



2019 Engineering Standards and Detail Specifications

Adopted April 16, 2019

City of Scandia

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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.

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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 (non-woven), 4.5oz/sq yd
 - Bit. Wear Course..... 1.5 inch – SPWEA330C Wearing Course
 - Bit Base Course..... 2.5 inches – SPNWEB330C Wearing Course
 - Draintile4" PVC/HDPE Perforated with trench rock and geotextile wrap
 - Commercial Pavement. Thickness & Mix Design..... varies

- Shoulder
 - Material4" 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 – Multi Lane Speed Limits Less Than 40 MPH
 - Single sided080" aluminum 9-inch plates w/1.5" corner radius
 - Lettering 6" for street names and 3" for street suffix and block No.
 - City Logo 6" on left side of plate, 6" arrow on right (if applicable)
 - Reflective sheeting..... Diamond Grade DG3
 - Public Streets Clearview One font, 3/8" margins
..... White lettering on green background
 - Private Streets Clearview One font, 3/8" margins,
..... White lettering on blue background
 - Border White ½" E Series
 - Sign Assembly 2" Cherry Mate Rivets with 1-3/4" PVC spacer
 - Sign Attachment.....3/8" steel Drive rivets with nylon washers
 - Posts12' Pre-Punched 2 inch Telespar, 12 GA with pyramid rain cap
 - Post Sleeve 2 ½ inch Omni, 18 inches long, 12 GA
 - Post Anchor Assembly..... 2 ¼ inch Telespar, 3.5 feet long, 12 GA

- Signing and Striping
 - Street Signs (informational and regulatory).....
 - Reflective sheeting..... Diamond Grade DG3
 - Sign Attachment.....3/8” steel Drive rivets with nylon washers
 - Posts Pre-Punched 2 inch Telespar, 12 GA
 -10’ for stop and other regulatory/information signs
 - ... 12’ for street sign/stop sign combination with pyramid rain cap
 - Post Sleeve2 ½ inch Omni, 18 inches long, 12 GA
 - Post Anchor Assembly..... 2 ¼ inch Telespar, 3.5 feet long, 12 GA
 - Sign Attachment3/8” steel Drive rivets
 - Striping Multi Comp

All Telespar posts to be bolted to post sleeve/post anchor with 5/16” corner bolts and 5/16” nylon lock washers

SIDEWALK/ TRAIL MATERIALS

- Sidewalk Section
 - Base 6 inch Aggregate, Cl. 5
 - Concrete 6 inch – Mix Number 3F52A
 - Width (min).... 6 foot

- Trail Section
 - Base 6 inch Aggregate, Cl. 5
 - Bituminous Wear Course3 inch – SPWEA230B 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
 - TypePrecast, RCP
 - Concrete Rings..... 2 minimum, 8” height maximum
 - Chimney sealInfi-Shield or approved equal
 - Minimum MH depth3.5 feet
 - Sump Depth 4’
 - Type of Casting.....R-1642-B, Stamped “Storm Sewer”

- Catch Basin
 - TypePrecast, 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 4’ 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
 - MaterialPVC
 - Class
Depth to 18 feet.....SDR 35
Depth 18 feet to 26 feet.....SDR 26
Depth > 26 feet.....As required by Engineer
- Manhole
 - TypePrecast, 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 MaterialDR 18 DIPS C-900
 - Concrete Rings 2 minimum, 8” height maximum
 - Chimney sealInfi-Shield or approved equal
- Service Pipe – 4 inch standard
 - MaterialPVC
 - 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*)..... 4” – 12” PVC DR 18 DIPS C-900
 - Fittings DIP, Epoxy Coated, U.S. Manufacture
 - Fitting BoltsCor-*Blue*
 - Restraints Mega-Lug
 - Tracer Wire (For PVC) Min. No. 12 AWG - Copper Clad Steel rated to 30 volts
- Hydrant
 - Type Waterous Pacer WB-67-250
 - Operating Rod Heavy Duty
 - Body boltsStainless Steel
 - Snake Pit Magnetized Tracer Box by Copperhead Industries,
Concrete/Driveway Tracer Box Model, or approved equal if PVC is used
- Valves
 - Type 12” or less.....Resilient Wedge Gate Valve (AWWA C515)
 - Manufacturer.. Waterous, American Flow Control 2500 Series or approved equal
 - Valve Box 4” through 12” – Tyler 6860 Series
 - Gate Valve Box Adaptor Plate ...¹/₄” Steel w/protective coating by Adaptor, Inc. or approved equal.
 - Valve Body BoltsStainless 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
..... HDPE C901, DR11 w/ Tracer Wire
..... 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 wearing course
 - 8 inches aggregate base class 5
 - 12 inches select granular borrow
 - Geotextile Fabric, Type V, non-woven
 - 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 wearing course
 - 10 inches aggregate base class 5
 - 12 inches select granular borrow
 - Geotextile Fabric, Type V, non-woven
 - Subgrade as approved by City Engineer

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

- Boulevard

- Width varies
 - Sidewalk Width.....6 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 unless additional access approved by City.

- 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 streets20 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, current edition and subsequent revisions, and Mn/DOT Standard Specifications for Construction, current edition, Section 2564.

 - Sign sheeting shall meet current Federal regulatory Retroreflectivity requirements.

- Mailbox requirements COORDINATE LOCATIONS WITH THE POSTMASTER
..... Cluster mailboxes to be approved by postmaster.

- Private Utilities Gas, electric, telephone, cable, etc. constructed in joint trench.

Private utility street crossings shall be made inside of 4” – 6” Sch. 40 conduit installed during street construction. Crossing locations to be determined by the private utility and submitted to the City on a map for review and approval.

STORM SEWER DESIGN REQUIREMENTS

All storm sewer shall be designed, at a minimum, using the Rational Method for storm sewer design and MnDOT Regional Atlas 14 Intensity-Duration-Frequency (IDF) curves for Washington County. Alternatively, storm sewer can be designed using the SCS Curve Number Method, Atlas 14 rainfall depth and MSE 3 nested distribution. All stormwater best management practices shall be designed using the SCS Curve Number Method, Atlas 14 rainfall depth and MSE 3 nested distribution to ensure that Post development peak flow rates will not exceed existing peak flow rates for the 2-year (2.8 inches in 24 hours), 10-year (4.1 inches in 24 hours), and 100-year (6.9 inches in 24 hours) storm events.

- 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
 - Sumps4’ in last CB or MH prior to outlet
- Design
 - Rainfall frequency or storm sewer design..... 10 yr.
 - Minimum storm sewer design velocity 3 fps
 - Maximum storm sewer discharge velocity5.5 fps
 - Design frequency for stormwater best management practices..... 100 yr.
 - Design 100-year flood level below adjacent basement floor elevations2.0 feet
 - Emergency overflow swale below building openings 1.0 foot
 - Maximum basin side slope.....3:1
 - Minimum detention basin depth4.0 feet
 - Maximum detention basin depth..... 10.0 feet
 - Minimum swale grade..... 2.0%

SANITARY SEWER DESIGN REQUIREMENTS

- Manhole
 - Maximum Manhole Spacing400 feet
 - Maximum inlet/outlet elevation difference2 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 Ends600 feet
 - Air Release measuresHydrant
 - Minimum Cover 8 feet
 - Side of StreetNorth and East side of centerline preferred

- Hydrant
 - Depth 8'-6" Bury (8 feet cover)
 - Spacing250'R to cover Building Pad
 - Gate valve on 6" Hydrant leads Yes
 - Supply two (2) Spring Mounted snow flags per hydrant. One to be installed on new hydrant and one to be delivered to the City.

- Valves
 - Maximum distance between Valves on Trunk Mains600 feet
 - Maximum No. house services between Valves on Lateral Mains20

- Residential Service Pipe
 - No splices in services are allowed

- Irrigation Service Pipe
 - Minimum diameter4"

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. Any style of street lighting that is installed shall use LEDs for illumination. 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.

As-Built/Record Drawings:

After construction is completed, two printed sets of as-built 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 format in accordance with the Plan Requirements. The record drawings shall indicate all changes from the as-bid plans. The contractor and construction year shall also be noted on the record plan drawings. The following are specific requirements for each element constructed with the project.

Sanitary Sewer:

As-built elevations of the rim and invert of each structure must be surveyed. The elevations shall be recorded and revised to the nearest 0.01'. If pipe elevations change more than 1 foot, the changed portion of the profile should be redrawn. The percentage of grade between manholes should be changed accordingly and recorded to the nearest 0.01%. Distance between manholes should be changed on both the plan and profile. The distance shall be measured from center of casting to the nearest 1'. Length of service risers shall be revised to the nearest 1'.

Water Main:

Any change in elevation of more than 1-foot should be noted on the profile. Any change in location of a main, hydrant, valve, etc. should be corrected on the plan as well as any additions. Each gate valve must have two or more ties recorded on the record plan recorded to the nearest 0.1'. The location of water main fittings shall be noted on the record plans. All top of hydrant elevations shall be recorded to the nearest 0.01'. The manufacturer, type, size, and class of piping, fittings, valves and boxes, brass, stop boxes shall be noted on the record drawings.

Services:

Service wye locations accurate to the nearest foot. The end of the service must be located with two or more ties. If a water service is installed in the same trench with the sanitary sewer the ties should be to the curb box. Service ties shall be recorded to the nearest 0.1'. Ties to drain tile service stub and clean-outs, recorded to the nearest 0.1'. Service invert elevations at R/W line, recorded to the nearest 0.1'.

Storm Sewer:

As-built elevations of the rim and invert of each structure must be surveyed, which includes storm sewer manhole and catch basin casting/inlet tops and inverts, flared end section inverts, and any other structure elevations shown on the as-bid plan. The elevations shall be recorded and revised to the nearest 0.01'. If pipe elevations change more than 1 foot, the changed portion of the profile should be redrawn. The percentage of grade between structures shall be changed accordingly and recorded to the nearest 0.01%. Any change in distance between structures or changes in bends or aprons must be changed on the plan sheet and profile. The distance shall be measured from center of casting/end section to the nearest 1'.

Streets:

Drawings should reflect any changes made. Any subgrade corrections that were made in addition to what is noted in the construction documents shall be noted.

Special Structures:

Record plans on special structures such as lift stations, pump houses, treatment plans, etc. should include as-built elevations of critical piping, slabs, etc. as well as any changes which may have occurred during construction.

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 three years after placement of the bituminous base course.