feet
  - Minimum depth of Manhole ..... 10 feet
  - Outside drop ..... 2.0 feet minimum
  
- Service
  - Extend from mainline pipe to property line with cleanout
  
- Cleanout
  - Extend to 8' bury at property line

## WATERMAIN DESIGN REQUIREMENTS

- Main Pipe
  - Minimum diameter.....8 inch
  - Maximum Length of Dead Ends.....600 feet
  - Air Release measures.....Hydrant
  - Minimum Cover.....8 feet
  - Side of Street North and East side of centerline preferred
  
- Hydrant
  - Depth .....9'-0" Bury (8 feet cover)
  - Spacing .....250'R to cover Building Pad
  - Gate valve on 6" Hydrant leads ..... Yes
  - Supply two (2) Spring Mounted snow flags per hydrant
  
- Valves
  - Maximum distance between Valves on Trunk Mains.....600 feet
  - Maximum No. house services between Valves on Lateral Mains .....20
  
- Residential Service Pipe
  - No splices in services are allowed
  
- Irrigation Service Pipe

# ***PROJECT PLAN REQUIREMENTS***

## **PLAN SHEET FORMAT REQUIREMENTS**

1. The maximum plan sheet size shall be 22" x 34".
2. The electronic file must be in AutoCAD.DWG format.
3. The electronic file must have layered designations for various items and text as indicated by the table named Minimum Layering Requirements.
4. The intent of the layering requirements is to separate various items of the drawing. The general concept of the layering is to separate;
  - Proposed features from existing features
  - Proposed text labeling from existing text labeling
  - Different utilities of the construction project
  - Proposed lateral and trunk features from utility services
5. Additional layering from that indicated by the Minimum Layering Requirements is encouraged, and can be completed according to your needs and/or company policy.
6. All electronic files must be accompanied by a "layer description list" that clearly identifies the elements of each layer or level.
7. Horizontal control of the Plans must be on Washington County Coordinate System.
8. Vertical control of the Plans must be on the City's Benchmark System.

### **Minimum Layering Requirements:**

<u>Layer/ Level</u>	<u>Items</u>
1.	Legend, bar scales, north arrows, headings, and sheet numbers, match lines and text, sheet references, and other general information
2.	Removals, hatching, shading, etc.
3.	Existing underground utilities (gas, electric, telephone, cable TV)
4.	Existing property lines, right-of-way lines and easements
5.	Existing sanitary sewer and services
6.	Existing sanitary sewer text
7.	Existing watermain and services
8.	Existing watermain text
9.	Existing storm sewer
10.	Existing storm sewer text
11.	Existing draintile and draintile service stubs
12.	Existing draintile text
13.	Existing curb line or edge of pavement
14.	Text for miscellaneous existing items
15.	Proposed sanitary sewer and appurtenances
16.	Proposed sanitary sewer text
17.	Proposed watermain and appurtenances
18.	Proposed watermain text
19.	Proposed sanitary sewer and watermain services
20.	Proposed sanitary sewer and watermain service text
21.	Proposed storm sewer and appurtenances

- 22. Proposed storm sewer text
  - 23. Proposed draintile and appurtenances
  - 24. Proposed draintile text
  - 25. Proposed curb lines, walks, trails, etc.
  - 26. Proposed street construction text
  - 27. Centerline
  - 28. Proposed vertical alignment
  - 29. Proposed vertical alignment text
- For grading plans or when applicable:
- 30. Existing contours
  - 31. Existing contour text
  - 32. Proposed contours
  - 33. Proposed contours text

As noted previously, additional layering is encouraged. However, placing similar items on multiple layers is not acceptable.

## **PLAN REQUIREMENTS**

- I. Title Sheet – With Location Map
- II. Sheet Index Map
- III. Legend, Typical Section
- IV. Details
- V. Grading, Drainage, and Erosion Control Plans
  - A. Show building Pads with building location. Define location of house and garage.
  - B. Indicate NWL and 100-year HWL, Low floor elevations, and emergency overflow elevations.
- VI. Storm Sewer and Street Plan Sheets:
  - A. Plan and Profile shall be shown on the same sheet
  - B. The following information shall be shown:  
(North arrow up or to the right on all sheets)
    - 1. Scale: 1"=50' horizontal and 1"=10' vertical  
Maximum sheet size 22" x 34"
    - 2. Sizes of storm sewer pipe.
    - 3. Types of storm sewer pipe, class of pipe.
    - 4. Lengths of storm sewer pipe.
    - 5. Sizes and types of manholes and catch basins.
    - 6. Proposed grades of storm sewer pipe.
    - 7. Proposed drainage swale locations and elevations.
    - 8. Elevations on all inverts and elevations of castings of all storm sewer structures.

9. Arrows indicating the direction of flow on the storm sewer plan views.
10. Number of each storm sewer structure on both plan and profile views.
11. Proposed watermain and sanitary sewer shown in plan and profile views, dashed line.
12. Proposed storm sewer pipe crossings on the storm sewer profile views.
13. Existing profile over storm sewer pipe.
14. Finished profile over storm sewer pipe.
15. Show concrete walks and bituminous paths.
16. Finished centerline street elevations every 50 feet.
17. Drainage flow arrows at street intersections.
18. Street names.
19. Lot and block numbers.
20. Existing and proposed easements/right-of-ways.
21. Centerline stationing needs to be shown.

VII. Street Light Plan – Standard street lights are “Traditional Coach Lantern” (Connexus Energy) and” Traditional”( Xcel Energy) Luminaires. The Developer can upgrade street lights to an “Acorn”(Xcel and Connexus) style. All street lights are to be furnished, paid, and installed by the Developer, with the City taking over the maintenance and repair costs after the system is approved by the Engineer and accepted by the City.

VIII. Street Signage and Pavement Marking Plan

1. All signing and pavement markings are to be in accordance with the Minnesota Manual on Uniform Traffic Control Devices (MMUTCD), 2001 Edition, and Mn/DOT Specification 2564.

IX. Sanitary Sewer and Watermain Plan Sheets:

- A. Plan and profile sheets shall contain both sanitary sewer and watermain on the same sheet.
- B. The following information shall be shown:  
(North arrow up or to the right on all sheets.)
  1. Scale: 1”=50’ horizontal and 1”=10’ vertical  
Maximum sheet size 22” x 34”.
  2. Size of proposed mains.
  3. Type of mains and class of pipe.
  4. Length of mains.
  5. Size and type of manholes.
  6. Proposed grade of sewer mains.
  7. Elevations of inverts of all sanitary sewer stubs, @ MH and stub end.
  8. Arrows indicating the direction of flow on the sanitary sewer plan views.
  9. Number of each sanitary sewer structure on both plan and profile views.  
Stationing of sanitary sewer structures on profile view.
  10. Proposed main line pipe crossings on the profile views.
  11. Proposed storm sewer shown in plan and profile views, dashed line.
  12. Hydrant, valve and fitting locations on the plan view.
  13. Existing profile over main line pipe.
  14. Finished profile over main line pipe.
  15. Street names

16. Lot and block numbers.
17. Location of all existing utilities.
18. Existing and proposed easements.
19. Centerline stationing needs to be shown.

## **RECORD DRAWINGS, COMMERCIAL PROJECTS**

- I. After construction is completed, two sets of asbuilt construction record drawings are to be prepared and provided to the City by the Developer. The final record drawings must also be submitted in electronic form in accordance with the Plan Sheet Format Requirements. The developer shall perform the following field work prior to preparation of the record drawings:
  - A. Sanitary and storm sewer manhole and catch basin casting/inlet tops and inverts, flared and section inverts, and any other structure elevations shown on the as-bid drawings must be surveyed, the actual elevations recorded to the nearest 0.1', and the actual pipe grades recorded to the nearest .01%.
  - B. Sanitary and storm sewer lines must be field measured from center of casting to center of casting or from center of casting to end of flared end and the lengths recorded to the nearest 0.5'.
  - C. All changes from planned pipe, structure, or hydrant locations must be recorded.
  - D. All top of hydrant elevations will be required on each construction plan sheet.
  - E. Service invert elevations at R/W line.
  - F. Service ties to curb boxes and stationing of sanitary sewer service wyes shown. Ties to draintile service stub and clean-outs.
  - G. Ties from watermain valves to permanent structures.
  - H. Location of watermain fittings (i.e. bends, tees, etc.).
  - I. Manufacturer, type, size, and class of piping, fittings, valves and boxes, brass, stop boxes.
- II. All changes from the as-bid plans should be indicated on the asbuilt Construction Record Drawings.
- III. The developer needs to supply the City with two complete sets of asbuilt prints.

## ***ISSUANCE OF BUILDING PERMITS***

- Building Permits, in a platted subdivision, will not be issued until the public improvements are completed, including public sanitary sewer, water main, services, private utilities (gas, electric, telephone, and cable television), concrete curb and gutter, aggregate base, bituminous base, and storm water management basins are constructed, street signs installed, and street lights installed.
- Building permits will not be issued until the developer has installed silt fence along the back of curb on all streets and along the back property lines for all lots. Side lot line silt fence is required adjacent to lots that have been finished graded, and have established turf.
- The individual builders shall maintain silt fence throughout home/building construction.
- Street sweeping is to be performed on a weekly basis, at the developer's cost, until 75% of the homes in the subdivision are constructed, or for a period of two years after the placement of the bituminous base course.
- The bituminous wearing course is to be constructed after a minimum of one frost cycle season and 75% of the homes are constructed, or two years after placement of the bituminous base course.