

Forest Lake

AS GOOD AS IT SOUNDS

2026 PUBLIC WORKS / ENGINEERING STANDARDS

CITY OF FOREST LAKE, MINNESOTA

Date: March 2026

Adopted by the Forest Lake City Council on March 9, 2026

It is the intent that these Engineering Standards supersede any prior standards adopted by the City of Forest Lake.

**CITY OF FOREST LAKE, MINNESOTA
2026 PUBLIC WORKS / ENGINEERING STANDARDS**

The purpose of these Public Works / Engineering Standards is to provide consistency in the level of detail required for the submittal of plans for preliminary plat approval, plan preparation guidelines for public improvements, and to provide the applicant detailed product materials. Construction requirements are now contained in the Forest Lake Standard Specifications for Utility and Street Construction manual.

The City Council reviews and adopts these standards on an annual basis, and the City of Forest Lake reserves the right to amend the requirements herein, as it may apply to various site conditions.

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Project Acceptance Form

Project Acceptance Form

Project Name: _____

CITY OF FOREST LAKE

Project No. _____

Recommendation for Acceptance

This project included sanitary sewer, water main, storm sewer and street improvements. The improvements were installed as a public improvement project based on plans and specifications prepared by the City's Engineer. The majority of the work was completed in 20(xx)

This project was constructed in general conformance with standard policy and procedures of the City of Forest Lake. The work is complete and in general conformance with the plans and specifications. Therefore, this project is recommended for formal acceptance by the City Council for perpetual maintenance.

City Engineer **Date:** _____

Public Works Director **Date:** _____

Finance Director **Date:** _____

Community Development Director **Date:** _____

City Council Acceptance Date: _____

Engineering Design Standards

General Requirements

As set forth in various sections of the City ordinances, Developers of property within the City of Forest Lake are required to submit certain plans and specifications for review and approval by the City. These include, but are not limited to items such as grading plans, drainage plans, topographic surveys, plats, preliminary utility and street plans and specifications. Competent licensed professionals shall prepare these plans and specifications.

The professional services required of the Developer might include an architect, land surveyor, planner, wetland specialist and engineer. "Project Engineer" in this document refers to a Professional Engineer registered in the State of Minnesota hired by the Developer.

Whenever public improvements or other conditions of approval are required with an approved development, a contract (Development Agreement) is required between the Developer/property owner and the City. This contract guarantees the City that all requirements will be satisfactorily completed by the Developer.

The City Engineer shall design and prepare final utility and street plans and specifications for all public infrastructure if directed by the City.

Developer Installed Public Improvements

- a. The City's comprehensive plans for sanitary sewer, water, storm drainage and thoroughfare plans shall be adhered to in design considerations.
- b. All plans are to be prepared by a Registered Professional Engineer and shall be in accordance with City standards as outlined herein.
- c. The Developer shall provide proper notification of improvements to the responsible governmental agencies, watershed districts, etc. affected by said construction. Watershed and NPDES permits shall be obtained by the Developer and copies provided to the City prior to commencing any work. All special requirements of the responsible agencies shall be complied with.
- d. The Developer shall submit to the City for review and approval: copies of all design calculations/modelling, a preliminary plat, a preliminary utility plan, and a preliminary grading, drainage and erosion/sediment control plan, each incorporating all comments provided by the City during the preliminary plat review process.
- e. After the design calculations, preliminary plat, utility, and grading plans are approved, the Developer shall submit electronic copies to the City in AutoCAD's DWG file format and PDF format. This information will be used as a base for developing final plans and specifications for the public utility and street improvements for the site.

- f. The Developer is responsible for preparation of the final grading, drainage, and erosion/sediment control plans for the grading portion of the project. Any changes from the preliminary grading plans shall be coordinated with the City Engineer for incorporation into the final utility and street plans.
- g. The contractor shall submit a list of suppliers as well as all certification tests of materials that will be used on the project to the City at the "Pre-construction" meeting.
- h. No work is to begin until all erosion and sediment control methods are in place and approved by the City. All project operations must comply with the City's Erosion Control Ordinance and all applicable permits.
- i. The Developer is responsible for providing surveying, inspections, and testing for all grading related work. Copies of test reports shall be submitted to the City for review.
- j. After site grading is completed, the Developer shall conduct a site survey to certify as-built elevations prior to commencement of the utility and street improvements. This information shall be used by the Developer to create as-built/record drawings of the grading plans.
- k. The City will provide inspections of public improvement work and shall be notified 24 hours in advance of all scheduled tests so its representatives can be present at the time tests are performed. The required tests will cover the sanitary sewer, water main, storm sewer, street subgrade, aggregate base materials, bituminous base course, bituminous wear course, concrete sidewalk, bituminous trail, and curb and gutter. The Engineer that produced the final construction plans will be responsible for the construction surveying/staking and to conduct the as-built survey and produce the as-built/record drawings of the public improvement plans.
- l. Upon completion of all the utility and street work required on both the public and private portions of the project, the City will make the required final inspections of all work. This includes a final inspection of all site grading and approval by the City before any building permits will be issued. All sanitary sewer and water main testing shall be completed, and copies of service ties submitted to the City prior to the issuance of any service connection permits.
- m. Before the final payment is made to the contractor by the Developer, the City shall be satisfied that all work is satisfactorily completed in accordance with the approved plans and specifications, and the Project Engineer has submitted a written statement attesting to same.
- n. Acceptance of said work shall be made by the City and the project acceptance form signed by all parties.

Private Improvements

If private drives or utilities are included in a development the following procedures are required.

- a. The design cross section of private drives shall be in accordance with the public street design requirements or approved by the City.
- b. Whenever practical, public sewer and water lines shall not be placed under private drives. A twenty (20) foot utility and drainage easement will be required for any public utilities that are not constructed within the public street right-of-way.
- c. Private utility installation requires a permit from the City and will be required to meet all applicable City Standards as determined by the City and/or Building Official.
- d. The entrance to each private drive must include design features that clearly differentiate it from a public street such as concrete apron.
- e. Private small utilities shall be installed per standard details STR-6 of the City Standard Details. Junction boxes shall not be installed on property lines that have public utilities installed under them.

Product/Material Requirements

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

Sanitary Sewer Materials

- Main Pipe
 - MaterialPVC
 - Class
 - Depth to 18 feet..... SDR 35 W/HWS-SDR-26 Wyes
 - Depth 18 feet to 26 feet SDR 26 W/HWS-SDR-26 Wyes
 - Depth > 26 feet C-900 or as directed by engineer W/ DI Wyes
- Manhole
 - Type 48" Dia. Precast Concrete conforming to ASTM C478
 - Install rubber gasket joint forming watertight seal conforming to ASTM C443
 - Manhole pipe connectors shall be water tight and conform to ASTM C923
 - Wrap each MH barrel joint with 12" rubber wrap or ¾" thick butyl rope in barrel joint
 - Type of CastingR-1642-B Stamped "Sanitary Sewer"
With two concealed pick holes and self-sealing lids
 - Outside drop Material - Ceramic lined DIP or C-900 PVC DR 18 with epoxy coated drop tee
 - Interior of drop manholes lined with Zebron polyurethan coating, SpectraShield polyurea coating or approved equal
 - HDPE adjustment rings2 minimum, 12" height maximum
Wrap exterior of rings with geotextile fabric, glue all rings
- Service Pipe
 - Residential
 - Size 4 inch
 - Material.....PVC
 - ClassSchedule 40
 - Commercial
 - Size 6 inch minimum connected to new or existing manhole
.....or connect to the existing main with a Romac CB sewer saddle
 - Material.....PVC
 - ClassSDR 26, 150 psi pressure rating ASTM 2241
 - Risers. same requirements as service pipe
- Cleanout
 - Material PVC
 - ClassSDR 26 or schedule 40, 150 psi pressure rating ASTM 2241

Water Main Materials

- Main Pipe
 - MaterialPVC C-900 (4" to 12"), DR-18
PVC C-905 (14" to 48"), DR-25
 - Directional Drill Fusible C900 (4" to 12"), DR-18
 Fusible C905 (14" to 36"), DR-25
 - Fittings DIP, Epoxy Coated, U.S. Manufacture
 - Fitting Bolts..... Cor-Blue
 - Restrains Fusion Bonded Mega-Lug
 - Tracer wire for open trench applications: Copperhead 1230 or approved equal
 - Tracer wire for directional boring applications: Copperhead 1245 HES or approved Equal
 - Tracer wire for pipe bursting applications: Copperhead SoloShot Extreme or approved equal

- Hydrant
 - Type Waterous Pacer WB-67-250 Red
 - Bury..... 8'6"
 - Operating Rod.....Heavy Duty
 - Body bolts Stainless Steel
 - Tracer Wire Access Box..... Magnetized Tracer Box
 Snake Pit Magnetized Tracer Box by Copperhead Industries,
 Concrete/Driveway Tracer Box Model (CD14*2T-SW), or approved equal

- Valves
 - Type 12" or less Resilient Wedge Gate Valve (AWWA C515)
 14" or greater Butterfly Valve (AWWA C504)
 - Manufacturer. Waterous, American Flow Control 2500 Series or approved equal
 - Valve Box4" through 12" – Ductile Iron Star VBGHD-DI or approved equal
 - Bottom Bell section 4" through 12" Power Seal Ductile Iron Box
 - Gate Valve Box Adaptor Plate ¼" Steel w/protective coating
 by Adaptor, Inc. or approved equal
 - Valve Body Bolts Stainless Steel
 - Extension Rod (single piece steel) Top Nut – 12"-18" below finished surface

- Residential Service Pipe
 - Service Size 1" Diameter
 - Service Material..... HDPE pipe (IPS SIDR -7 250 PSI)
 - Service SaddlesSmith-Blair 372 or approved equal
Fused saddles for HDPE water main
 - Type of Corporation Stop Mueller ball valve B-25009N, E-25009N or
 A.Y. McDonald 74701B-3Q for HDPE
 - Pipe liner..... Mueller 505142 or A.Y. McDonald 6136
 - Type of Curb Stop Mueller ball curb valve B-25142N, E-25142N
or A.Y> McDonald 76104-3Q, 76104-33 for HDPE or approved equal
 - Type of Curb Box.....A.Y. McDonald 5614ATW or approved equal

- Pigtail Length 10 feet with plugged end for testing
- Tracer wire.....Copperhead 1230 copper clad steel – 30V rating, insulated, blue
- Casting for curb box in paved area Neenah R-1914-A or approved equal

- Commercial Service Pipe

- Service Size 6” Diameter
- Service Material..... PVC C-900
- Valve..... Resilient Wedge Gate Valve (AWWA C515) Waterous or American Flow Control 2500 series
- Valve Box4” through 12” – Ductile Iron Star VBGHD-DI or approved equal
- Bottom Bell section 4” through 12” Power Seal Ductile Iron Box
- Gate Valve Box Adaptor Plate ¼” Steel w/protective coating by Adaptor, Inc. or approved equal
- Valve Body Bolts Stainless Steel
- Extension Rod (single piece steel) Top Nut – 12”-18” below finished surface
- Tracer wire..... Copperhead 1230 CCS – 30V rating, insulated, blue
- Wet Tap.....Stainless steel saddle with Waterous or American Flow Control 2500 series valve.

- Irrigation Service Pipe

- Service size.....4” Diameter extending to the property line
- Service Material.....PVC C-900 DR 18
- Standard City Gate Valve at lateral main tee connection

Storm Sewer Materials

- Main Pipe

- Material RCP Only
- Depth and Class Varies
- Culvert Material..... CMP (rural driveway only) /RCP (street crossing)
- Rear Yard Drain TilePVC

- Manhole

- TypePrecast Concrete conforming to ASTM C478/C443
- HDPE Adjustment Rings.....2 minimum, 12” height maximum
..... Wrap exterior of rings with geotextile fabric, glue all rings
- Minimum MH depth4 feet
- Sump Depth 3 feet in last MH/CBMH in street upstream of pond
- Type of Casting R-1642-B, Stamped “Storm Sewer”
- Interior of drop structures lined with Zebron, SpectraShield or approved equal.

- Catch Basin
 - Type Precast Concrete conforming to ASTM C478
 - HDPE Adjustment Rings 2 minimum, 12” height maximum
..... Wrap exterior of rings with geotextile fabric, glue all rings
 - Minimum CB Depth to Invert..... 3.5 feet
 - Sump Depth 3’ in last CB in street upstream of pond
 - Max Depth of 2 x 3 4.5’
 - Type of Casting – Curb Inlet..... Neenah R-3067-V
 - Type of Casting – off-street drop inlet.....
..... Neenah R-4342 with concrete stool grate frame
 - Interior of mainline drop structures lined with Zebron, SpectraShield or approved equal.

Street Materials

- Street Section (Residential)
 - Geotextile Fabric..... MnDOT Type 5, Non-Woven
 - Subbase..... 20” Select Granular – Modified
..... 40% max on 40 sieve, max 5% on the 200 sieve
 - Base 10” Aggregate Base, Cl. 5
..... Maximum 75% concrete and 4% bituminous
 - Bit. Wear Course 4 inches – 1.5” SPWEA330C Wearing Course Mixture (Final Lift)
2.5” SPWEB330C Wearing Course Mixture (Initial Lift)
 - Drain tile 4” HDPE perforated with filter sock

- Street Section (Commercial)
 - Geotextile Fabric..... MnDOT Type 5, Non-Woven
 - Subbase..... 20” Select Granular – Modified
..... 40% max on the 40 sieve, max 5% on the 200 sieve
 - Base 10” Aggregate, Cl. 5
..... Maximum 75% concrete and 4% bituminous
 - Bit. Wear Course..... SPWEA330C Wearing Course Mixture (Final Lift)
 - Bit Base Course SPNWB330C Wearing Course Mixture (Initial Lift)
 - Drain tile 4” HDPE perforated with filter sock
 - Commercial Pavement. Thickness..... varies

- Shoulder
 - Material 4”, CL 2 Trap Rock or Limestone

- Boulevard
 - Sod salt resistant, type lawn
 - Seed Residential Turf (RT) (MnDOT 25-151) for appropriate application
 - Topsoil 4” Minimum Depth
Residential Topsoil Borrow (MnDOT 3877.2B)

- CommercialTopsoil Borrow (MnDOT 3877.2B)
- Rural.....Topsoil Borrow (MnDOT 3877.2B)
- Fertilizer Type 3 slow release (MnDOT 3881.2B.B3)

- Curb

- Mix Design (machine/hand formed)..... MnDOT 3F32/3F52
- Type – Residential Reconstruction Surmountable/B618
- Type – New Residential Developments Surmountable/B618
- Type – Commercial B618

- Street Name Signs

- Multi lane – Speed limits 40mph and greater12” plates
 - Lettering W/Logo 8” upper case, 6” lower case
- Multi lane – Speed limits less than 40 mph and all 2-Lane9” plates
 - Lettering W/Logo.....6” upper case, 4” lower case
- Private Streets White lettering on blue background W/ Logo
- Public Streets White lettering on green background W/Logo
- No Outlet Black lettering on yellow background, all capital letters No Logo
- Reflective sheeting..... Diamond grade DG3

- Street Lighting

-Standard street lights are “Traditionaire” (Connexus Energy) and “Traditional” (Xcel Energy) Luminaires.

-The Developer may upgrade street lights to an “Acorn” (Xcel and Connexus) style.

-The standard street lights in the area known as “Headwaters” (west of Hwy 61 and south of 200th St) shall be the “Domus” (Connexus Energy).

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.

Sidewalk / Trail / Fire Department Access Lane Materials

- Sidewalk Section

- Base 6 inch Aggregate, CL 5 (7 feet min. width)
- Concrete..... 6 inch – MnDOT 3F52
- Width (min).....6 feet

- Detectable Warning Plates..... Neenah R-4984 or approved equal

- Thickness (min)5/16”
- Color..... Unpainted

- Bituminous Trail Section

- Base 6 inch Aggregate, CL 5 (12 feet min. width)
- Bituminous Wear Course..... 3” – SPWEA230B Wearing Course
- Width (min).....10 feet

- Fire Department Access Lane Section
 - Min. 85,000 lb load carrying capacity (Design approval req'd by City Engineer)
 - Subgrade and aggregate base compaction testing required
 - Geotextile Fabric (as required by engineer) Mn/DOT Type V, Non-Woven
 - Subbase.....minimum 12" Select Granular Modified
(or as required by the soils engineer)
 - Base (bituminous section) 10" Aggregate Cl. 5
 (option: gravel shoulder section) 14" Aggregate Cl. 5
 - Bituminous Wear Course (SPWEA330C) (Final Lift)..... 2"
 - Bituminous Wear Course (SPWEB330C) (Initial Lift) 2"
 - Option: Gravel Shoulders (in addition to Base Aggregate)..... 4"

Design Requirements

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

Sanitary Sewer Design Requirements

- Manhole
 - Maximum Manhole Spacing 400 feet
 - Maximum inlet/outlet elevation difference2 feet W/ City Approval
 - Minimum depth of Manhole..... 10 feet without adjacent water main
Or 12 feet with adjacent water main.
 - Outside drop 42" Minimum
 - Manholes in C-D-S10' from center of manhole to lip of curb
- Service
 - Extend from mainline pipe to 10 feet past property line
 - Entire line including 10' tail shall be pressure tested
- Cleanout (BY PLUMBER)
 - 8' bury at property line
 - Maximum length between cleanouts 75 feet

Water Main Design Requirements

- Main Pipe
 - Minimum diameter 8"
 - Maximum Length of Dead Ends 600 feet
 - Air Release measuresHydrant
 - Minimum Cover..... 8 feet to top of pipe
 - Side of Street..... North and East side of centerline preferred
- Hydrant
 - Depth8'-6" Bury (8 feet cover)
 - Spacing 250'R to cover Building Pad
 - Gate valve on 6" Hydrant leads (distance from center of hydrant)..... 3 feet
 - Install one (1) 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
 - Entire line including 10' tail shall be pressure tested
- Irrigation Service Pipe

-Minimum diameter 4"

Storm Sewer Design Requirements

•Main Pipe

- Minimum pipe diameter 12"
- Aprons on all inlets and outlets without an outlet structure
- Trash GuardHD Trash guards on 24" and greater aprons

•Cross Culverts

- Minimum culvert size 15"
- Minimum culvert length 24 feet
- Aprons Required on each end

•Driveway Culverts

- Minimum culvert size 15"
- Aprons Required on each end

•Manhole

- Must meet storm design criteria for specific project

•Catch Basin

- Minimum pipe cover 2 feet
- SpacingTypically max 300 ft, site specific depending on spread calculations
- Spreadper MnDOT SALT Maximum Allowable Spread Table
- Sumps3' in last CB in street upstream of pond

•Rear Yard Storm Sewer

- Minimum size structure48" Dia.
- Last structure in the run may be a 27" dia. if approved by Public Works
- Spacingdependent on proposed grading
- All inlet structures require a concrete stool grate frame and 4342 casting

•Design

- Design frequency of storms10 yr.
- Minimum storm sewer design velocity 3 fps
- Design frequency for detention basins 100 yr.
- Low Opening elevation 2.0 feet higher than 100yr. HWL
- Emergency overflow swale below building openings 1.0 foot
- Maximum basin side slope3:1
- Minimum detention basin depth 4.0 feet
- Maximum detention basin depth 10.0 feet
- Side yard swale grades Minimum 2.5% design grade with a 0.5% construction tolerance.
- Rear yard swale grades Minimum 3.0% design grade with a 0.5% construction tolerance.

Design grades of rear yard swales of less than 3.0% will require rear yard storm sewer and/or drain tile per City requirements.

The City’s design standard for storm sewer pipe sizing is the 10-year return interval with Atlas 14 rainfall depths. This can be sized using the Rational Method or other hydrodynamic method. All hydrodynamic modeling (SCS Methodology) shall use MSE 3 nested distribution. The pipe can operate under pressure as long as the structures do not surcharge.

Street Design Requirements

•Street Width and Rights-of-way

Major Thoroughfares and Major Streets – Rights-of-way as indicated on Street Comprehensive Plan, Capital Improvement Plan, and Municipal State Aid Needs Report.

Street Width shall be as indicated on the Street Comprehensive Plan, Capital Improvement Plan, and Municipal State Aid Needs Report.

Collector Streets – 150 foot Rights-of-way

- Width face to face 44’ (two 12’ through lanes with 10’ shoulders)
- Width can increase to accommodate four through lanes upon traffic analysis.

Residential Public (Minor) Streets – 60 foot Rights-of-way

Width

- face to face 32’ (Residential)
- face to face 30’ (on approved cul-de-sacs)
- face to face varies (Commercial)

Streets with Medians – Minimum 80 foot Rights-of-way

- 10 foot maximum median width
- 20 foot minimum lane width

Cul-de-sac

- Radius60 foot rights-of-way
- face to face 50’ (Residential)
- face to face varies (Commercial)

Private Streets

-Width

- face to face32’with parking on both sides (Residential)
- face to face28’with parking on one side (Residential)

Private Drives - Shared

- face to face 22’ with no parking (Residential)
- Maximum Length 225 feet

- Street Section (Residential)

The Standard Street Section shall meet the requirements of City Detail STR-22A for urban streets
Drain tile is required behind curb, for a minimum of 50' each way from Catch Basins at low points and 50' upstream of catch basins not at low points

- Street Section (Rural)

The Standard Street Section shall meet the requirements of City Detail STR-22 for rural streets

- Street Section (Commercial)

The Standard Street Sections will vary

- Boulevard

- Width varies
- Sidewalk Width 6 feet
- Bituminous Trail Width 10 feet

- Street Lighting

- Spacing Typically 200 – 400 feet on lot lines depending on the style of light, curvature of road, and as approved by engineer.
- Placed at all intersections, end of cul-de-sacs, and trail crossings
- Placed on sidewalk/trail side of the street

- Entrances (Single family residential)

- Driveway – Width.....Minimum – 12 feet
..... Maximum – 30 feet
Cul-de-sac driveway widths to be reviewed by City Staff for approval
All driveways are to meet minimum side yard setbacks - 5 feet
- Driveway location
 - 30 feet from the curb of an intersecting street on Minor Streets to the closest edge of the driveway
 - 100 feet from the curb of intersecting street on Collector Streets
- One access per Residential Property
- Maximum driveway slope 8.0%
- Secondary Access (if approved by City)
 - A secondary access may be allowed, as determined by the City, for the purpose of accessing a detached accessory structure used for storing a vehicle, camper, boat, or similar.
 - Secondary access at the public right-of-way is restricted to a width of 12 feet (minimum and maximum width).
 - A concrete driveway apron per Engineering Standards is required at all secondary access points.

- Secondary access must be setback a minimum of 5 feet from side or rear property line.
- Secondary access must be located at least 50 feet from the curb of an intersecting street.
- The City reserves the right to restrict a secondary access because of safety issues.
- Each secondary access request will be reviewed on an individual basis and Engineering and City Staff will grant final approval.

- Commercial Entrances

- Driveway width 32 feet
- Driveway widths greater than 32 feet requires engineering approval
- Driveway location requires engineering approval
- Maximum driveway slope 8%

- Fire Department Access Lane (Buildings up to 24' high)

- Width..... 20 feet
.....(option: 10' bituminous with 5' gravel shoulders)
- Minimum inner radius..... 30 feet
- Minimum outer radius 50 feet
- Crown...maximum 2.0%
- Minimum percent of grade0.5%
- Maximum percent of grade5.0%
- Distance from building to centerline of Access Lane
 - Minimum 25 feet
 - Maximum 150 feet
- Unobstructed Vertical Clearance13'-6"
- Maximum length dead end Access Lane..... 150 feet
(City approved turn around required if length exceeds 150 feet)
- The alignment of the Access Lane must be approved by the City and may be modified to match the circumstances and capabilities of the fire department.
- Signage (Fire Dept. approval required)...within 20' of every entrance

- Fire Department Access Lane (Buildings over 24' high)

- Width 20 feet
..... Option: 10' bituminous with 5' gravel shoulders)
- Minimum inner radius..... 30 feet
- Minimum outer radius 50 feet
- Crown...maximum 2.0%
- Minimum percent of grade0.5%
- Maximum percent of grade5.0%
- Distance from building to centerline of Access Lane
 - Minimum 25 feet
 - Maximum 65 feet
- Unobstructed Vertical Clearance13'-6"
- Maximum length dead end Access Lane..... 150 feet
.....(City approved turn around required if length exceeds 150 feet)

- The alignment of the Access Lane must be approved by the City and may be modified to match the circumstances and capabilities of the fire department.
- At least one Access Lane must be positioned parallel to the building along the entire length of the building.
- Overhead power and utility lines are not allowed within the Access Lane.
- Signage (Fire Dept. approval required).....within 20' of every entrance

- Street Miscellaneous

- Crown 2.5% Urban sections and 3.0% on Rural sections
- Minimum percent of grade0.5%
- Maximum approach grade at intersection for 50' distance2.0%
- Maximum percent of grade6.0%
- Diameter of Cul-de-sac (no islands allowed) 100 feet
- Minimum % of grade around Cul-de-sac Curb Flow line0.5%
- 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 line70' dia. on Adjacent Property in PE
Unless the are no driveways on the stub street.

- Horizontal Street Alignment

When a horizontal street centerline deflection at any one point is 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 250 feet, centerline of street to centerline of street for minor streets. Collector 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 Mn/DOT Standard Specifications for Construction, Current Edition 2020, Section 2564

- Mailbox requirements Cluster Mailboxes, 8 to 16 per location
 - 4" thick concrete slab at each cluster mailbox location
 - Swing away post as per detail GEN-6 for single boxes
 - COORDINATE LOCATIONS AND BOX ACCEPTABILITY WITH THE POSTMASTER

- Private Utilities

All private utilities, including gas, electric, telephone, and cable television are to be constructed in a joint trench in accordance with City Detail STR-6. All street crossings by private utilities shall be made in 4" – 6" PVC conduits installed prior to street construction per City Detail STR-7.

Utility Testing Requirements

Water Mains:

1. Perform hydrostatic pressure, disinfection, and continuity tests.
 2. The Engineer will observe and verify all tests and visually inspect final Work for compliance.
- B. Hydrostatic Pressure Test:
1. Minimum Test Pressure: 150 psi.
 2. Test Duration: 2 hours.
 3. Criteria: No drop in pressure allowed.
 4. Testing Gauge: Liquid filled, 4-1/2 inches diameter, labeled in 1-psi increments, such as Ashcroft Model 1082, or approved equal.
 5. Test all lines, including hydrant leads, water services, and stubs.
 6. Any valved section of water system may be isolated for pressure testing.
 7. Sequence and sectioning of water system for pressure testing shall be proposed by Contractor and approved by the Engineer prior to testing.
 8. Notify the Engineer immediately if it is determined that the existing valve is not holding pressure during the hydrostatic pressure test.
 9. If a faulty valve is suspected, a meeting with the Engineer and Owner will be necessary to attempt pressure testing prior to the Contractor continuing. No claims by the Contractor for extra work related to pressure testing will be processed if this meeting has not occurred.
- C. Disinfection:
1. General Requirement: AWWA C651 – Disinfecting Water Mains (Tablet Method or granular method).
 2. Place hypochlorite tablets in each section of pipe and all appurtenances:
 - a. Attach tablets to top of pipe with a food grade adhesive, such as denture grip.
 - b. The estimated number of tablets required per 20-foot length of pipe based on 3-1/4 grain available chlorine per tablet is as follows:

| | <u>Diameter</u> | <u>No. of Tablets</u> |
|----|-----------------|-----------------------|
| 1) | 4 Inches | 1 |
| 2) | 6 Inches | 2 |
| 3) | 8 Inches | 3 |
| 4) | 10 Inches | 4 |
| 5) | 12 Inches | 5 |

3. Placement of calcium hypochlorite granules during construction. Calcium hypochlorite granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-ft (150-m) intervals. The quantity of granules at each location shall be as shown in Table 1 below.

TABLE 1 WEIGHT OF CALCIUM HYPOCHLORITE GRANULES TO BE PLACED AT THE BEGINNING OF MAIN AND AT EACH 500-FT (150-M) INTERVAL

| Pipe Diameter (<i>d</i>) | | Calcium Hypochlorite Granules | |
|----------------------------|-------------|-------------------------------|------------|
| <i>in.</i> | <i>(mm)</i> | <i>oz</i> | <i>(g)</i> |
| 4 | (100) | 1.7 | (48) |
| 6 | (150) | 3.8 | (108) |
| 8 | (200) | 6.7 | (190) |
| 10 | (250) | 10.5 | (298) |
| 12 | (300) | 15.1 | (428) |

4. Fill main with water at a velocity of less than 1 foot per second with either method.
5. Begin flushing after the chlorinated water has been allowed to disinfect the new pipe for 24 hours.
6. 1 bacteria test location is required for every 1,200 feet of water main installed, with a minimum of 2 sample locations per Project. Locations shall be identified by the Engineer. All dead-end lines will be sampled.
7. Sampling methods:
 - Option A: Before approving a main for release, take an initial set of samples after flushing the main and then resample again after a minimum of 16 hr using the sampling site procedures outlined. Both sets of samples must pass for the main to be approved for release. If a sample fails, the sampling procedure starts over.
 - Option B: Before approving a main for release, and after flushing, let it sit for a minimum of 16 hr without any water use. Then collect, using the sampling site procedures outlined and without flushing the main, the first set of samples and then resample again after a minimum of 16 hr using the sampling site

procedures outlined. Both sets of samples must pass for the main to be approved for release. If a sample fails, the sampling procedure starts over.

8. The Engineer shall be present during sampling. Engineer will assist with operating valves if necessary.
9. The Contractor will be responsible for costs associated with bacteria testing of samples obtained. Contractor is responsible for costs associated with bacteria testing of any failing tests.
10. Water mains needing reflushing or to be rechlorinated, must be done to meet Department of Health and AWWA requirements. Perform re-flushing or re-chlorination within 48 hours of notification of failing tests.

D. Tracer Wire System (PVC):

1. The Contractor shall demonstrate the ability to locate the entire tracer wire system using a typical low frequency (512Hz) handheld locating device. Locating shall be witnessed by the Owner and Engineer.
2. Contractor shall perform initial testing after installation and shall be witnessed by the Engineer.
3. The Owner will perform final acceptance testing at the conclusion of the project.
4. Any areas that are not able to be located shall be replaced at the Contractor's expense.
5. Continuity testing will not be accepted in lieu of actual line tracing.
6. Test all lines, including hydrant leads, water services, and stubs.

Sanitary Sewer

Gravity Pipe Leak Testing:

1. General:
 - a. Test all systems (pipe and structures) for leakage before being put in service. Notify Engineer of the date and time for each test 1 day prior to actual testing.
2. Low Pressure Air Test:
 - a. Diameter: Less than or equal to 24 inches.
 - b. Must meet criteria set forth in ASTM F1417.
 - c. Pipe shall be cleaned but may be wetted. Pneumatic balls shall be used to plug the ends at manholes. Low-pressure air shall be introduced into plugged line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any groundwater pressure that may submerge the pipe. At least 2 minutes shall be allowed for the pressure to stabilize before readings are taken and the timing started. During this time, check all plugs with soap solution to detect plug leakage. If any plugs are found to leak, air shall be bled off, the plugs shall be retightened, and the air shall be reintroduced into the line.
 - d. The sewer line under test will be accepted as having passed the air test if the pressure does not drop more than 0.6 psig in less time than 1/2 minute per inch in diameter of the pipe being tested. The minimum starting pressure is 3.6 psig.

- e. Requirement may be waived for reconstruction projects where reconnection of active sewer services prevents testing with permission from Owner.

Gravity Pipe Deflection Testing:

1. Required for all flexible pipe.
2. Deflection Testing Methods:
 - a. Pipe Diameters Through 24 Inches: Pull mandrel through the pipe by hand (without aid of mechanical pulling devices).
3. Deflection testing shall be done in the presence of the Engineer.
4. 5-percent deflection allowance.
5. Mandrel Diameter Requirements:
 - a. Diameter equal to 95 percent of the base inside diameter noted in Appendix XI of ASTM C3034 for PSM PVC pipe (SDR pipe) and calculated from Appendix X2 of ASTM F679 for PS 46 or 115 pipe.
 - b. Mandrel shall be constructed of rigid steel, be non-adjustable, and have an odd number of legs (9 legs minimum). Its effective length shall not be less than its nominal diameter.
6. Deflection Template/Bar Requirements:
 - a. The circular template diameter (or rigid bar length) shall be equal to the mandrel diameter requirements as determined above.
 - b. Circular templates shall be constructed of rigid materials and be non-adjustable.
 - c. Rigid bars shall have a 1-inch diameter circular section, be constructed of steel, and be non-adjustable.

1.02 REQUIREMENTS FOR TEST FAILURES

A. Leak Test Failure:

1. Repair piping as necessary to conform to product requirements.
2. All repair work shall be subject to approval by the Engineer.
3. Chemical type sealants added to the test water will not be permitted.
4. The Engineer may require removal and replacement of pipe in failed test sections.
5. Pay for the cost of replacement, repair, and re-testing of failed pipe sections.

B. Deflection Test Failure:

1. Owner reserves the right to measure the deflection of all flexible pipe at any time during the correction period. Deflections greater than 5 percent of the inside diameter of the pipe shall be considered failure. Re-excavate the trench, re-compact the backfill material, and restore the surface with no additional compensation for such work. Re-rounding of pipes that fail the deflection test will may be allowed.
2. Damaged pipe shall not be reinstalled, but shall be removed from the Site.

1.1

SANITARY SEWER CLEANING

A. Cleaning Equipment

1. High-Velocity Jet (Hydro cleaning) Equipment.
 - (a) All high-velocity sewer cleaning equipment will be constructed for ease and safety of operation.
 - (b) The equipment will have a selection of 2 or more high-velocity nozzles.
 - (c) The nozzles will be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned.
 - (d) Equipment will include a high-velocity gun for washing and scouring manhole walls and floor.
 - (e) The gun will be capable of producing flows from a fine spray to a solid stream.
 - (f) The equipment will carry its own water tank, auxiliary engines, pumps and hydraulically driven hose reel.

B. Cleaning Precautions

1. During sewer cleaning operations, satisfactory precautions will be taken in the use of cleaning equipment.
2. No fire hydrants will be obstructed in case of a fire in the area served by the hydrant.

C. Sewer Cleaning

1. The cleaning of the sewer lines will begin upstream and work downstream.
2. The sewer manhole sections will be cleaned using hydraulically propelled, high-velocity jet or mechanically powered equipment. Selection of the equipment will be based on the conditions of lines at the time the work commences.
3. The equipment will be capable of removing dirt, grease, rocks, sand and other materials and obstructions from the sewer lines and manholes.
4. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment will be set up on the other manhole and cleaning will be attempted again.
5. If successful cleaning from both manholes cannot be completed, Contractor will contact the Engineer.

D. Material Removal

1. All sludge, dirt, sand, rocks, grease and other solids or semisolid material resulting from cleaning operations will be removed at the downstream manhole of the section being cleaned.
2. Passing material from manhole section to manhole section, which could cause line stoppages, accumulation of sand in wet wells, or damage to pumping equipment, will not be permitted.

E. Disposal of Material

1. All solids or semisolids resulting from the cleaning operations will be removed from the site and disposed of at a site secured by Contractor.
2. All materials will be removed from the site no less often than at the end of each workday. Under no circumstances will Contractor be allowed to accumulate debris on the site of work.

F. Final Acceptance

1. Acceptance of sewer line cleaning will be made up on successful completion of the television inspection and will be to the satisfaction of the Owner.
2. If television inspection shows the cleaning to be unsatisfactory, Contractor will be required to re-clean and re-televise the sewer line until cleaning is shown to be satisfactory.

1.2 EXAMINATION

- A. Commence televising only when pipe and structures are clean and free of dirt or other foreign matter.

1.3 **SANITARY AND STORM SEWER TELEVISIONING**

A. General

1. Televising will be performed on all gravity/pressure utility lines that are shown in the plans and specifications.
2. Camera – The camera will be a self-propelled unit providing color video with the ability to tilt up and down and pan left to right. The camera lens will be capable of turning and looking up each wye or service tap to a minimum distance of the first fitting of the service pipe. The camera is to provide color video and still photographs of any defect.
3. Rate – The televising will be conducted at a rate not to exceed 30.0-feet per minute.

B. Line Requirements

1. All lines will be jetted and vacuumed so that all debris has been removed prior to televising.
2. A small quantity of water is to be introduced into the line prior to televising. Amount will be determined by the Engineer and coordinated with the Owner's Water and Sewer Department. The amount of water will be sufficient enough to distinguish any sags or alignment problems with the pipe.
3. Each run will consist of a starting and ending MH-#, pipe material and diameter, direction of flow, and a zero reading on the counter at center of the starting manhole.
4. Each service wye will be examined using the pan and tilt feature.
5. The video camera operator will type into the video the station (distance), wye location on either the top, left, or right side of the pipe and any problems/defects they notice while televising the sewer lines. Examples of defects include offset joints, leaking joints, sags, cracked pipe, dents or manufacturing defects not found during air or mandrel testing, etc. Camera operators failure to note defects does not relieve the contractor responsibility to repair the defect.

C. Manhole Requirements

1. Examine upstream and down doghouses for water tightness.
2. Examine all joints to confirm watertight quality of gaskets and seals.
3. While at the bottom of the manhole, the camera will examine for infiltration as high as it can see around the entire manhole circumference.
4. Examine vertical drops.

- D. Report Requirements
 - 1. A technician will observe the monitor at all times during the televising and record the data per NASSCO standards.
 - 2. Date, time, city, street, name of operator, inspector, and weather conditions.
 - 3. Note locations, length, and depth of any sag in the pipe.
 - 4. Note locations, length, and depth of any areas of dirt or debris in the pipe.
 - 5. Note all defective or substandard areas identified during the inspection.
 - 6. Record distance from center of manhole to center of manhole.
 - 7. Note each change in pipe material, including station.
 - 8. Note each wye or service tap location with station and orientation (Example: wye right, 3 o'clock).
 - 9. Note direction of flow using cardinal/ordinal directions.
 - 10. Include color photos/images of defects in the written report.
- E. Review
 - 1. All television reports and videos will be reviewed after the submittal is received.
- F. Video and Reporting Format
 - 1. All televising videos and reports shall be uploaded to a USB flash drive.
 - 2. Video files shall be viewable without the use of specialty software.
 - 3. Report files shall be in .pdf format, viewable using standard Adobe or Bluebeam software.
 - 4. File Naming
 - (a) The Contractor will be provided with a map or plan showing manhole identification numbers.
 - (b) All files shall be named using the upstream and downstream structure numbers.

All required utility testing on commercial projects shall be completed and accepted prior to water meters being installed.

All required utility testing on housing development projects shall be completed and accepted prior to the plumbers making connections to the sewer and water services.

Fall Street Construction Requirements

1. All concrete placed after October 1 will be high early concrete.
2. Concrete curb will not be allowed to be placed after November 1
3. Concrete curb will not be allowed to be placed on frozen ground
4. Contractor will have an approved cold weather plan in place prior to placing concrete if temperatures fall below freezing at night.
5. Placement of additional aggregate base and vibratory compaction will not be allowed until concrete has reached 3000 psi.
6. The initial lift of bituminous may be placed on frozen aggregate base if tolerancing and density testing has been completed prior to the aggregate base freezing. Developer shall be responsible for any pavement repairs resulting from paving on the frozen grade.
7. The final wear course shall not be placed unless the temps are 45 degrees and rising.

Plan Requirements

The following provides the project plan requirements for development projects in the Forest Lake, Minnesota. The requirements have been established and adopted by the City to provide consistency with today’s engineering and construction practices.

General Plan Requirements:

1. The maximum plan sheet size shall be 22” x 34”.
2. The electronic files must be submitted in both AutoCAD.DWG and PDF format.
3. The electronic AutoCAD 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:
 - a. Proposed features from existing features
 - b. Proposed text labeling from existing text labeling
 - c. Different utilities of the construction project
 - d. Proposed lateral and trunk features from utility services
5. Additional layering from that indicated by the Minimum Layering Requirements may be needed, and can be completed based on specific project needs.
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, NAVD 88.
9. All sheets shall include bar scale(s), north arrows, headings, and sheet numbers, match lines and text, and sheet references.
10. Where practical, north shall be orientated up and to the right or somewhere in between the two on the plan sheet.

| Minimum Layering Requirements | |
|--|--|
| Individual layers shall be used to differentiate between existing, proposed and future, if applicable, for elements noted. | |
| Annotation | <ul style="list-style-type: none"> • General: Scales, North Arrow • General Notes |
| Survey Lines | <ul style="list-style-type: none"> • Rights of Way • Property Lines • Easements • Section lines • Annotation |
| Topographic Survey | <ul style="list-style-type: none"> • Each individual differential element shall have its own layer (i.e. curb back, curb face, curb lip, bituminous edge, gravel edge, top of slope, bottom of slope, existing utilities, etc.) |

| | |
|------------------|--|
| | <ul style="list-style-type: none"> • Line types shall be used to differentiate between linear elements |
| Removals | <ul style="list-style-type: none"> • Hatching, Shading • Removal Pipe (separate into different utilities) • Removal Structures (separate into different utilities) |
| Grading Elements | <ul style="list-style-type: none"> • Contours • Contour Labels • Slope Labels and Spot Elevations • Annotation relating to grading elements |
| Sanitary Sewer | <ul style="list-style-type: none"> • Structures (Manholes and clean outs) • Pipe • Services • Annotation relating to sanitary sewer elements |
| Water Main | <ul style="list-style-type: none"> • Water Main • Hydrants • Valves • Services • Annotation relating to water main elements |
| Storm Sewer | <ul style="list-style-type: none"> • Structures (Catch Basins, Manholes, Outlet Structures, Flared End Sections) • Pipe • Drain tile • Annotation relating to storm sewer elements |
| Streets | <ul style="list-style-type: none"> • Street Centerline • Curb • Surface edges (concrete, bituminous, gravel, etc.) • Annotation relating to street elements |

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

Construction Plans:

Base Drawings: Individual base drawings shall be utilized at a minimum to differentiate between the existing and proposed elements to a project. The base drawing shall be in Washington County coordinates and referenced into the individual construction plan sheets. The base drawings should NOT include annotation relating to the project work and should be put into the individual plan sheets where it is most appropriate.

Title Sheet – Includes a vicinity map, a plan sheet index, and identifies type of improvement.

Legend, Typical Section Plan - Standard symbology, linework, and hatching to be used throughout the plan. Storm sewer schedule and general notes can be located on this plan sheet. Typical Sections shall be drawn to scale.

Location Plan – The location plan shall include all right-of-way lines, property lines, and easements. All existing and proposed sanitary, water, storm lines, and structures. Structure labels shall be included on this sheet. Street names, addresses, lot and block numbers, and adjacent subdivision names (if applicable) shall be labeled.

Demolition Plan – Clearly show all existing sewer, water, storm sewer lines, manholes and valves, curb lines, pavement, sidewalks and pathways. Limits of removals shall be clearly noted. Provide a legend if necessary.

Site Grading, Drainage Plan, Erosion Control Plan - Show and label existing and proposed contours. Label slopes, provide spot elevations, and provide dimensions necessary for construction. Show building pads with building location. Define location of house and garage. Indicate NWL and 100-year HWL, low floor elevations, and emergency overflow elevations. Erosion control plans for grading shall address both temporary and permanent erosion control needs for the project. Where sufficient both can be addressed on one sheet. The plan shall be adequate to represent a Stormwater Pollution Prevention Plan (SWPPP) as required by the NPDES Construction Permit. A legend shall be provided identified the proposed BMP's.

Sanitary Sewer And Water Main Plan - This sheet is required for the construction of sanitary sewer, water main and services. Provide only relevant information to these utilities on these sheets. Plan and profile sheets shall contain both sanitary sewer and water main. All sanitary sewer and water main must be shown on both plan and profile views at 1"=50' horizontal and 1"=10' vertical scales. All storm sewer on the same streets should be shown in shaded line work on the sanitary sewer/water main plan and profiles. The plan view for these sheets should also indicate locations of the existing utilities, public and private.

Sanitary Sewer:

Plan View

Include lot and block numbers, street names, addresses, adjoining development names, structure labels, size of sanitary sewer main (proposed and existing), pipe stationing, wye stationing, sewer service invert elevation, riser lengths, easement dimensions and all construction notes. Direction of flow shall be shown in plan view, typically with the line type. Match points shall reference the proper sheets.

Profile View

Structure labels, manhole sewer station*, rim and pipe invert elevations to the nearest hundredth of a foot, length of pipe between manholes, diameter of pipe, material or class of pipe, slope of pipe labeled in percent of grade, length of riser pipe for any drop manholes and service riser. All pipes that cross the sanitary sewer should be shown. Existing and design profile over the pipe shall be labeled.

Subsurface information pertinent to construction should also be shown, such as top of bedrock and ground water elevations, if known.

* Sewer baseline stationing shall begin at the downstream manhole and be continuous from manhole to manhole following the centerline of the pipe.

Water Main:

Plan View

Lot, block numbers, street names, addresses, easement dimensions and adjoining development names. The water main size shall be labeled (example 6" WM, 12" WM). The water main should be dimensioned if located anywhere but on a lot line or parallel to the sanitary sewer. Each hydrant, valve, fitting, and special structure shall be labeled. The elevation to the top nut of the hydrants should be shown to the nearest tenth of a foot. The depth of cover over the water main should be shown. All match points should be referenced to the proper sheet or location on the same sheet.

Profile View

The water main should be drawn at the appropriate depth, top and bottom of pipe. The size, material and class of pipe should be labeled. Any variations from the standard depth shall be noted. All other pipe crossings should be shown. Existing and design profile over the pipe shall be labeled.

Services:

For single-family residential areas, where the services are to be of a uniform size, a general note stating the size and material should be shown on each sheet. If the service sizes vary, each service must be noted with the proper size and location. The wye station, top of curb box, sewer service invert and top of riser elevation, if applicable, should be noted on the appropriate lot. Both the sanitary and water service lines should be shown on the plan from the main to the end of the service. Show and identify all irrigation services.

Storm Sewer Plan -Only information related to this utility is shown on these sheets. Sanitary sewer, water main and streets shall be shown as background in these sheets. Storm sewer pipes and structures are drawn in a base drawing. Sheets should reference in the base drawing and any other necessary sheets. The sheets should have annotation in them to include the following:

Plan View:

Lot and block numbers, street names, addresses, adjoining development names, structure numbers, bends, aprons, rip rap, easement dimensions, and construction notes. Show and identify all storm sewer services. Show drainage arrows at all intersections. All match points should be referenced to the proper sheet or location on the same sheet.

Profile View:

Structure numbers, structure sewer station*, rim, pipe and sump invert elevations to the nearest hundredth of a foot, length of pipe between manholes or bends, diameter of pipe, material or class of pipe, slope of pipe labeled in percent of grade. All critical pipes that cross the storm sewer should be shown. Profiles need to be shown for all pipes, including catch basin leads. Sheets containing profiles only should be avoided. Plan/Profile sheets are preferred for ease of use. Subsurface information pertinent to construction should also be shown, such as top of bedrock and ground water elevations, if known.

*Sewer baseline stationing shall begin at the downstream structure and be continuous from structure to structure following the centerline of the pipe.

Street Plans -Only information related to curb and gutter and street design is shown on these sheets. Sanitary manholes, water main valves, hydrants and storm sewer structures shall be shown on these sheets, but not the pipes. If private utility conduits are to be installed they will be shown on these sheets.

Curb lines, sidewalks, trails and all other line work should be drawn in the base drawing. Sheets should reference in the base drawing or any other necessary sheets. The street sheets should have annotation in them, to include the following:

Plan View:

Lot and block numbers, street names, addresses, and adjoining development names. All match points should be referenced to the proper sheet or location on the same sheet. The centerline of each street should be stationing with a tick mark at every 50-foot station and stations labeled every 100 feet using a text height of 0.08". Show the type of curb and gutter. Streets with curb and gutter should be labeled face-to-face (F-F). Sidewalks and or trails should be labeled indicating width and type. Radiuses at intersections need to be labeled. Top of curb elevations, along with the street stations, shall be shown at each begin and end radius at street intersections and around cul-de-sacs at 30° intervals. Show drainage arrows at all intersections. Include construction notes. Separate sheets for the cul-de-sac and intersections are necessary to include more detailed information.

Profile View:

The centerline stationing and elevation of each intersecting street should be shown on the profile. Finished centerline should be labeled every 50-foot station at a minimum. Existing centerline grades should be shown when the grading is part of the contract. Vertical curve information to include at a minimum the PVI station and elevation, high and low point station and elevation, and length of curve. Tangents should be labeled in percent of grade to the nearest one-hundredth of a percent.

Cul-De-Sac Street Improvements:

Include additional sheets for cul-de-sac streets. Label centerline, right-of-way, lot lines, easements, street stationing at beginning, end, PC, PT and even 100' elevations. Label the size of radii, street and pathway width and type, lot and block numbers, intersecting streets. Show all of the utility structures, but not the pipes.

Intersection Street Improvements:

Create intersection details for all intersections. Label all begin and end radius points, mid radius if high or low point, show arrow indicating flow direction. Please note spot elevations should be edge of pavement/lip of curb.

Cross Sections:

Show right-of-way, centerline and any easement lines on each section. Show finished and existing ground lines, including finished and existing centerline grade. Sections are typically plotted at 50-foot stations and any critical station. Grading slopes (3:1, 4:1, etc.) and dimensions should be labeled on each section when they vary from the typical section. Cumulative average end area excavation and embankment volumes should be shown. Use a 1"=10' horizontal and 1"=5' vertical scale when plotting cross sections (This will present them at a 1"=20' H and 1"=10' V at half scale). When earthwork quantities are shown, specify if a shrinkage factor was used and if so, identify it.

Street Light Plan – Show locations per the requirements of the street light section under the *Street Design Requirements* of this publication.

Building Permit Requirements

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, concrete curb and gutter, aggregate base, bituminous base, and storm water management basins are constructed, and street signs 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.

The bituminous wearing course is to be constructed after a minimum of one frost cycle season and a minimum of 70 percent of homes are completed, and/or as determined by the development agreement.

Standard Detail Plates

CITY OF FOREST LAKE STANDARD DETAILS INDEX

City Plate No.

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| SAN-2 | SANITARY SEWER JUNCTION MANHOLE |
| SAN-3 | SANITARY SEWER DROP INLET MANHOLE |
| SAN-4 | AIR RELEASE MANHOLE |
| SAN-5 | SUMP PUMP DISCHARGE |
| SAN-6 | GREASE INTERCEPTOR |

WATER MAIN DETAILS

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| WAT-4 | GATE VALVE AND BOX |
| WAT-6 | CONCRETE THRUST BLOCKING |
| WAT-8 | HYDRANT |
| WAT-9 | INSULATION |
| WAT-10 | WATERMAIN OFFSET |
| WAT-11 | MULTIPLE UNITS USING MAIN WATER METER |
| WAT-12 | MUTIPLE UNITS USING INDIVIDUAL WATER METERS |

STORM SEWER DETAILS

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| STO-4 | STORM SEWER JUNCTION MANHOLE W/REINFORCED TOP SLAB AND SUMP |
| STO-5 | TYPE II CATCH BASIN MANHOLE |
| STO-6 | CATCH BASIN MANHOLE WITH SUMP |
| STO-9 | 2'X3' CATCH BASIN |
| STO-12 | FLARED END SECTION |
| STO-13 | RIP RAP AT OUTLETS |
| STO- 20 | 4" HDPE PERFORATED DRAINTILE WITH FILTER SOCK |
| STO-28 | PRECAST 27" SHALLOW DEPTH BEEHIVE WITH CONCRETE STOOL GRATE FRAME |
| STO-29 | OFF STREET CATCH BASIN WITH CONCRETE STOOL GRATE FRAME |
| STO-31 | POND OUTLET SKIMMER STRUCTURE WITH BAFFLE WALL |
| STO-31A | POND OUTLET SKIMMER WITHOUT BAFFLE WALL |
| STO-32 | TYPICAL BENCH DETAIL |



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2024

CITY PLATE NO.
INDEX - 1

CITY OF FOREST LAKE STANDARD DETAILS INDEX

City Plate No.

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| BED-2 | PIPE BEDDING METHODS FOR RCP OR PVC WATER MAIN |
| BED-3 | IMPROVED PIPE FOUNDATION FOR RCP AND PVC |

STREET DETAILS

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| STR-1A | CURB AND GUTTER |
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| STR-23 | TYPICAL STREET TURNAROUND - RURAL SECTION |
| STR-24 | TYPICAL BITUMINOUS TRAIL AND CONCRETE SIDEWALK |
| STR-25 | PLAYGROUND PLAY AREA |



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2024

CITY PLATE NO.
INDEX - 2

CITY OF FOREST LAKE STANDARD DETAILS INDEX

City Plate No.

STR-26
STR-27
STR-28

STREET DETAILS

FIRE DEPARTMENT ACCESS LANE (BUILDINGS UP TO 24' HIGH)
FIRE DEPARTMENT ACCESS LANE (BUILDINGS OVER 24' HIGH)
TYPICAL PUBLIC PARKING LOT SECTION

EROSION CONTROL DETAILS

ERO-1A
ERO-1B
ERO-1C
ERO-1D
ERO-1E
ERO-2
ERO-3
ERO-4A

ERO-4B

ERO-4C
ERO-4D
ERO-5A
ERO-5B
ERO-5C
ERO-5D
ERO-5E
ERO-5F
ERO-6A
ERO-6B
ERO-7
ERO-8A
ERO-8B
ERO-9
ERO-10
ERO-11
ERO-12A

SILT FENCE - MACHINE SLICED
SILT FENCE - HEAVY DUTY
SILT FENCE - STANDARD
SILT FENCE - J HOOK
SUPER DUTY SILT FENCE
EROSION CONTROL BLANKET INSTALLATION
FLOATING SILT CURTAIN
INLET PROTECTION - SILT BOX FOR CATCH BASIN
BEFORE ROAD CONSTRUCTION
INLET PROTECTION - ROCK FILTER FOR CATCH BASIN
DURING ROAD CONSTRUCTION
INLET PROTECTION - CATCH BASIN INSERT AFTER PAVING
INLET PROTECTION - SILT BOX FOR BEEHIVE CASTING
DITCH CHECK - 3D VIEW FOR 5B, 5C AND SPACING
DITCH CHECK - ROCK WEEPER AND BIO WEEPER
DITCH CHECK - SMALL CHECK DAM AND LARGE CHECK DAM
DITCH CHECK - MACHINE SLICED SILT FENCE
DITCH CHECK - TRIANGULAR SILT DIKE
DITCH CHECK - COMPOST LOG
PIPE CHECK - WOODEN WEIR
PIPE CHECK - BIO ROLL WEIR AND ROCK WEIR
CONSTRUCTION ENTRANCE - ROCK AND WOOD CHIP
TEMPORARY SEDIMENTATION BASIN - PIPE OUTLET
TEMPORARY SEDIMENTATION BASIN - STANDPIPE OUTLET
TEMPORARY SEDIMENT TRAP
DIVERSION MOUND AND TEMPORARY PIPE DOWNDRAIN
SLOPE TRACKING
SUPER DUTY PERIMETER CONTROL -
SILT FENCE / CONCRETE BARRIER SYSTEM



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STANDARD DETAILS

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2024

CITY PLATE NO.
INDEX - 3

CITY OF FOREST LAKE STANDARD DETAILS INDEX

City Plate No.

GEN-3
GEN-4
GEN-5
GEN-6

GENERAL DETAILS

WETLAND BUFFER SIGN
WETLAND BOUNDARY SIGN
STRUCTURE MARKER SIGNS
MAIL BOX INSTALLATION



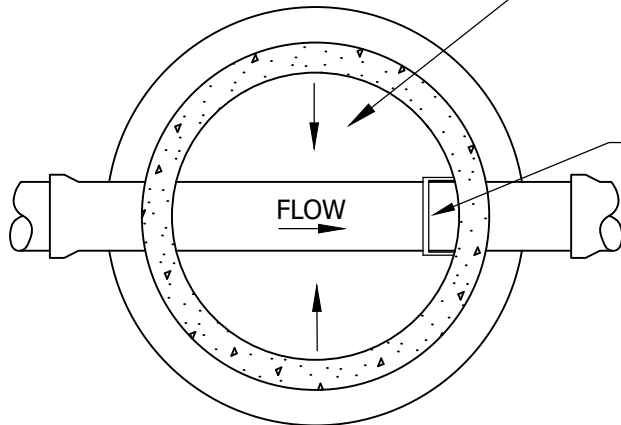
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2024

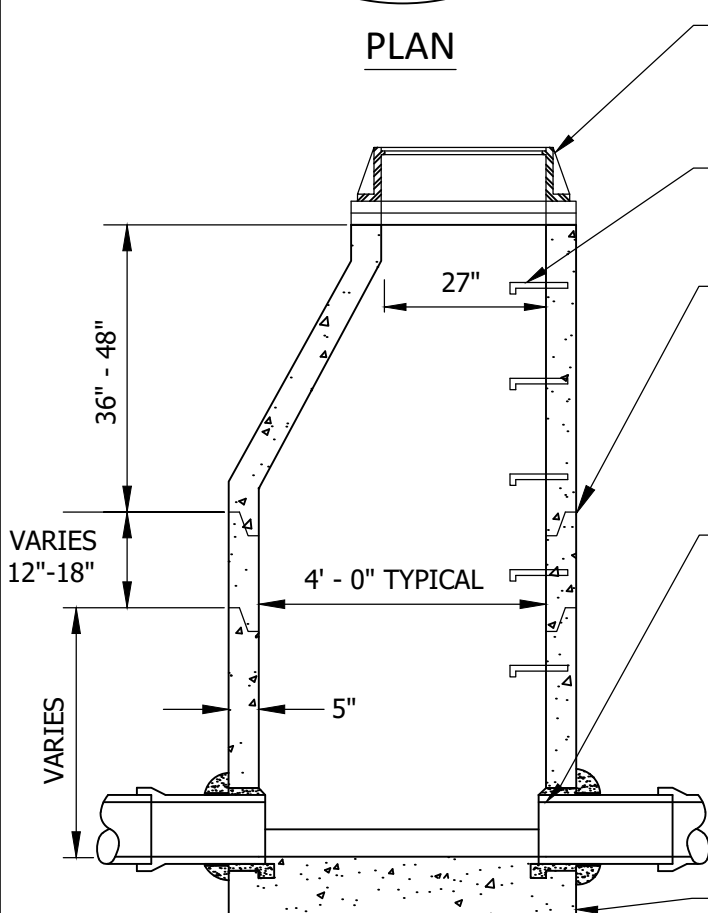
CITY PLATE NO.
INDEX - 4



PLAN

PRECAST INVERT MUST BE 1/2 DIAMETER OF THE PIPE AND BENCHES SLOPED 2" TOWARD THE INVERT.

MANHOLE STEPS SHALL BE PLACED SO THAT OFFSET VERTICAL PORTION OF CONE IS FACING DOWNSTREAM.



SECTION

CASTING AND ADJUSTMENT RINGS AS SPECIFIED AND PER DETAIL PLATE STR-14

MANHOLE STEPS, 16" ON CENTER.

JONTS TO COMPLY WITH ASTM C-443 WRAP EACH MANHOLE BARREL JOINT WITH 12" MASTIC SEAL, OR RING JOINTS W/ 3/4" BUTYL ROPE.

PIPE SHALL BE CUT TO EXTEND INSIDE OF MANHOLE WALL AND HAVE A WATER TIGHT SEAL CONFORMING TO ASTM C923.

ALL DOG HOUSES SHALL BE GROUTED ON INSIDE AND OUTSIDE.

MINIMUM THICKNESS OF INTEGRAL PRECAST BASE IS 6" FOR 14' DEEP OR LESS, AND INCREASES 1" IN THICKNESS FOR EVERY 4' OF DEPTH GREATER THAN 14'.



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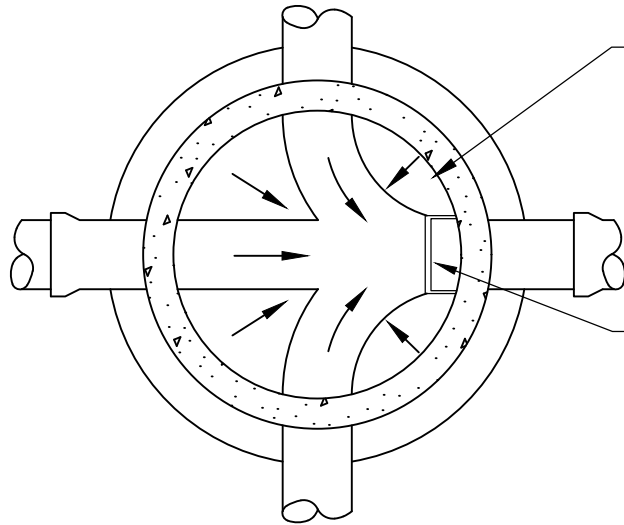
STANDARD DETAILS

SANITARY SEWER MANHOLE

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2025

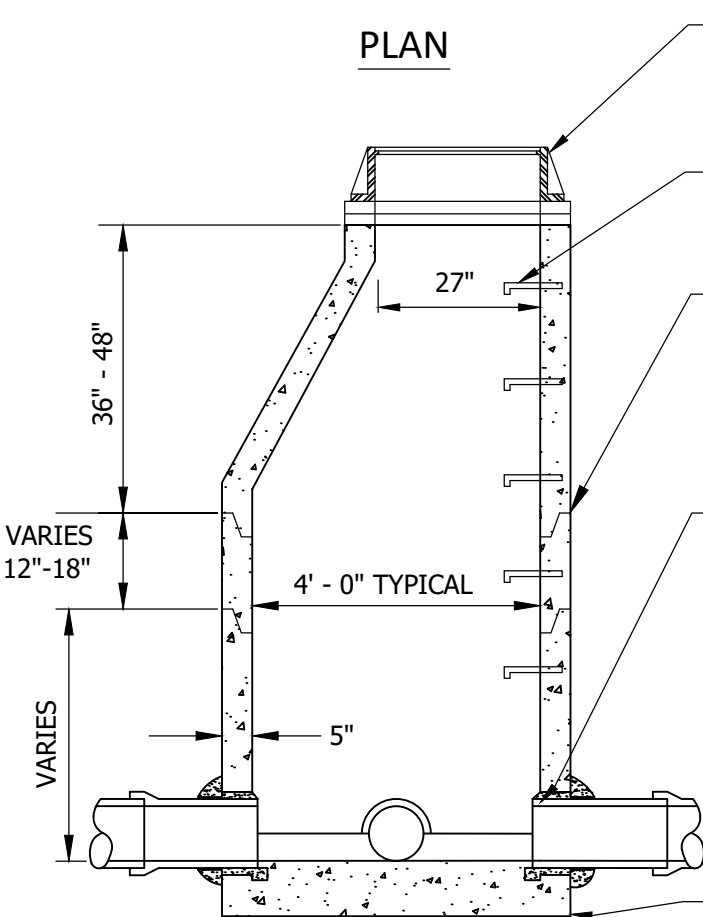
CITY PLATE NO.
SAN-1



PRECAST INVERT MUST BE 1/2 DIAMETER OF PIPE AND BENCHES SHOULD BE SLOPED 2" TOWARD INVERT.

MANHOLE STEPS SHALL BE PLACED SO THAT OFFSET VERTICAL PORTION OF CONE IS FACING DOWNSTREAM.

PLAN



CASTING AND ADJUSTMENT RINGS AS SPECIFIED AND PER DETAIL PLATE STR-14

MANHOLE STEPS 16" ON CENTER.

JOINTS TO COMPLY WITH ASTM-C-443 WRAP EACH MANHOLE BARREL JOINT WITH 12" MASTIC SEAL, OR RING JOINTS W/ 3/4" BUTYL ROPE.

PIPE SHALL BE CUT TO EXTEND INSIDE OF MANHOLE AND HAVE A WATER TIGHT SEAL CONFORMING TO ASTM C923.

ALL DOG HOUSES SHALL BE GROUTED ON INSIDE AND OUTSIDE.

MINIMUM THICKNESS OF INTEGRAL PRECAST BASE IS 6" FOR 14' DEEP OR LESS, AND INCREASES 1" IN THICKNESS FOR EVERY 4' OF DEPTH GREATER THAN 14'.

SECTION



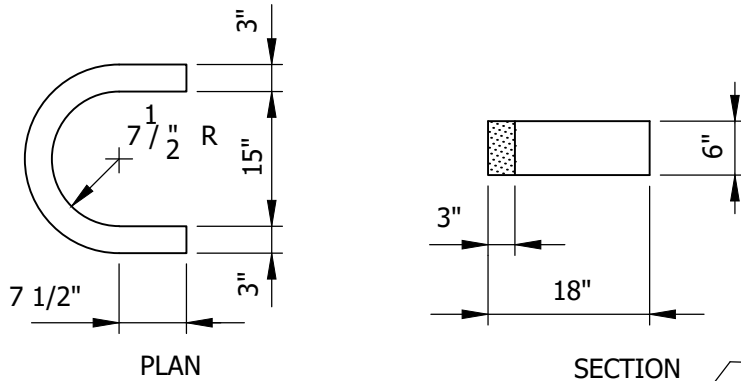
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
SANITARY SEWER JUNCTION
MANHOLE

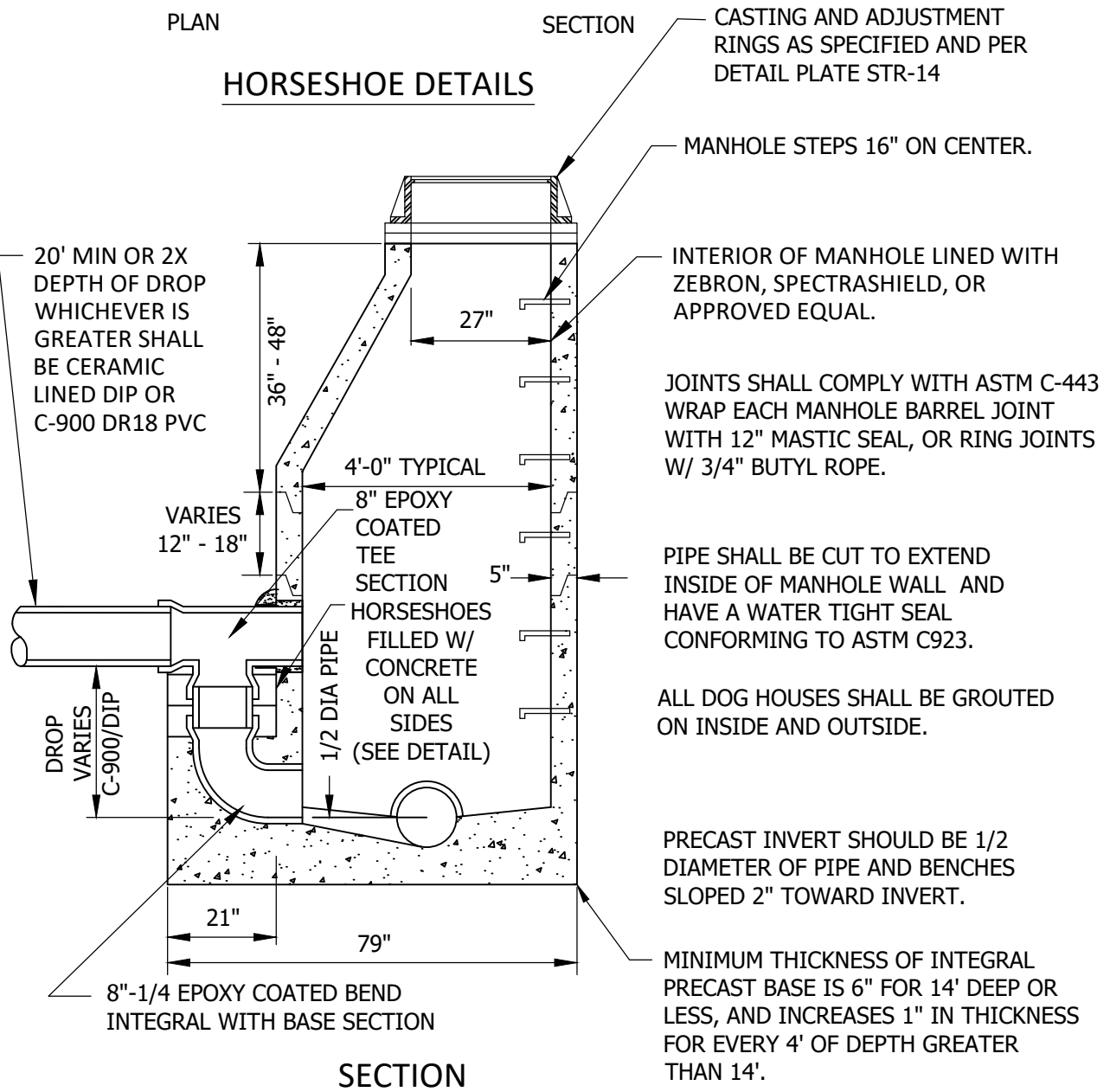
FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2025

CITY PLATE NO.
SAN-2



HORSESHOE DETAILS



SECTION



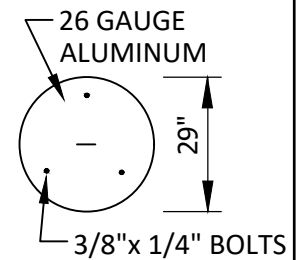
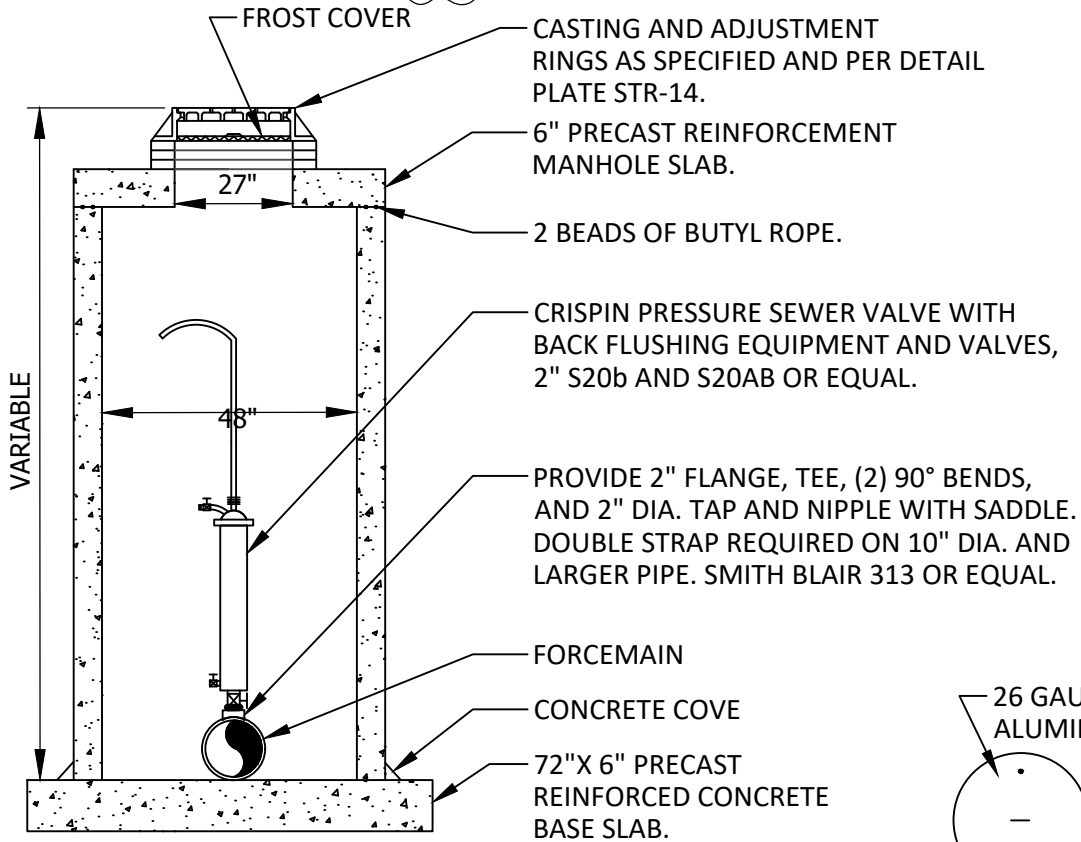
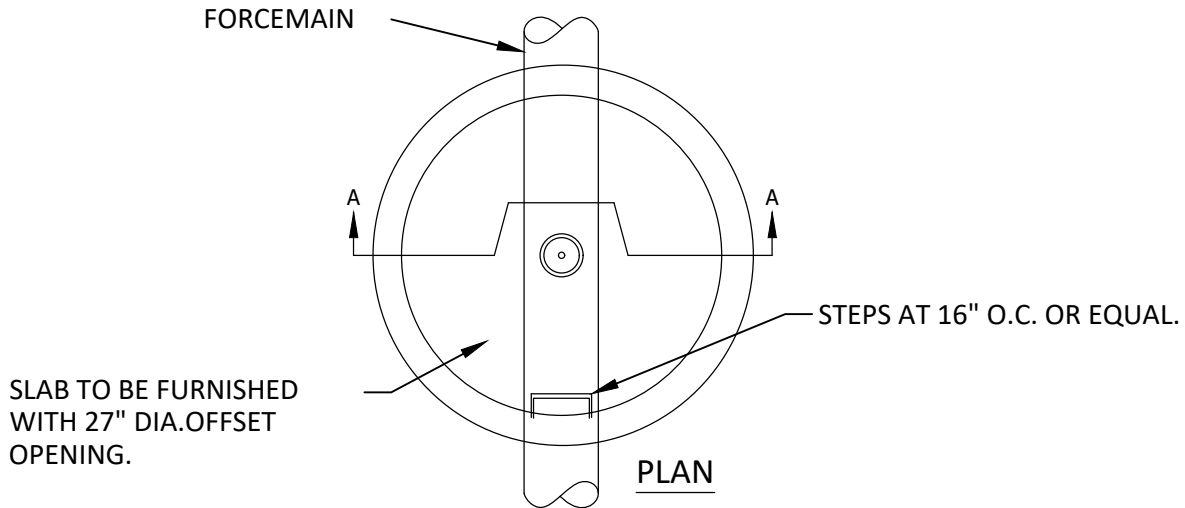
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
SANITARY SEWER DROP INLET
MANHOLE

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2025

CITY PLATE NO.
SAN-3



NOTES:

1. WHEN THE MANHOLE STRUCTURE IS CONSTRUCTED OUTSIDE THE TRAVELED ROADWAY, A WITNESS POST AND SIGN SHALL BE INSTALLED NEXT TO THE MANHOLE PER DETAIL PLATE GEN-5.

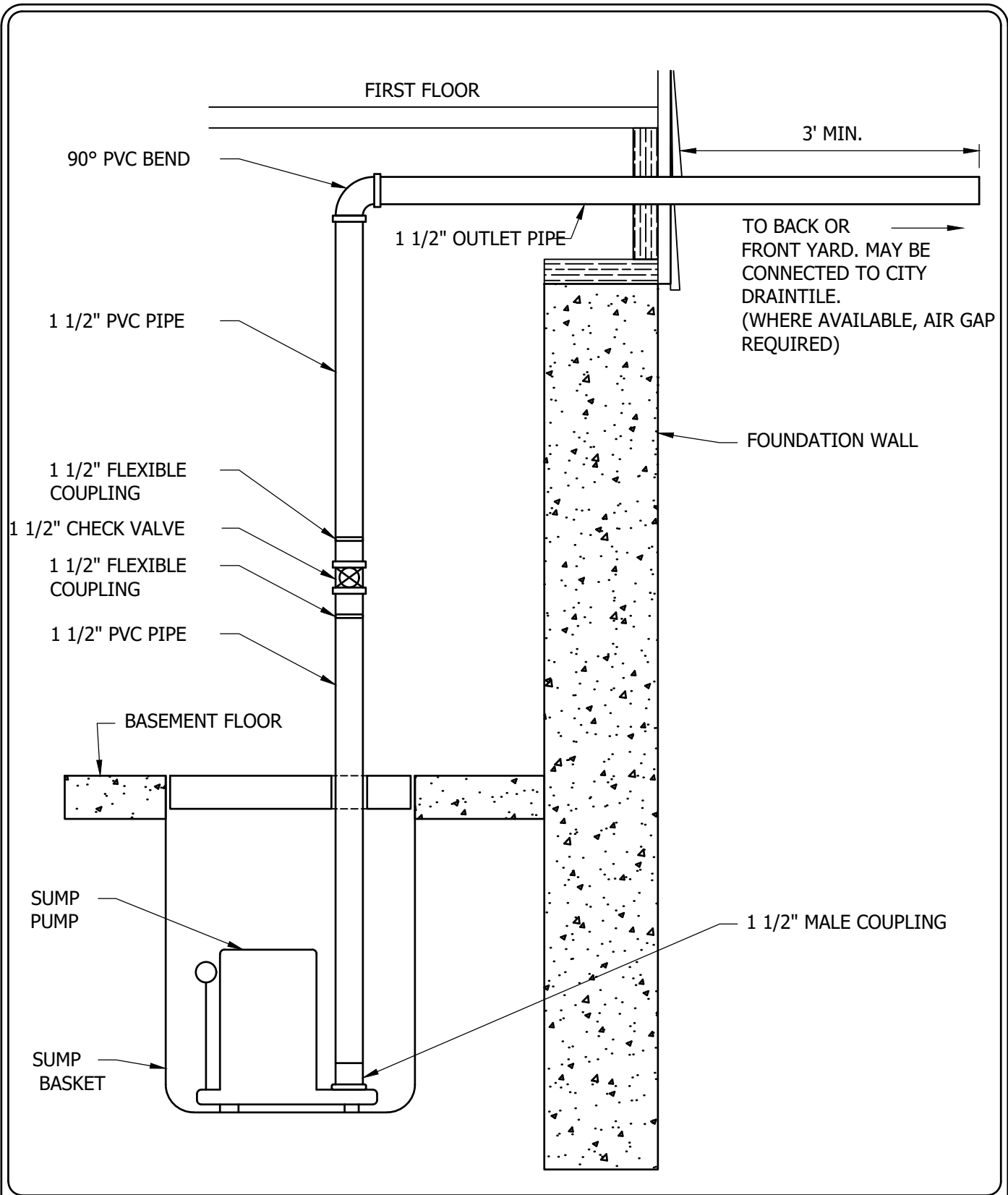
SECTION A-A



STANDARD DETAILS
AIR RELEASE MANHOLE
FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2022

CITY PLATE NO.
SAN-4



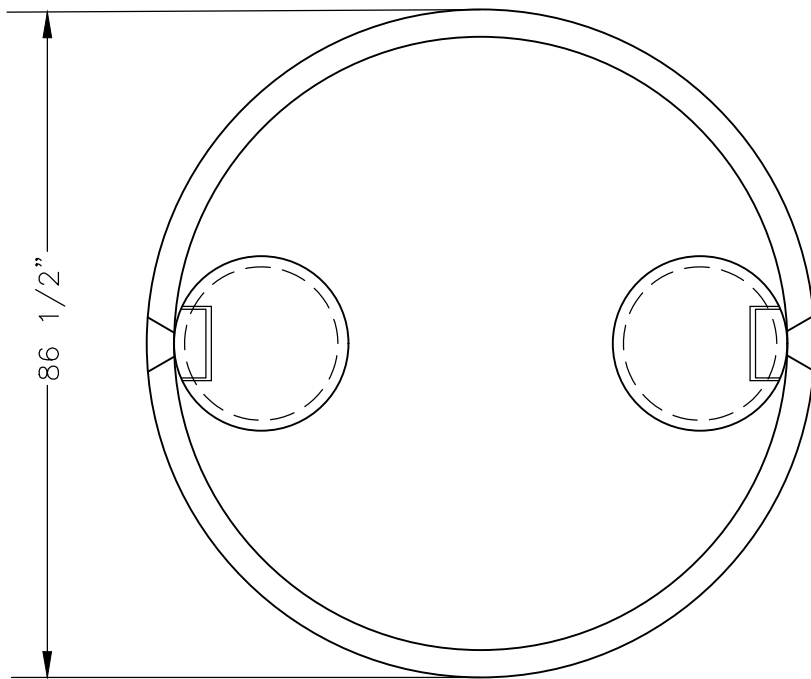
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
SUMP PUMP DISCHARGE

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2019

CITY PLATE NO.
SAN-5



TOP VIEW

**WEHD1500 GREASE INTERCEPTER
TANK SPECIFICATIONS:**

DIMENSIONS:

- WALL: 3.5"
- BOTTOM: 5"
- COVER: 6"
- MANHOLE: 24" I.D.
- HEIGHT: 95.5" O.D.
- OUTSIDE DIA.: 86.5"
- BELOW INLET: 78"
- LIQUID LEVEL: 70"

SPECIAL FEATURE:

"POSITIVE SEAL"
V-SHAPED JOINT CONNECTION
BETWEEN TANK AND COVER.

INLET AND OUTLET BAFFLES:
AS SHOWN

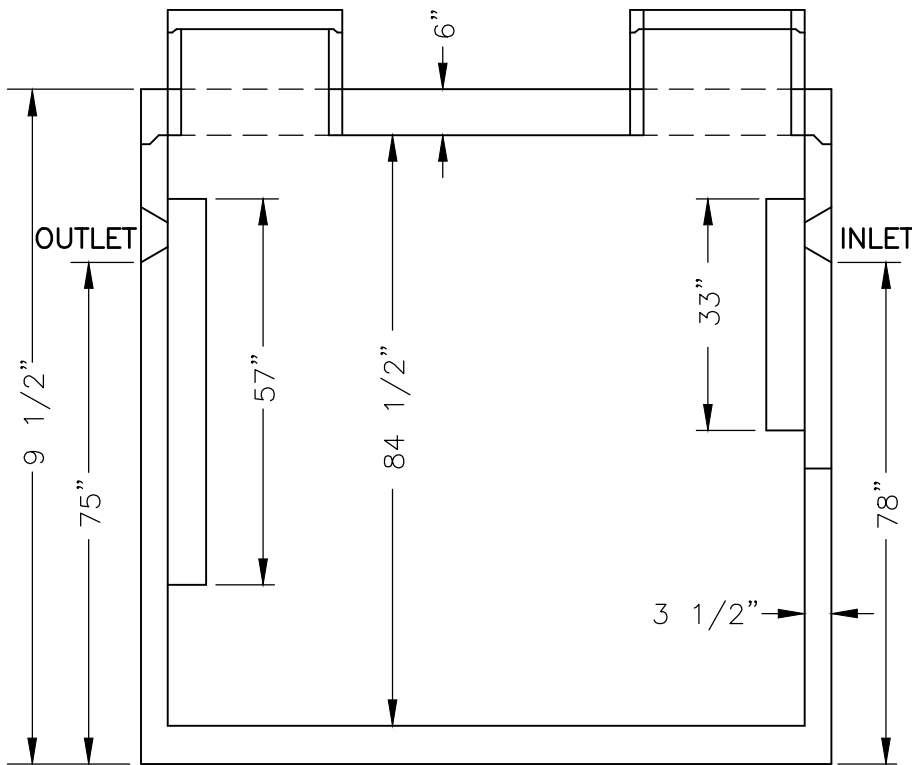
LIQUID CAPACITY:
21.48 GAL/IN

LOADING DESIGN: 12'-0"
UNSATURATED SOIL

WEIGHT: COVER 3,000 LBS
TANK 9,535 LBS

FLOATATION:

WITH SATURATED SOIL TO
TOP OF COVER: 1.5" OF
SOIL OVER COVER-NO
FLOATATION 3' OVER COVER
OFFERS 1.4 + SAFETY
FACTOR.



SIDE VIEW



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

GREASE INTERCEPTOR

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2019

CITY PLATE NO.
SAN-6

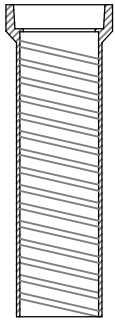


DROP LID

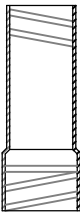


NOTES:

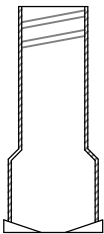
1. VALVE BOX SHALL BE 3-PIECE DUCTILE IRON SCREW-TYPE.
2. 8' MINIMUM COVER REQUIRED OVER TOP OF WATER MAIN.



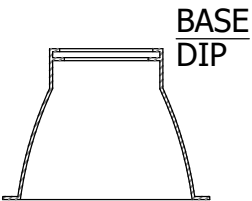
TOP
10"-26"



EXTENSION
9"-26"



BOTTOM
14"-36"



BASE
DIP

1 1/2" CLASS A WASHED ROCK
ALL AROUND. MIN. 1 CY.

GRADE

ADJUST TOP TO 1/2" BELOW
GRADE. BOX TO BE SET TO
PROVIDE 12" OF ADJUSTMENT.

EXTENSION ROD-TOP
WITHIN 12-18" OF GRADE.

1/4" STEEL GATE VALVE
ADAPTOR W/
PROTECTIVE COATING
MANUFACTURED BY
ADAPTOR, INC. OR
EQUAL.

RESILIENT WEDGE VALVE
CONFORMING TO AWWA
C-509-80 STANDARDS.

TRACER WIRE

8" CONC. BLOCK

STANDARD DETAILS

GATE VALVE AND BOX

FOREST LAKE, MINNESOTA



Forest Lake
AS GOOD AS IT SOUNDS

LAST REVISION:
APR 2024

CITY PLATE NO.
WAT-4

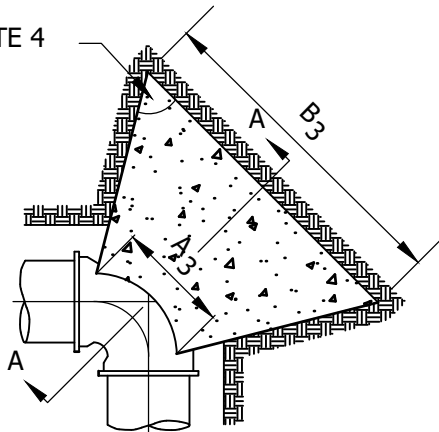
NOTES:

1. SHAPE OF BACK OF BUTTRESS MAY VARY AS LONG AS Poured AGAINST FIRM UNDISTURBED EARTH.
2. DIMENSION C1,C2,C3 SHOULD BE LARGE ENOUGH TO MAKE ANGLE ϕ EQUAL TO OR LARGER THAN 45°.
3. DIMENSION A1,A2,A3 SHOULD BE AS LARGE AS POSSIBLE WITHOUT INTERFERING WITH MJ BOLTS.
4. ϕ = 45° MINIMUM.
5. PLACE POLYETHYLENE BETWEEN CONCRETE & PIPE.

BUTTRESS DIMENSIONS

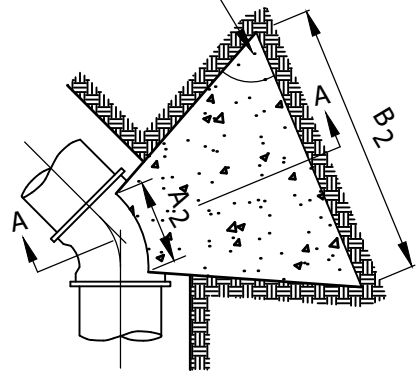
| PIPE SIZE | 22 1/2° BEND | | 45° BEND | | 90° BEND | |
|-----------|----------------|----------------|----------------|----------------|----------------|----------------|
| | B ₁ | D ₁ | B ₂ | D ₂ | B ₃ | D ₃ |
| 6" | 1'-5" | 1'-5" | 1'-5" | 1'-5" | 2'-1" | 1'-6" |
| 8" | 1'-5" | 1'-5" | 2'-1" | 1'-6" | 2'-8" | 2'-0" |
| 12" | 1'-10" | 1'-10" | 3'-4" | 2'-0" | 4'-9" | 2'-6" |
| 16" | 3'-0" | 2'-0" | 3'-10" | 3'-0" | 6'-2" | 3'-6" |
| 20" | 3'-6" | 2'-8" | 5'-6" | 3'-4" | 8'-4" | 4'-0" |
| 24" | 4'-4" | 3'-0" | 6'-10" | 3'-10" | 9'-8" | 5'-0" |
| 30" | - | - | 9'-3" | 6'-0" | 17'-0" | 6'-0" |

ϕ - SEE NOTE 4



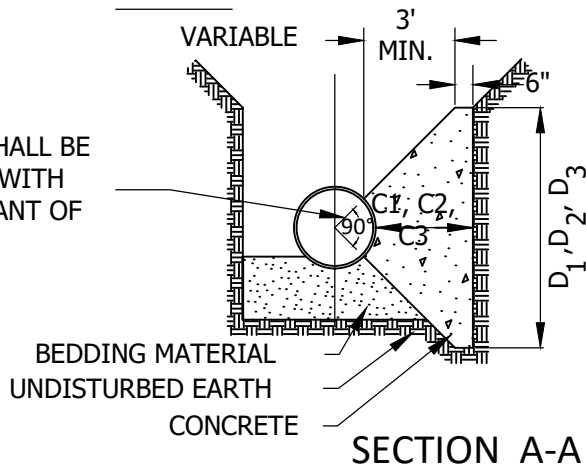
PLAN 90° BENDS

ϕ - SEE NOTE 4



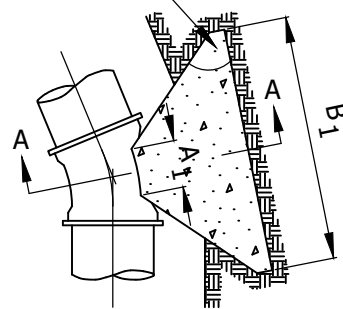
PLAN 45° BENDS

CONCRETE SHALL BE IN CONTACT WITH THIS QUADRANT OF PIPE



SECTION A-A

ϕ - SEE NOTE 4



PLAN 22 1/2° BENDS



Forest Lake
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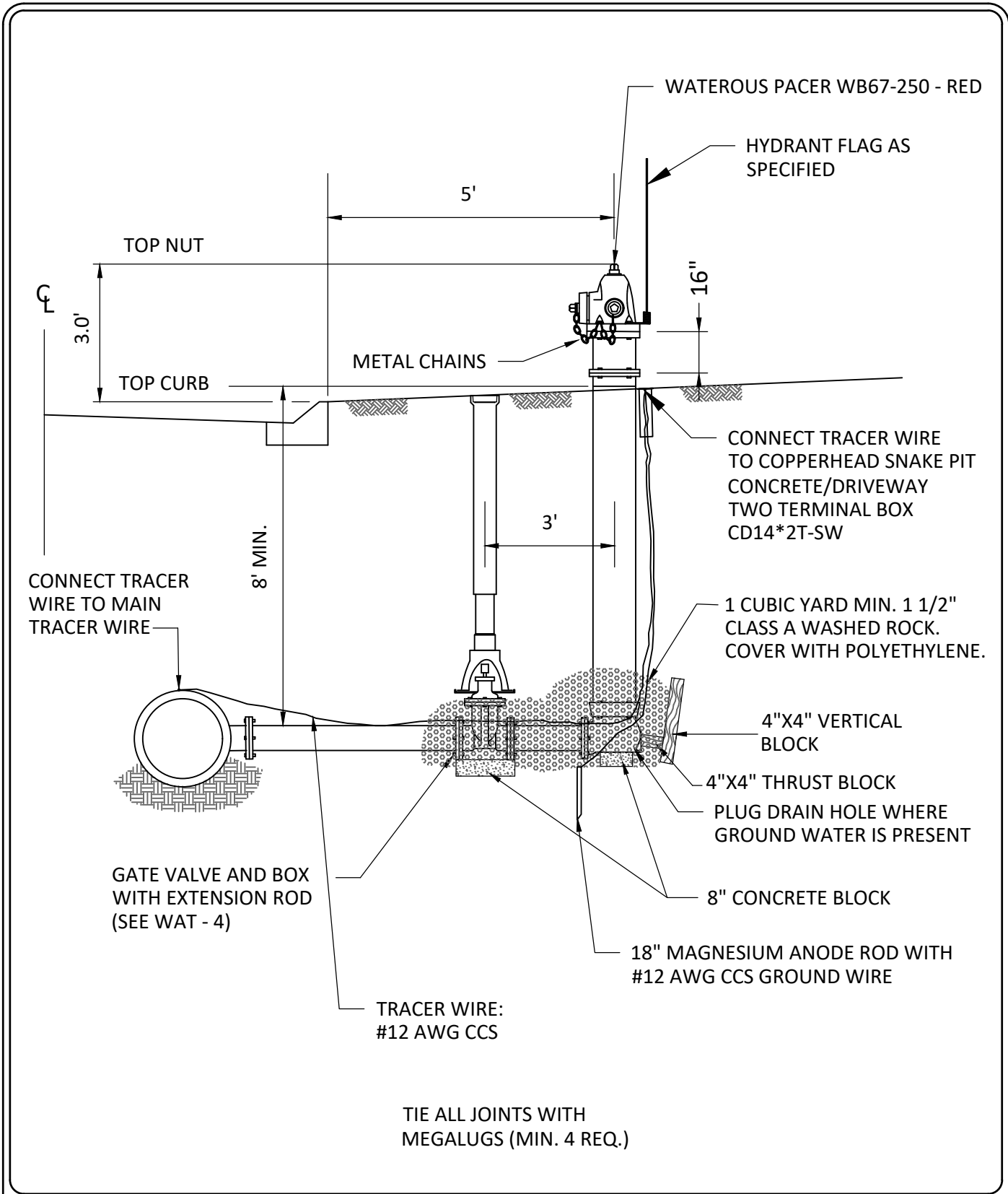
STANDARD DETAILS

CONCRETE THRUST BLOCKING

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2000

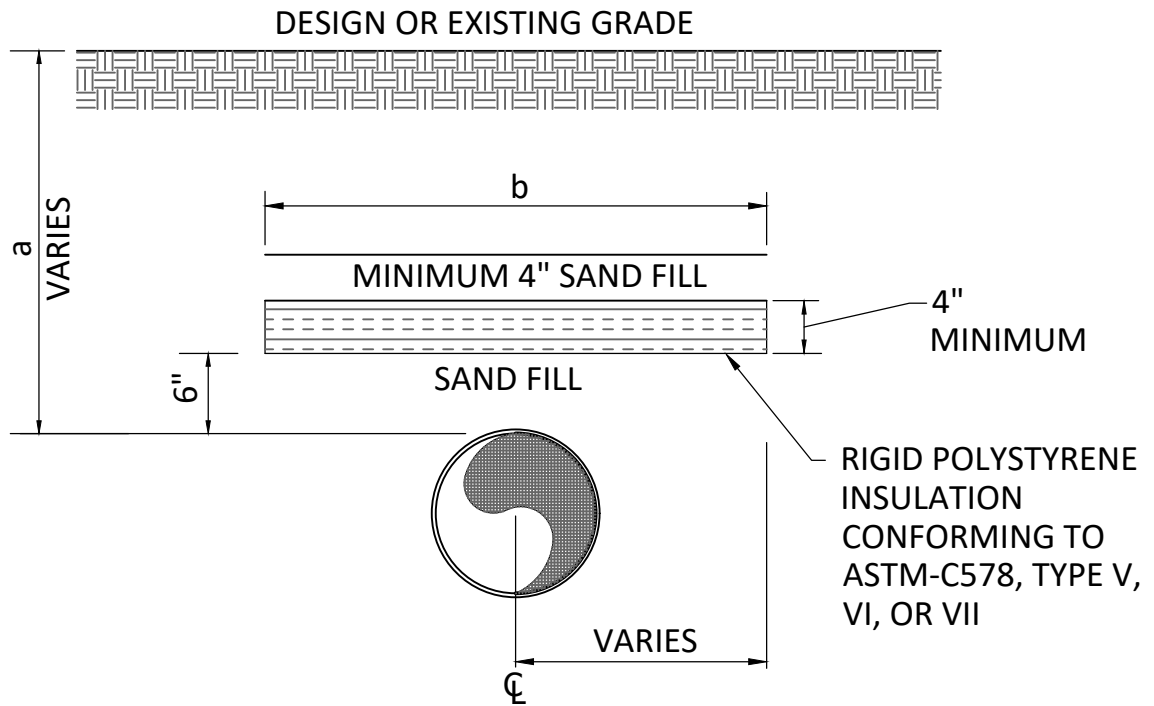
CITY PLATE NO.
WAT-6



STANDARD DETAILS
HYDRANT
FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2024

CITY PLATE NO.
WAT-8



NOTE: PIPE SHALL BE CENTERED UNDER INSULATION UNLESS OTHERWISE SPECIFIED.

COVER OVER PIPE - a

WIDTH OF INSULATING BOARD - b

2'

11'

3'

9'

4'

7'

5'

5'

6'

3'



Forest Lake
AS GOOD AS IT SOUNDS

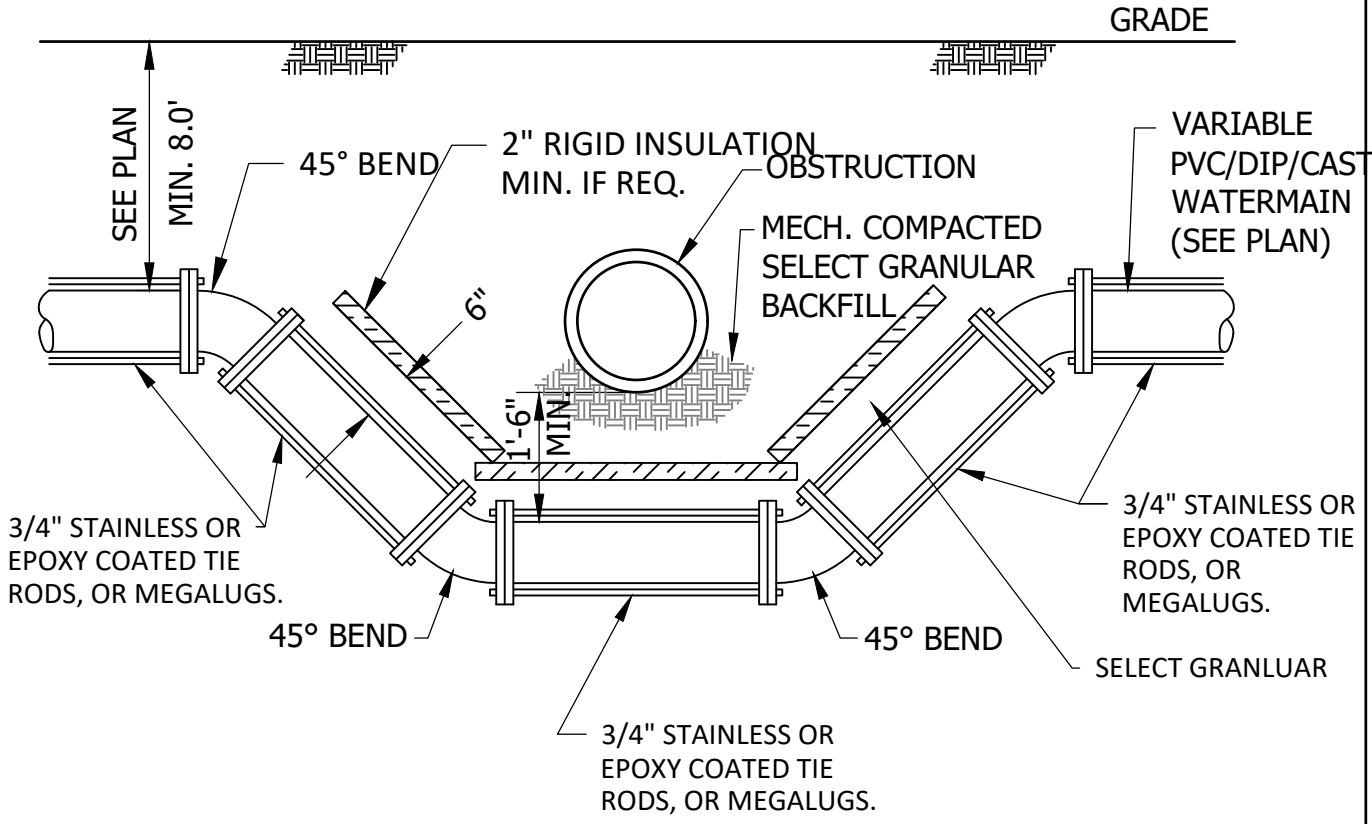
STANDARD DETAILS

INSULATION

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2023

CITY PLATE NO.
WAT-9



NOTE:

1. ALL FITTINGS SHALL BE FUSION BONDED EPOXY COATED DUCTILE IRON TO MEET OR EXCEED ANSI/AWWA C550 AND C116/A21.16 REQUIREMENTS.
2. MEGALUGS WILL NOT BE ALLOWED ON ANY CIP WATER MAIN.
3. SELECT GRANULAR WILL BE REQUIRED BETWEEN INSULATION, WATER MAIN, AND OBSTRUCTION.
4. ALL BENDS SHALL HAVE MEGALUGS OR TIE RODS WITH BLOCKING IN ACCORDANCE WITH STANDARD PLATE WAT-6.
5. 12 AWG CCS TRACER WIRER SHALL BE USED ON PVC WATER MAIN AND CADWELDED TO DIP OR CAST.
6. ALL WATER MAIN BOLTS SHALL BE CORE-BLUE OR APPROVED EQUAL.



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STANDARD DETAILS

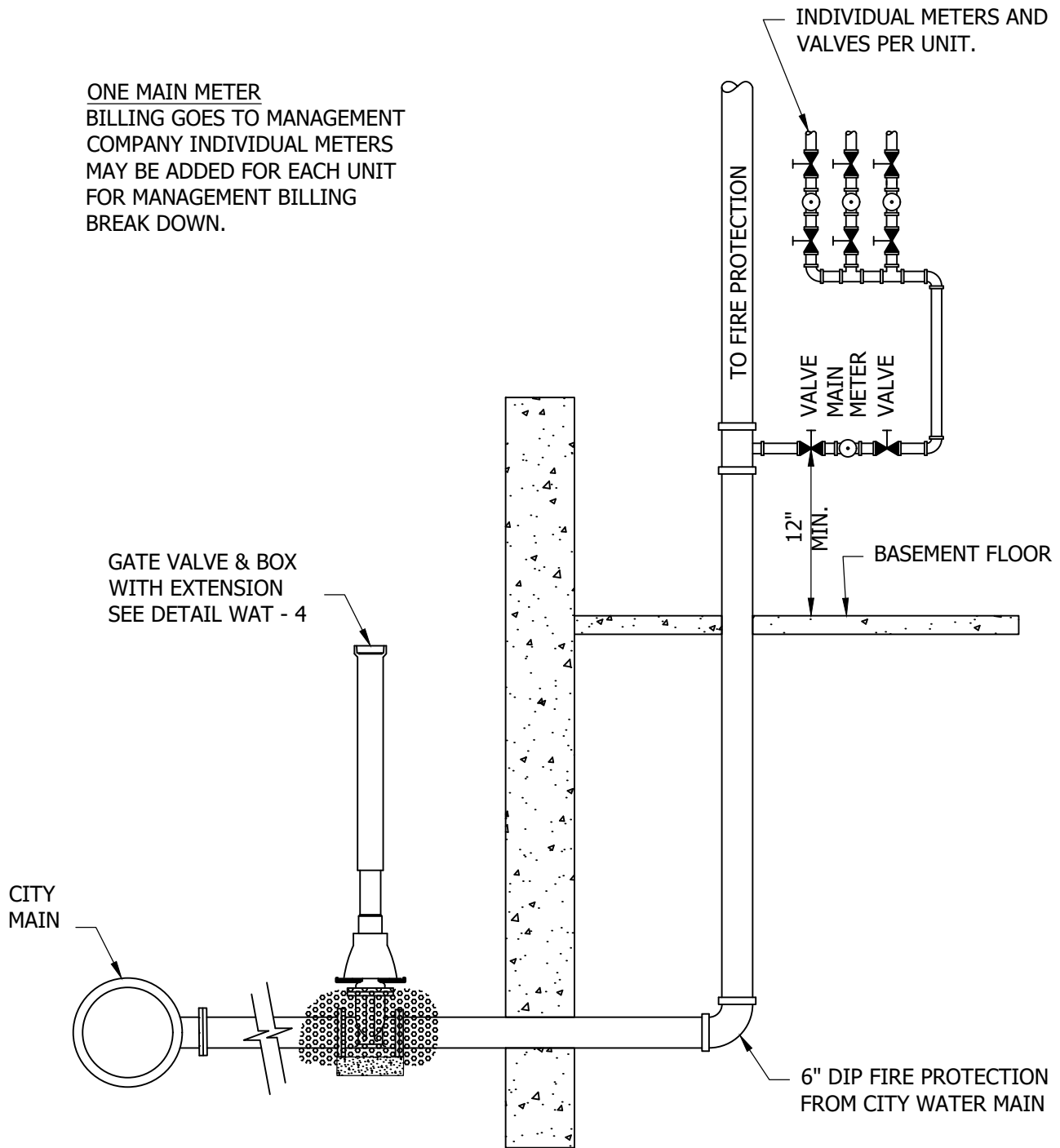
WATER MAIN OFFSET

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2023

CITY PLATE NO.
WAT-10

ONE MAIN METER
 BILLING GOES TO MANAGEMENT
 COMPANY INDIVIDUAL METERS
 MAY BE ADDED FOR EACH UNIT
 FOR MANAGEMENT BILLING
 BREAK DOWN.



NOTE: ALL METERS MUST BE LOCATED IN A
 CENTRAL ROOM AT POINT WHERE
 WATER SERVICE ENTERS BUILDING.
 IRRIGATION LINES MUST ALSO HAVE
 SEPARATE METER IF LINE IS
 CONNECTED PRIOR TO MAIN.



Forest Lake
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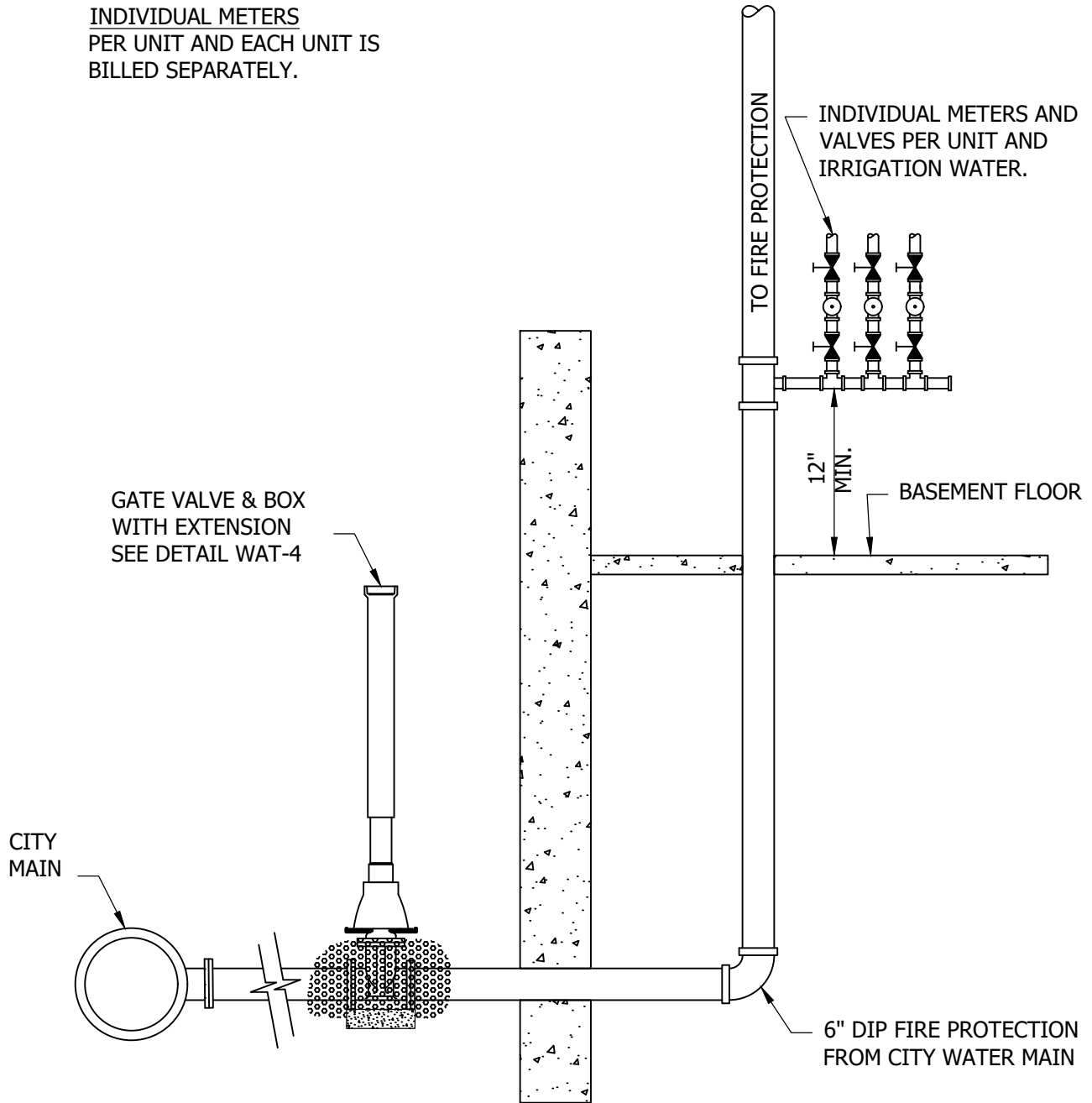
STANDARD DETAILS
 MULTIPLE UNITS
 USING MAIN WATER METER

FOREST LAKE, MINNESOTA

LAST REVISION:
 MAR 2021

CITY PLATE NO.
 WAT-11

INDIVIDUAL METERS
PER UNIT AND EACH UNIT IS
BILLED SEPARATELY.



NOTE: ALL METERS MUST BE LOCATED IN A
CENTRAL ROOM AT POINT WHERE
WATER SERVICE ENTERS BUILDING.
IRRIGATION LINES MUST ALSO HAVE
SEPARATE METER IF LINE IS
CONNECTED PRIOR TO MAIN.



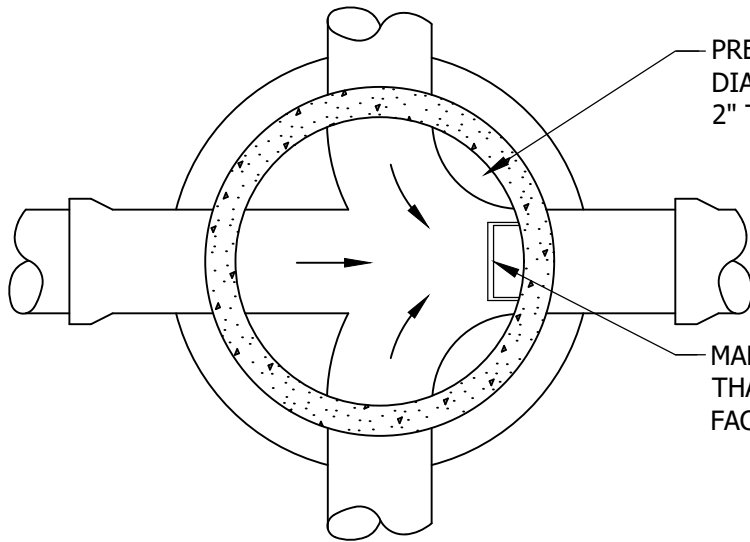
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
MULTIPLE UNITS
INDIVIDUAL WATER METER

FOREST LAKE, MINNESOTA

LAST REVISION:
OCT 2007

CITY PLATE NO.
WAT-12

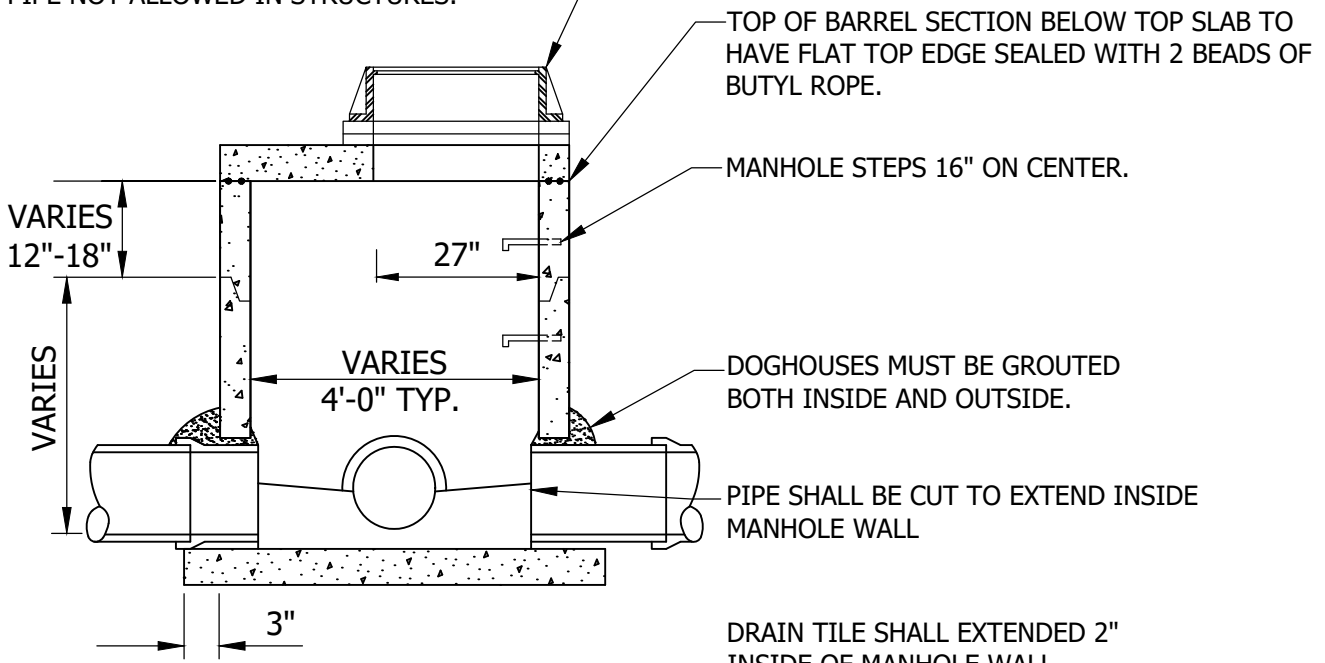


PRECAST INVERT SHOULD BE 1/2 DIAMETER OF PIPE AND BENCHES SLOPED 2" TOWARD INVERT.

MANHOLE STEPS SHALL BE PLACED SO THAT OFFSET HOLE IN TOP SLAB IS FACING DOWNSTREAM.

PLAN

NO BLOCK STRUCTURES OR PRECAST INVERTS ARE ALLOWED. BELL ENDS OF PIPE NOT ALLOWED IN STRUCTURES.



CASTING AND ADJUSTMENT RINGS AS SPECIFIED AND AS PER DETAIL STR-14

TOP OF BARREL SECTION BELOW TOP SLAB TO HAVE FLAT TOP EDGE SEALED WITH 2 BEADS OF BUTYL ROPE.

MANHOLE STEPS 16" ON CENTER.

DOGHOUSES MUST BE GROUTED BOTH INSIDE AND OUTSIDE.

PIPE SHALL BE CUT TO EXTEND INSIDE MANHOLE WALL

DRAIN TILE SHALL EXTENDED 2" INSIDE OF MANHOLE WALL

SECTION

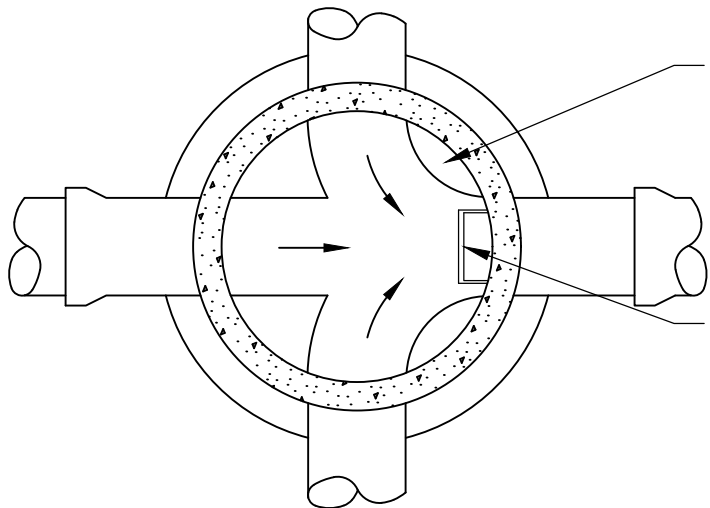


Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
STORM SEWER JUNCTION MANHOLE
WITH REINFORCED TOP SLAB
FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2025

CITY PLATE NO.
STO-3

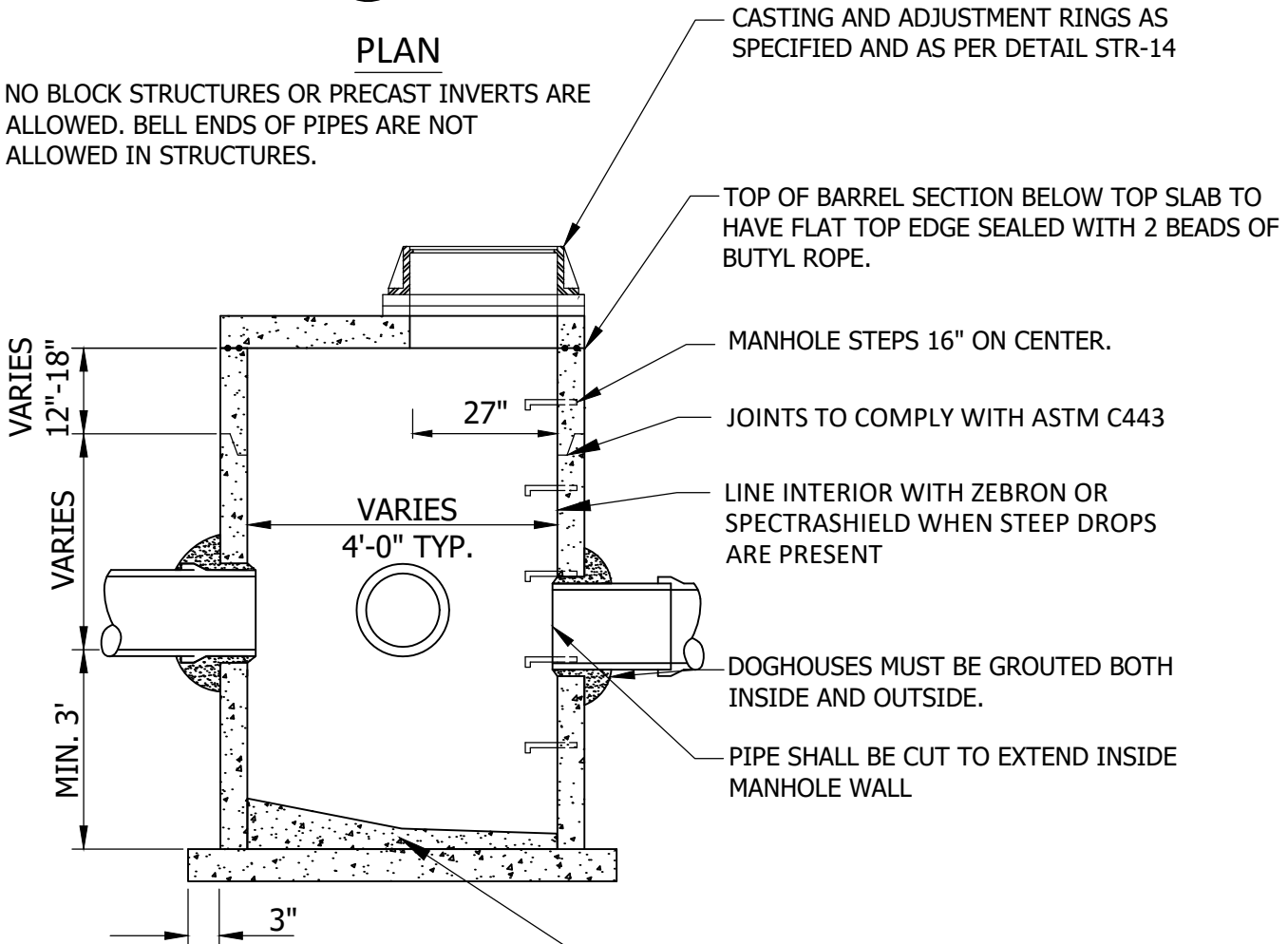


PRECAST INVERT SHOULD BE 1/2 DIAMETER OF PIPE AND BENCHES SLOPED 2" TOWARD INVERT.

MANHOLE STEPS SHALL BE PLACED SO THAT OFFSET HOLE IN TOP SLAB IS FACING DOWNSTREAM.

PLAN

NO BLOCK STRUCTURES OR PRECAST INVERTS ARE ALLOWED. BELL ENDS OF PIPES ARE NOT ALLOWED IN STRUCTURES.



CASTING AND ADJUSTMENT RINGS AS SPECIFIED AND AS PER DETAIL STR-14

TOP OF BARREL SECTION BELOW TOP SLAB TO HAVE FLAT TOP EDGE SEALED WITH 2 BEADS OF BUTYL ROPE.

MANHOLE STEPS 16" ON CENTER.

JOINTS TO COMPLY WITH ASTM C443

LINE INTERIOR WITH ZEBRON OR SPECTRASHIELD WHEN STEEP DROPS ARE PRESENT

DOGHOUSES MUST BE GROUTED BOTH INSIDE AND OUTSIDE.

PIPE SHALL BE CUT TO EXTEND INSIDE MANHOLE WALL

GROUT INVERT TO SLOPE TO OPENING IN TOP SLAB

SECTION



Forest Lake
AS GOOD AS IT SOUNDS

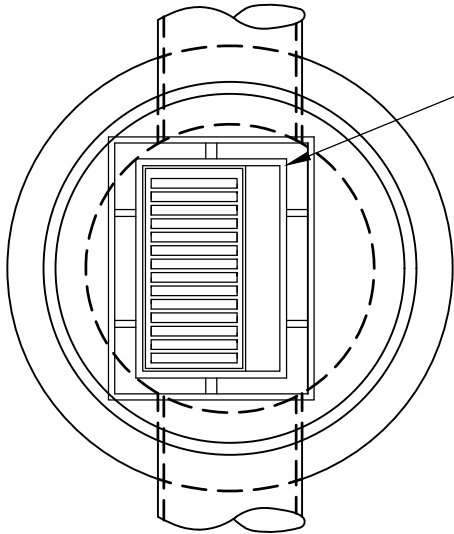
STANDARD DETAILS

STORM SEWER JUNCTION MANHOLE WITH REINFORCED TOP SLAB & SUMP

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2025

CITY PLATE NO.
STO-4



24"X36" SLAB OPENING FOR NEENAH R3067V OR ESS. BROS. 330 HIGH CAPACITY OR EQUAL. INSTALL R3501-TB FOR DRIVEWAYS AND R3290-A FOR VALLEY GUTTERS. (VANE GRATE SHOWN)

DIMENSION FROM BACK OF CURB TO CENTER OF PIPE.
 4' DIA. MH - 9" IN FROM BACK OF CURB
 5' DIA. MH - 3" IN FROM BACK OF CURB
 6' DIA. MH - 3" BEHIND BACK OF CURB
 7' DIA. MH - 9" BEHIND BACK OF CURB
 8' DIA. MH - 15" BEHIND BACK OF CURB

PLAN

NO BLOCK STRUCTURES OR PRECAST INVERTS ARE ALLOWED. BELL ENDS OF PIPES ARE NOT ALLOWED IN STRUCTURES.

CASTING AND ADJUSTMENT RINGS AS SPECIFIED AND AS PER DETAIL STR-14

TOP OF BARREL SECTION BELOW TOP SLAB TO HAVE FLAT TOP EDGE SEALED WITH 2 BEADS OF BUTYL ROPE.

MANHOLE STEPS 16" ON CENTER PLACED BELOW THE DOWNSTREAM CORNER OF THE OPENING NEAREST THE STREET.

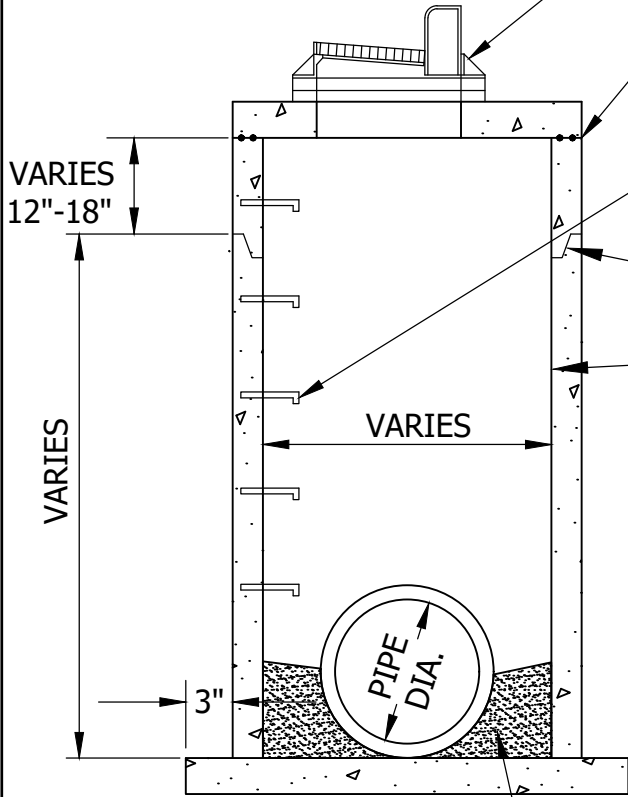
JOINTS TO COMPLY WITH ASTM C443

LINE INTERIOR WITH ZEBRON OR SPECTRASHIELD WHEN STEEP DROPS ARE PRESENT

PIPES SHALL BE CUT TO EXTEND INSIDE MANHOLE WALL

DOGHOUSES MUST BE GROUTED BOTH INSIDE AND OUTSIDE.

DRAIN TILE TO EXTEND 2" INSIDE MANHOLE WALL



SECTION

GROUT BOTTOM 1/2 DIA OF PIPE



Forest Lake
 AS GOOD AS IT SOUNDS

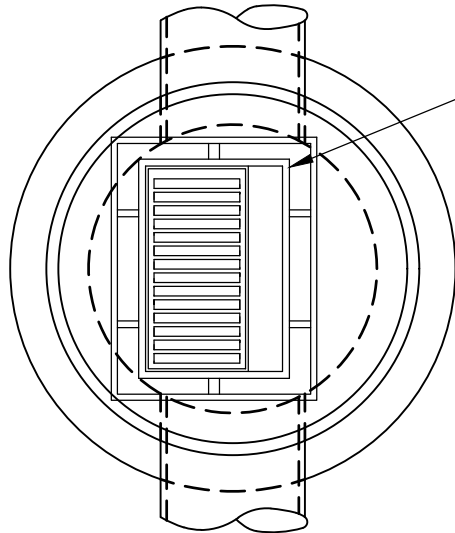
STANDARD DETAILS

TYPE II
 CATCHBASIN MANHOLE

FOREST LAKE, MINNESOTA

LAST REVISION:
 APR 2025

CITY PLATE NO.
 STO-5

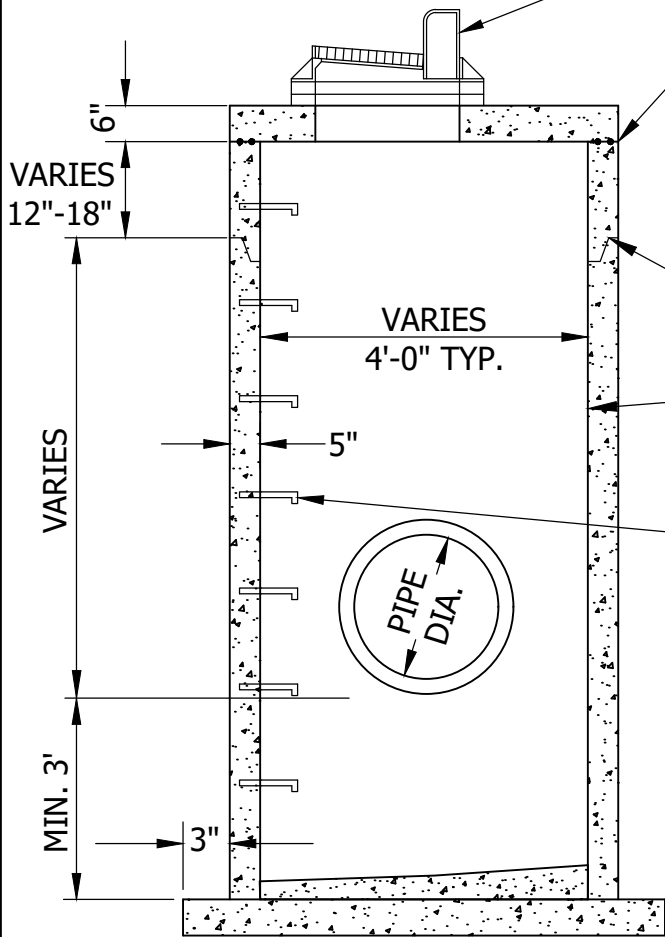


PLAN

24"X36" SLAB OPENING FOR CASTING AS SPECIFIED.

DIMENSION FROM BACK OF CURB TO CENTER OF PIPE.

- 4' DIA. MH - 9" IN FROM BACK OF CURB
- 5' DIA. MH - 3" IN FROM BACK OF CURB
- 6' DIA. MH - 3" BEHIND BACK OF CURB
- 7' DIA. MH - 9" BEHIND BACK OF CURB
- 8' DIA. MH - 15" BEHIND BACK OF CURB



SECTION

CASTING AND ADJUSTMENT RINGS AS SPECIFIED AND AS PER DETAIL STR-14

TOP OF BARREL SECTION BELOW TOP SLAB TO HAVE FLAT TOP EDGE SEALED WITH 2 BEADS OF BUTYL ROPE.

JOINTS SHALL COMPLY WITH ASTM C443

LINE INTERIOR WITH ZEBRON OR SPECTRASHIELD WHEN STEEP DROPS ARE PRESENT

MANHOLE STEPS 16" ON CENTER.

PIPES SHALL BE CUT TO EXTEND INSIDE MANHOLE WALL

DOGHOUSES MUST BE GROUTED BOTH INSIDE AND OUTSIDE.

NO BLOCK STRUCTURES OR PRECAST INVERTS ARE ALLOWED. BELL ENDS OF PIPES NOT ALLOWED IN STRUCTURES.



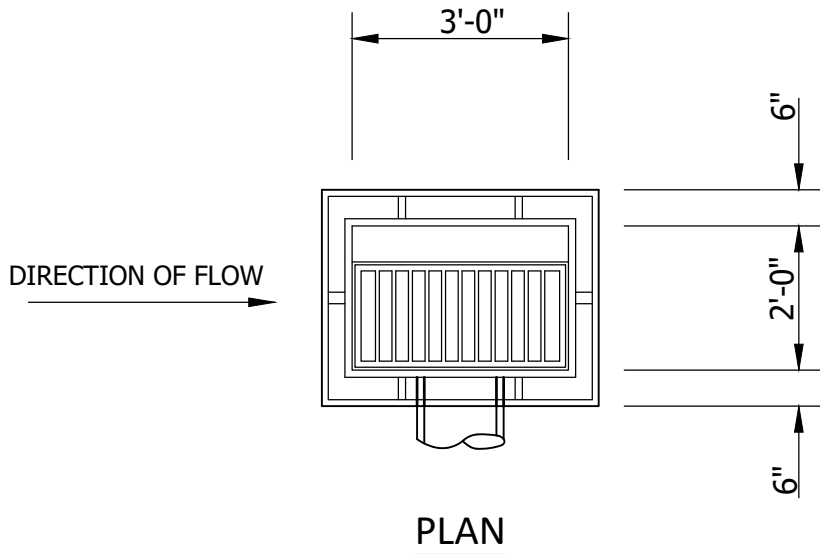
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
CATCHBASIN MANHOLE
WITH SUMP

FOREST LAKE, MINNESOTA

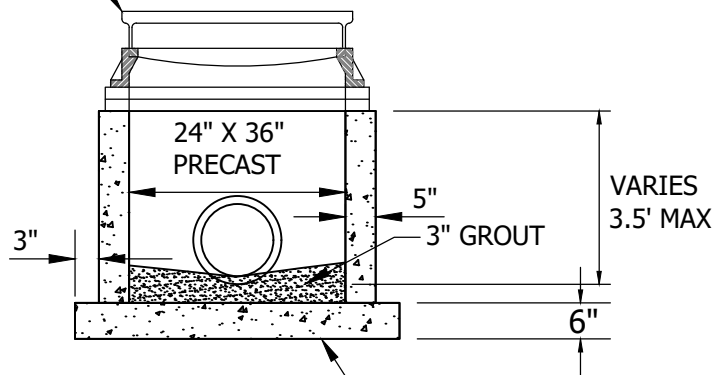
LAST REVISION:
APR 2025

CITY PLATE NO.
STO-6



CASTING AND ADJUSTMENT RINGS AS SPECIFIED AND PER DETAIL STR-14.

DOGHOUSES SHALL BE GROUTED ON BOTH THE INSIDE AND OUTSIDE.



NO BLOCK STRUCTURES OR PRECAST INVERTS ARE ALLOWED. BELL ENDS OF PIPE ARE NOT ALLOWED IN STRUCTURES.



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

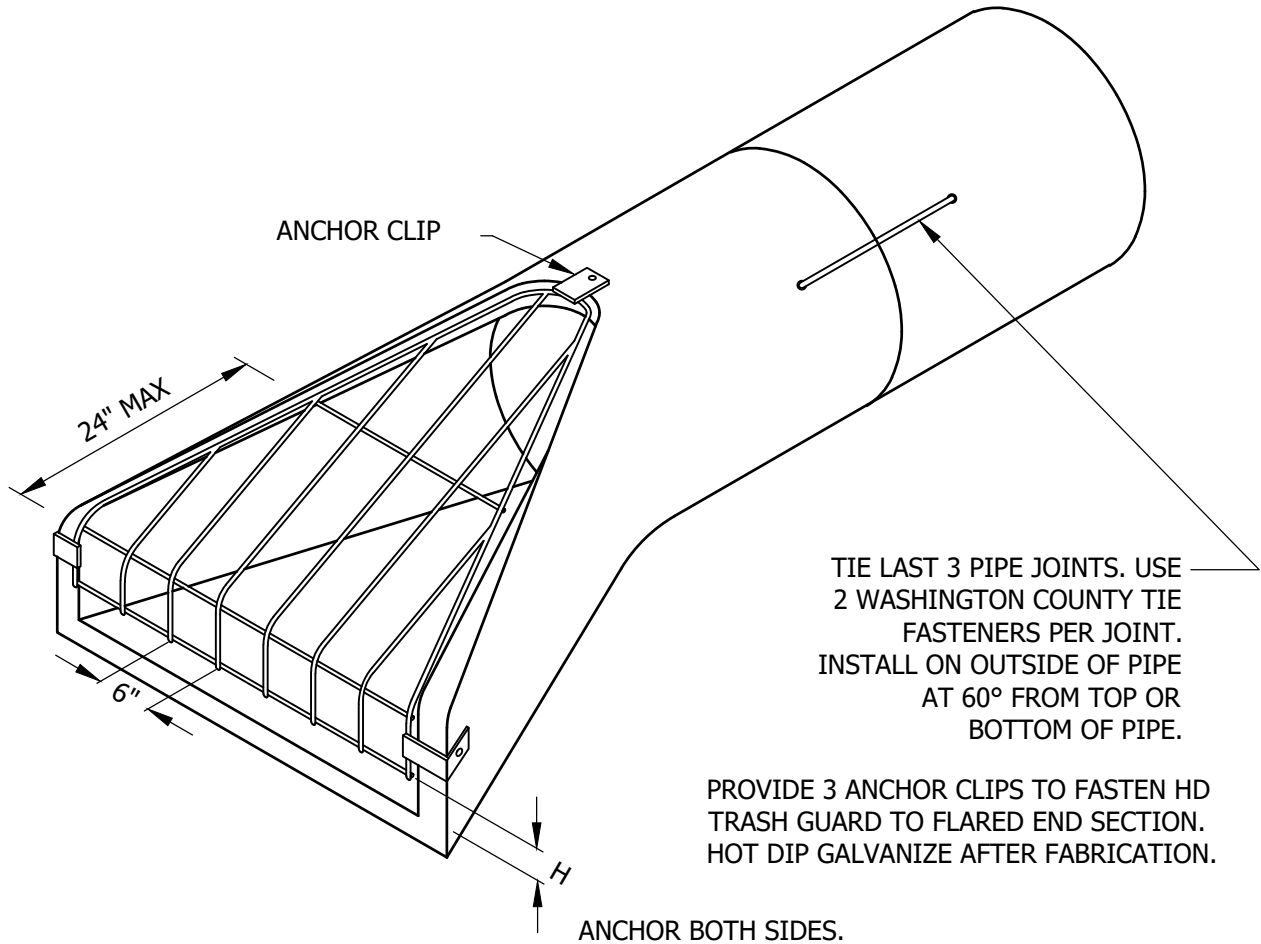
2' X 3' CATCHBASIN

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2025

CITY PLATE NO.
STO-9

SEE CITY PLATE NO. STO-13 FOR RIPRAP PLACEMENT.



ISOMETRIC

| PIPE SIZE | TRASH GUARD SIZING | | |
|-----------|--------------------|-----|-------|
| | BARS | 'H' | BOLTS |
| 24"- 42" | 1"φ | 6" | 3/4" |
| 48"-72" | 1 1/4"φ | 12" | 1" |

NO TRASH GUARDS FOR FLARED ENDS LESS THAN 24" DIA



Forest Lake
AS GOOD AS IT SOUNDS

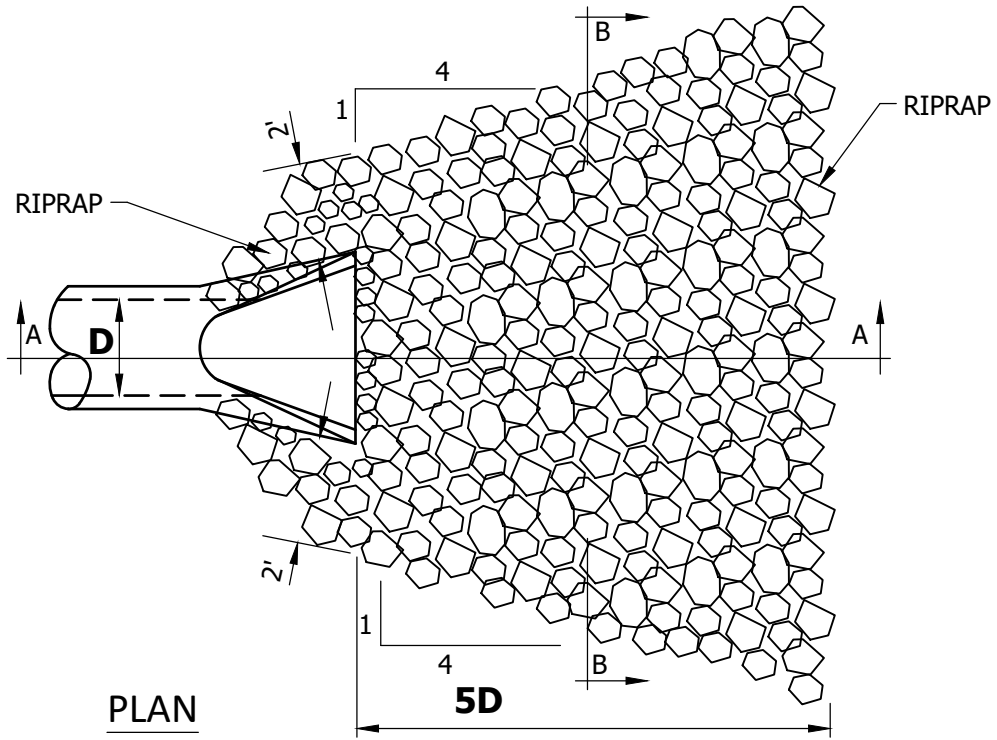
STANDARD DETAILS

FLARED END SECTION
AND TRASH GUARD

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2026

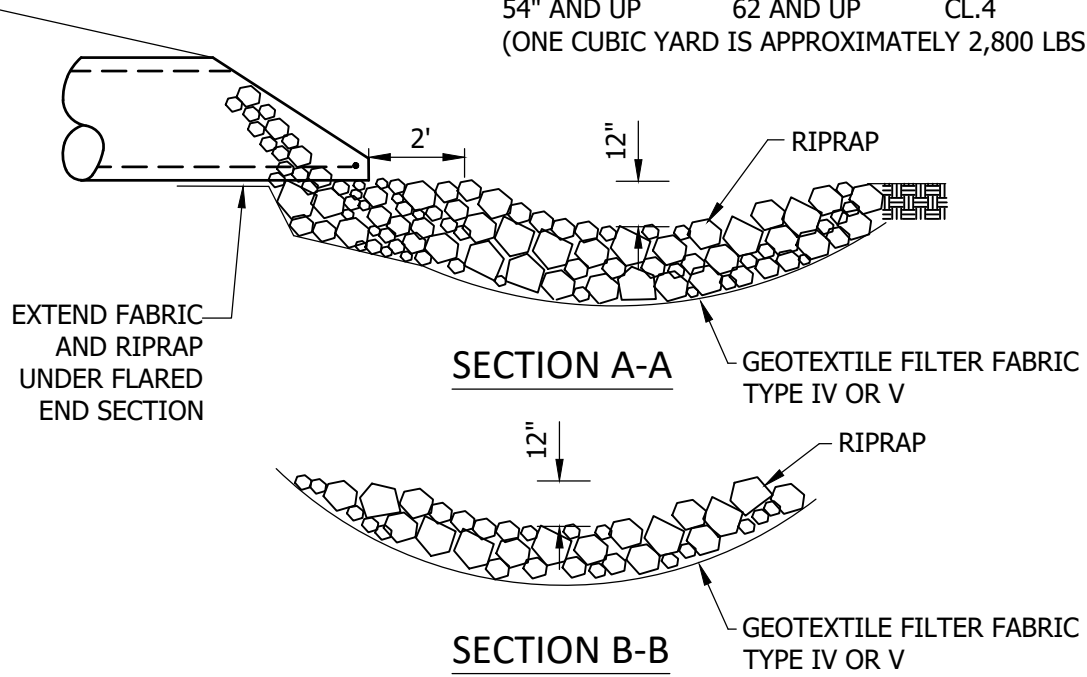
CITY PLATE NO.
STO-12



RIPRAP REQUIREMENTS

| D | CY | CLASS |
|------------|-----------|--------------|
| 12" TO 24" | 8 TO 12 | CL.3 |
| 27" TO 33" | 14 TO 20 | CL.3 |
| 36" TO 48" | 23 TO 38 | CL.3 |
| 54" AND UP | 62 AND UP | CL.4 |

(ONE CUBIC YARD IS APPROXIMATELY 2,800 LBS.)



Forest Lake
AS GOOD AS IT SOUNDS

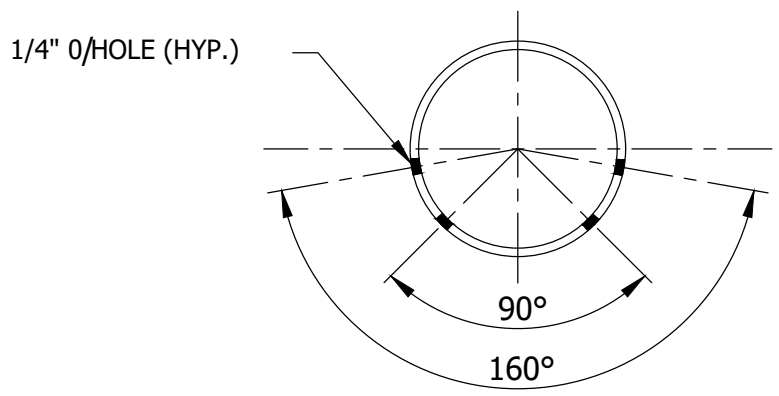
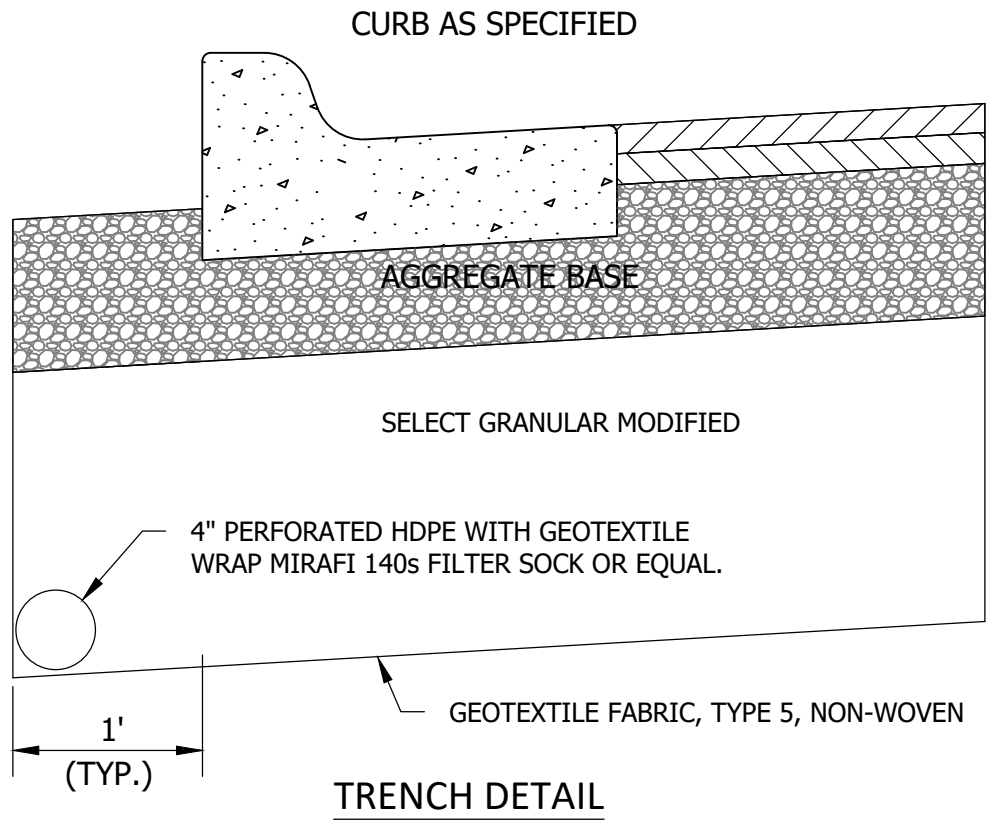
STANDARD DETAILS

RIPRAP AT OUTLETS

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2019

CITY PLATE NO.
STO-13



4" PERFORATED HDPE WITH GEOTEXTILE WRAP MIRAFI 140s FILTER SOCK OR EQUAL.

PIPE DETAIL



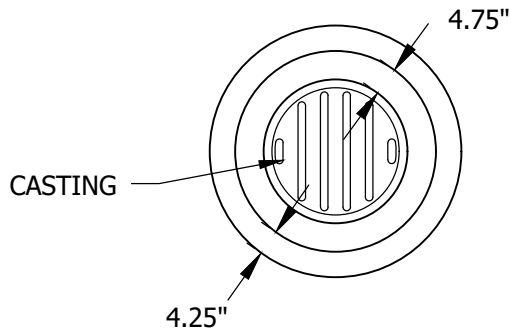
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
4" HDPE PERFORATED DRAINTILE
WITH FILTER SOCK

FOREST LAKE, MINNESOTA

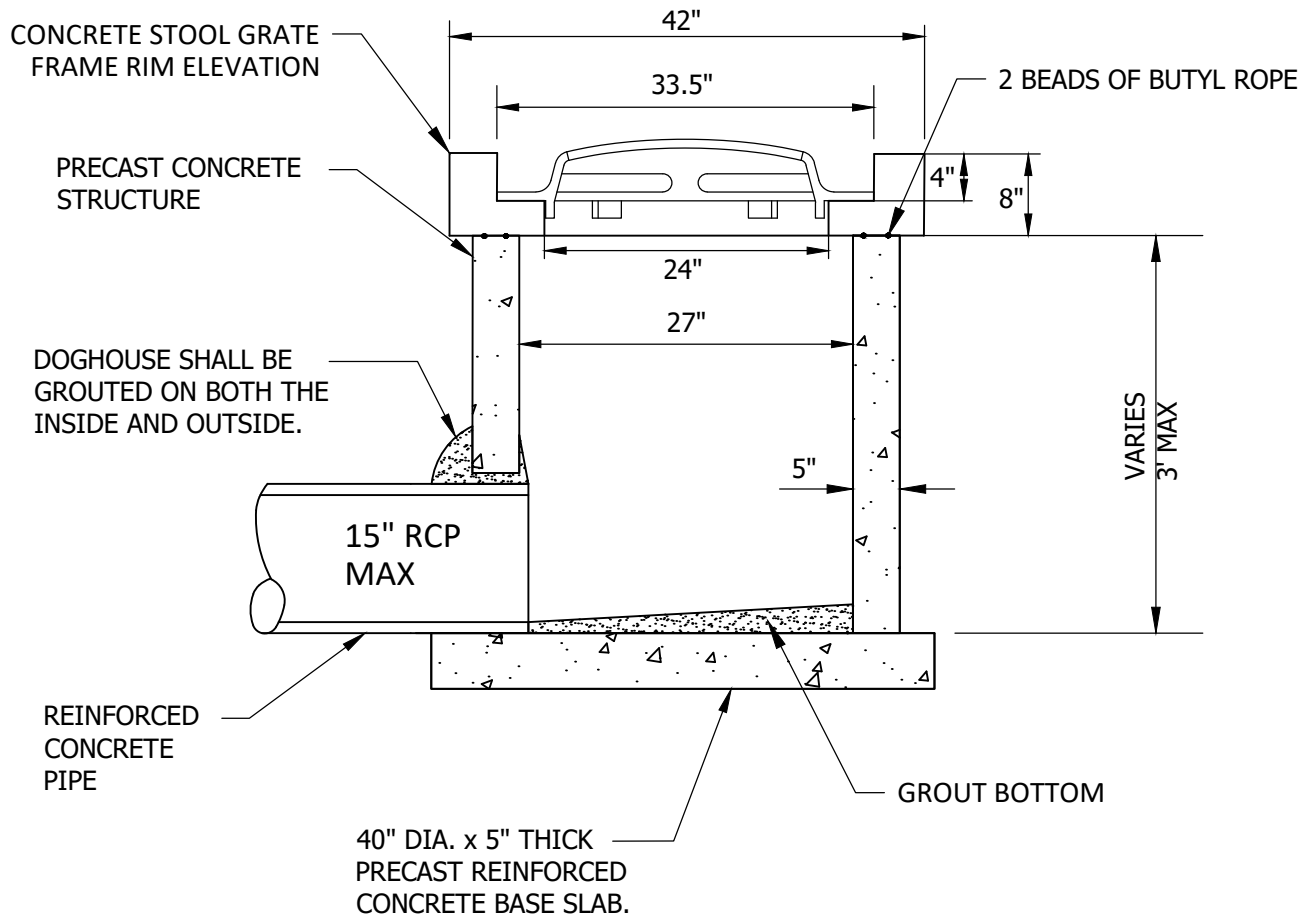
LAST REVISION:
APR 2025

CITY PLATE NO.
STO-20



BEEHIVE CASTING
AS SPECIFIED AND AS PER
DETAIL STR-14

TOP VIEW
GRATE FRAME



NO BLOCK STRUCTURES OR PRECAST
INVERTS ARE ALLOWED. BELL ENDS OF
PIPE ARE NOT ALLOWED IN STRUCTURES.

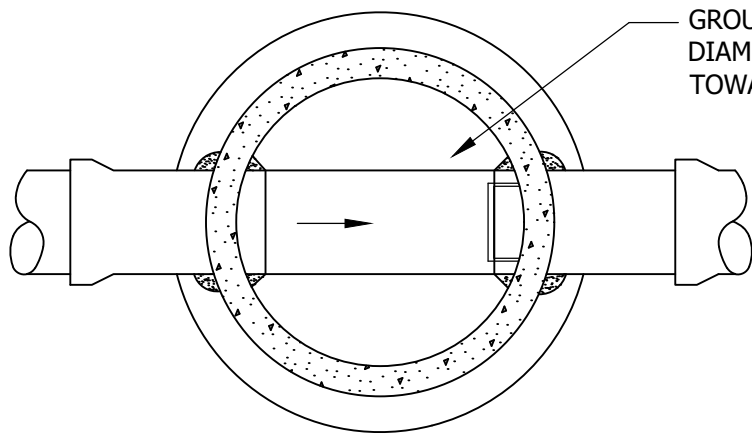


Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
PRECAST 27" SHALLOW
DEPTH BEEHIVE WITH CONCRETE
STOOL GRATE FRAME
FOREST LAKE, MINNESOTA

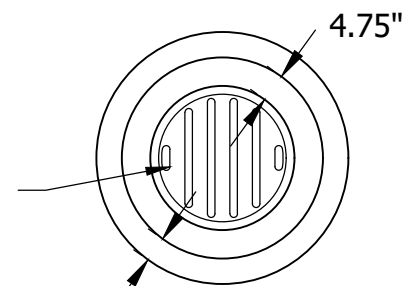
LAST REVISION:
FEB 2026

CITY PLATE NO.
STO-28



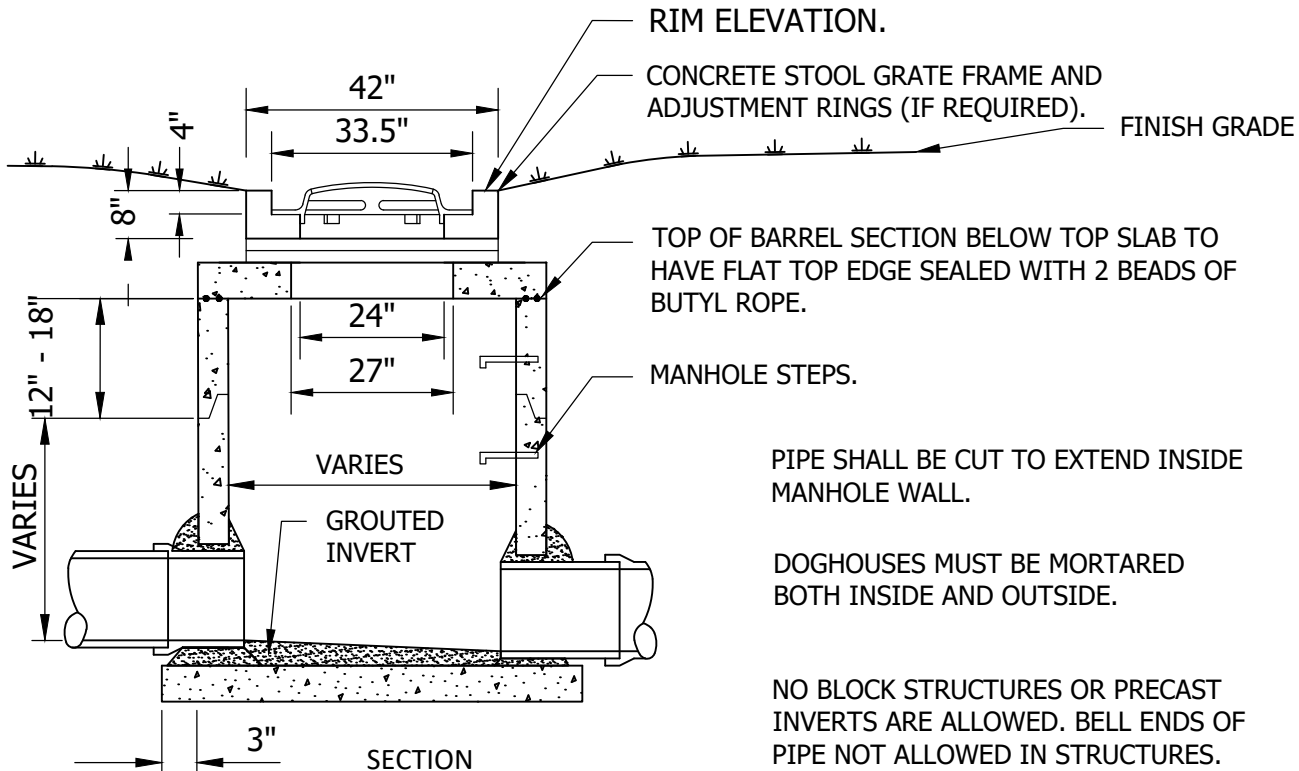
GROUT BOTTOM OF MANHOLE TO 1/2 DIAMETER AT PIPE AND SLOPE GROUT 2" TOWARD INVERT.

PLAN-INVERT



CASTING

4.25" TOP VIEW GRATE FRAME



SECTION

PIPE SHALL BE CUT TO EXTEND INSIDE MANHOLE WALL.

DOGHOUSES MUST BE MORTARED BOTH INSIDE AND OUTSIDE.

NO BLOCK STRUCTURES OR PRECAST INVERTS ARE ALLOWED. BELL ENDS OF PIPE NOT ALLOWED IN STRUCTURES.



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
OFF STREET CATCH BASIN WITH
CONCRETE STOOL GRATE FRAME

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2025

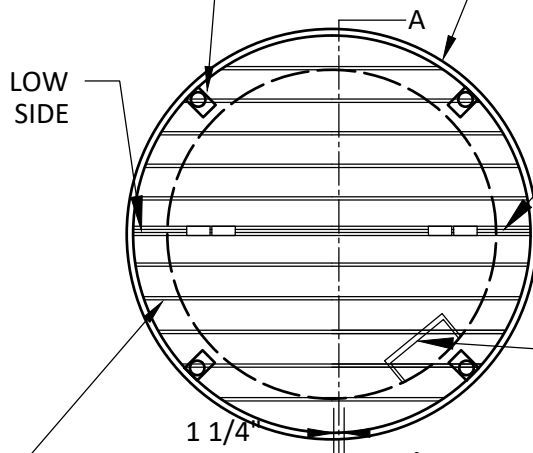
CITY PLATE NO.
STO-29

PROVIDE 4 - 1/2" SS ANCHOR BOLTS

LOW SIDE

OUTER RING

2"x 8" KEYWAY CAST INTO WALL BY SUPPLIER.



ELEV.=xxx.x

HIGH SIDE

ELEV.=xxx.x

MANHOLE STEPS

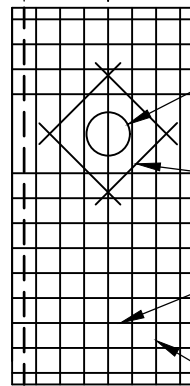
ELEV.=xxx.x

HOT DIPPED GALVANIZED GRATE IN 2 SECTIONS

1 1/4"

SKIMMER GRATE

2.5' 2.5'



xx" Ø HOLE IN BAFFLE WALL

ADDITIONAL #4's x 4'-0" LONG

#4 @ 12" HORIZONTAL

#4 @ 12" VERTICLE

SECTION A-A CONCRETE BAFFLE WALL

SEE GRATE DETAIL

BAFFLE WALL OPTIONAL (PROJECT SPECIFIC)

ELEV.=xxx.x

ELEV.=xxx.x

NWL ELEV.=xxx.x

9" - 24"

Varies

EQUAL TO PIPE OUTLET SIZE

OUTLET

STORM WATER POND

10:1 BENCH

CL. II RIP RAP 12" DEPTH WITH GEOTEXTILE FABRIC

6" CLEARANCE

5' DIA. (TYP.) MANHOLE

8" MIN. INTERGRAL SLAB THICKNESS

BELL ENDS OF PIPE NOT ALLOWED IN STRUCTURE



Forest Lake
AS GOOD AS IT SOUNDS

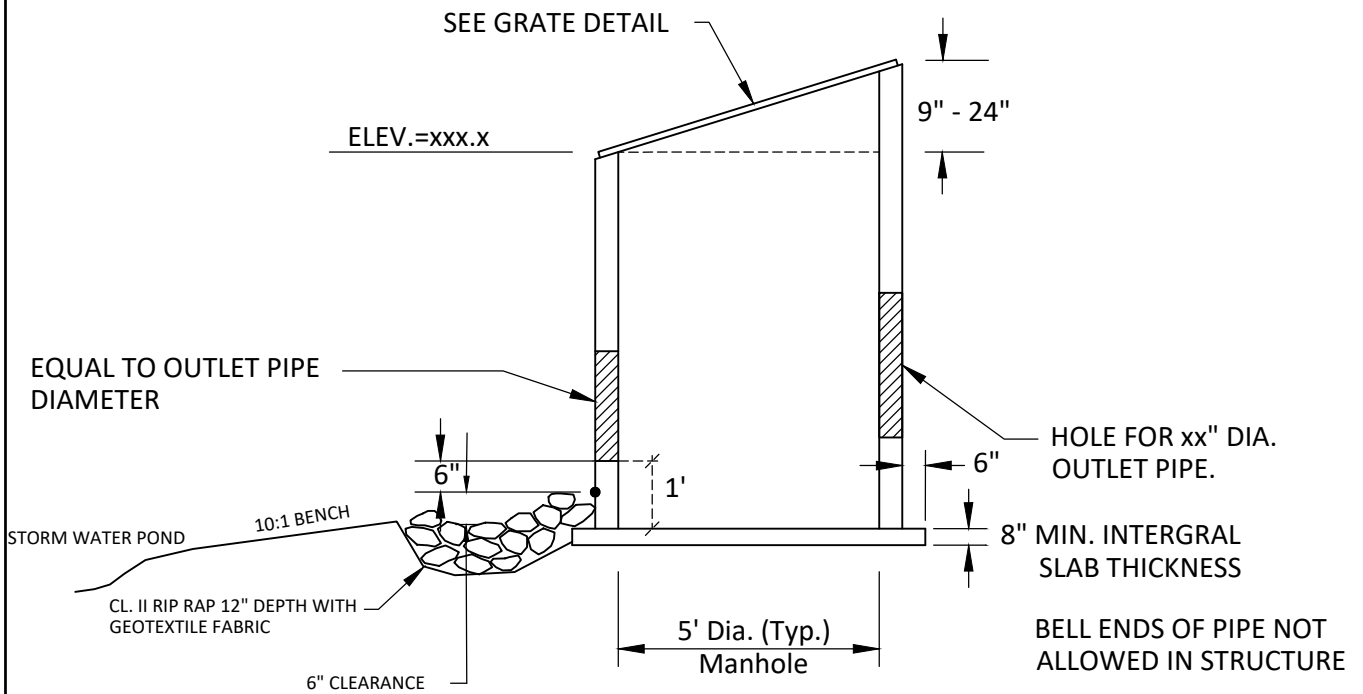
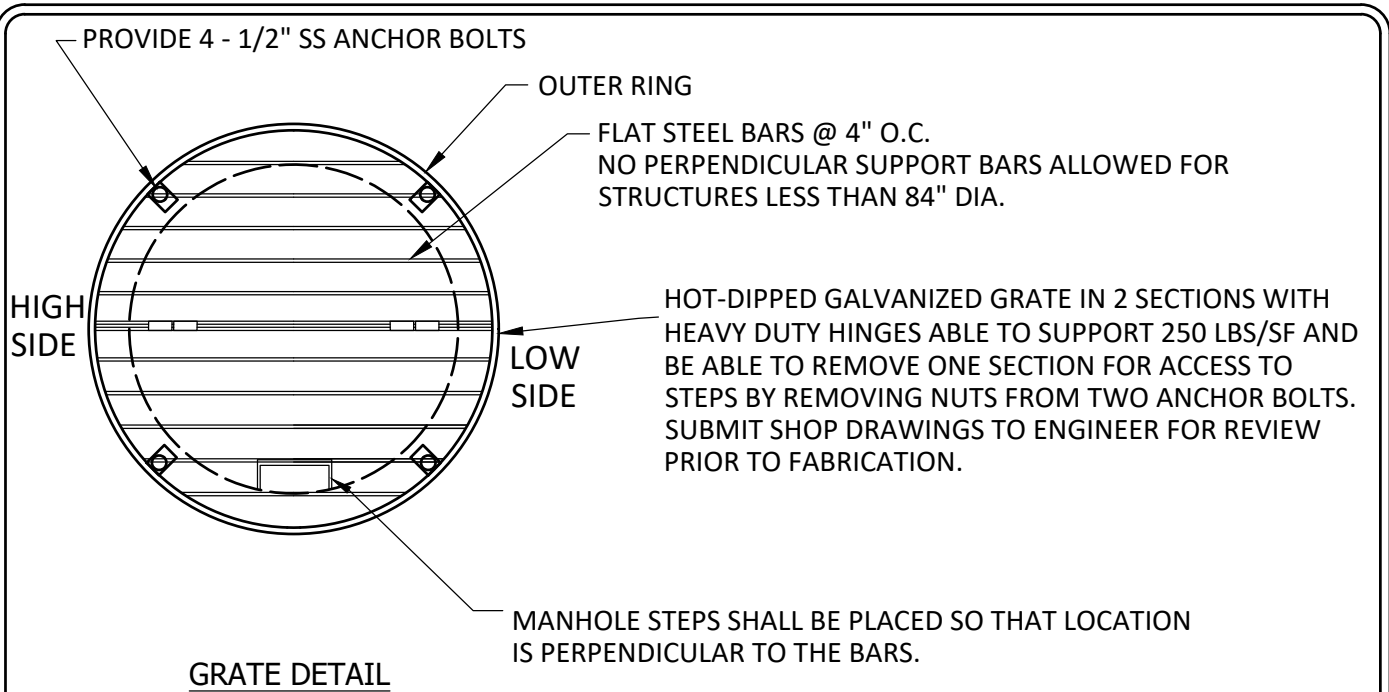
STANDARD DETAILS

POND OUTLET SKIMMER STRUCTURE

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2023

CITY PLATE NO.
STO-31

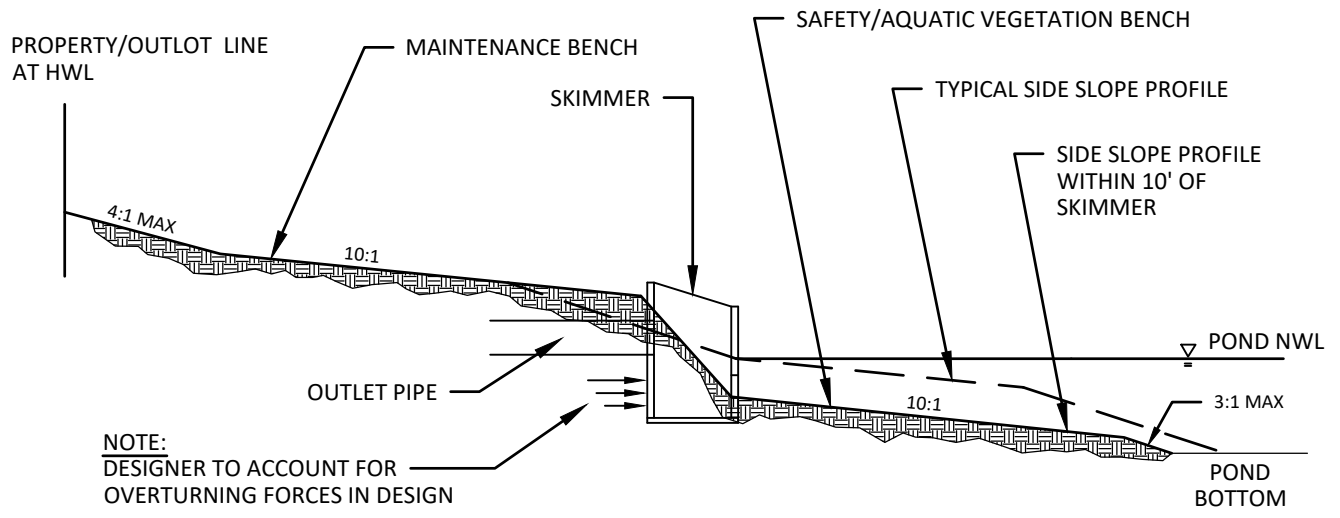


Forest Lake
AS GOOD AS IT SOUNDS

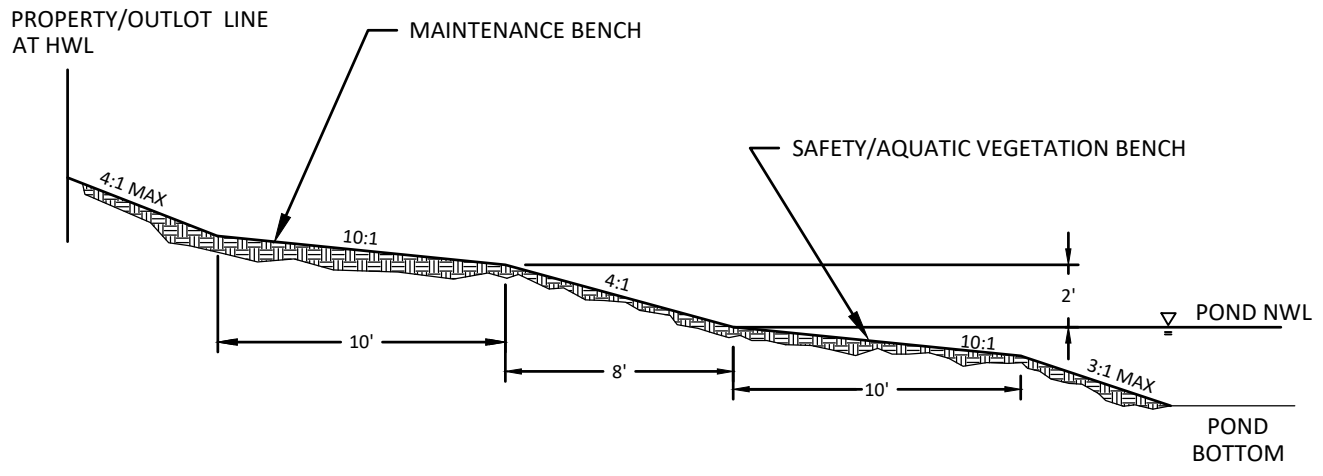
STANDARD DETAILS
POND OUTLET SKIMMER STRUCTURE
WITHOUT BAFFLE WALL
FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2023

CITY PLATE NO.
STO-31A



TYPICAL BENCH DETAIL
WITHIN 10' OF SKIMMER OUTLET



TYPICAL BENCH DETAIL



Forest Lake
AS GOOD AS IT SOUNDS

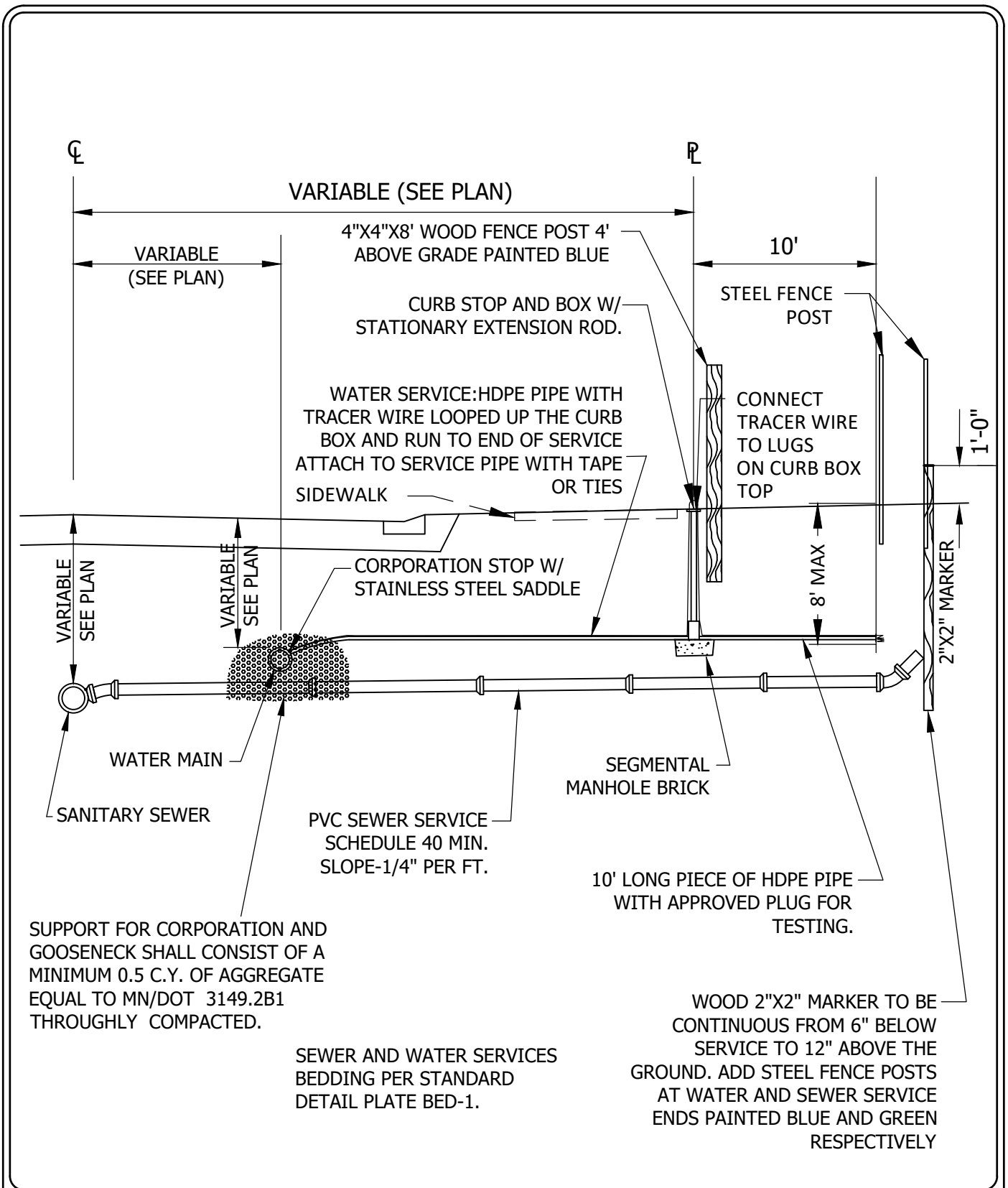
STANDARD DETAILS

TYPICAL BENCH DETAIL

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2016

CITY PLATE NO.
STO-32



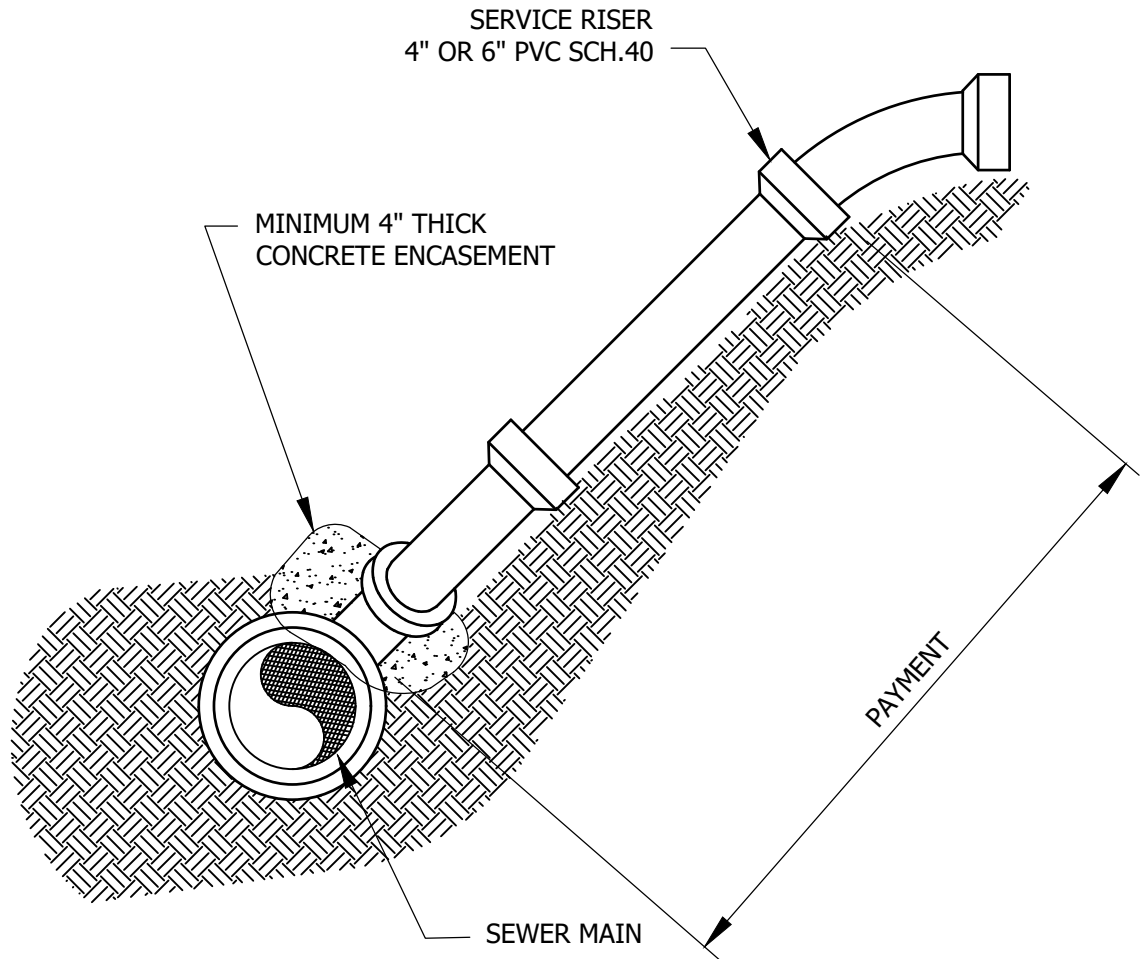
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
SEWER AND WATER
SERVICE CONNECTIONS

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2025

CITY PLATE NO.
SER-1



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

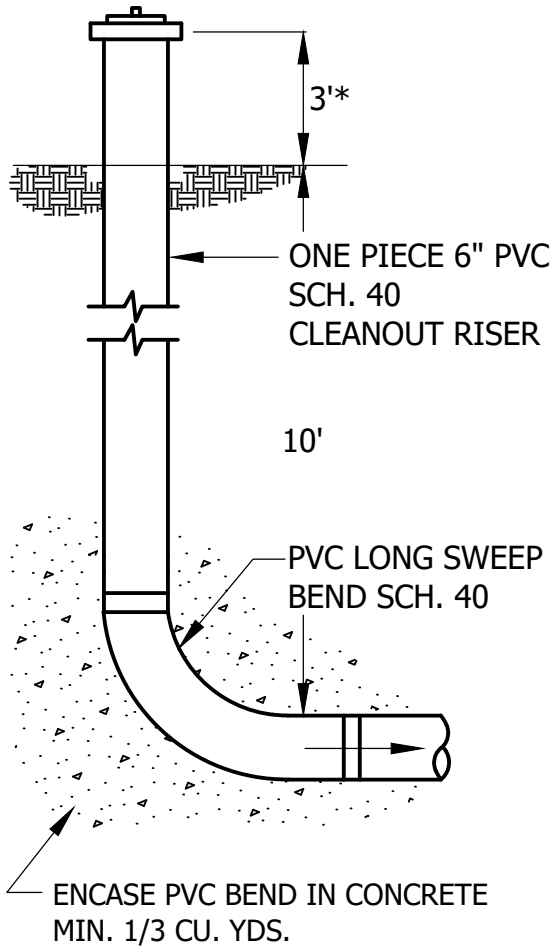
SERVICE RISER

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2021

CITY PLATE NO.
SER-2

NOTE:
6" HUB WITH THREADED
PVC PLUG - DO NOT GLUE

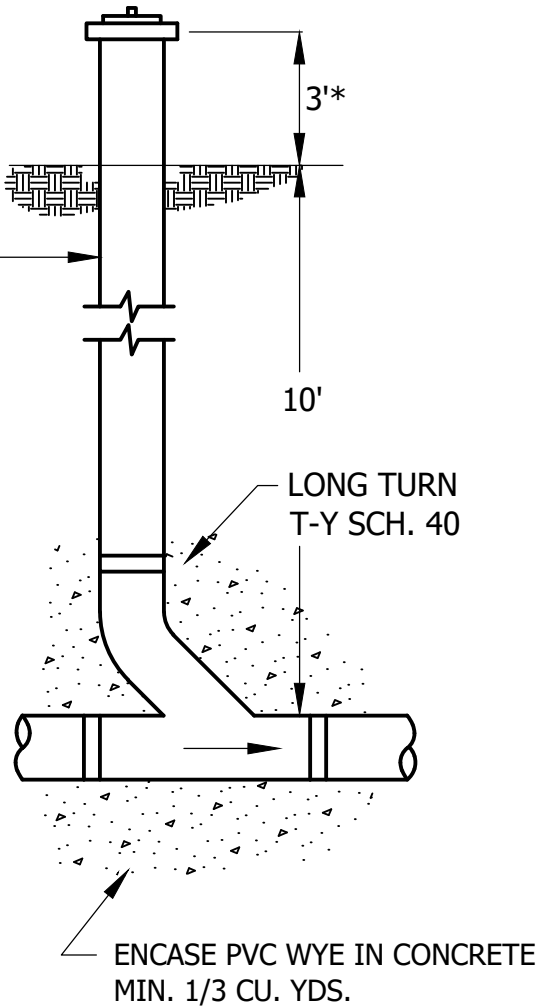


END OF LINE CLEANOUT

CLEANOUTS REQUIRED EVERY 75 FEET

* HOMEOWNER MAY CUT OFF FLUSH WITH GROUND AFTER
LANDSCAPING IS COMPLETED

NOTE:
ENCLOSE LONG SWEEP BEND
OR COMBINATION WYE IN
CONCRETE AS SHOWN.



IN LINE CLEANOUT



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

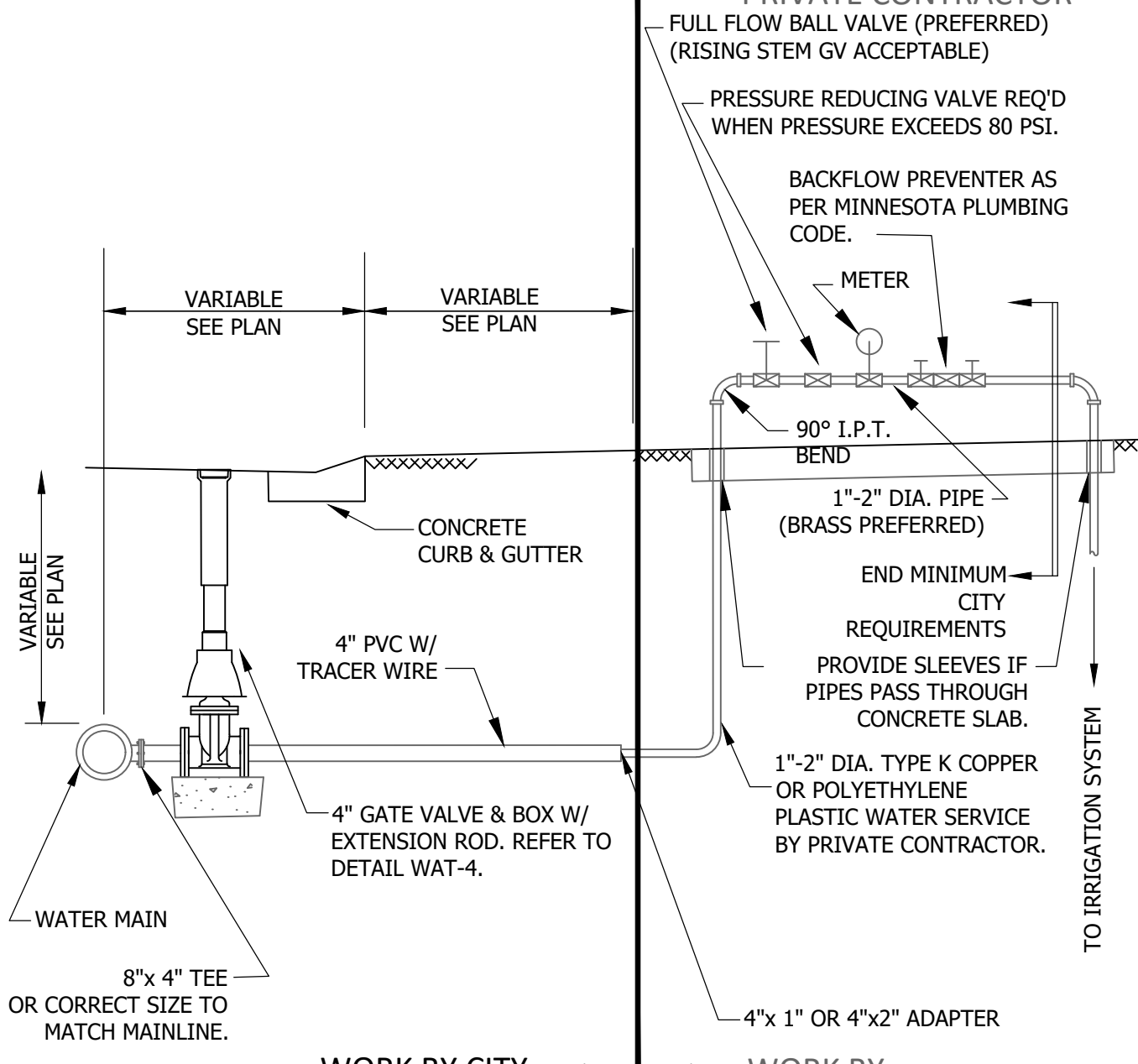
PVC SERVICE LINE CLEANOUTS
FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2025

CITY PLATE NO.
SER-4

WORK BY CITY

WORK BY PRIVATE CONTRACTOR



- NOTES:
1. CITY WATER SERVICE & PLUMBING PERMITS REQUIRED FOR WORK BY PRIVATE CONTRACTORS.
 2. ANNUAL TESTING OF RPZ REQUIRED.
 3. REQUIRED EQUIPMENT MUST BE ENCLOSED AND SUPPORTED.
 4. SLEEVES FOR PIPES IN CONCRETE SLABS SHALL BE 4" DIAMETER PVC OR SIMILAR.



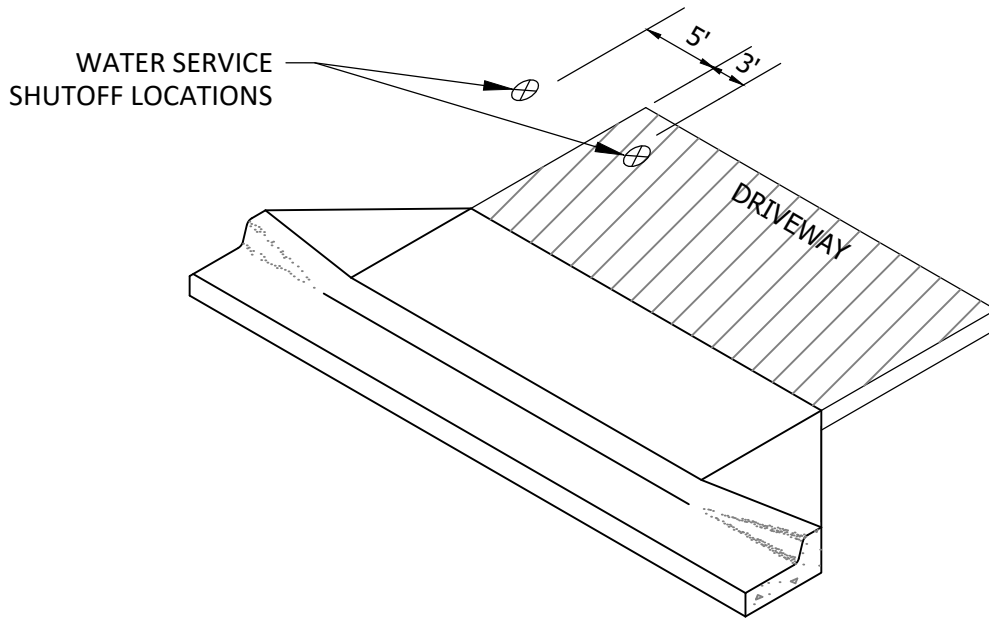
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
IRRIGATION SERVICE
BY PRIVATE CONTRACTOR

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2021

CITY PLATE NO.
SER-5



ISOMETRIC
NO SCALE

NOTES:

1. WATER SERVICE SHUTOFF TO BE LOCATED A MINIMUM OF 5' OUTSIDE OF THE DRIVEWAY EDGE, OR A MINIMUM OF 3' INSIDE OF THE DRIVEWAY EDGE.
2. SHUT OFFS LOCATED IN THE DRIVEWAY WILL REQUIRE A NEENAH R-1914-A CASTING WITH A LOCKING COVER OR APPROVED EQUAL.



Forest Lake
AS GOOD AS IT SOUNDS

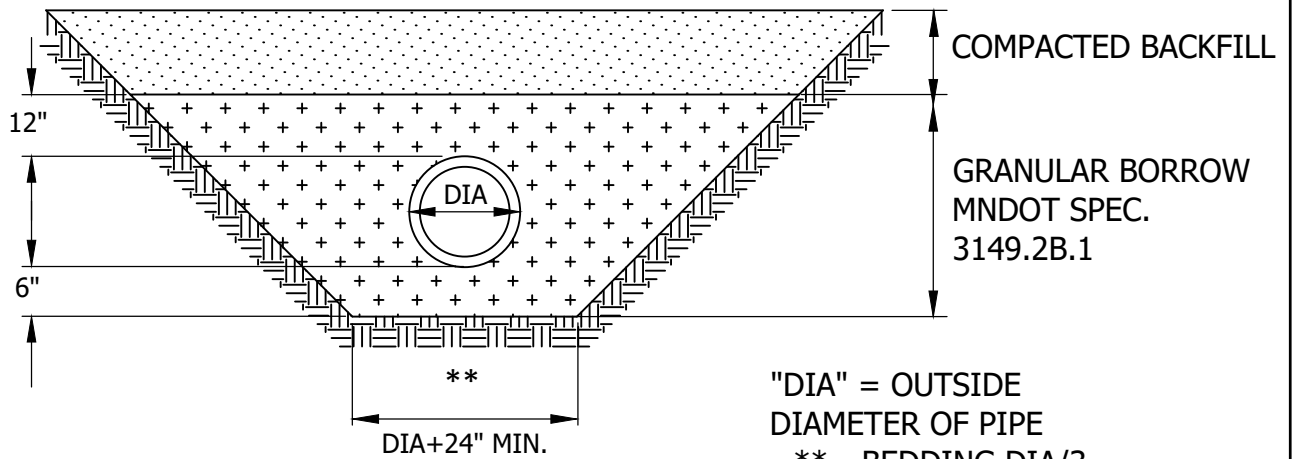
STANDARD DETAILS

WATER SERVICE SHUT OFF LOCATION

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2013

CITY PLATE NO.
SER-6



"DIA" = OUTSIDE
DIAMETER OF PIPE
** BEDDING DIA/3
WIDE.
LOOSELY
PLACED/UNCOMPACTED
MATERIAL

PIPE FOUNDATION & BEDDING
GOOD SOILS



Forest Lake
AS GOOD AS IT SOUNDS

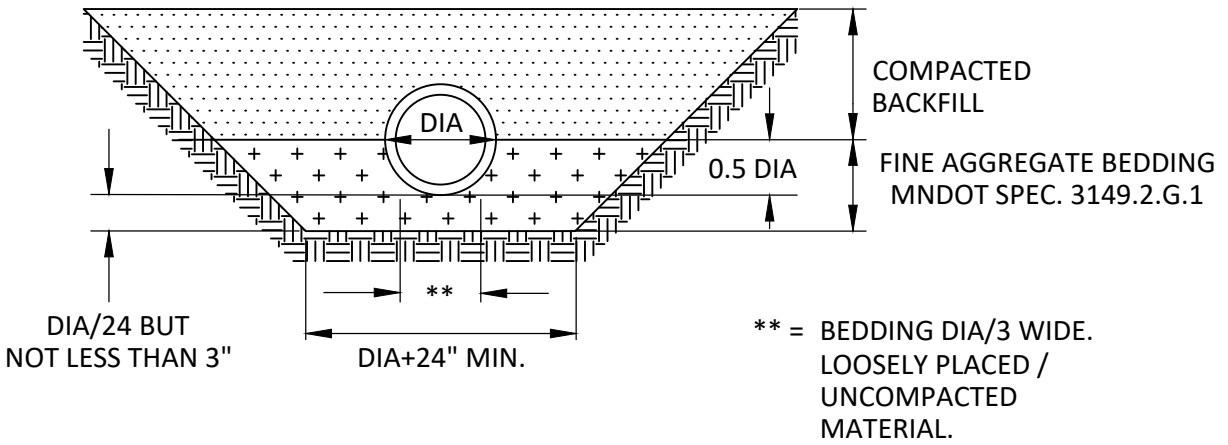
STANDARD DETAILS

PIPE FOUNDATION & BEDDING
METHODS FOR PVC

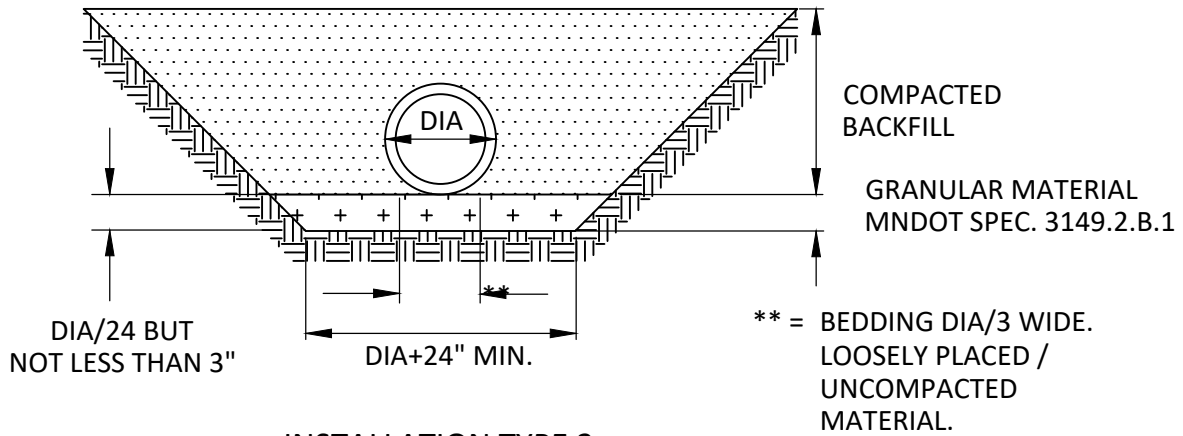
FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2026

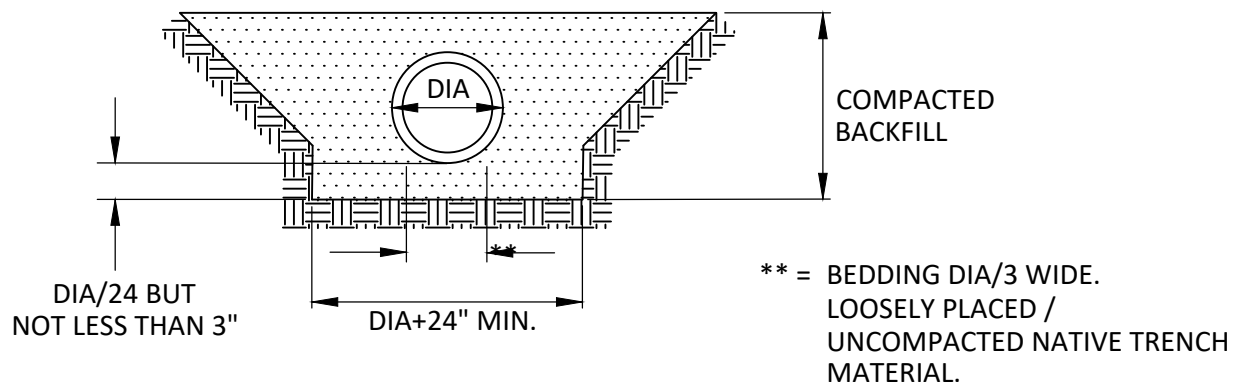
CITY PLATE NO.
BED-1



INSTALLATION TYPE 1



INSTALLATION TYPE 2



INSTALLATION TYPE 3



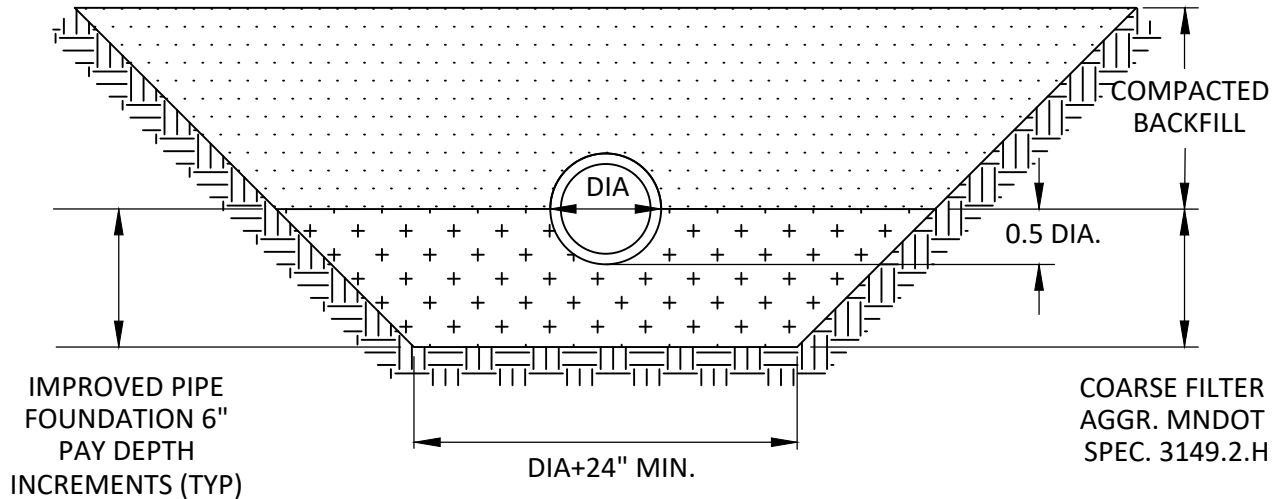
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
BEDDING METHODS FOR RCP
OR DIP

FOREST LAKE, MINNESOTA

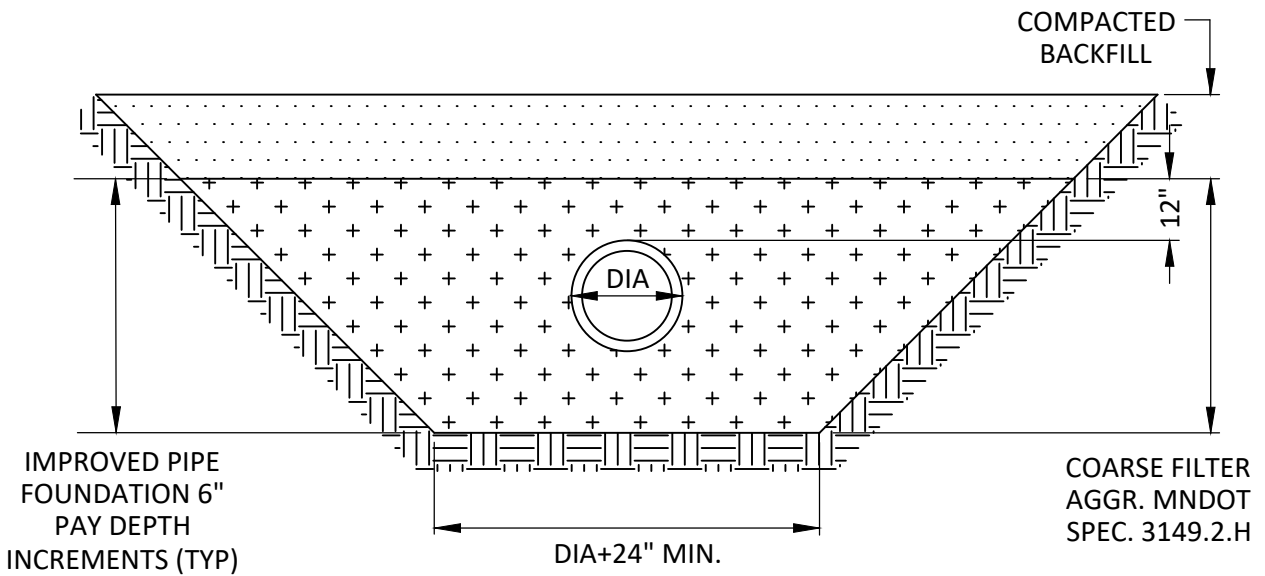
LAST REVISION:
MAR 2025

CITY PLATE NO.
BED-2



DIA = OUTSIDE DIAMETER OF PIPE

RCP



DIA = OUTSIDE DIAMETER OF PIPE

PVC



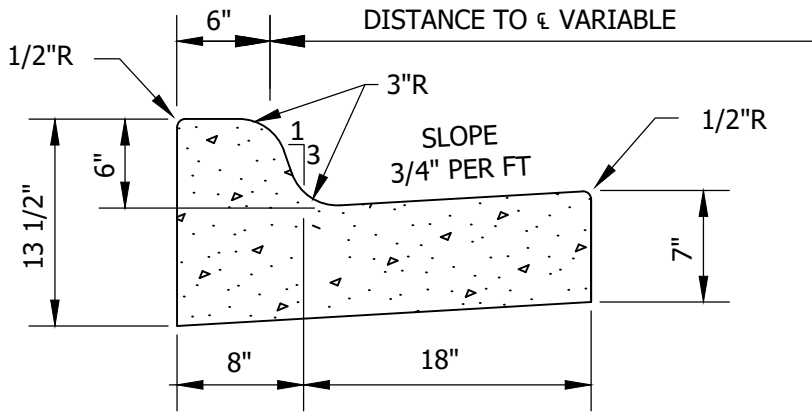
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
IMPROVED FOUNDATION FOR
RCP AND PVC

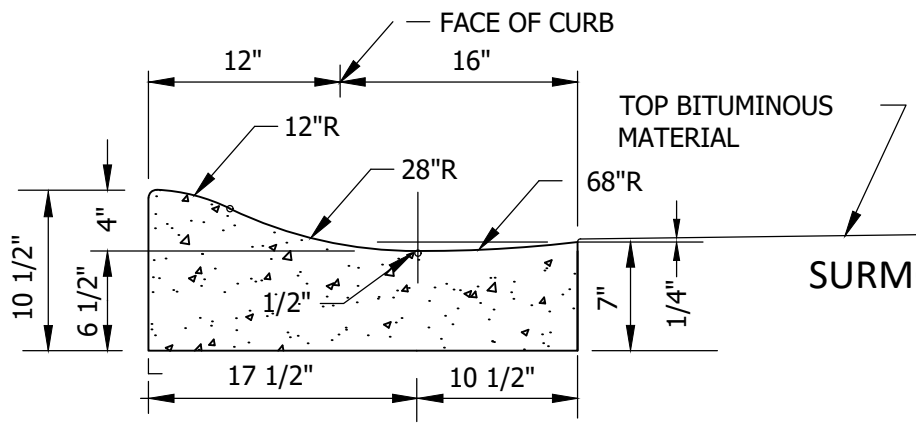
FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2021

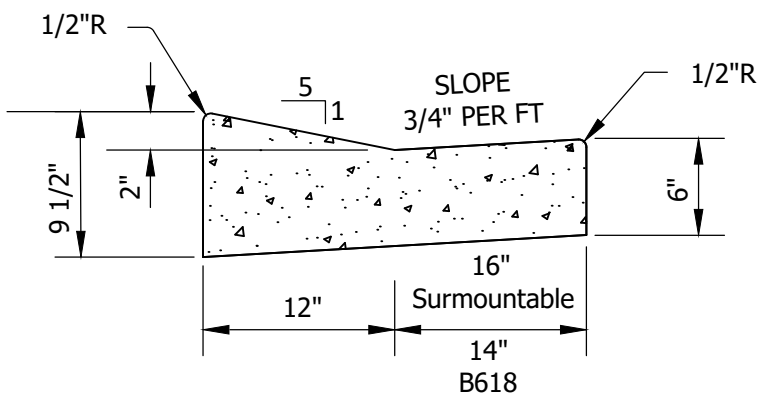
CITY PLATE NO.
BED-3



MNDOT B618



SURMOUNTABLE



DRIVEWAY



Forest Lake
AS GOOD AS IT SOUNDS

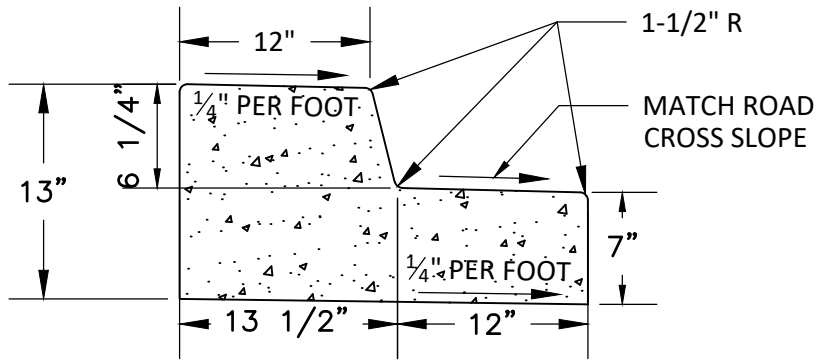
STANDARD DETAILS

CURB AND GUTTER

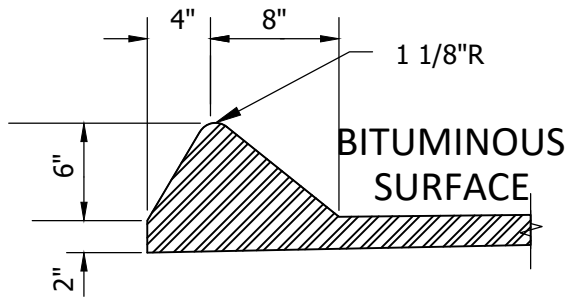
FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2021

CITY PLATE NO.
STR-1



PARKWAY CURB



6" SHOE FORMED



Forest Lake
AS GOOD AS IT SOUNDS

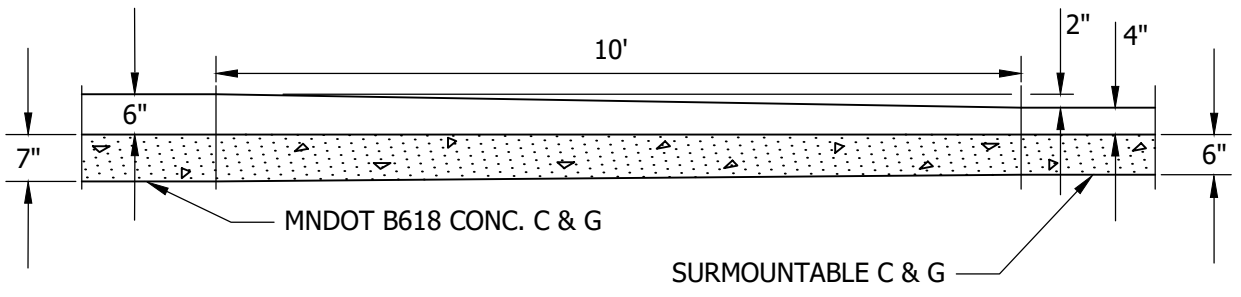
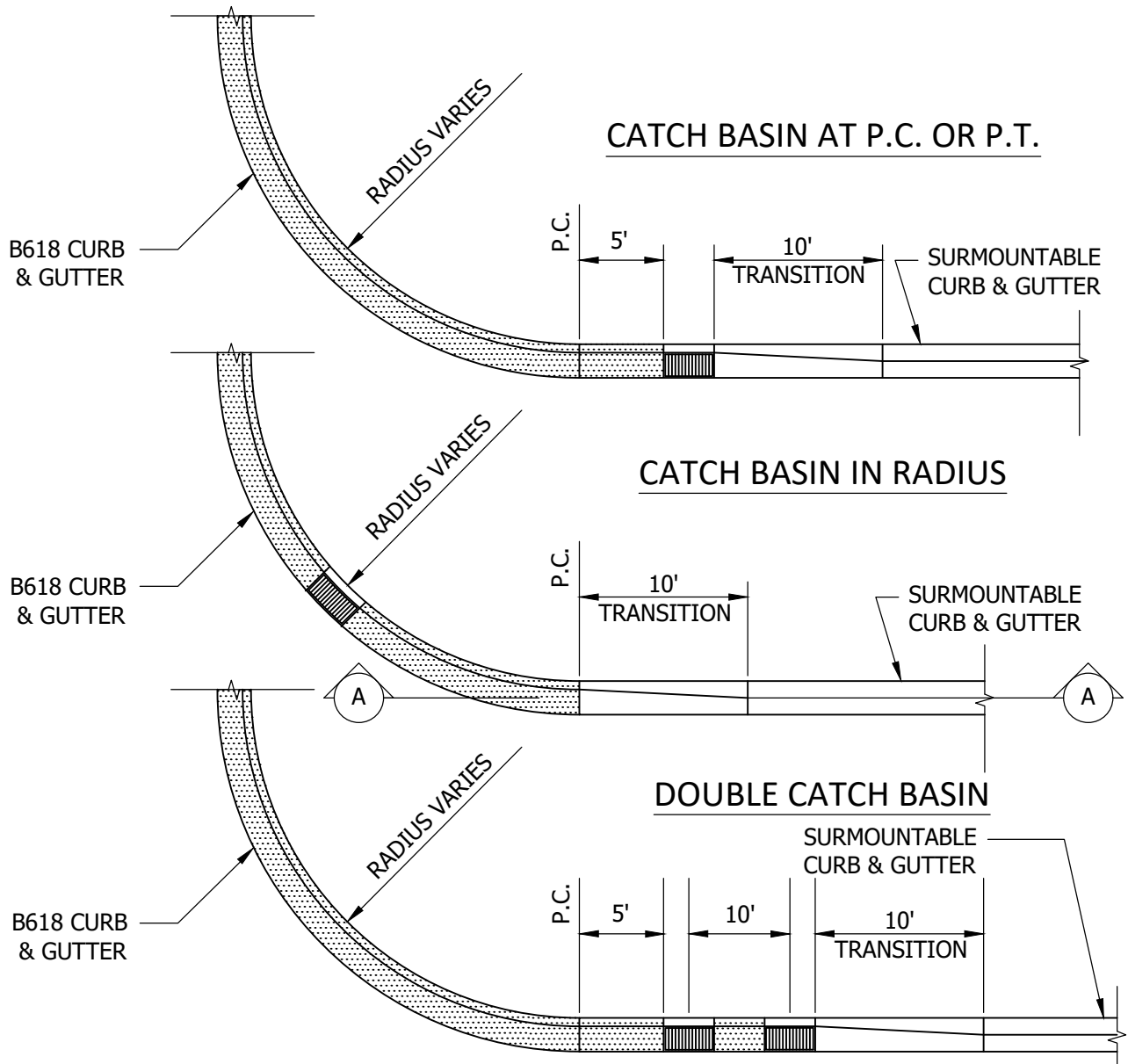
STANDARD DETAILS

CURB AND GUTTER

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2021

CITY PLATE NO.
STR-1A



SECTION A-A



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
CONCRETE CURB & GUTTER

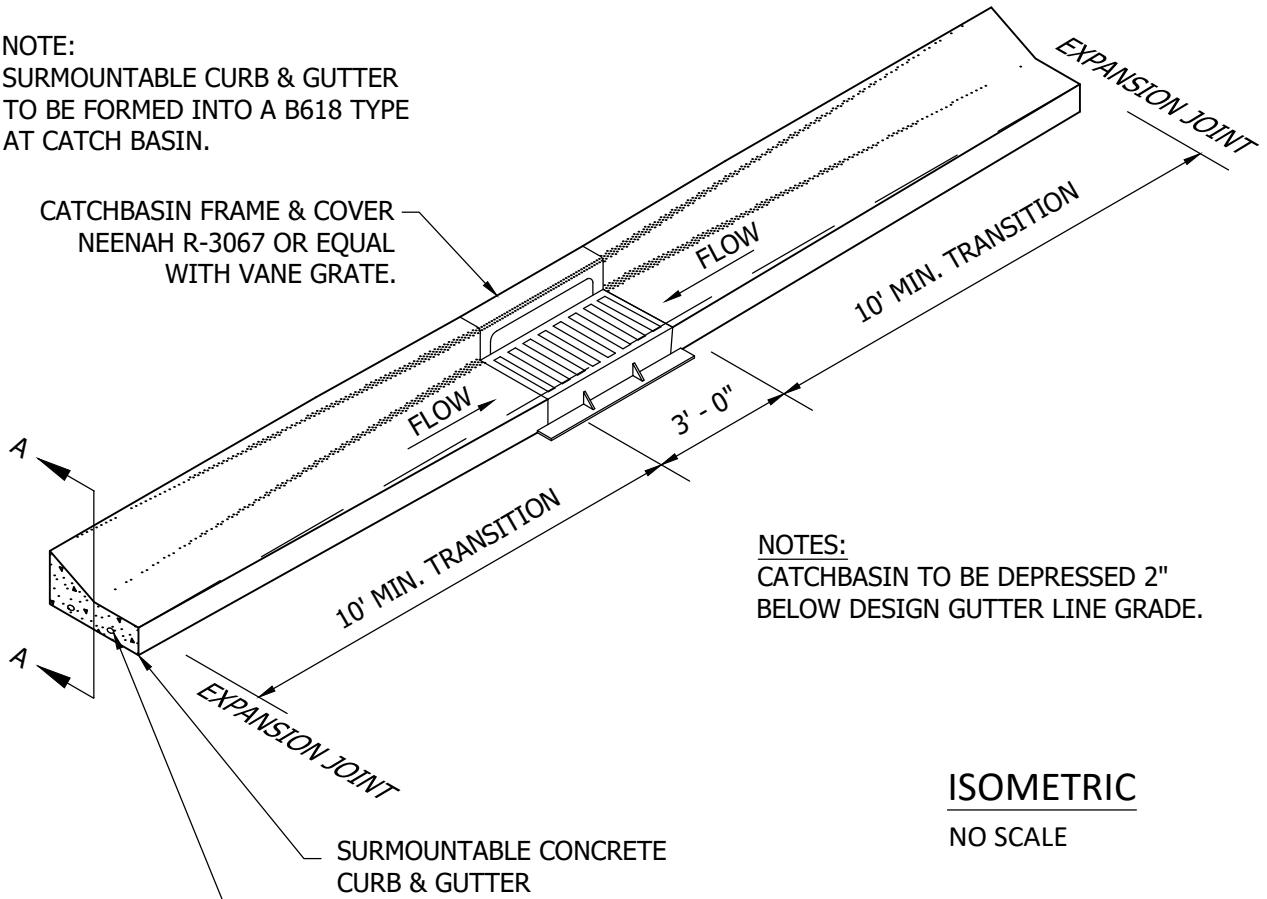
FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2026

CITY PLATE NO.
STR-2

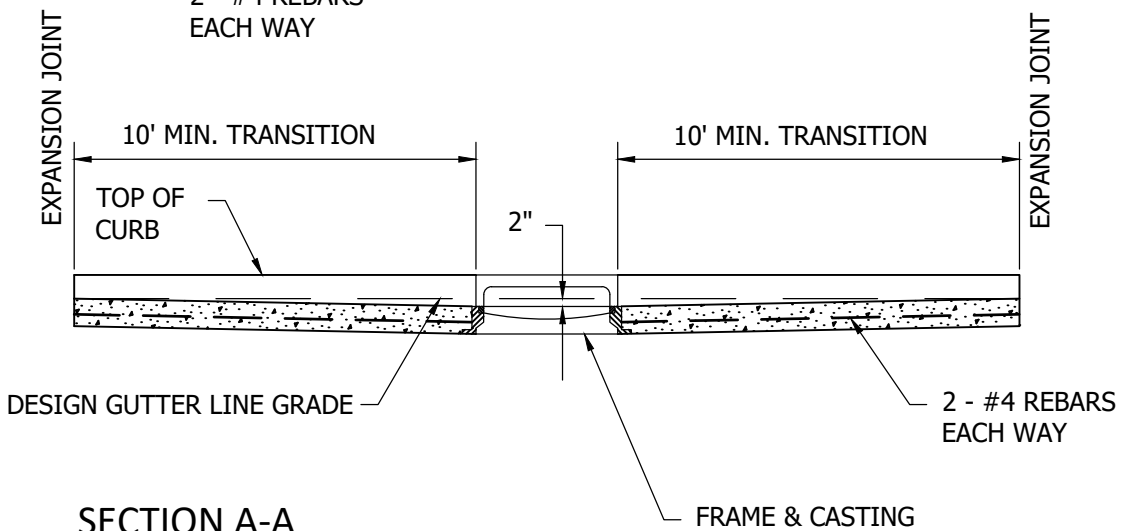
NOTE:
SURMOUNTABLE CURB & GUTTER
TO BE FORMED INTO A B618 TYPE
AT CATCH BASIN.

CATCHBASIN FRAME & COVER
NEENAH R-3067 OR EQUAL
WITH VANE GRATE.



NOTES:
CATCHBASIN TO BE DEPRESSED 2"
BELOW DESIGN GUTTER LINE GRADE.

ISOMETRIC
NO SCALE



SECTION A-A
NO SCALE

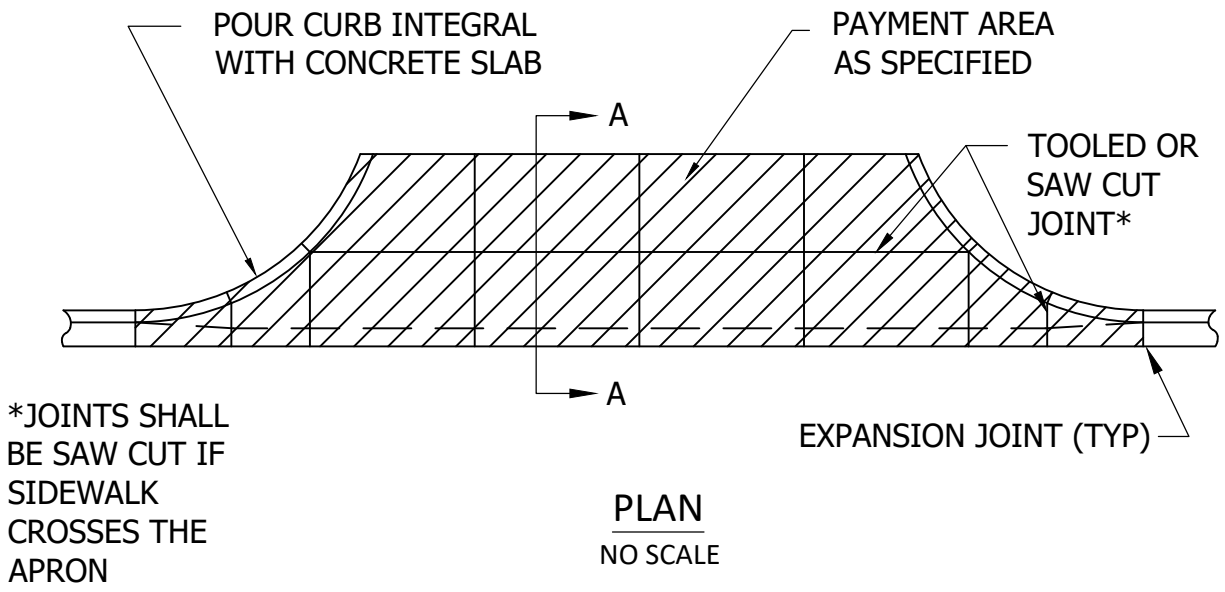
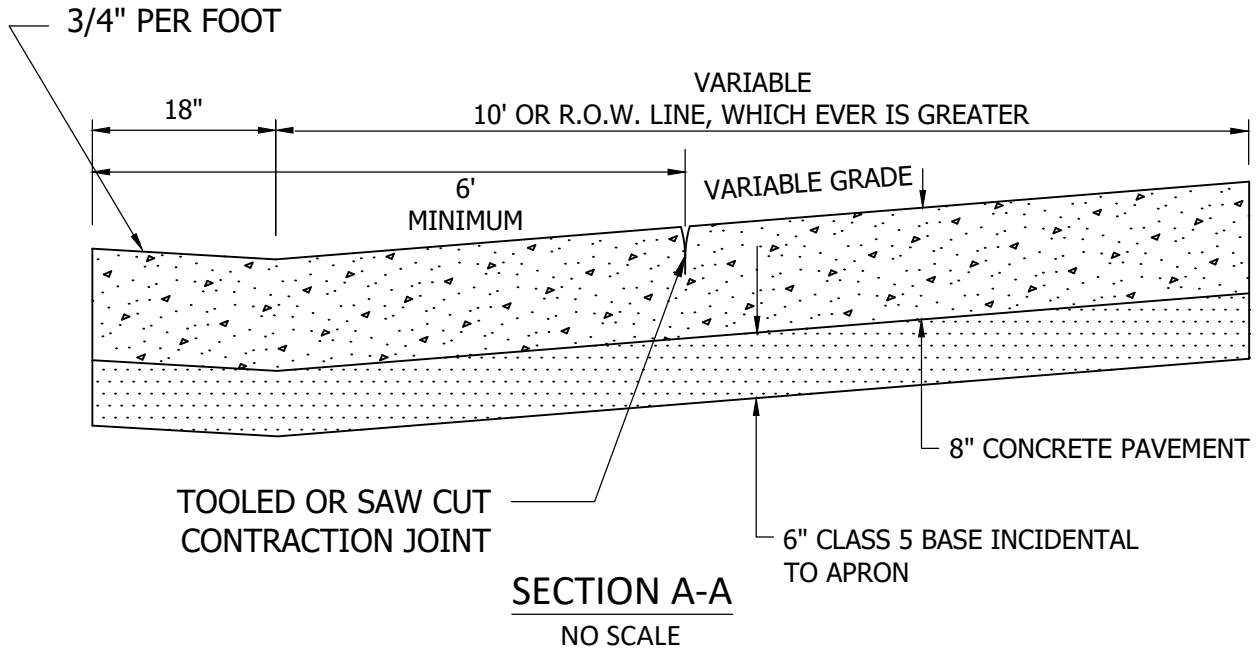


STANDARD DETAILS
SURMOUNTABLE CURB & GUTTER
CONSTRUCTION AT CATCHBASIN

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 1996

CITY PLATE NO.
STR-3



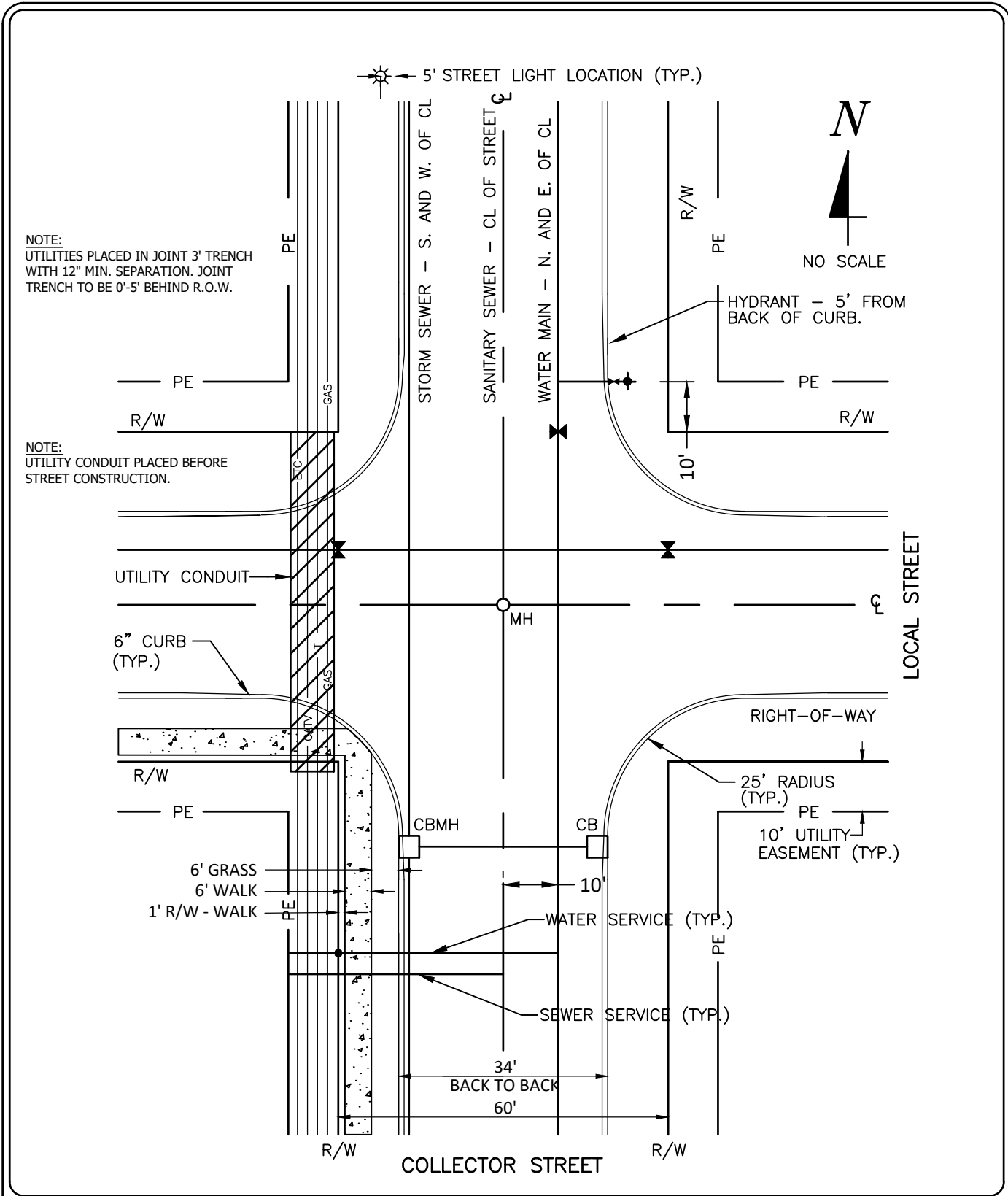
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
CONCRETE COMMERCIAL
DRIVEWAY APRON

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2026

CITY PLATE NO.
STR-4



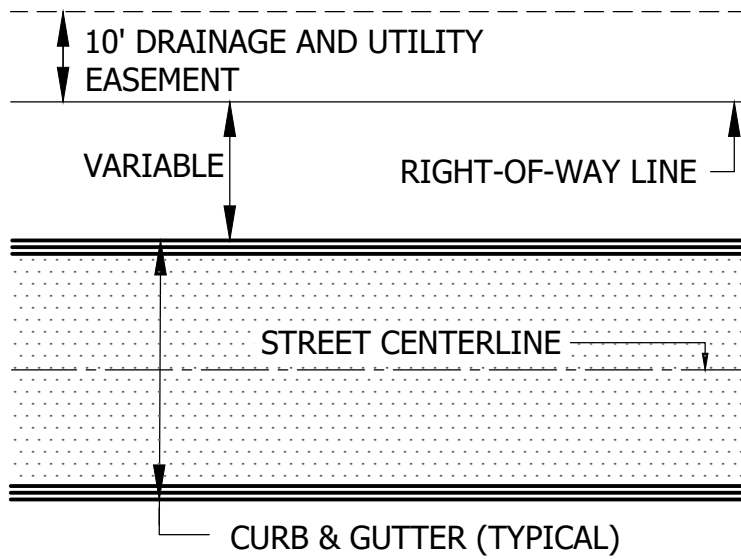
STANDARD DETAILS
TYPICAL UTILITY LOCATIONS
(PUBLIC AND PRIVATE)

FOREST LAKE, MINNESOTA

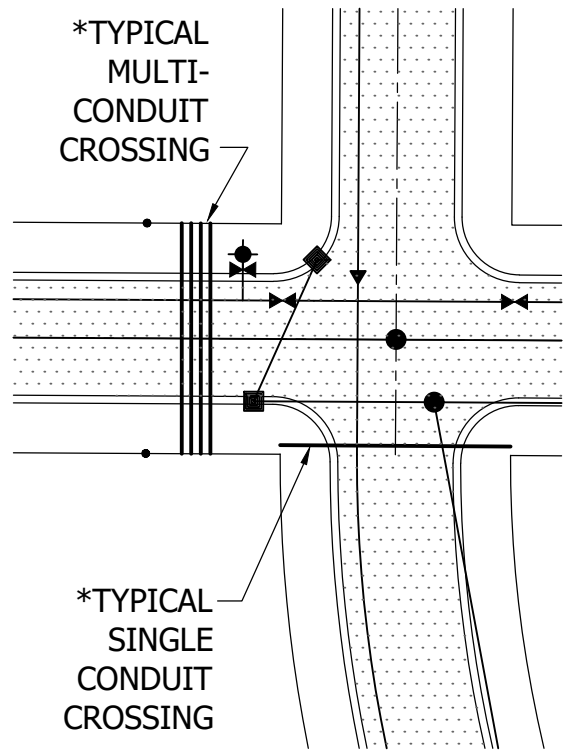
LAST REVISION:
FEB 2026

CITY PLATE NO.
STR-6

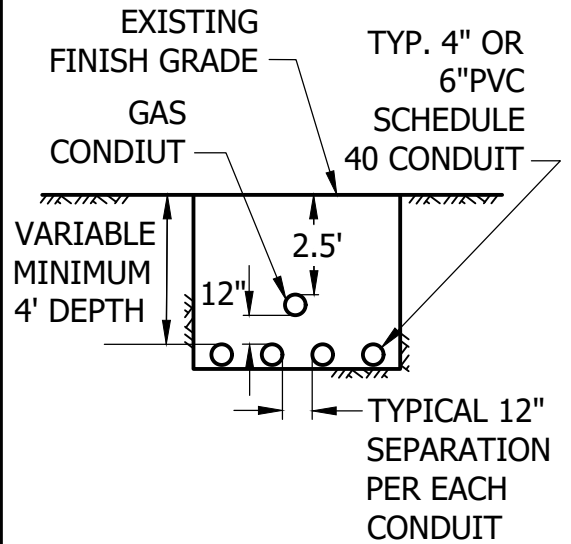
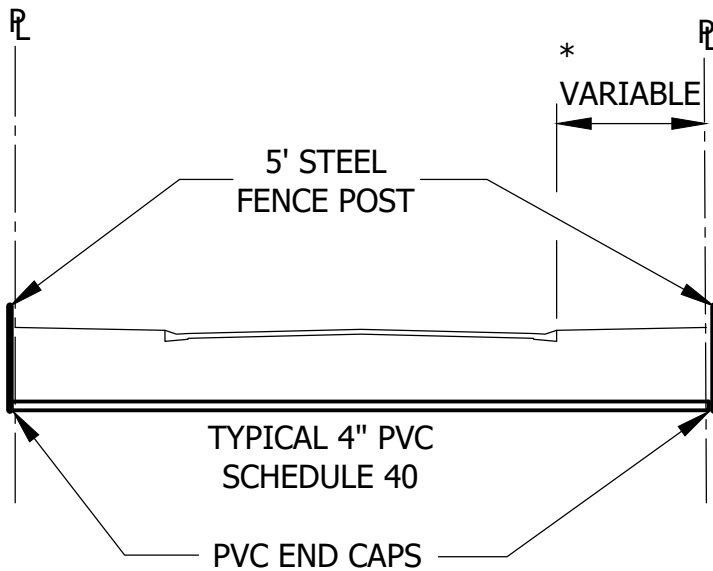
(NOTE: ALL UTILITIES IN SAME TRENCH)
TRENCH WIDTH VARIES, MAXIMUM OF 5'



*TYPICAL
MULTI-
CONDUIT
CROSSING



*TYPICAL
SINGLE
CONDUIT
CROSSING



Forest Lake
AS GOOD AS IT SOUNDS

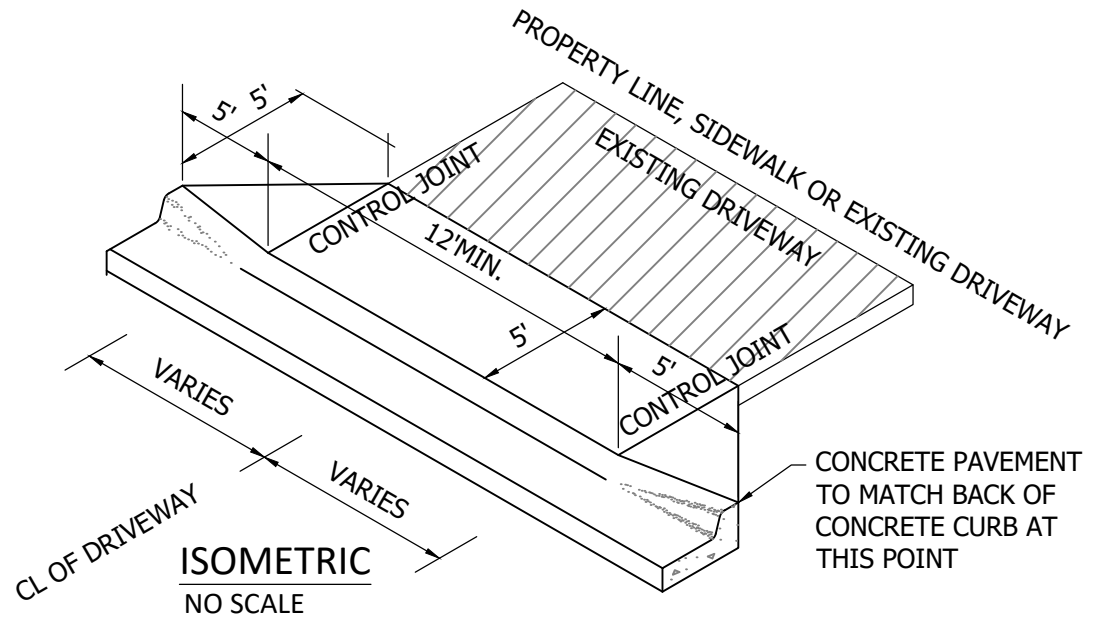
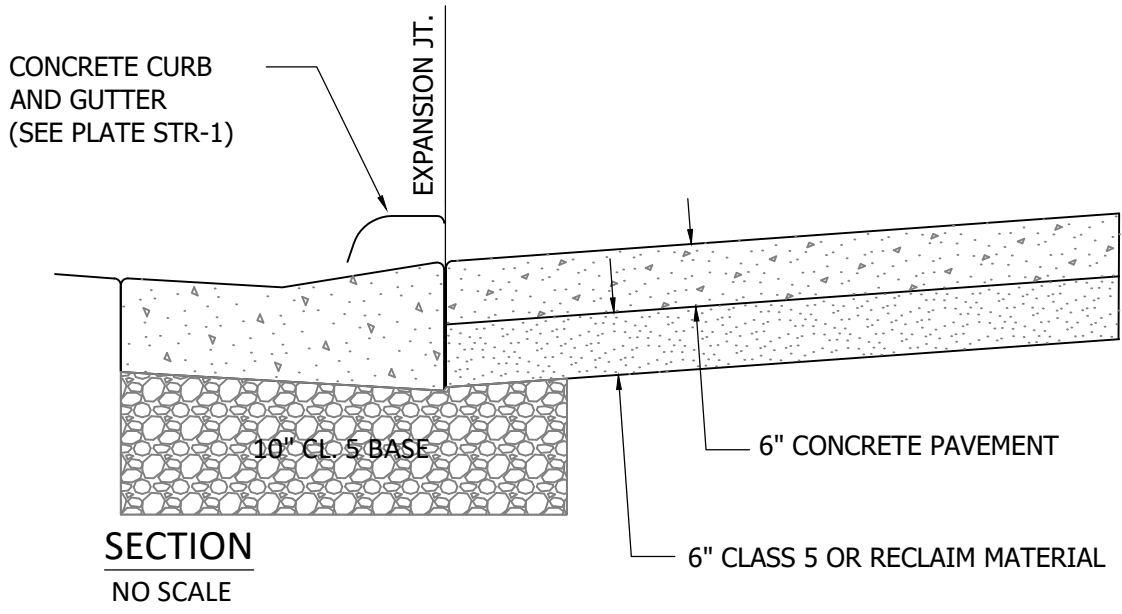
STANDARD DETAILS

PRIVATE UTILITY
CONDUIT CROSSING

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2021

CITY PLATE NO.
STR-7



- NOTE:**
1. CONTROL JOINTS IN CONCRETE CURB NOT TO EXCEED 10' SPACING THROUGH DRIVEWAY SECTION.
 2. ALL DRIVEWAYS MUST BE AT LEAST 5 FEET FROM THE PROPERTY LINE AND AT LEAST 30 FEET FROM A STREET RIGHT -OF-WAY.
 3. ONLY ONE DRIVEWAY ENTRANCE PER PARCEL UNLESS OTHERWISE APPROVED BY CITY.
 4. NEENAH R-1914-A CASTING IS REQUIRED FOR CURB STOPS LOCATED IN DRIVEWAYS.
 5. MAX. CROSS SLOPE OF SIDEWALK THROUGH DRIVEWAY IS 0.02 FT/FT. ADJUST APRON RUNNING SLOPE AS NEEDED.



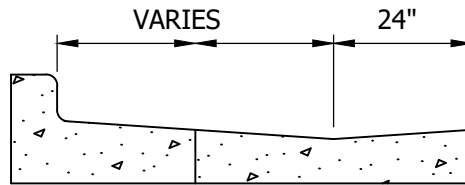
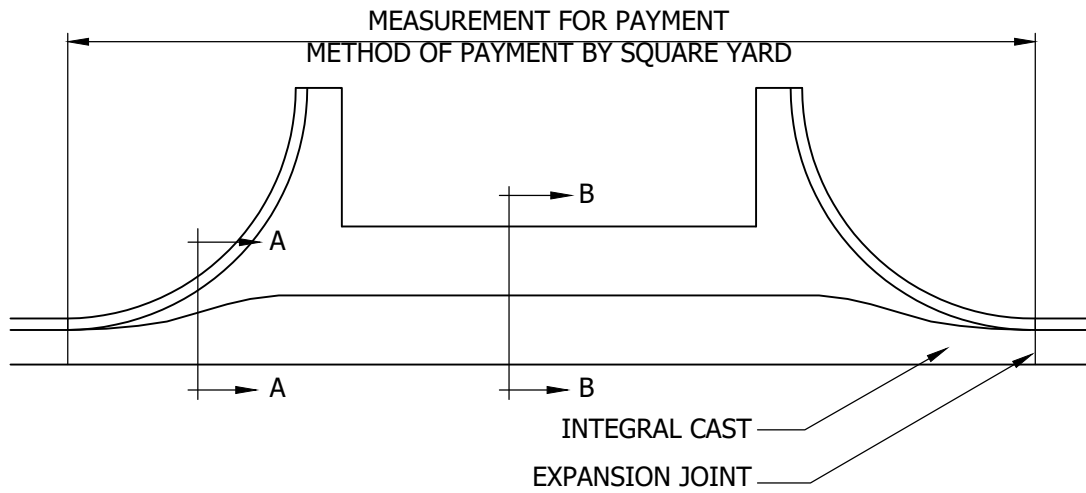
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
URBAN RESIDENTIAL CONCRETE
DRIVEWAY APRON

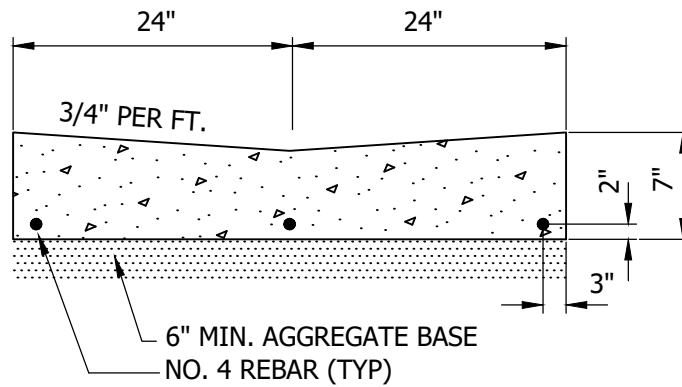
FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2022

CITY PLATE NO.
STR-9



SECTION A-A THRU
B618 C & G



SECTION B-B
THRU CONCRETE GUTTER



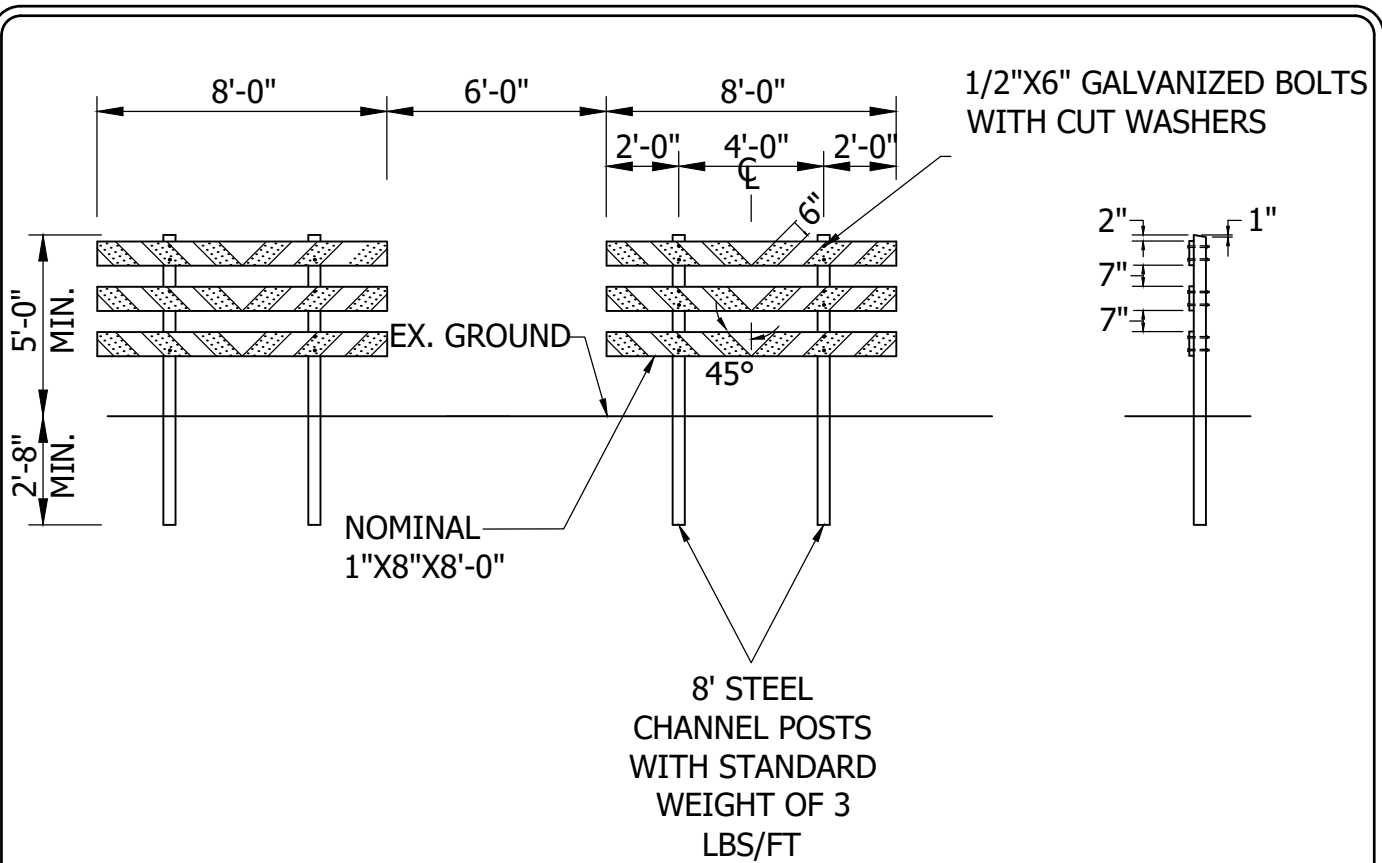
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
CONCRETE VALLEY GUTTER

FOREST LAKE, MINNESOTA

LAST REVISION:
JAN 2022

CITY PLATE NO.
STR-10



NOTES:

1. THE BARRICADE FACE SURFACES SHALL BE FULLY REFLECTORIZED IN ALTERNATE SILVER-WHITE AND RED STRIPING, USING A REFLECTIVE SHEETING CONFORMING TO THE REQUIREMENTS OF MNDOT SPEC 3352.2A.3.
2. THE PLACEMENT OF THE BARRICADES SHALL BE 10'-0" FROM THE END OF THE BITUMINOUS ROAD WITH THE BARRICADE CENTERED ON THE ROADWAY AND FACING TRAFFIC.
3. PLACE FUTURE ROAD EXTENSION SIGN STR-12 ON ONE BARRICADE IF REQUIRED



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STANDARD DETAILS

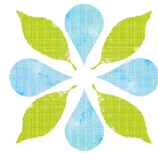
DOUBLE PERMANENT BARRICADE

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2023

CITY PLATE NO.
STR-11

**FUTURE
ROAD
EXTENSION**



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NOTES:

1. SIGN SIZE SHALL BE 24"x30".
2. LETTERS TO BE BLACK ON A WHITE BACKGROUND.
3. THE CITY LOGO SHALL BE IN COLOR AS SHOWN.
4. THE SIGN IS TO BE MOUNTED ON THE PERMANENT BARRICADE, TOP INSIDE POST.



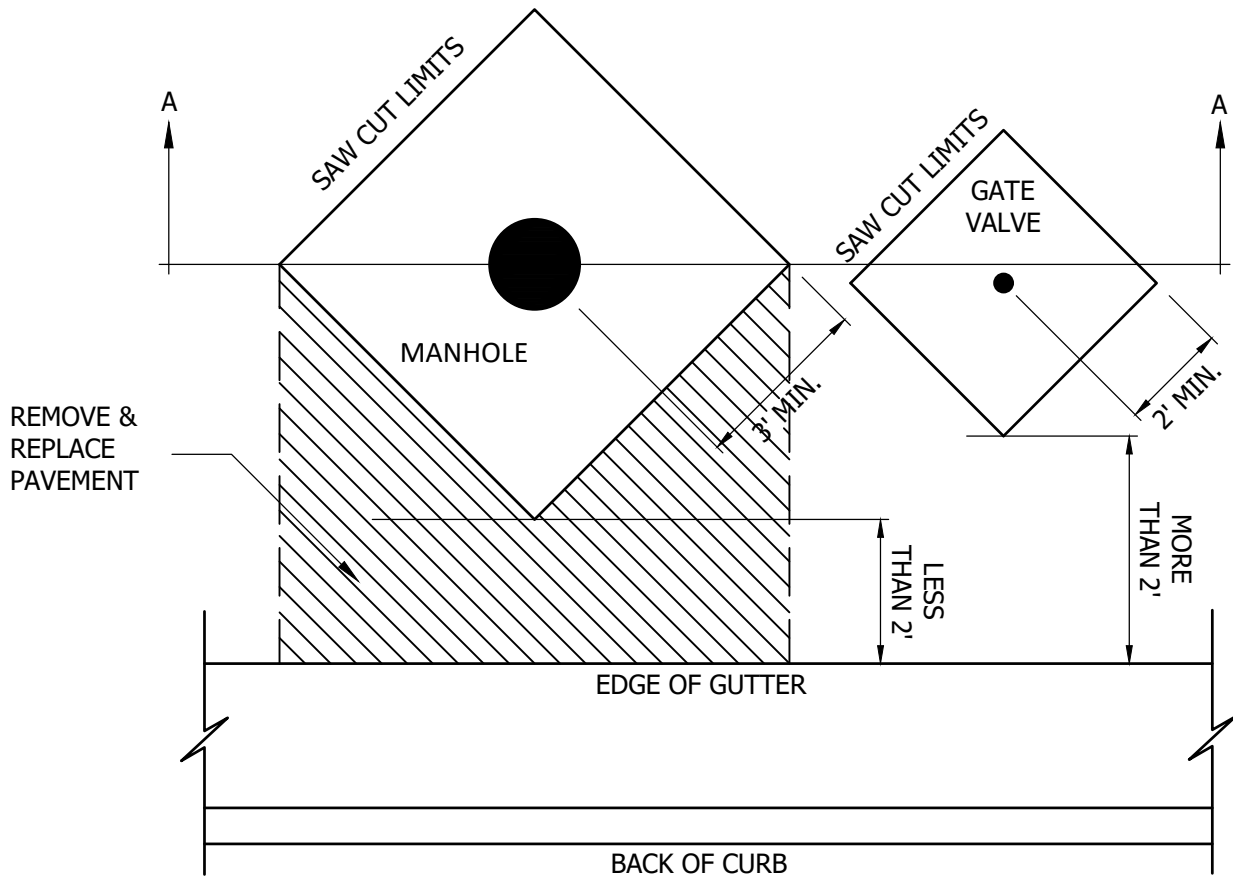
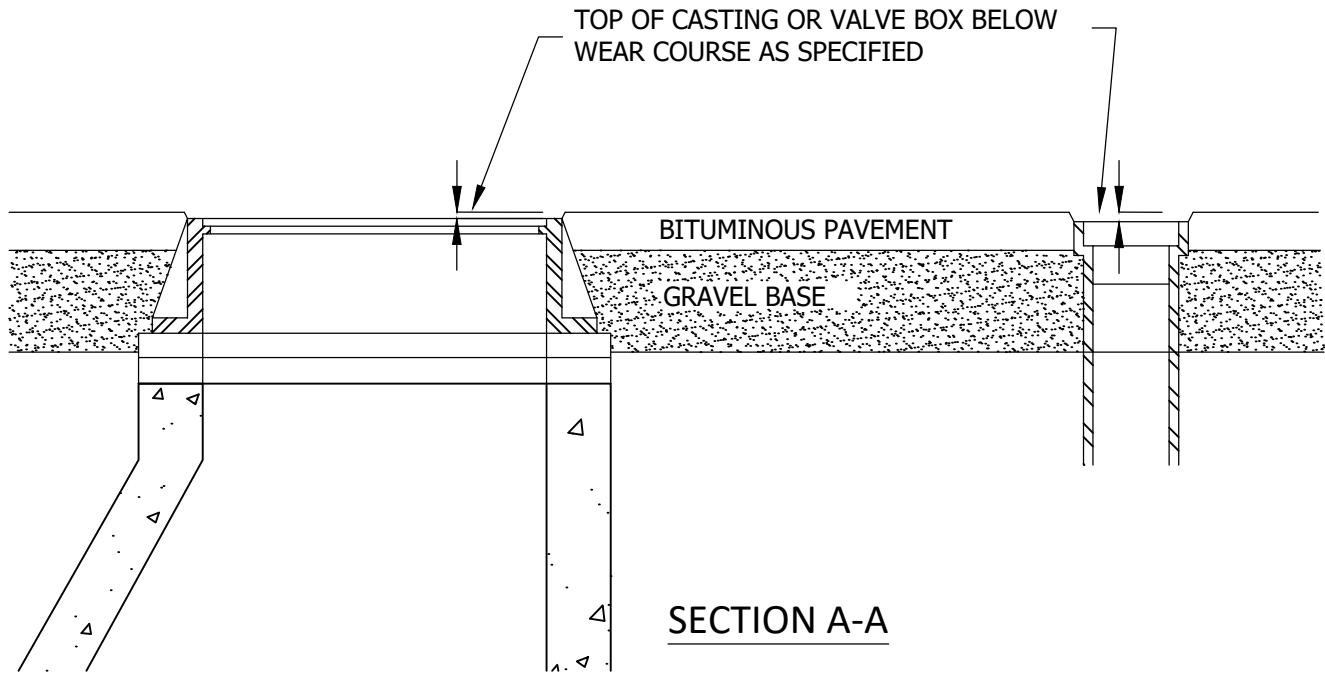
Forest Lake
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STANDARD DETAILS

FUTURE ROAD EXTENSION SIGN
FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2019

CITY PLATE NO.
STR-12



Forest Lake
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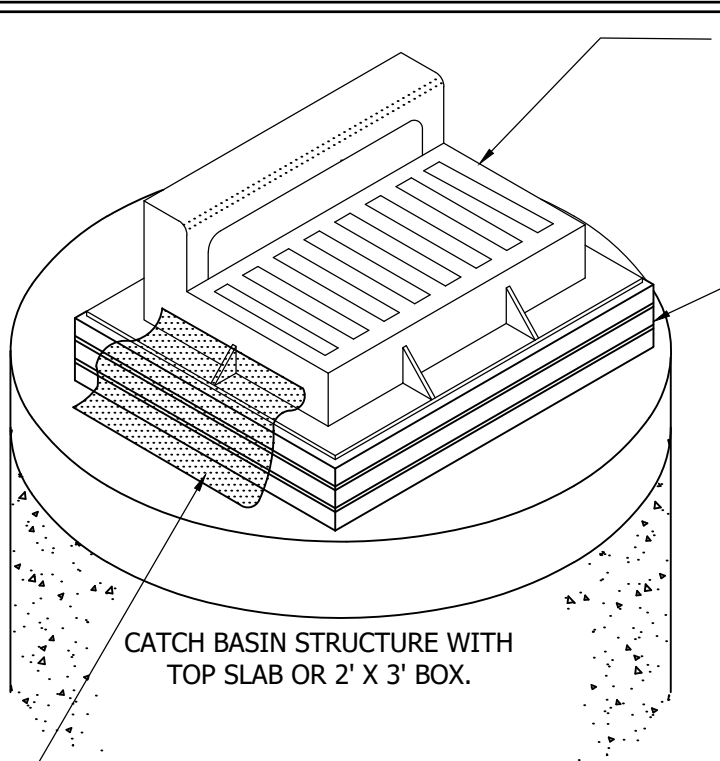
STANDARD DETAILS

MANHOLE AND GATE VALVE
ADJUSTMENT IN PAVEMENT

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2020

CITY PLATE NO.
STR-13

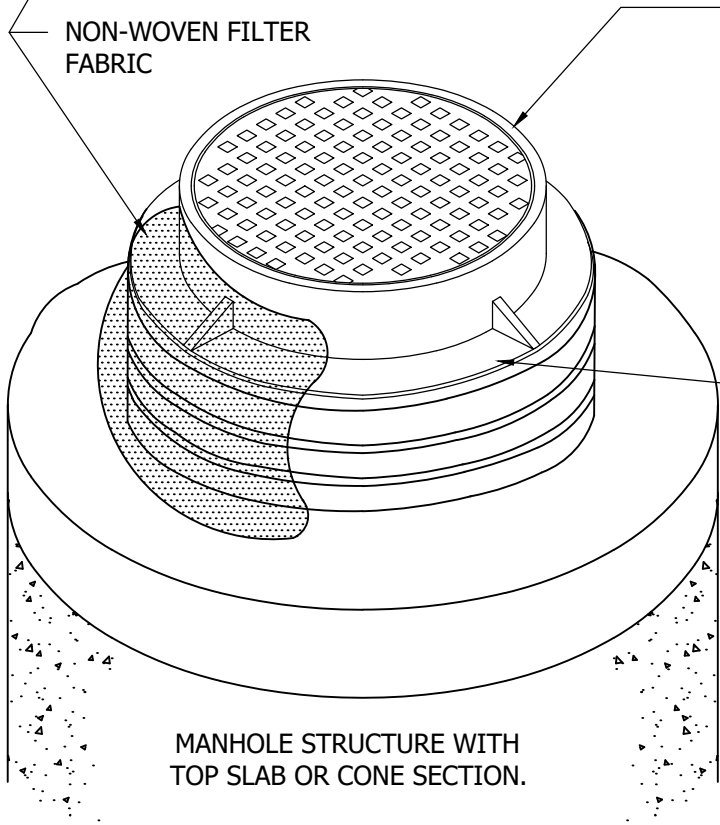


NEENAH R-3067V CATCH BASIN FRAME AND GRATE SHALL BE FURNISHED WITH CURB INLET BOX AND 3" DIA. FRONT FACE AND 4" MAXIMUM OPENING. SET GRATE 2" BELOW GUTTER GRADE.

HIGH DENSITY POLYETHYLENE (HDPE) ADJUSTMENT RINGS. MIN. OF 4", MAX. OF 12". SET BOTTOM RING IN MORTAR TO LEVEL IF NECESSARY AND GLUE REMAINING RINGS WITH APPROVED SEALANT.

NO CONCRETE COLLARS ALLOWED. CONTRACTOR TO ADD AND COMPACT AGGREGATE BASE AROUND STRUCTURE FOR CURB PLACEMENT AFTER ADJUSTMENT.

CATCH BASIN STRUCTURE WITH TOP SLAB OR 2' X 3' BOX.



NEENAH R-1642B MANHOLE FRAME AND COVER SHALL BE FURNISHED WITH 2 CONCEALED PICK HOLES AND STAMPED "SANITARY SEWER" OR "STORM SEWER".

HIGH DENSITY POLYETHYLENE (HDPE) ADJUSTMENT RINGS. MIN. OF 4", MAX. OF 12". SET BOTTOM RING IN MORTAR TO LEVEL IF NECESSARY AND GLUE WITH APPROVED SEALANT.

NON-WOVEN FILTER FABRIC

MANHOLE STRUCTURE WITH TOP SLAB OR CONE SECTION.



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AS GOOD AS IT SOUNDS

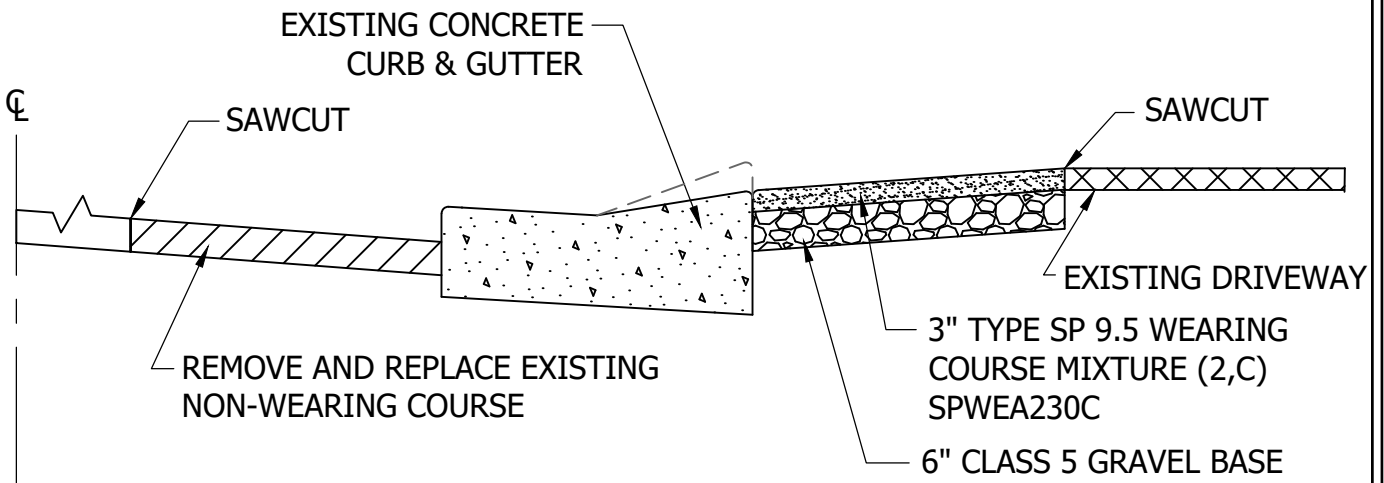
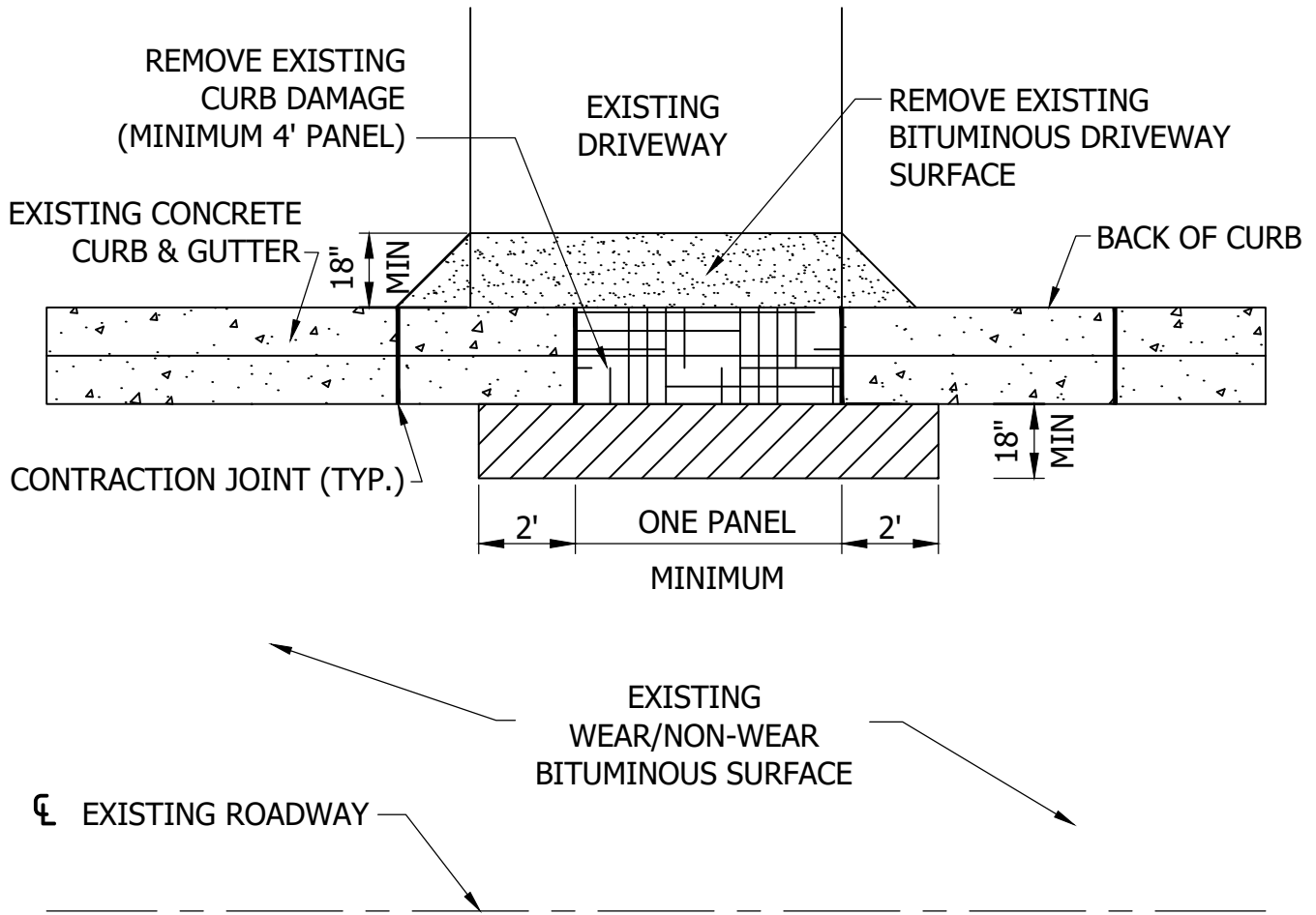
STANDARD DETAILS

CATCH BASIN AND MANHOLE ADJUSTMENT

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2025

CITY PLATE NO.
STR-14



Forest Lake
AS GOOD AS IT SOUNDS

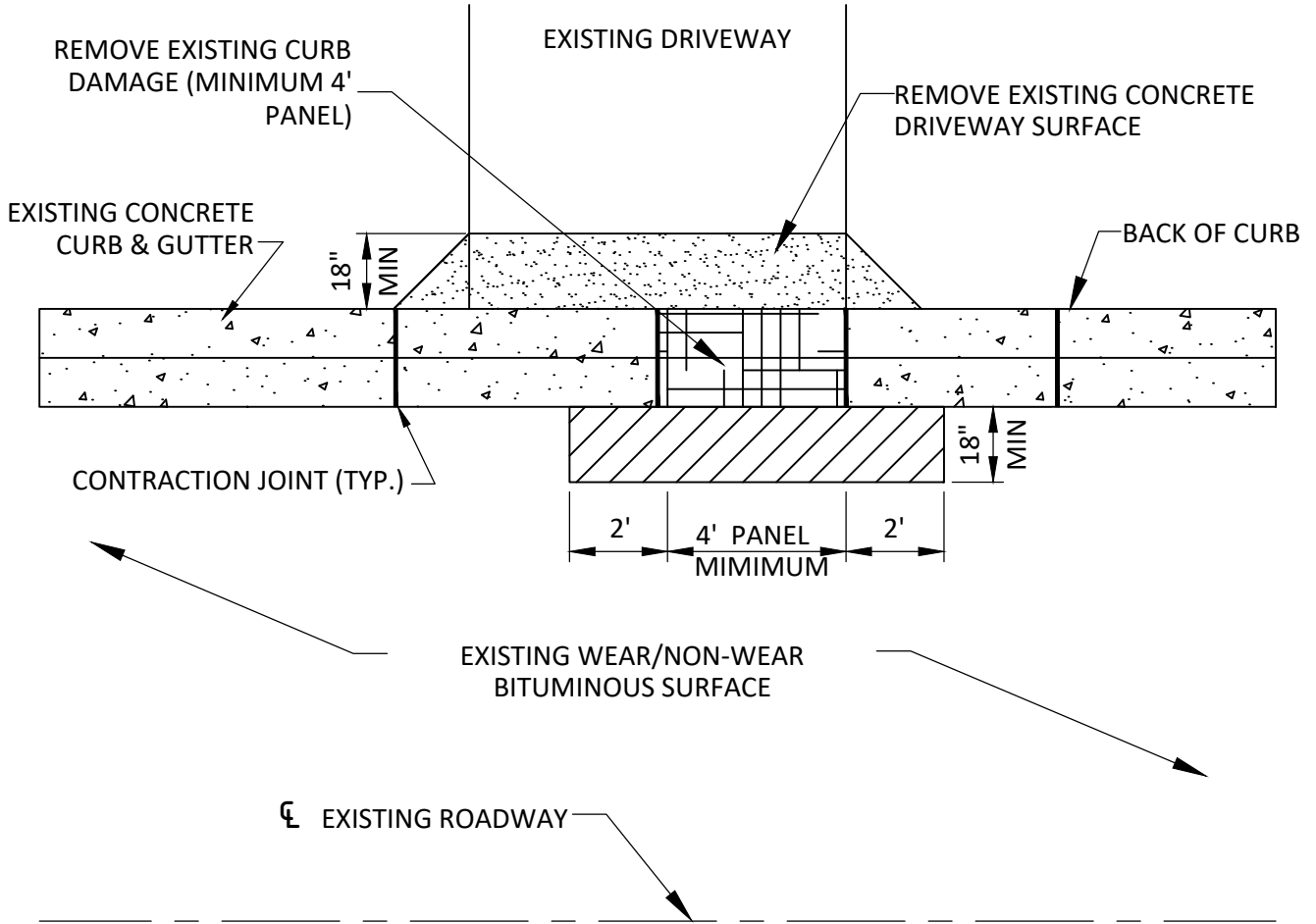
STANDARD DETAILS

CONCRETE CURB REPLACEMENT DRIVEWAY
LOCATION (BITUMINOUS D/W)

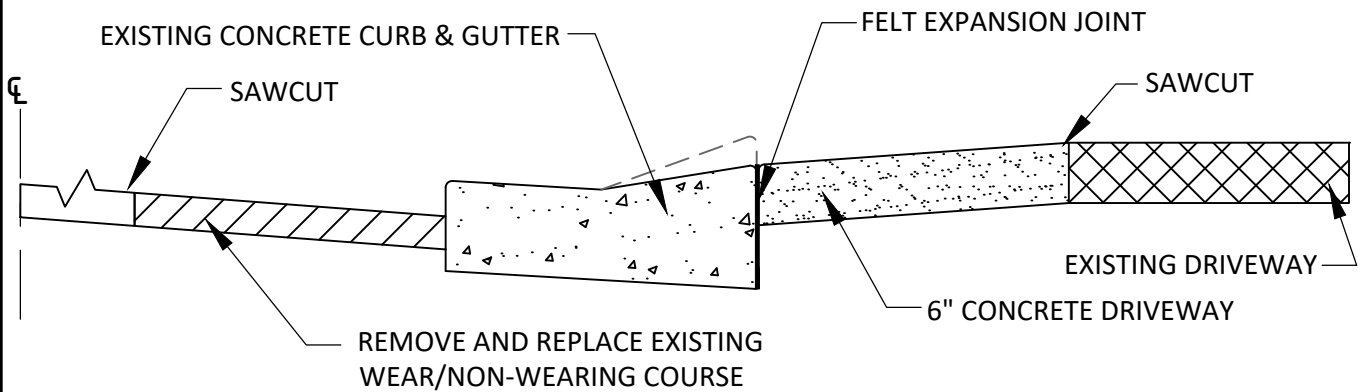
FOREST LAKE, MINNESOTA

LAST REVISION:
JAN 2022

CITY PLATE NO.
STR-15



EXISTING ROADWAY



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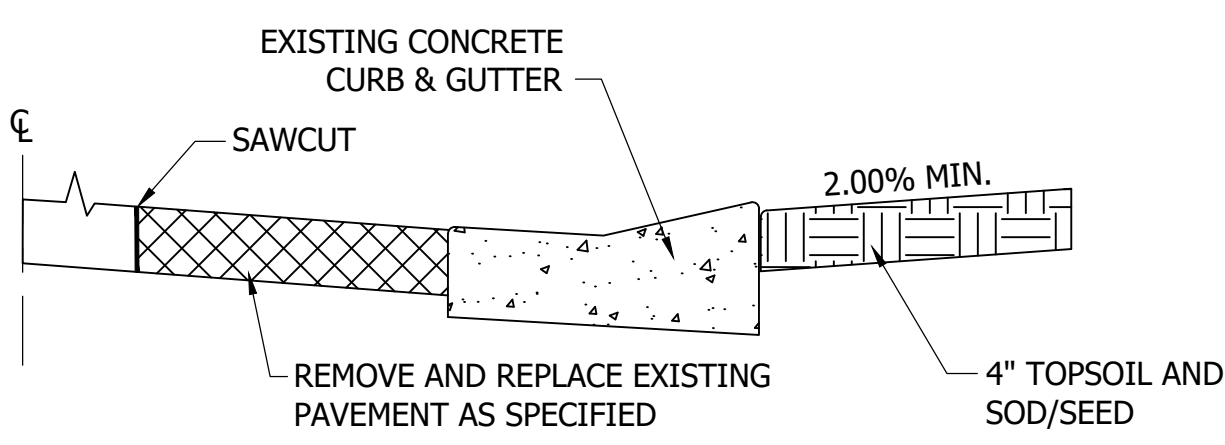
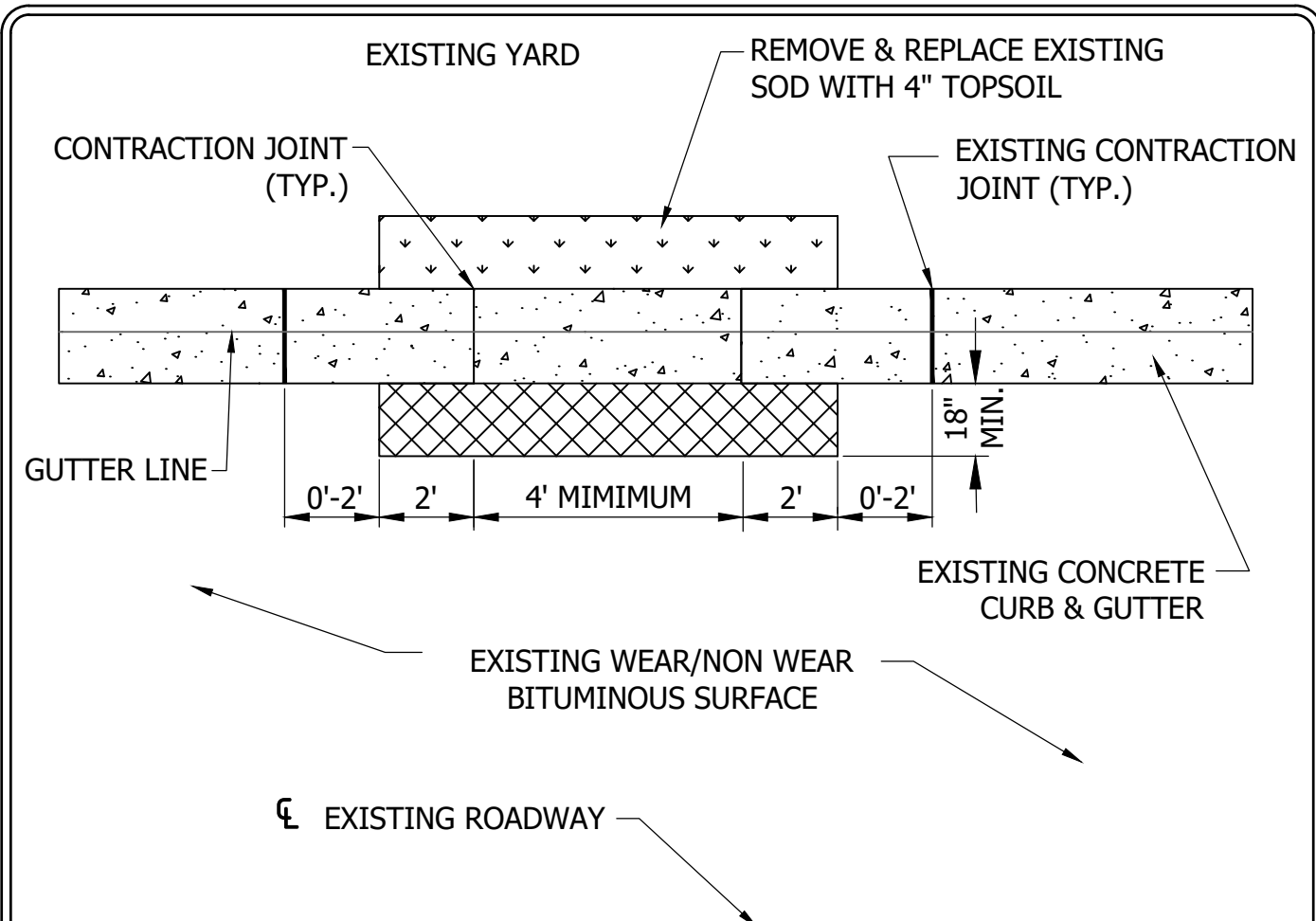
STANDARD DETAILS

CONCRETE CURB REPLACEMENT DRIVEWAY LOCATION
(CONCRETE D/W)

FOREST LAKE, MINNESOTA

LAST REVISION:
JAN 2021

CITY PLATE NO.
STR-15A



SECTION



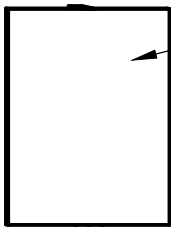
STANDARD DETAILS

CONCRETE CURB REPLACEMENT
NON DRIVEWAY LOCATION

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2022

CITY PLATE NO.
STR-15B



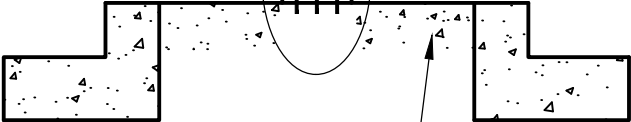
SIGN PANELS AS SPECIFIED OR AS SHOWN ON THE PLANS OR SIGN LEGEND.

STREET SIGNS

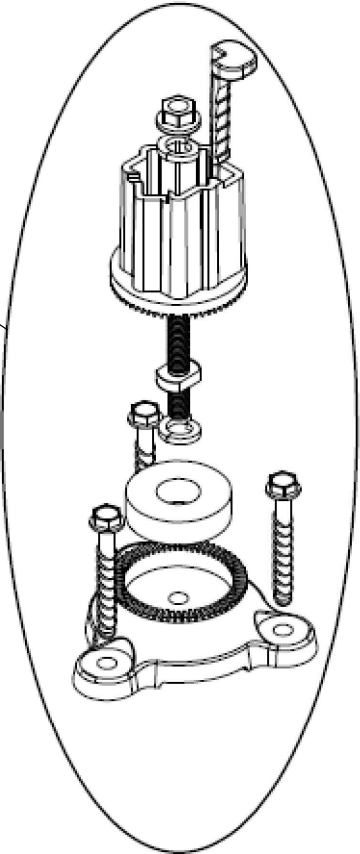
2" x 2" x 12 ga. TELES PAR GALVANIZED SIGN POST

1 3/4" x 3' x 12 ga. INTERIOR SLEEVE

SURFACE MOUNT ANCHOR BASE
1/2" ALLOWABLE SHIM



CONCRETE



KLEEN BREAK SURFACE MOUNT ANCHOR MODEL NO. 425



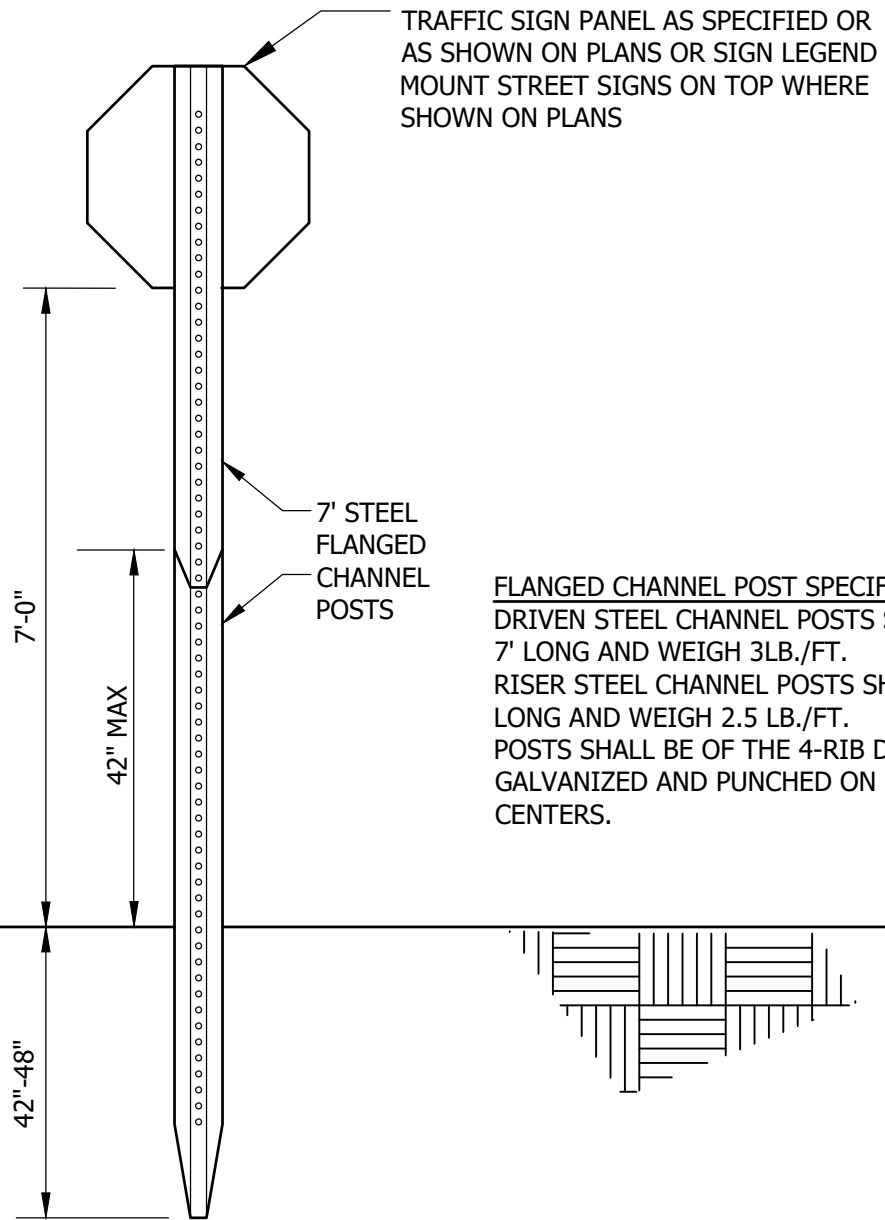
Forest Lake
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STANDARD DETAILS

TRAFFIC SIGN INSTALLATION IN
CONCRETE MEDIAN
FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2020

CITY PLATE NO.
STR-17



Forest Lake
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STANDARD DETAILS

TRAFFIC SIGN IN GROUND

FOREST LAKE, MINNESOTA

LAST REVISION:
 MAR 2019

CITY PLATE NO.
 STR-18



MULTI-LANE - MORE THAN 40MPH



MULTI-LANE - 40MPH OR LESS
2 LANE - ALL SPEED LIMITS

STANDARD CONSTRUCTION NOTES FOR STREET NAME SIGNS:

1. ALL STREET SIGNS SHALL BE DIAMOND GRADE DG3, DOUBLE-FACED EXTRUDED BLADES.
2. ADDRESS NUMBERS FOR STREET NAME BLADES WILL BE PROVIDED AT A LATER DATE.
3. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR STREET NAME BLADES PRIOR TO FABRICATION.
4. STREET SIGN POSTS SHALL BE PER DETAIL PLATE STR-18
5. SIGN LOCATIONS SHALL BE STAKED BY THE ENGINEER AT THE TIME OF CONSTRUCTION.
6. ALL NAME BLADES SHALL BE "GREEN" IN COLOR. LETTERING ON ALL STREET NAME BLADES SHALL BE DIAMOND GRADE DG3, "WHITE" IN COLOR.
7. ALL NO OUTLETS SHALL BE DIAMOND GRADE DG3, "YELLOW" IN COLOR. LETTERING ON ALL NO OUTLET BLADES SHALL BE "BLACK" IN COLOR AND ALL CAPITAL LETTERS.
8. MAXIMUM WIDTH OF SIGN SHALL BE 48"



Forest Lake
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STANDARD DETAILS
STREET NAME BLADE SIGNS
PUBLIC STREETS

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2026

CITY PLATE NO.
STR-19



FIRST LETTER UPPER CASE - 6"
 LOWER CASE LETTERS - 4.5"

MULTI-LANE - 40MPH OR LESS
2 LANE - ALL SPEED LIMITS

STANDARD CONSTRUCTION NOTES FOR STREET NAME SIGNS:

1. ALL STREET SIGNS SHALL BE DIAMOND GRADE DG3, DOUBLE-FACED EXTRUDED BLADES.
2. ADDRESS NUMBER FOR STREET NAME BLADES TO BE SUPPLIED AT A LATER DATE
3. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR STREET NAME BLADES PRIOR TO FABRICATION.
3. STREET SIGN POSTS SHALL BE 12 FEET LONG, 4 FEET DRIVEN INTO THE GROUND.
4. STREET SIGN POSTS SHALL BE PER DETAIL PLATE STR-18
5. SIGN LOCATIONS SHALL BE STAKED BY THE ENGINEER AT THE TIME OF CONSTRUCTION.
6. ALL PRIVATE STREET NAME BLADES SHALL BE "BLUE" IN COLOR. LETTERING ON ALL STREET NAME BLADES SHALL BE DIAMOND GRADE DG3, "WHITE" IN COLOR.
7. MAXIMUM WIDTH OF SIGN SHALL BE 48".



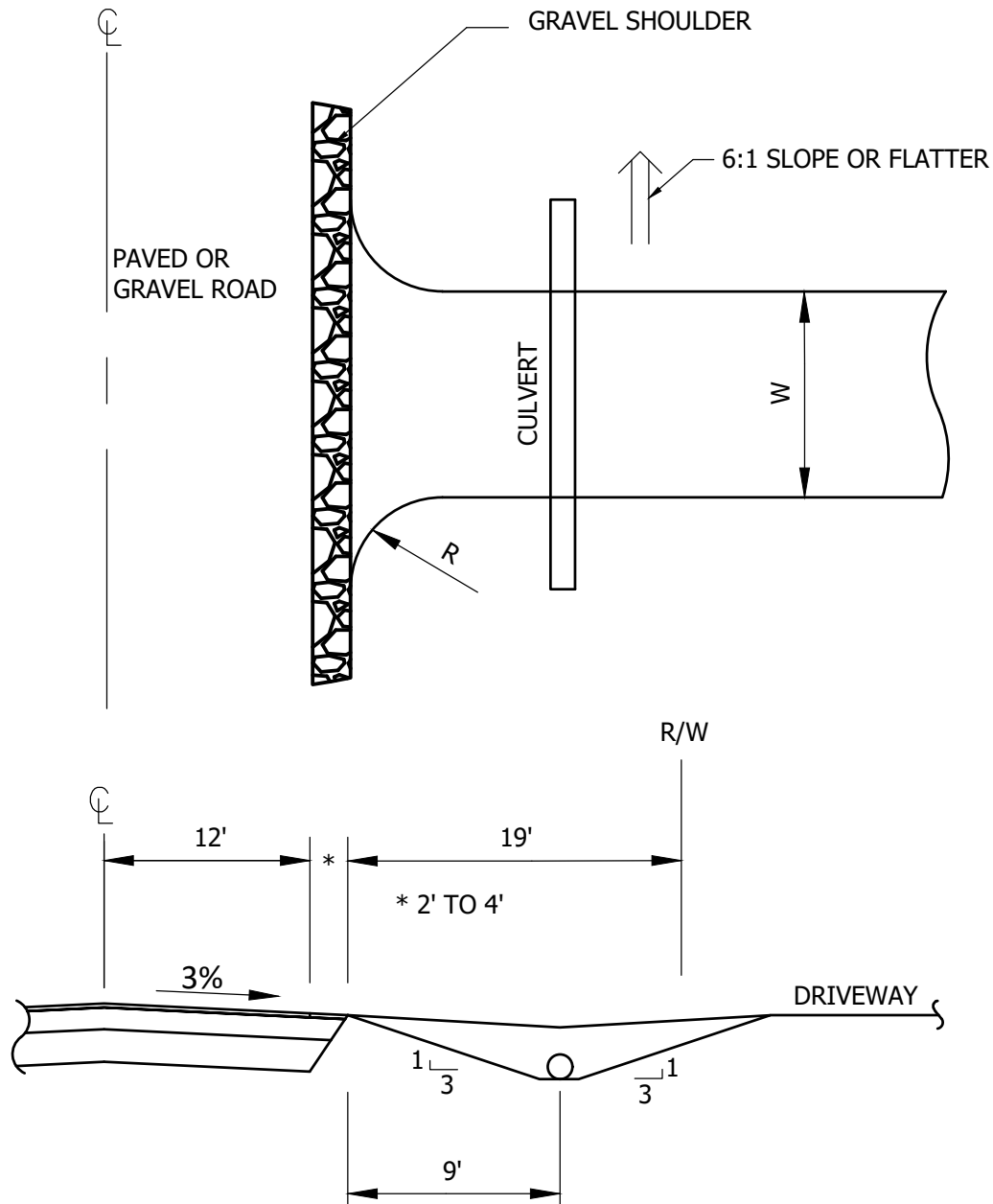
Forest Lake
 AS GOOD AS IT SOUNDS

STANDARD DETAILS
 STREET NAME BLADE SIGNS
 PRIVATE STREETS

FOREST LAKE, MINNESOTA

LAST REVISION:
 FEB 2026

CITY PLATE NO.
 STR-20



NOTES:

1. DRIVEWAY WIDTH (W): 12' MIN., 22' MAX.
2. RADIUS AT CONNECTION TO STREET (R): 5' MIN., 15' MAX.
3. CULVERT UNDER DRIVEWAY: MIN. 15" DIA., CMP OR RCP
4. DRIVEWAY SLOPES GREATER THAN 6% SHALL BE PAVED TO PREVENT EROSION.
5. MAINTAIN 60' MIN. CLEARANCE FROM EDGE OF DRIVEWAY TO R/W LINE OF ADJACENT STREET INTERSECTION.
6. CULVERT FLARED ENDS ARE REQUIRED.
7. MINIMUM 1% GRADE ON CULVERTS.
8. HOMEOWNER IS RESPONSIBLE FOR CULVERT INSTALLATION AND ESTABLISHMENT OF VEGETATION ALONG DRIVEWAY.



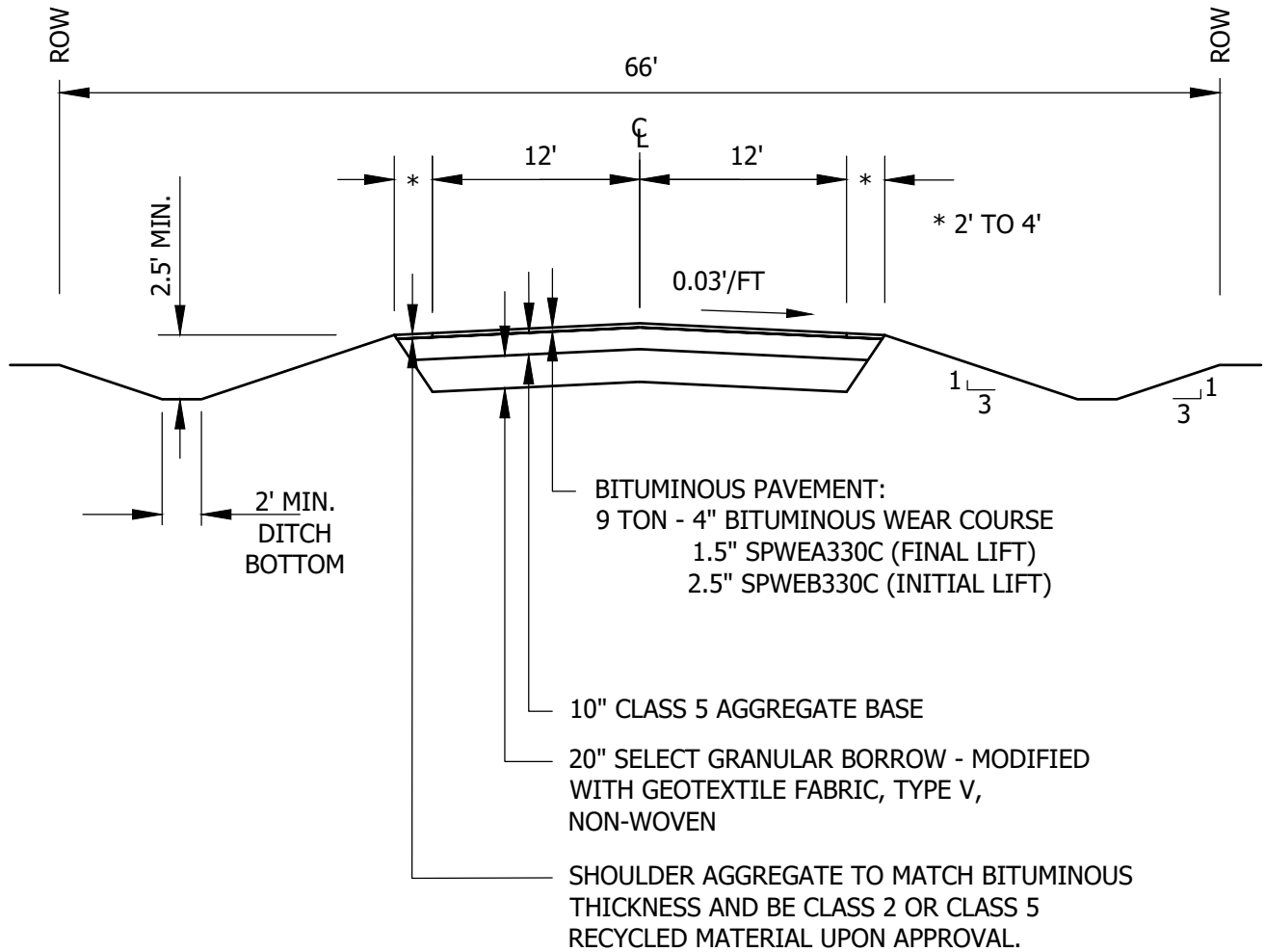
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
TYPICAL DRIVEWAY &
CULVERT INSTALLATION

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2019

CITY PLATE NO.
STR-21



NOTES:

1. ALL ORGANIC OR OTHER UNSUITABLE MATERIAL SHALL BE REMOVED FROM BENEATH THE ROADWAY.
2. A TEST ROLL OF THE PREPARED SUBGRADE SHALL BE PERFORMED IN THE PRESENCE OF A CITY INSPECTOR. THE CITY HAS THE AUTHORITY TO REQUIRE ADDITIONAL SUBGRADE CORRECTION AND GRANULAR BORROW.



Forest Lake
 AS GOOD AS IT SOUNDS

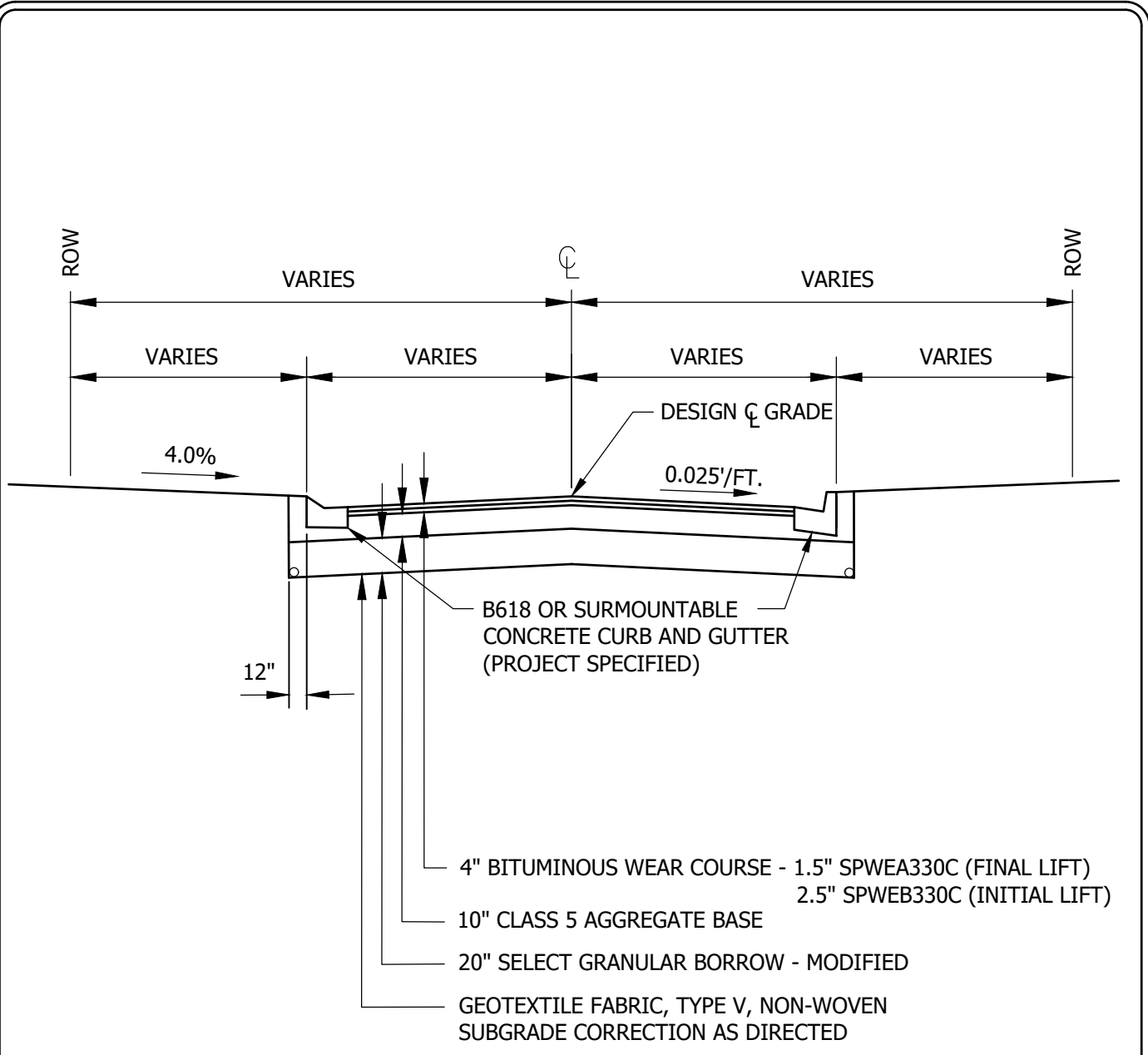
STANDARD DETAILS

TYPICAL RURAL ROAD SECTION

FOREST LAKE, MINNESOTA

LAST REVISION:
 APR 2024

CITY PLATE NO.
 STR-22



NOTES:

1. ALL ORGANIC OR OTHER UNSUITABLE MATERIAL SHALL BE REMOVED FROM BENEATH THE ROADWAY.
2. A TEST ROLL OF THE PREPARED SUBGRADE SHALL BE PERFORMED IN THE PRESENCE OF A CITY INSPECTOR. THE CITY HAS THE AUTHORITY TO REQUIRE ADDITIONAL SUBGRADE CORRECTION AND GRANULAR BORROW.
3. DRAINTILE IS REQUIRED BEHIND CURB, MINIMUM 50' EACH WAY FROM CATCH BASINS AT LOW POINTS AND 50' UPSTREAM OF IN-LINE CATCH BASINS.



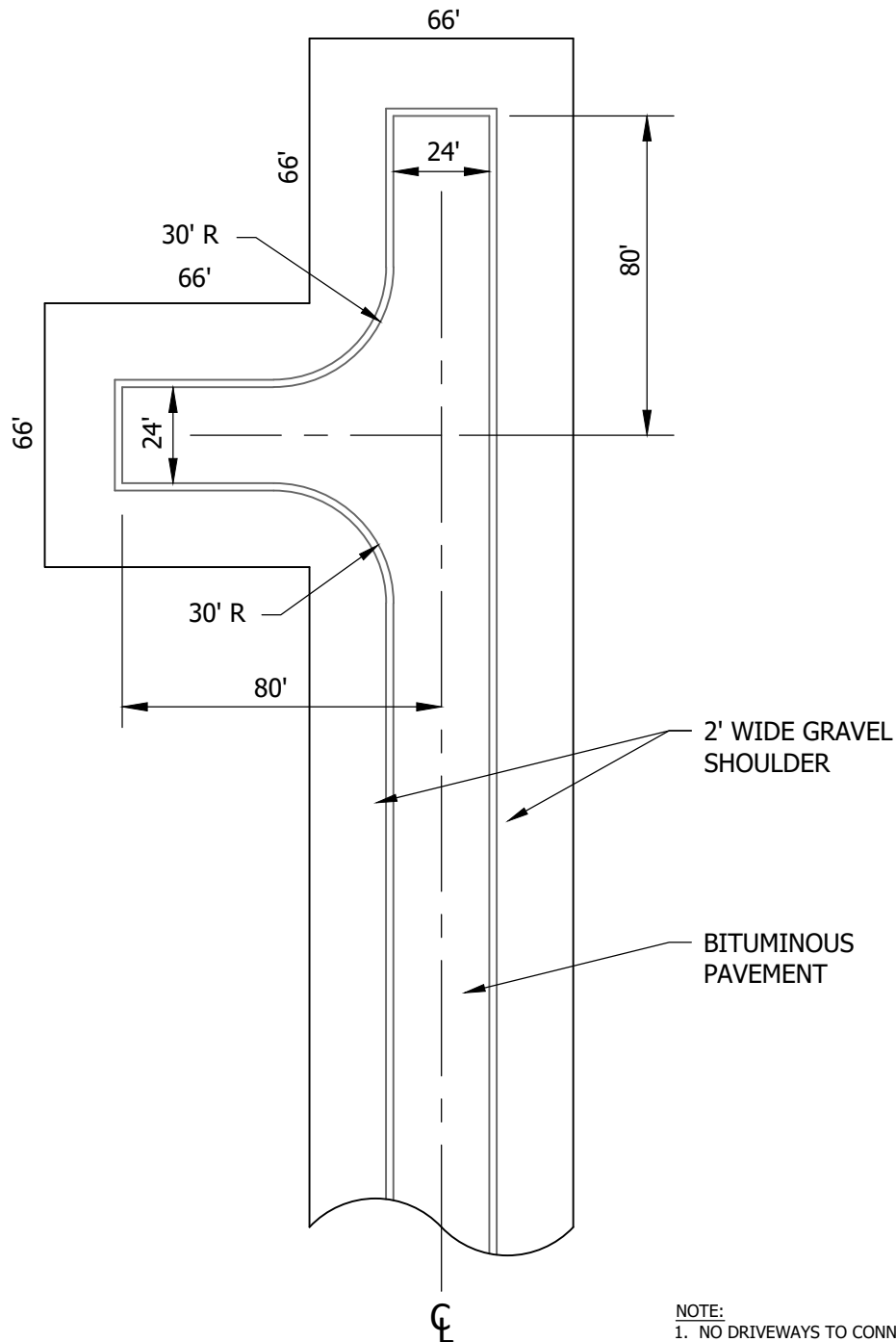
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
TYPICAL URBAN ROAD SECTION
NON-COLLECTOR

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2026

CITY PLATE NO.
STR-22A



- NOTE:
1. NO DRIVEWAYS TO CONNECT TO ENDS OF EITHER LEG.
 2. ALL TURNAROUNDS SHALL BE TO THE LEFT, AS SHOWN.



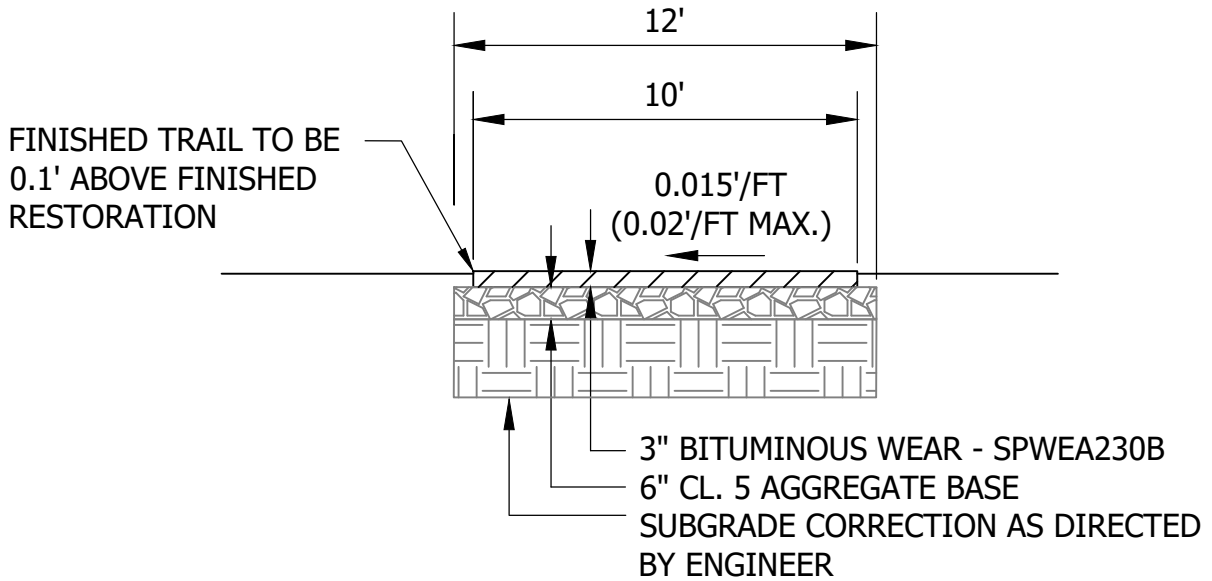
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
TYPICAL STREET TURNAROUND
RURAL SECTION

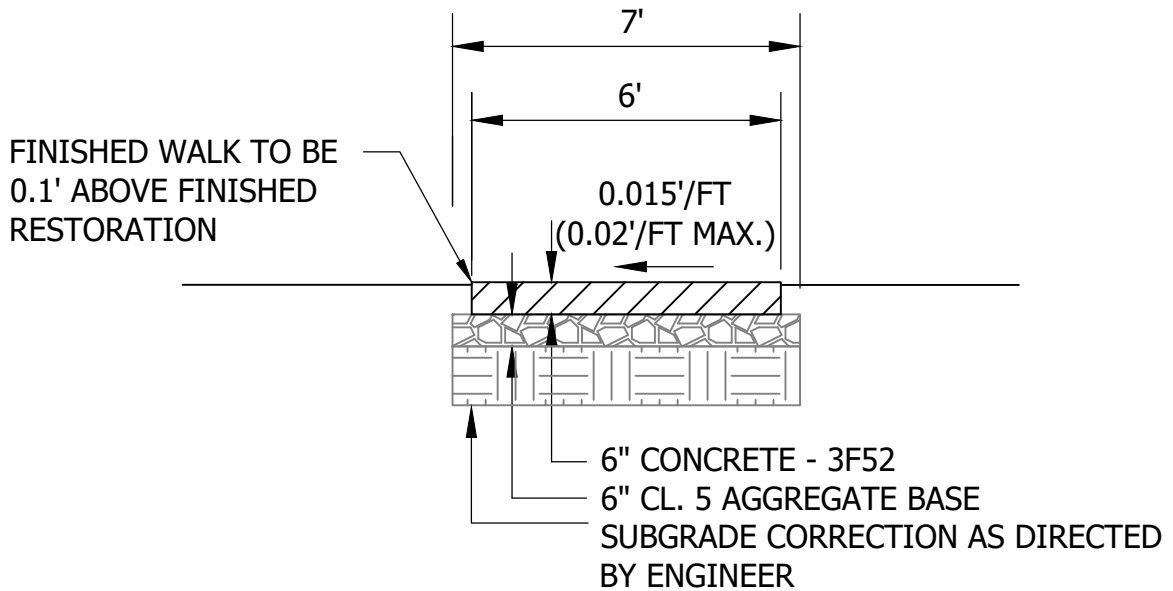
FOREST LAKE, MINNESOTA

LAST REVISION:
SEPT 2003

CITY PLATE NO.
STR-23



TYPICAL TRAIL SECTION



CONCRETE SIDEWALK



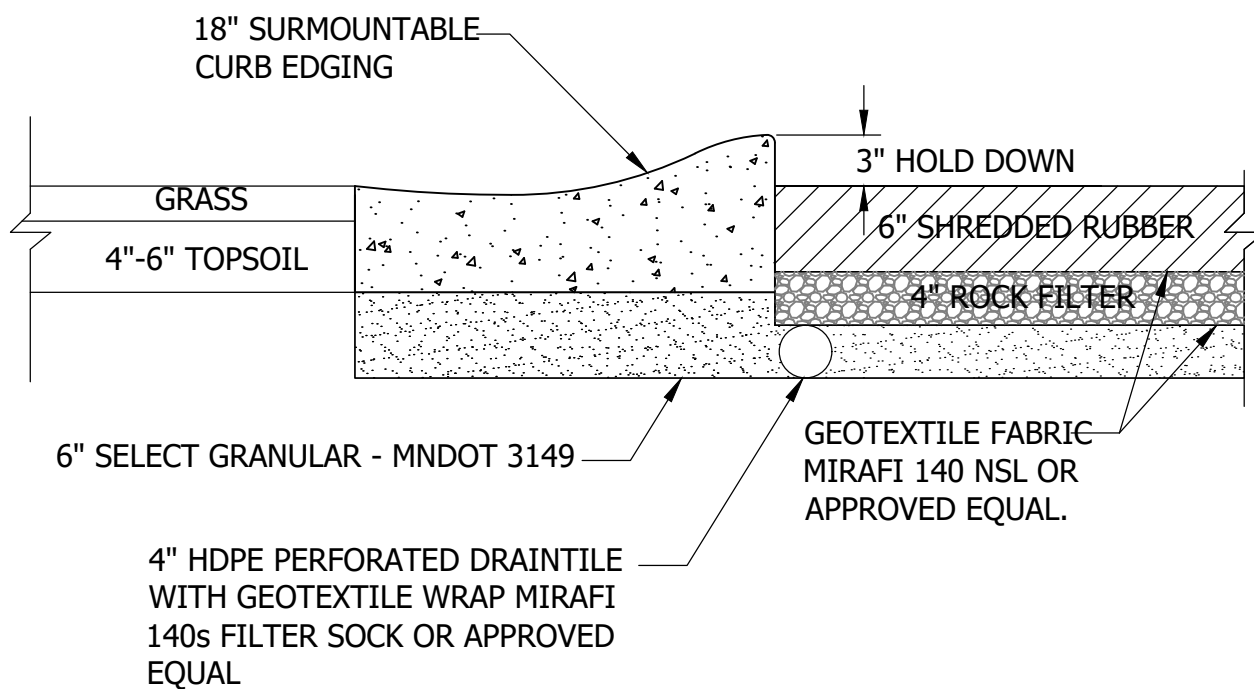
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
TYPICAL BITUMINOUS TRAIL
AND CONCRETE SIDEWALK

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2026

CITY PLATE NO.
STR-24



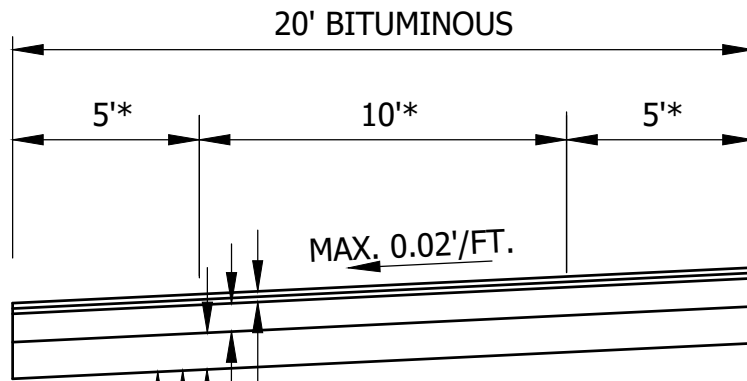
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
PLAYGROUND PLAY AREA

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2016

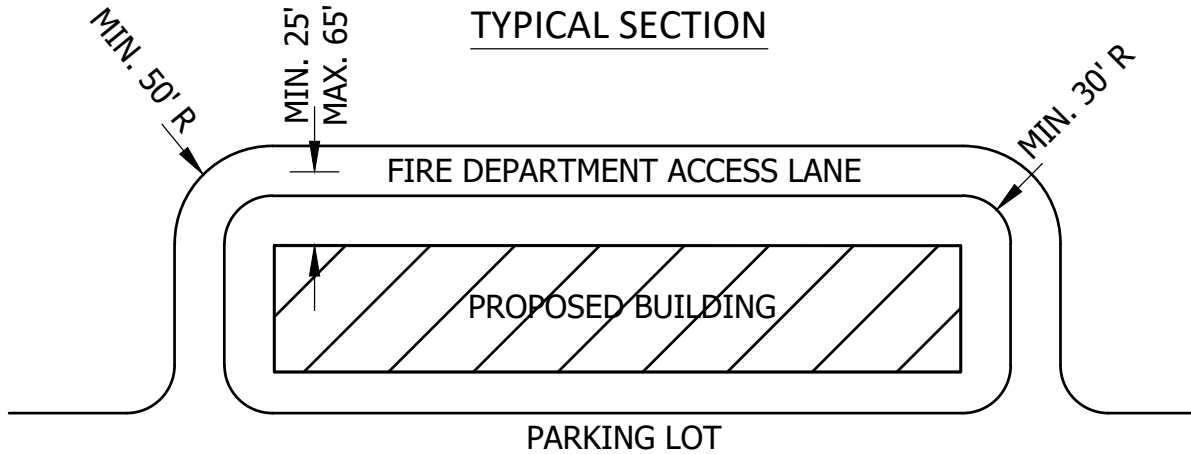
CITY PLATE NO.
STR-25



- 4" BITUMINOUS WEAR COURSE - SPWEA240C (2 LIFTS)
- 10" CLASS 5 AGGREGATE BASE
- 12" SELECT GRANULAR BORROW - MODIFIED (OR AS RECOMMENDED BY SOILS ENGINEER)
- GEOTEXTILE FABRIC, TYPE V, NON-WOVEN (AS RECOMMENDED BY SOILS ENGINEER)
- APPROVED COMPACTED SUBGRADE

* OPTION: 10' WIDE BITUMINOUS, WITH 5' WIDE GRAVEL SHOULDERS. GRAVEL SECTION MUST BE INCREASED 4" UNDER SHOULDERS TO PROVIDE EQUIVALENT STRUCTURAL SUPPORT FOR SHOULDERS.

TYPICAL SECTION



PLAN VIEW

NOTES:

1. DEAD END ACCESS LANES OVER 150' IN LENGTH NEED AN APPROVED TURNAROUND.
2. UNOBSTRUCTED VERTICAL CLEARANCE OF 13'-6" REQUIRED ABOVE ACCESS LANE.
3. PROVIDE FIRE DEPARTMENT APPROVED SIGNS WITHIN 20' OF EVERY ENTRANCE POINT.



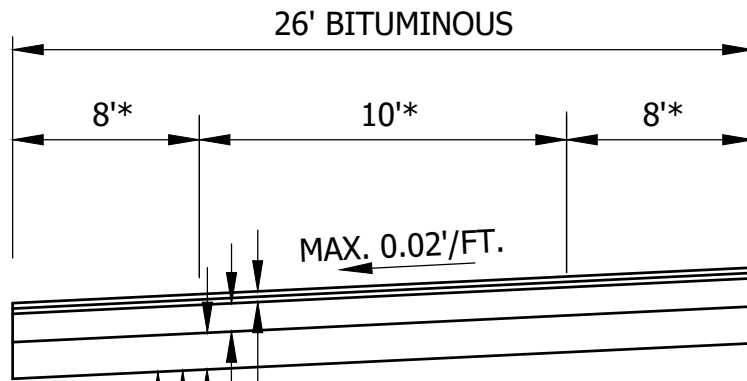
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
FIRE DEPARTMENT ACCESS LANE
BUILDINGS UP TO 24' HIGH

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2016

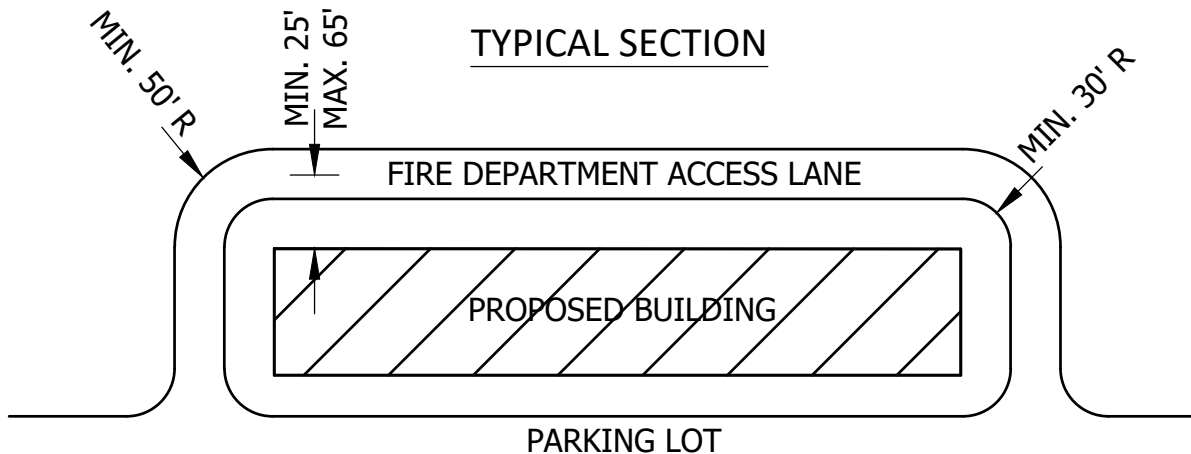
CITY PLATE NO.
STR-26



- 4" BITUMINOUS WEAR COURSE - SPWEA240C (2 LIFTS)
- 10" CLASS 5 AGGREGATE BASE
- 12" SELECT GRANULAR BORROW - MODIFIED (OR AS RECOMMENDED BY SOILS ENGINEER)
- GEOTEXTILE FABRIC, TYPE V, NON-WOVEN (AS RECOMMENDED BY SOILS ENGINEER)
- APPROVED COMPACTED SUBGRADE

* OPTION: 10' WIDE BITUMINOUS, WITH 8' WIDE GRAVEL SHOULDERS. GRAVEL SECTION MUST BE INCREASED 4" UNDER SHOULDERS TO PROVIDE EQUIVALENT STRUCTURAL SUPPORT FOR SHOULDERS.

TYPICAL SECTION



PLAN VIEW

NOTES:

1. DEAD END ACCESS LANES OVER 150' IN LENGTH NEED AN APPROVED TURNAROUND.
2. UNOBSTRUCTED VERTICAL CLEARANCE OF 13'-6" REQUIRED ABOVE ACCESS LANE.
3. PROVIDE FIRE DEPARTMENT APPROVED SIGNS WITHIN 20' OF EVERY ENTRANCE POINT.



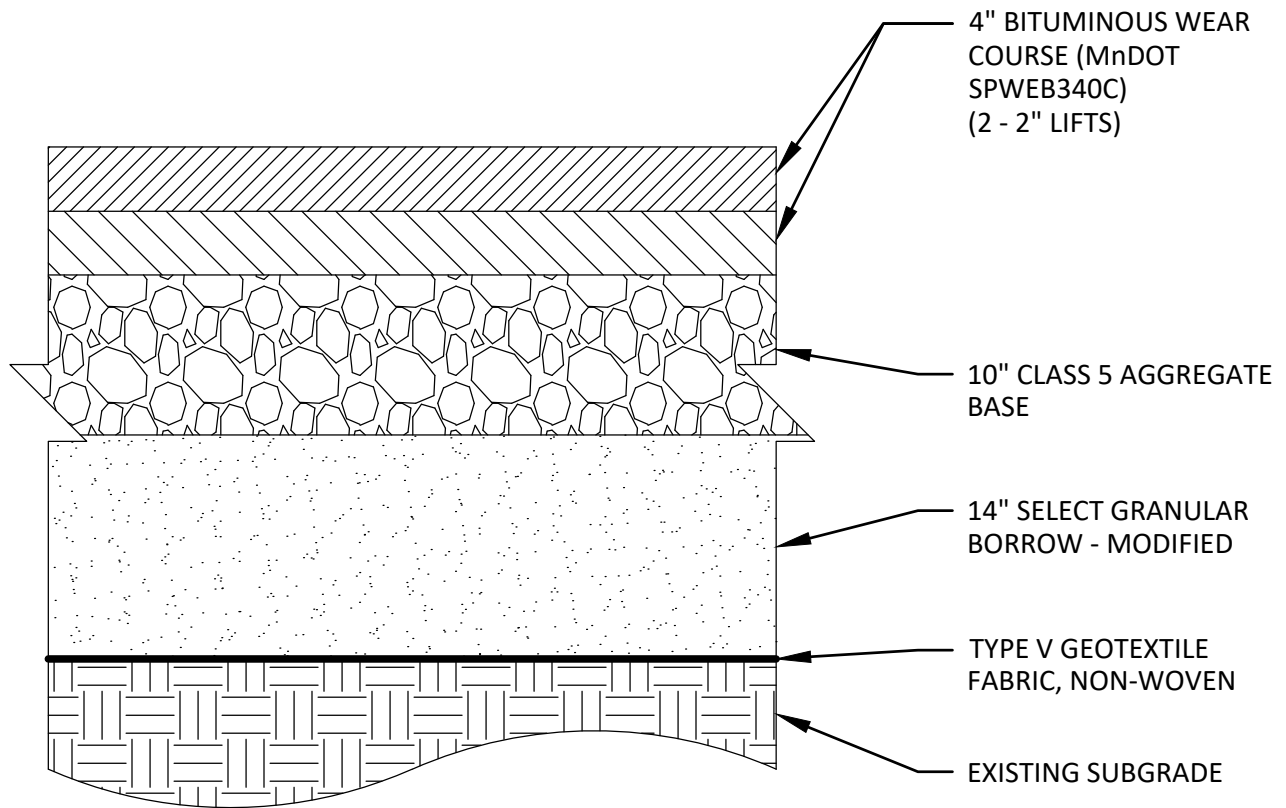
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
FIRE DEPARTMENT ACCESS LANE
BUILDINGS OVER 24' HIGH

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2016

CITY PLATE NO.
STR-27



NOTES:

1. ALL ORGANIC OR OTHER UNSUITABLE MATERIAL SHALL BE REMOVED FROM BENEATH THE ROADWAY.
2. A TEST ROLL OF THE PREPARED SUBGRADE SHALL BE PERFORMED IN THE PRESENCE OF A CITY INSPECTOR. THE CITY HAS THE AUTHORITY TO REQUIRE ADDITIONAL SUBGRADE CORRECTION AND GRANULAR BORROW, OR ELIMINATE THE STABILIZATION FABRIC AND GRANULAR BORROW.
3. DRAINTILE IS REQUIRED BEHIND CURB, MINIMUM 50' EACH WAY FROM CATCH BASINS AT LOW POINTS AND 50' UPSTREAM ON IN-LINE CATCH BASINS.



Forest Lake
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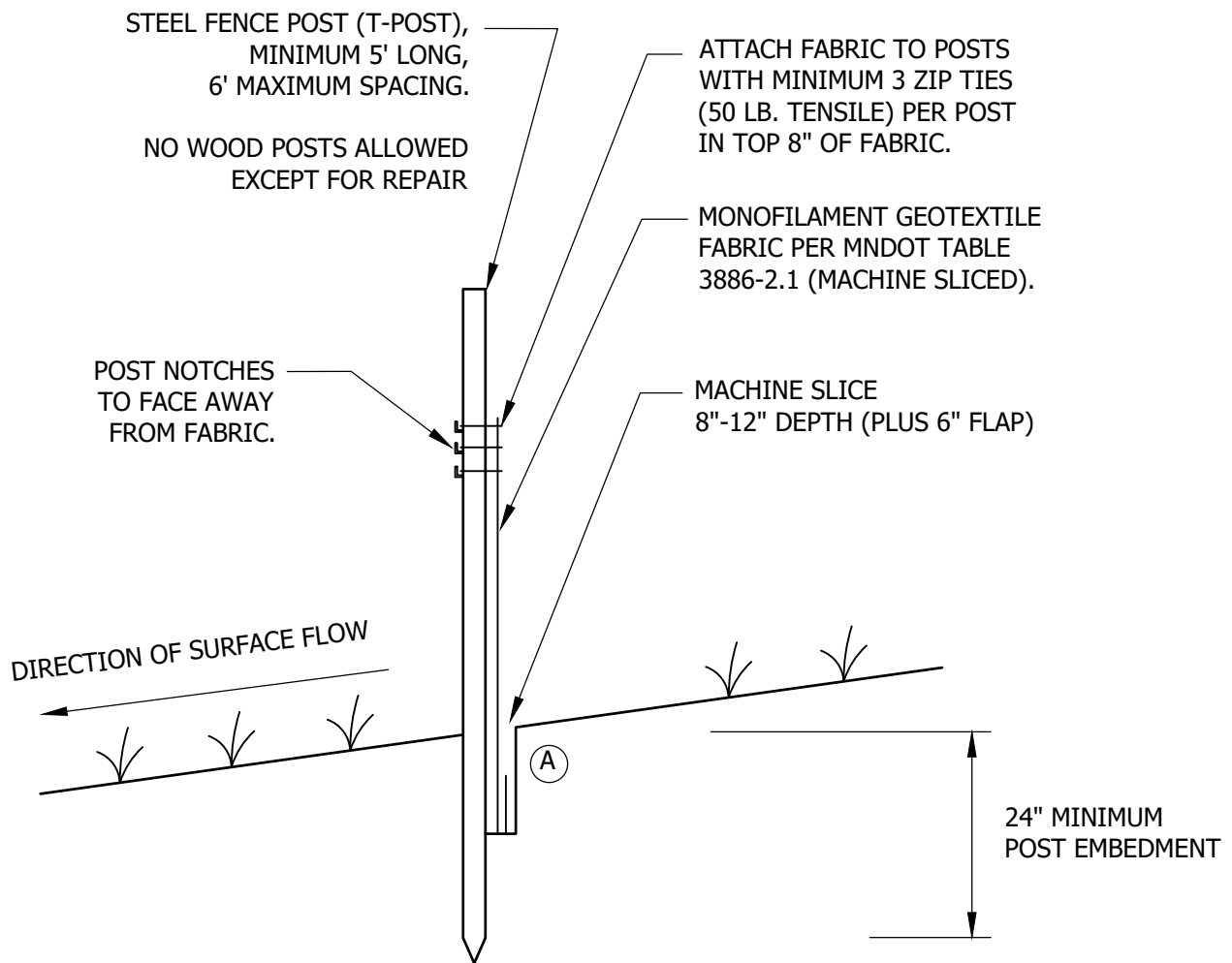
STANDARD DETAILS

TYPICAL PUBLIC PARKING LOT SECTION

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2026

CITY PLATE NO.
STR-28



NOTE:
THE MACHINE SLICED METHOD (THIS DETAIL) IS THE STANDARD SILT FENCE INSTALLATION METHOD. HEAVY-DUTY (ERO-1B) OR HAND INSTALLED (ERO-1C) SILT FENCE INSTALLATION METHODS SHOULD ONLY BE USED WHEN APPROVED OR DIRECTED BY THE CITY.

(A) **COMPACTION:**
AFTER "SLICING" IN THE FABRIC AND *BEFORE* INSTALLATION OF STEEL POSTS, DRIVE INSTALLATION EQUIPMENT OVER THE "SLICE" WHILE FABRIC IS LAYING ON THE GROUND. *THEN* INSTALL STEEL POSTS AND PULL UP FABRIC TO ATTACH AT A UNIFORM HEIGHT.



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

SILT FENCE
MACHINE SLICED

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2023

CITY PLATE NO.
ERO-1A

STEEL FENCE POST (T-POST),
MINIMUM 5' LONG,
6' MAXIMUM SPACING.

NO WOOD POSTS ALLOWED
EXCEPT FOR REPAIR

POST NOTCHES
TO FACE AWAY
FROM FABRIC.

ATTACH FABRIC TO
POST WITH MINIMUM
3 ZIP TIES (50 LB.
TENSILE) PER POST
IN TOP 8" OF FABRIC.

WIRE MESH REINFORCEMENT, STD.
FIELD FENCE, MIN 30" HIGH,
MAX MESH SPACING 6" AND
MIN 14 1/2 GAUGE WIRE.

GEOTEXTILE FABRIC PER MNDOT
TABLE 3886-2.1 (HEAVY DUTY) -
OVERLAP TOP 6" OF FABRIC AND
FASTEN TO WIRE MESH AT 2'
INTERVALS WITH RINGS OR WIRE
TIES.

ATTACH WIRE MESH TO
POSTS WITH MINIMUM 3
U-SHAPED WIRE
FASTENERS PER POST.

LAY FABRIC/WIRE MESH IN
THE TRENCH, BACKFILL WITH
NATURAL SOIL, AND COMPACT
WITH LIGHT EQUIPMENT
PRIOR TO PLACEMENT OF THE
POSTS.

DIRECTION OF
SURFACE FLOW

EXTEND WIRE MESH
INTO TRENCH

6"

24" MINIMUM
POST EMBEDMENT

6"

NOTE:
HEAVY DUTY SILT FENCE FOR
CURB PROTECTION REQUIRE
POSTS TO BE INSTALLED ON
HOUSE SIDE OF FABRIC.

NOTE:
DUAL PURPOSE USE OF HEAVY
DUTY FENCE FOR PERIMETER
CONTROL AND CURB PROTECTION
REQUIRE STEEL POSTS
ALTERNATING ON BOTH SIDES OF
FABRIC WITH 4' SPACING. SEE
LAND DISTURBANCE PERMIT.



Forest Lake
AS GOOD AS IT SOUNDS

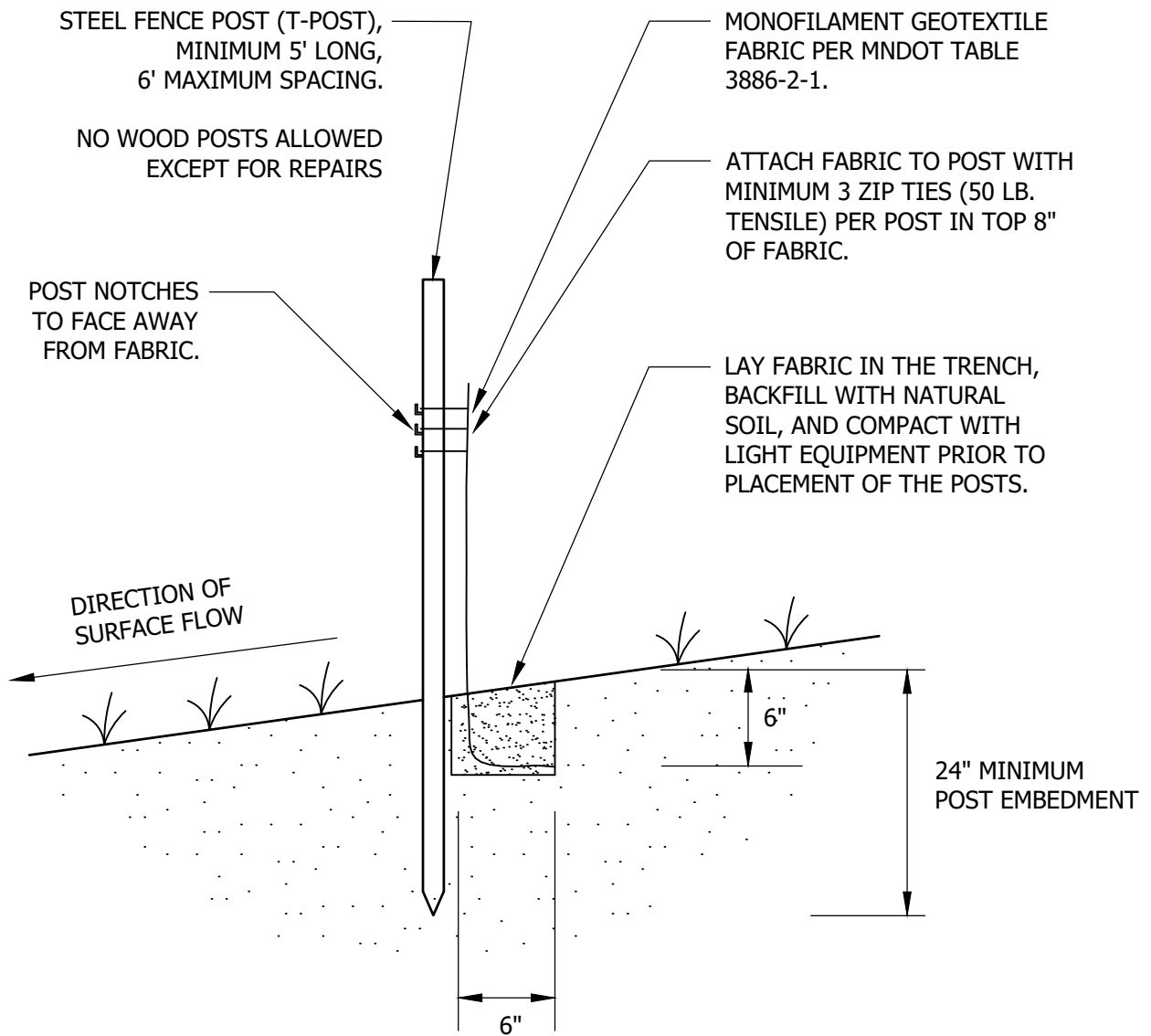
STANDARD DETAILS

SILT FENCE
HEAVY DUTY

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2023

CITY PLATE NO.
ERO-1B



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

SILT FENCE
HAND INSTALLED

FOREST LAKE, MINNESOTA

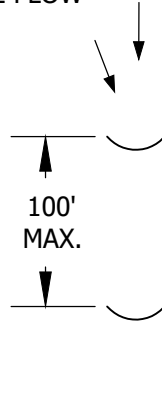
LAST REVISION:
FEB 2023

CITY PLATE NO.
ERO-1C

PLAN VIEW

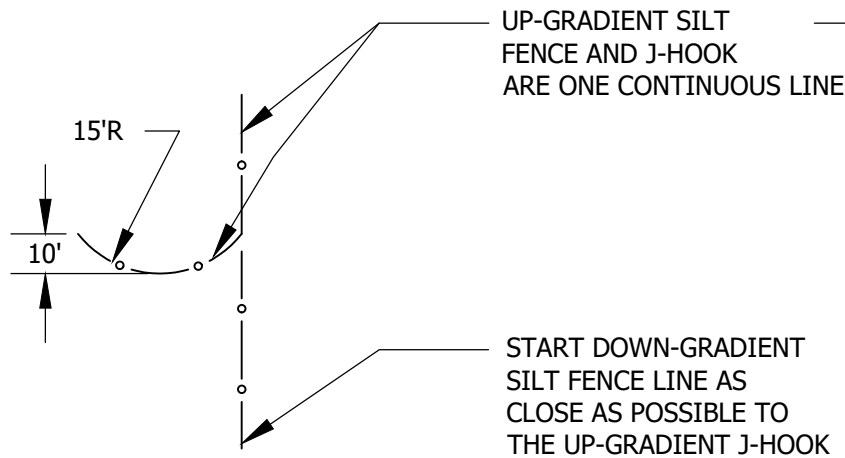
I. SPACING REQUIREMENTS

DIRECTION OF SURFACE FLOW

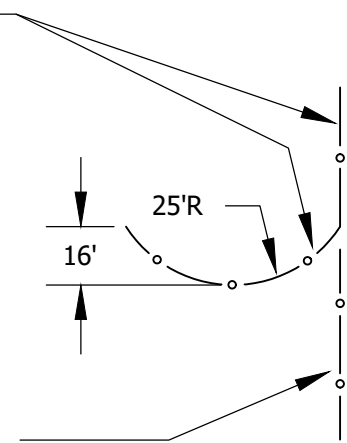


NOTE: SPACING DISTANCES WILL VARY, BUT ARE NOT TO EXCEED 100 FEET.

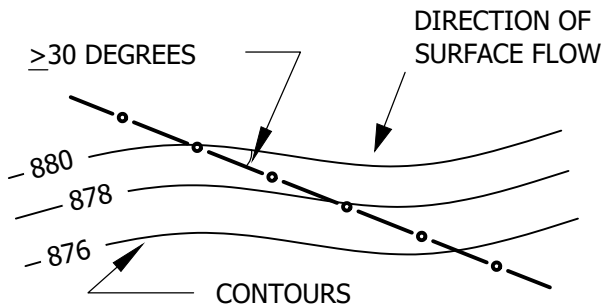
II. SIZING REQUIREMENTS: J15, J25



J15 - FOR CATCHMENT AREA < 0.25 ACRES



J25 - FOR CATCHMENT AREA ≥ 0.25 ACRES



NOTE: J-HOOKS SHALL BE USED WHEN THE SILT FENCE IS INSTALLED AT AN ANGLE OF 30 DEGREES OR GREATER FROM PARALLEL TO THE CONTOURS.



Forest Lake
AS GOOD AS IT SOUNDS

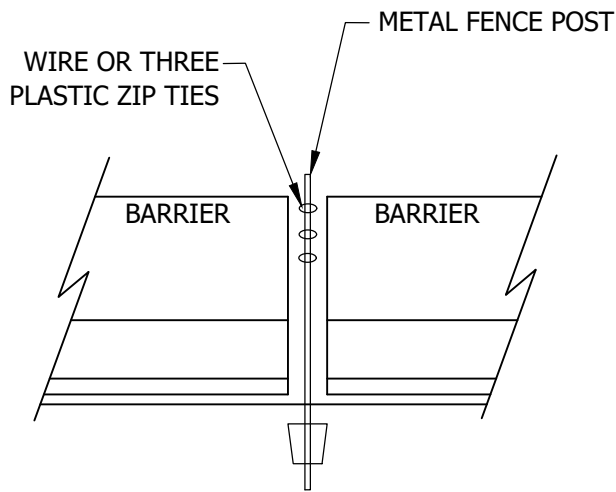
STANDARD DETAILS

SILT FENCE
J - HOOK

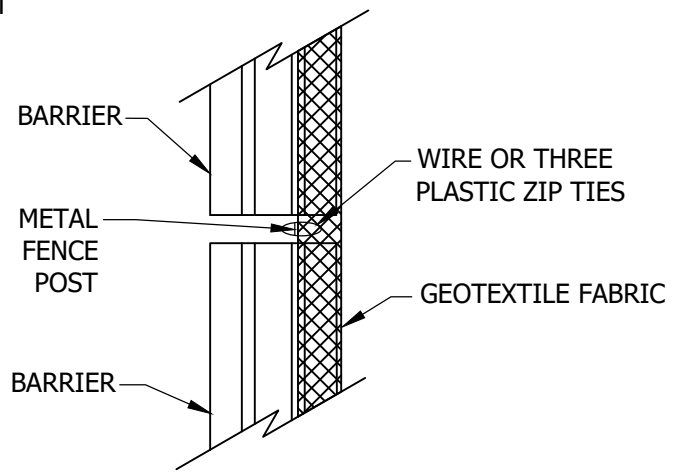
FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-1D

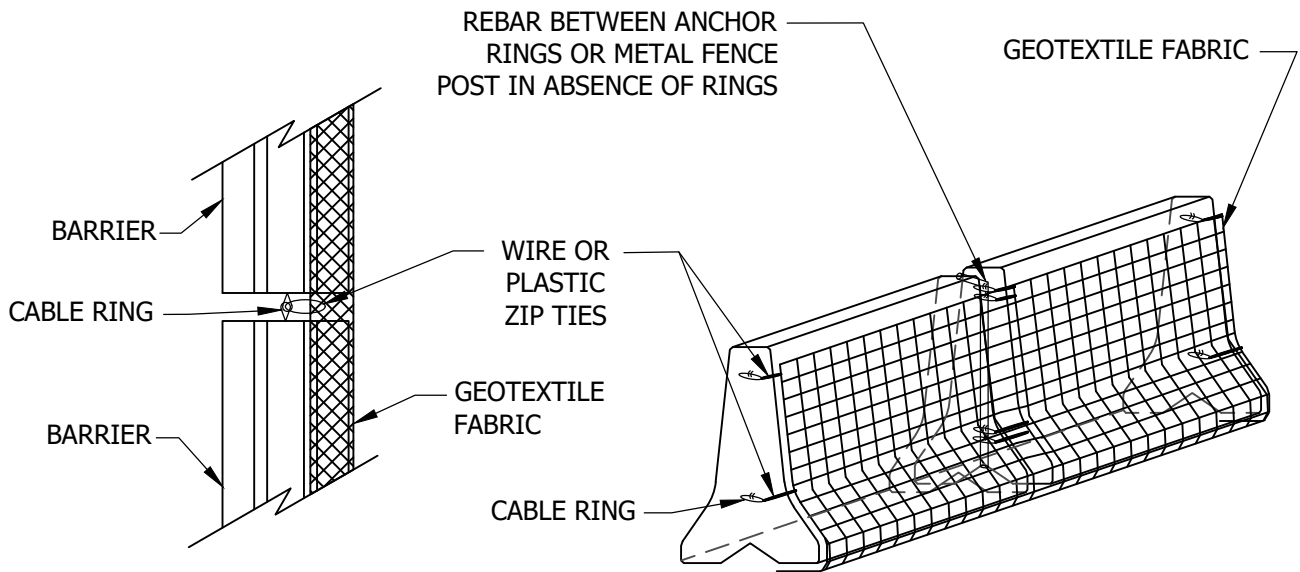


SIDE VIEW



TOP VIEW

BARRIER WITHOUT CABLE RINGS



TOP VIEW

3D VIEW

**BARRIER WITH CABLE RINGS
SILT FENCE, SUPER DUTY**



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
SUPER DUTY PERIMETER CONTROL
SILT FENCE/CONCRETE BARRIER SYSTEM

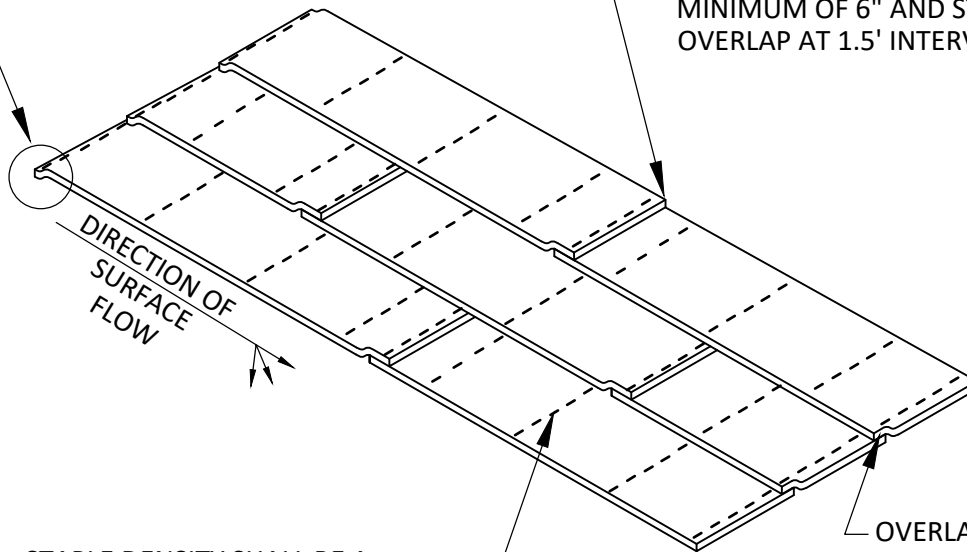
FOREST LAKE, MINNESOTA

LAST REVISION:
JAN 2021

CITY PLATE NO.
ERO-1E

ANCHOR TRENCH
(SEE DETAIL AND NOTES BELOW)

OVERLAP END JOINTS
MINIMUM OF 6" AND STAPLE
OVERLAP AT 1.5' INTERVALS.

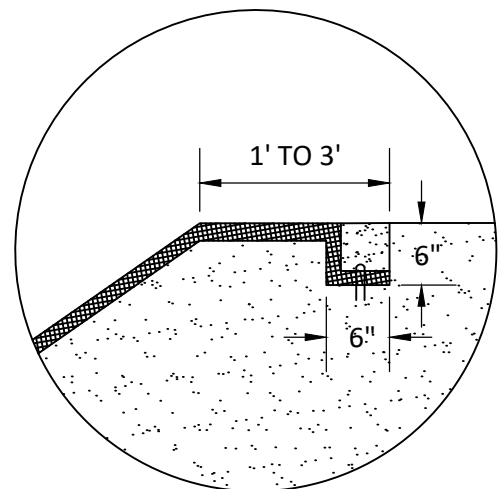


STAPLE DENSITY SHALL BE A
MINIMUM OF 3 U-SHAPED 8",
11 GAUGE METAL STAPLES PER
SQUARE YARD (THIS MAY VARY
AS DIRECTED BY THE CITY).

OVERLAP
LONGITUDINAL JOINTS
MINIMUM OF 6"

ANCHOR TRENCH

1. DIG 6" X 6" TRENCH
2. LAY BLANKET IN TRENCH
3. STAPLE AT 1.5' INTERVALS
4. BACKFILL WITH NATURAL SOIL AND COMPACT
5. BLANKET LENGTH SHALL NOT EXCEED 100'
WITHOUT AN ANCHOR TRENCH



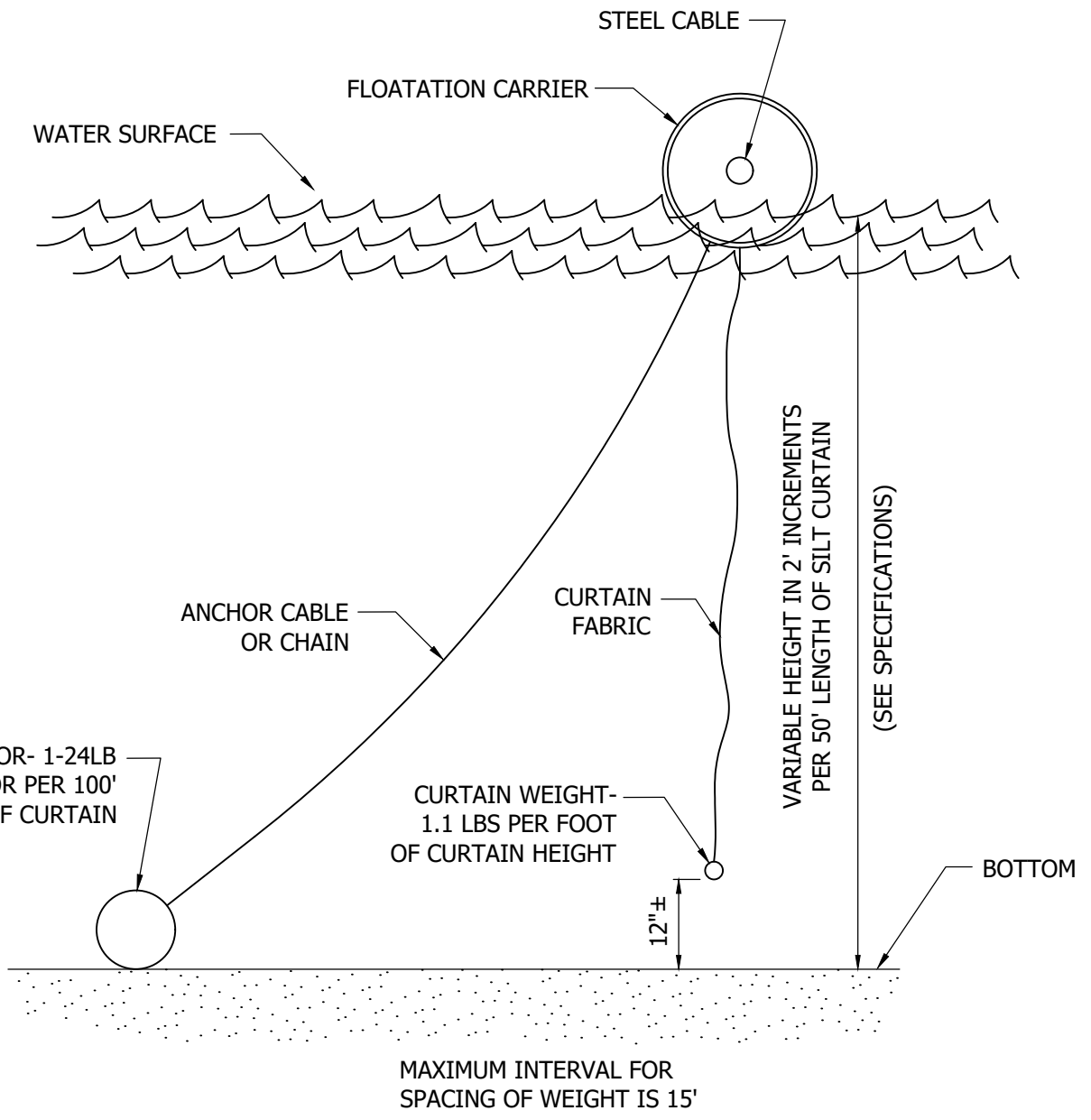
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
EROSION CONTROL BLANKET
INSTALLATION

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-2



MAXIMUM INTERVAL FOR SPACING OF WEIGHT IS 15'

NOTES:

- DOUBLE SILT CURTAINS SHOULD BE SPACED 10' APART.
- CURTAIN LENGTH TO MATCH BOTTOM PROFILE AS CLOSELY AS POSSIBLE.



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

FLOATING SILT CURTAIN

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2007

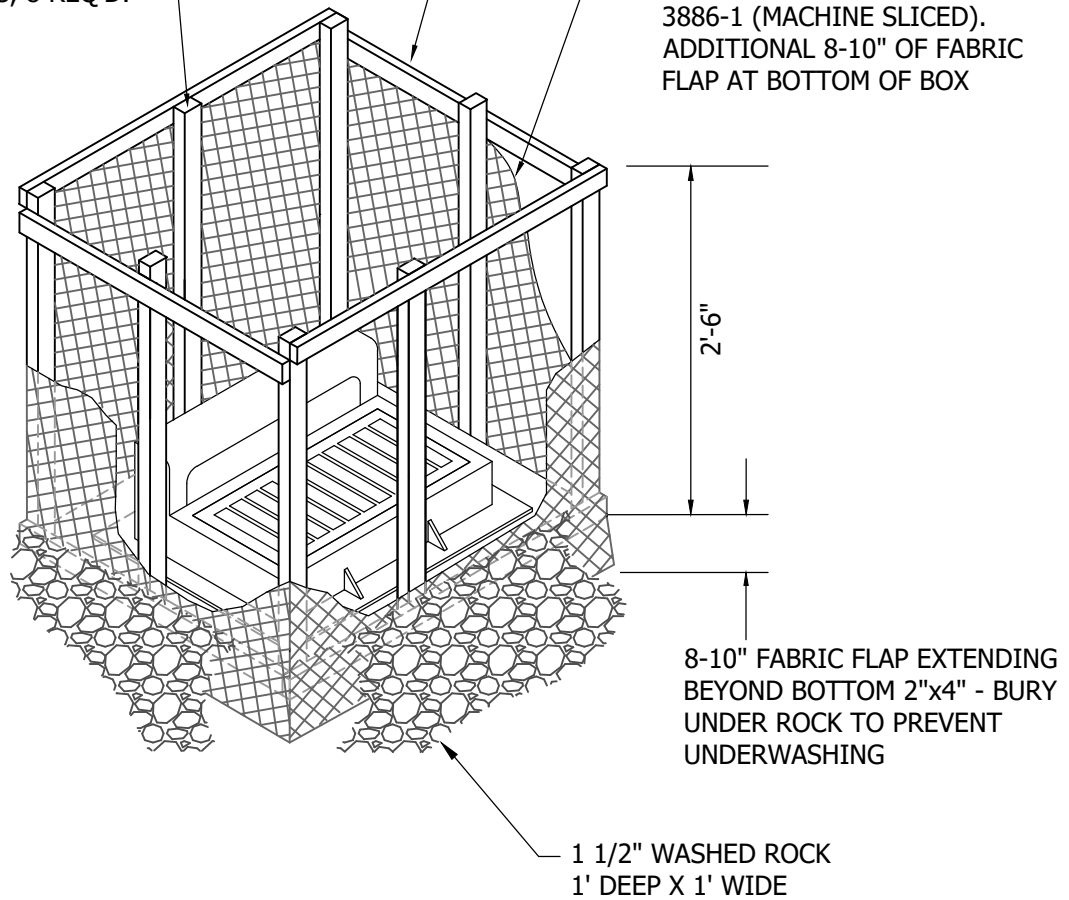
CITY PLATE NO.
ERO-3

WOODEN LATH SHALL BE NAILED SECURELY TO THE POST MEMBER TO SECURE FILTER FABRIC.

2" X 4" HORIZONTAL MEMBERS CONTINUOUS AROUND TOP AND BOTTOM. FASTENED TO EACH POST USING 2-20D COMMON NAILS

2" X 4" X 2.5' LONG WOOD POSTS, 8 REQ'D.

MONOFILAMENT GEOTEXTILE FABRIC AS PER MNDOT TABLE 3886-1 (MACHINE SLICED). ADDITIONAL 8-10" OF FABRIC FLAP AT BOTTOM OF BOX



NOTES:

CONTRACTOR SHALL CONSTRUCT SILT BOX TO FIT AROUND THE INLET STRUCTURE WITH 6" MINIMUM CLEARANCE TO EDGES OF STRUCTURE. SILT BOX TO BE PLACED ON AN EVEN SURFACE 6" BELOW STRUCTURE OPENING. TOP OF SILT BOX TO EXTEND 18" MINIMUM ABOVE EXISTING GRADE.



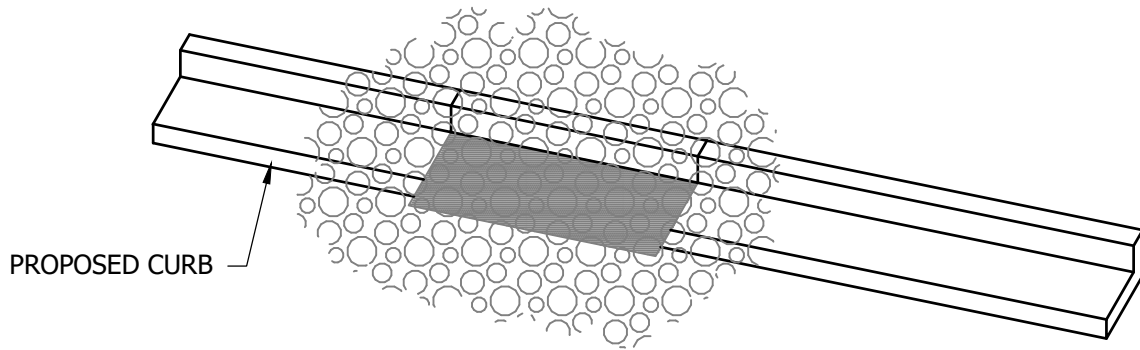
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
INLET PROTECTION SILT BOX
FOR CATCH BASIN BEFORE CONSTRUCTION
FOREST LAKE, MINNESOTA

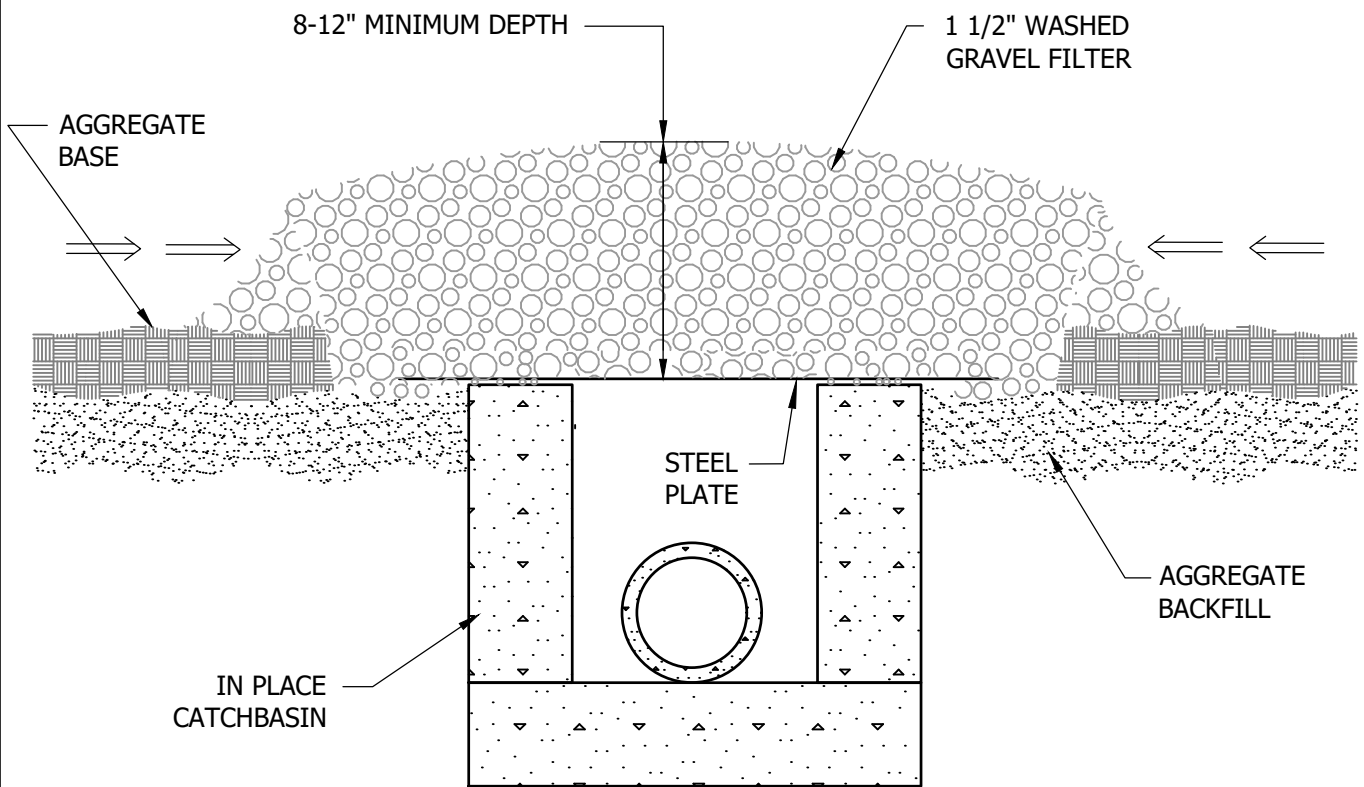
LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-4A

PLAN



← ← = DIRECTION OF SURFACE FLOW

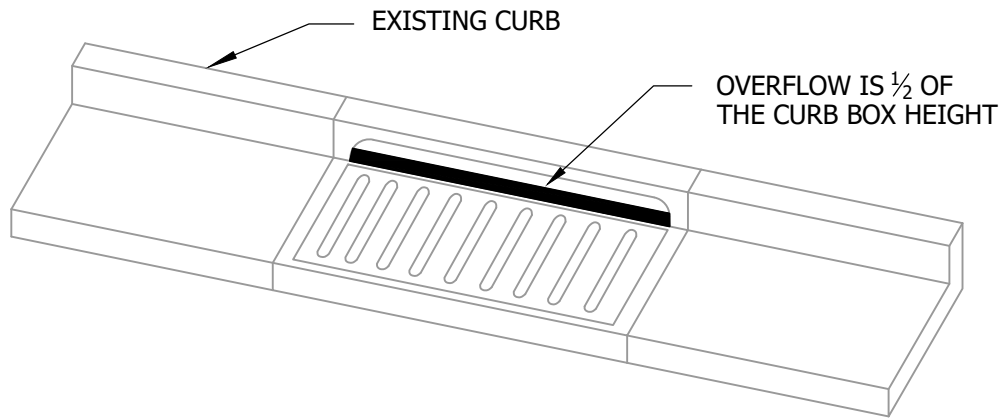


Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
INLET PROTECTION ROCK FILTER FOR
CATCH BASIN DURING ROAD CONSTRUCTION
FOREST LAKE, MINNESOTA

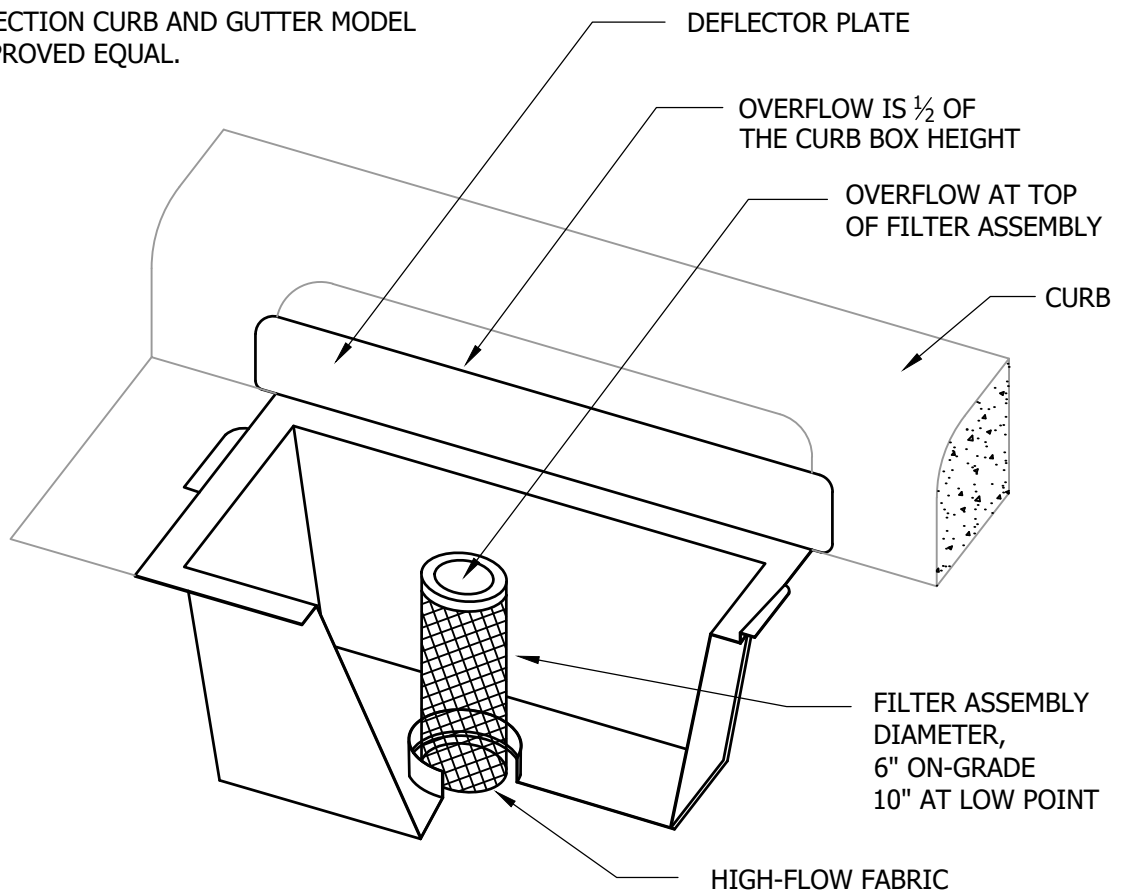
LAST REVISION:
APR 2016

CITY PLATE NO.
ERO-4B



PLAN

WIMCO ROAD DRAIN CG-23* HIGH FLOW
INLET PROTECTION CURB AND GUTTER MODEL
OR CITY APPROVED EQUAL.



* FOR THE NEW R-3067-VB STANDARD CASTING,
INSTALL WIMCO ROAD DRAIN
CG-3290 OR CITY APPROVED EQUAL.



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
INLET PROTECTION
CATCH BASIN INSERT AFTER PAVING

FOREST LAKE, MINNESOTA

LAST REVISION:
APR 2016

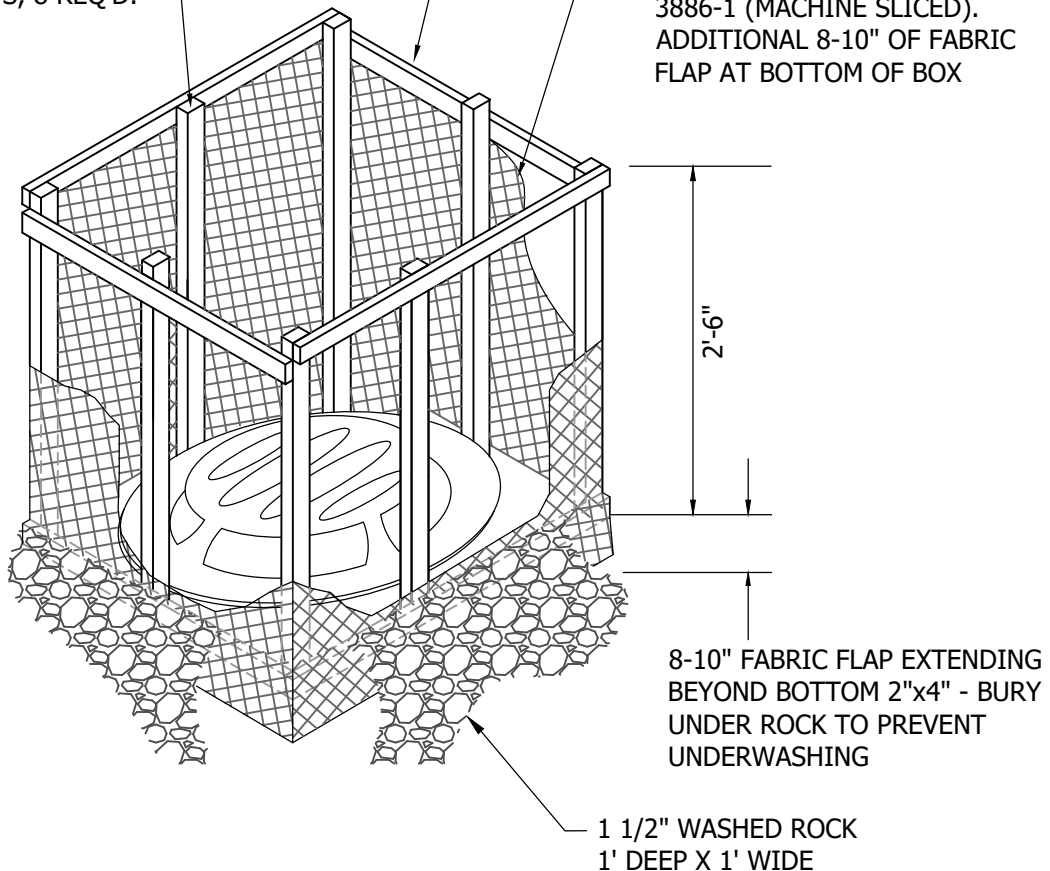
CITY PLATE NO.
ERO-4C

WOODEN LATH SHALL BE NAILED SECURELY TO THE POST MEMBER TO SECURE FILTER FABRIC.

2" X 4" HORIZONTAL MEMBERS CONTINUOUS AROUND TOP AND BOTTOM. FASTENED TO EACH POST USING 2-20D COMMON NAILS

2" X 4" X 2.5' LONG WOOD POSTS, 8 REQ'D.

MONOFILAMENT GEOTEXTILE FABRIC AS PER MNDOT TABLE 3886-1 (MACHINE SLICED). ADDITIONAL 8-10" OF FABRIC FLAP AT BOTTOM OF BOX



NOTES:

CONTRACTOR SHALL CONSTRUCT SILT BOX TO FIT AROUND THE INLET STRUCTURE WITH 6" MINIMUM CLEARANCE TO EDGES OF STRUCTURE. SILT BOX TO BE PLACED ON AN EVEN SURFACE 6" BELOW STRUCTURE OPENING. TOP OF SILT BOX TO EXTEND 18" MINIMUM ABOVE EXISTING GRADE.



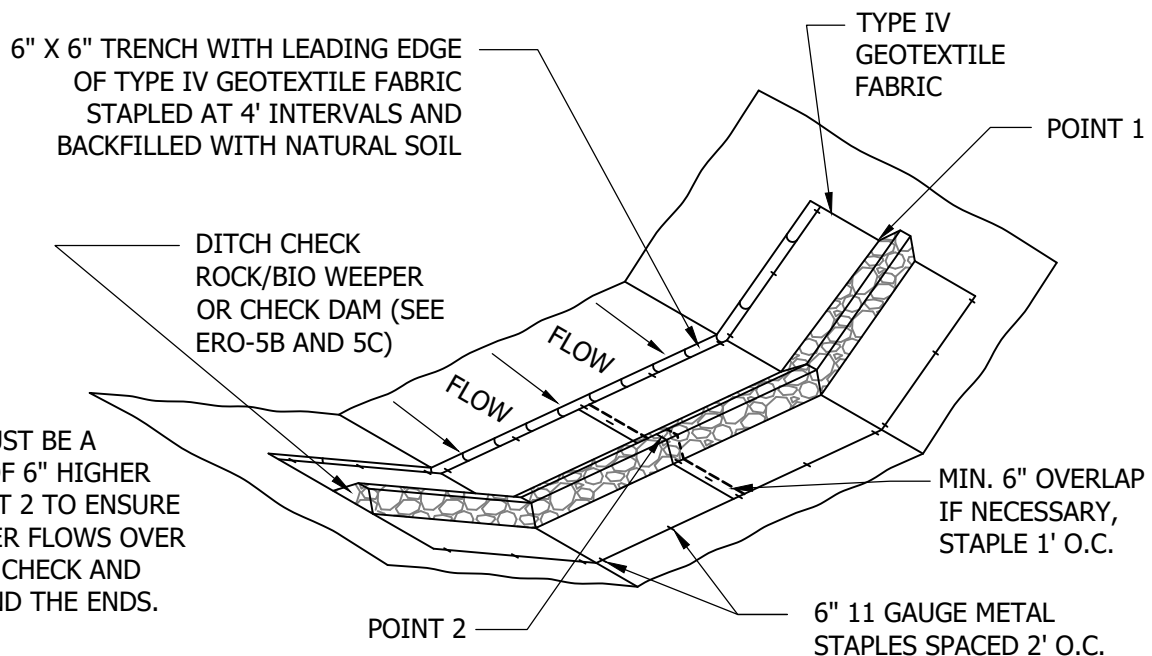
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
INLET PROTECTION
SILT BOX FOR BEEHIVE CASTING

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-4D



NOTE:
 POINT 1 MUST BE A
 MINIMUM OF 6" HIGHER
 THAN POINT 2 TO ENSURE
 THAT WATER FLOWS OVER
 THE DITCH CHECK AND
 NOT AROUND THE ENDS.

DITCH CHECK SPACING
 (USE FOR DETAILS ERO-5B, 5C, 5D, AND 5E)

| DITCH GRADE | INTERVAL |
|-------------|----------|
| (%) | (FT) |
| 2 | 100 |
| 4 | 75 |
| 6 | 50 |
| 8 | 40 |
| 10 | 25 |
| 10+ | 25 |



Forest Lake
 AS GOOD AS IT SOUNDS

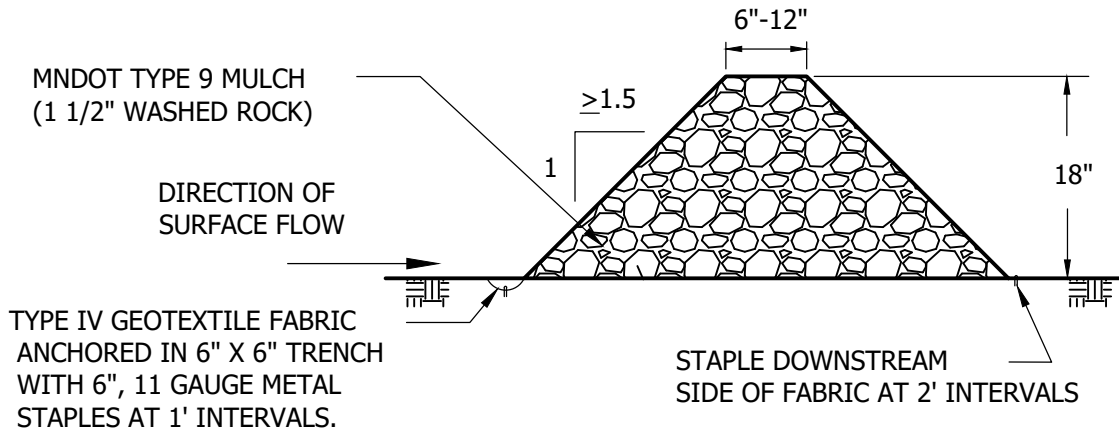
STANDARD DETAILS
DITCH CHECK
 3D VIEW FOR 5B, 5C SPACING

FOREST LAKE, MINNESOTA

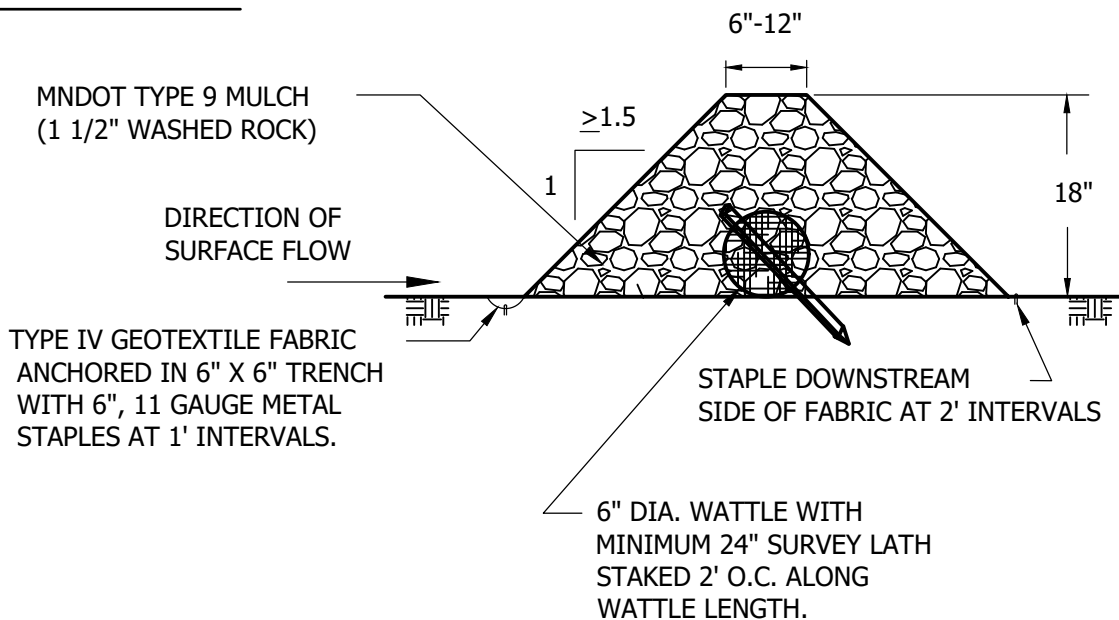
LAST REVISION:
 MAR 2007

CITY PLATE NO.
 ERO-5A

I. ROCK WEEPER



II. BIO WEEPER



Forest Lake
AS GOOD AS IT SOUNDS

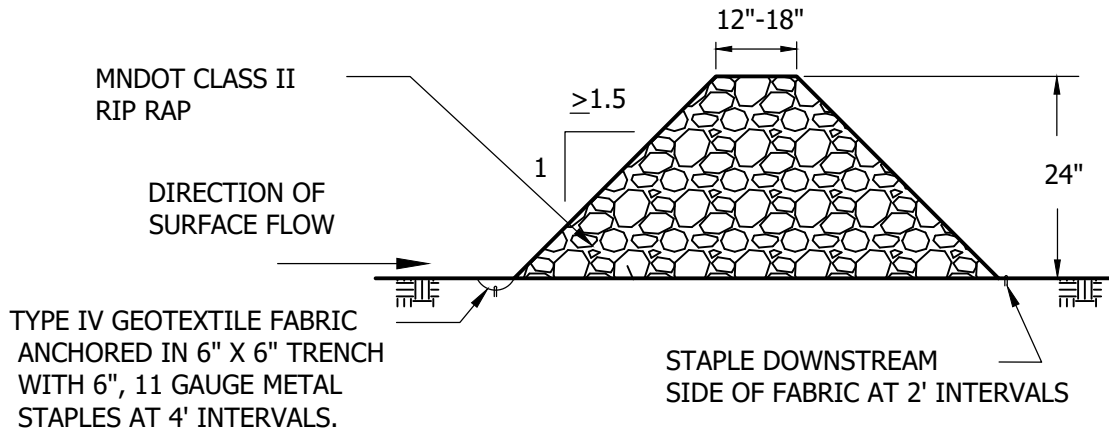
STANDARD DETAILS
DITCH CHECK
ROCK WEEPER, BIO WEEPER

FOREST LAKE, MINNESOTA

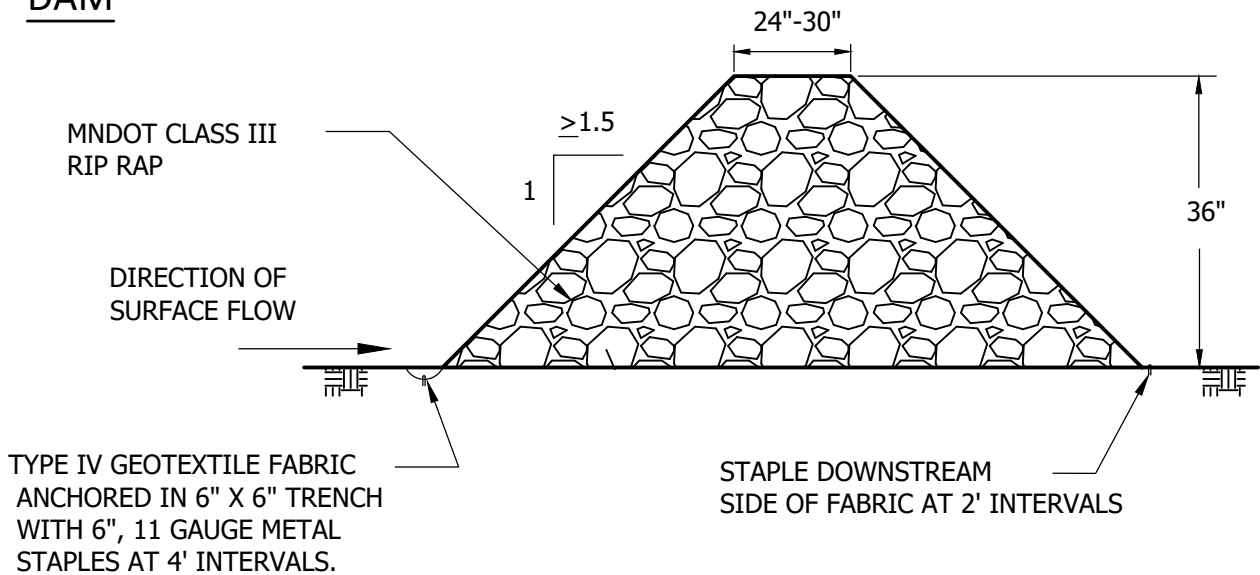
LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-5B

I. SMALL CHECK DAM



II. LARGE CHECK DAM



Forest Lake
AS GOOD AS IT SOUNDS

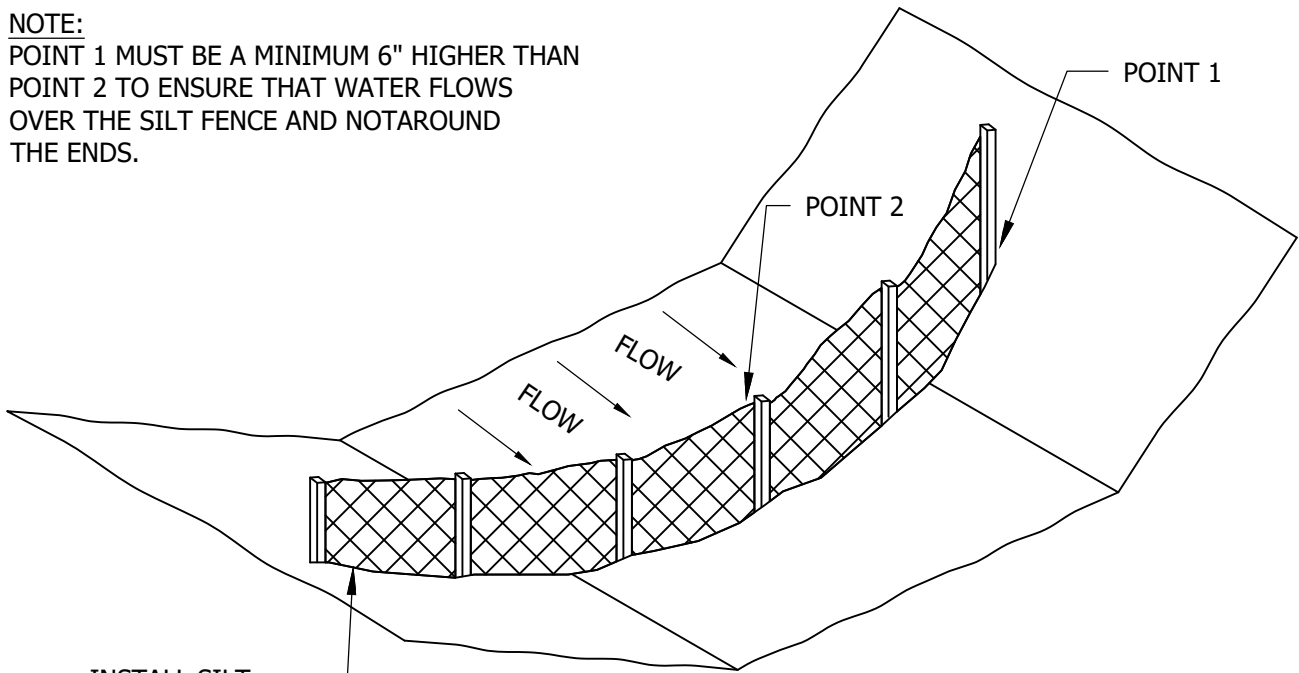
STANDARD DETAILS
DITCH CHECK
ROCK WEEPER, BIO WEEPER

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-5C

NOTE:
 POINT 1 MUST BE A MINIMUM 6" HIGHER THAN
 POINT 2 TO ENSURE THAT WATER FLOWS
 OVER THE SILT FENCE AND NOT AROUND
 THE ENDS.



INSTALL SILT
 FENCE AS SHOWN BELOW

STEEL FENCE POST (T-POST),
 MINIMUM 5' LONG,
 4' MAXIMUM SPACING.

POST NOTCHES
 TO FACE AWAY
 FROM FABRIC.

ATTACH FABRIC TO POSTS
 WITH MINIMUM 3 ZIP TIES
 (50 LB. TENSILE) PER POST
 IN TOP 8" OF FABRIC.

MONOFILAMENT GEOTEXTILE
 FABRIC PER MNDOT TABLE
 3886-1 (MACHINE SLICED).

MACHINE SLICE
 8"-12" DEPTH (PLUS 6" FLAP)

DIRECTION OF SURFACE FLOW

24" MINIMUM
 POST EMBEDMENT

(A) COMPACTION:
 AFTER "SLICING" IN THE FABRIC AND
 BEFORE INSTALLATION OF STEEL POSTS, DRIVE INSTALLATION
 EQUIPMENT OVER THE "SLICE" WHILE FABRIC IS LAYING ON THE
 GROUND. THEN INSTALL STEEL POSTS AND PULL UP FABRIC TO
 ATTACH AT A UNIFORM HEIGHT.



Forest Lake
 AS GOOD AS IT SOUNDS

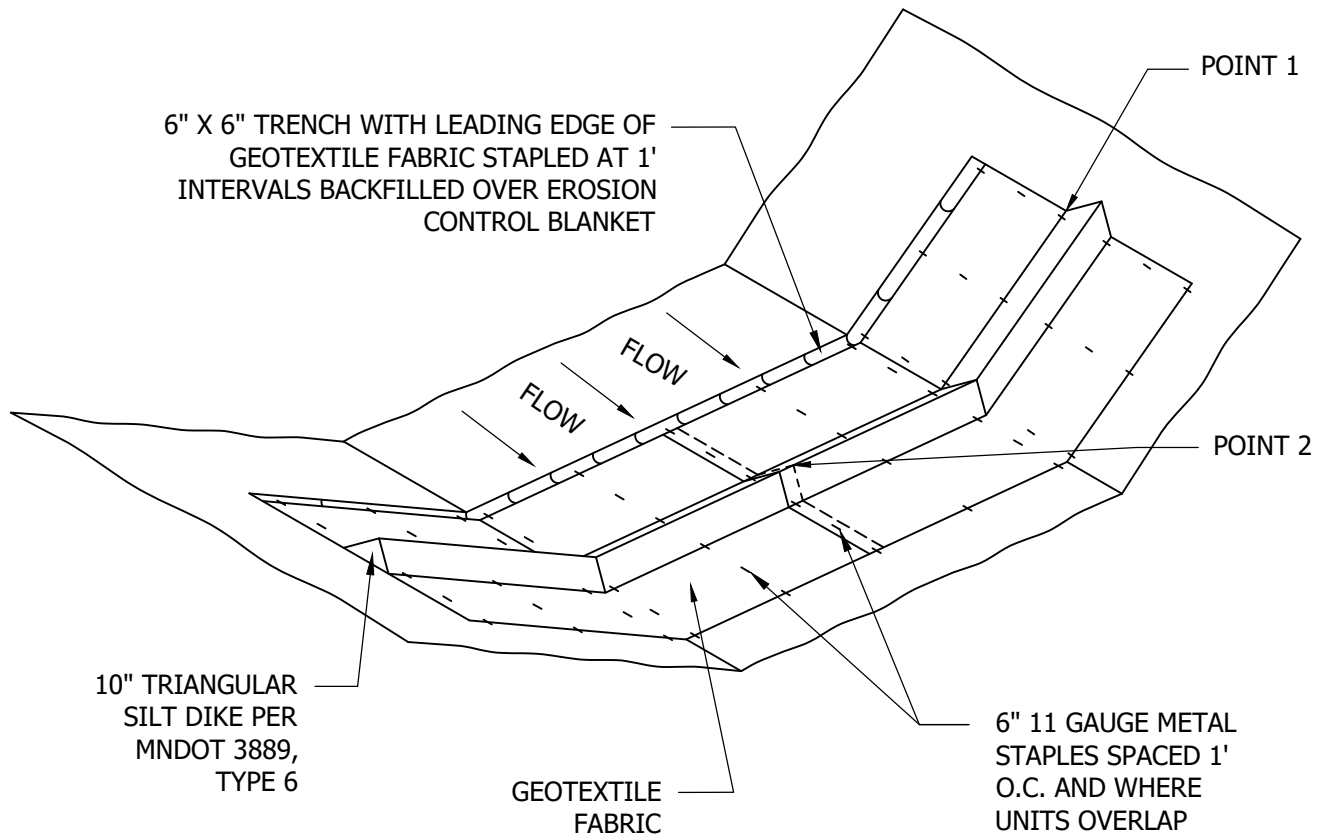
STANDARD DETAILS
 DITCH CHECK
 MACHINE SLICED SILT FENCE

FOREST LAKE, MINNESOTA

LAST REVISION:
 MAR 2007

CITY PLATE NO.
 ERO-5D

NOTE:
POINT 1 MUST BE A MINIMUM OF 6"
HIGHER THAN POINT 2 TO ENSURE
THAT WATER FLOWS OVER THE DIKE
AND NOT AROUND THE ENDS.



10" TRIANGULAR
SILT DIKE PER
MNDOT 3889,
TYPE 6

GEOTEXTILE
FABRIC

6" 11 GAUGE METAL
STAPLES SPACED 1'
O.C. AND WHERE
UNITS OVERLAP



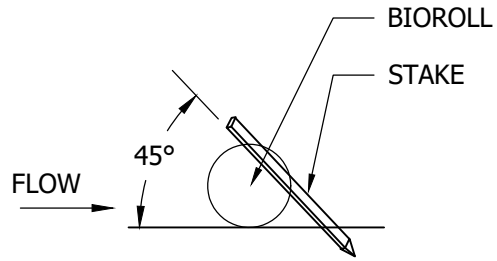
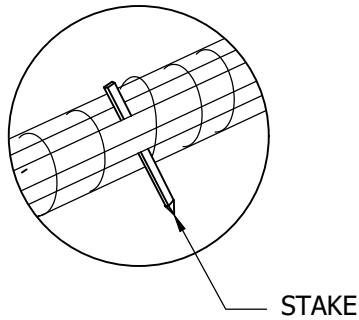
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
DITCH CHECK
TRIANGULAR SILT DIKE

FOREST LAKE, MINNESOTA

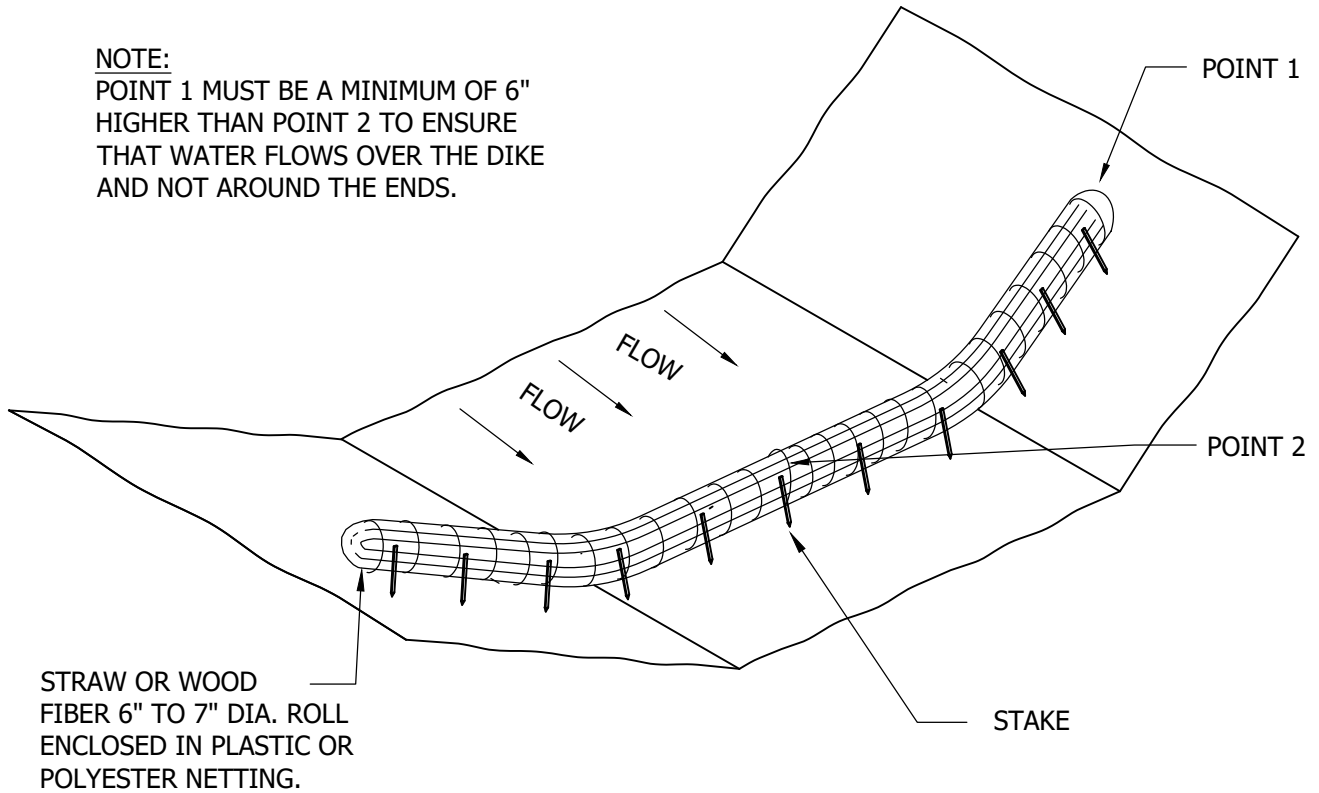
LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-5E



1/2" x 2" x 16" LONG WOODEN STAKES AT 1'-0" SPACING MINIMUM. STAKES SHALL BE DRIVEN THROUGH THE BACK HALF OF THE COMPOST LOG AT AN ANGLE OF 45° WITH THE TOP OF THE STAKE POINTING UPSTREAM.

NOTE:
POINT 1 MUST BE A MINIMUM OF 6" HIGHER THAN POINT 2 TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS.



Forest Lake
AS GOOD AS IT SOUNDS

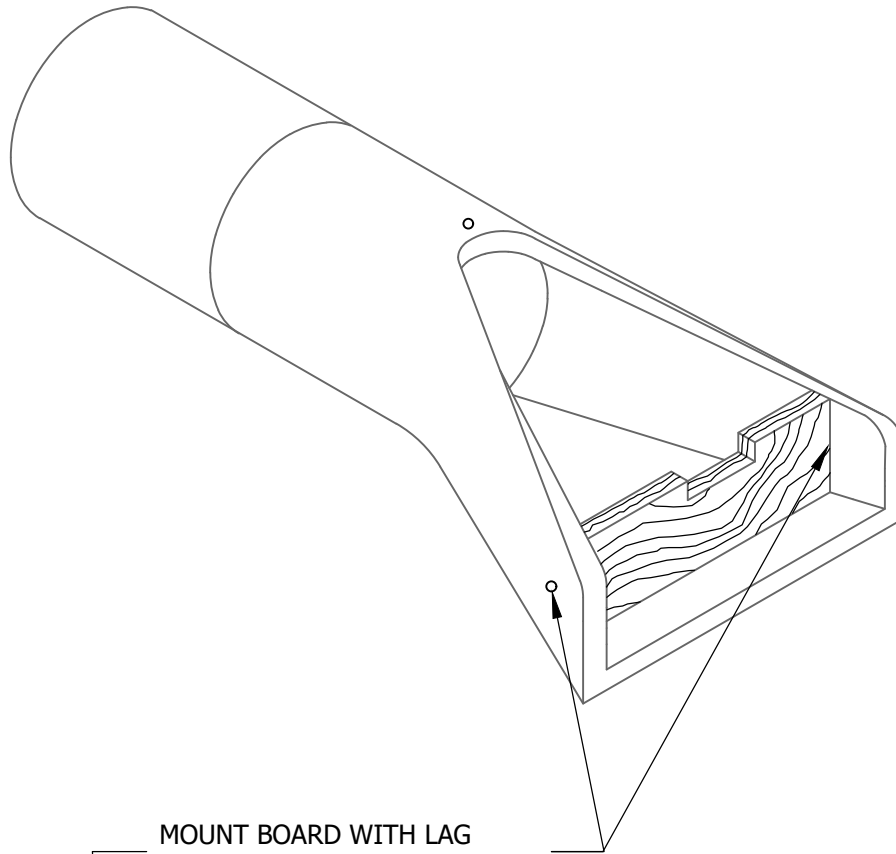
STANDARD DETAILS

COMPOST LOG
DITCH CHECK

FOREST LAKE, MINNESOTA

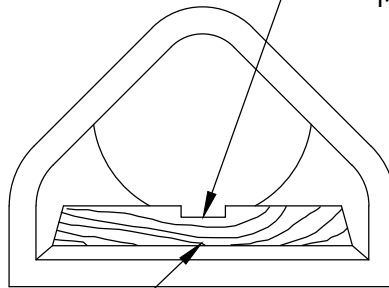
LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-5F



MOUNT BOARD WITH LAG BOLTS THROUGH TRASH GUARD MOUNTING HOLES.

LENGTH OF NOTCH NOT TO EXCEED 33% OF PIPE DIAMETER AND NEVER MORE THAN 12".



WEIR (2" x VARIABLE HEIGHT) NOT MORE THAN 33% OF PIPE DIAMETER AND NEVER MORE THAN 12".

NOTE:
1" NOTCH FOR WEIRS 4"-6" HIGH
2" NOTCH FOR WEIRS 6"-12" HIGH



Forest Lake
AS GOOD AS IT SOUNDS

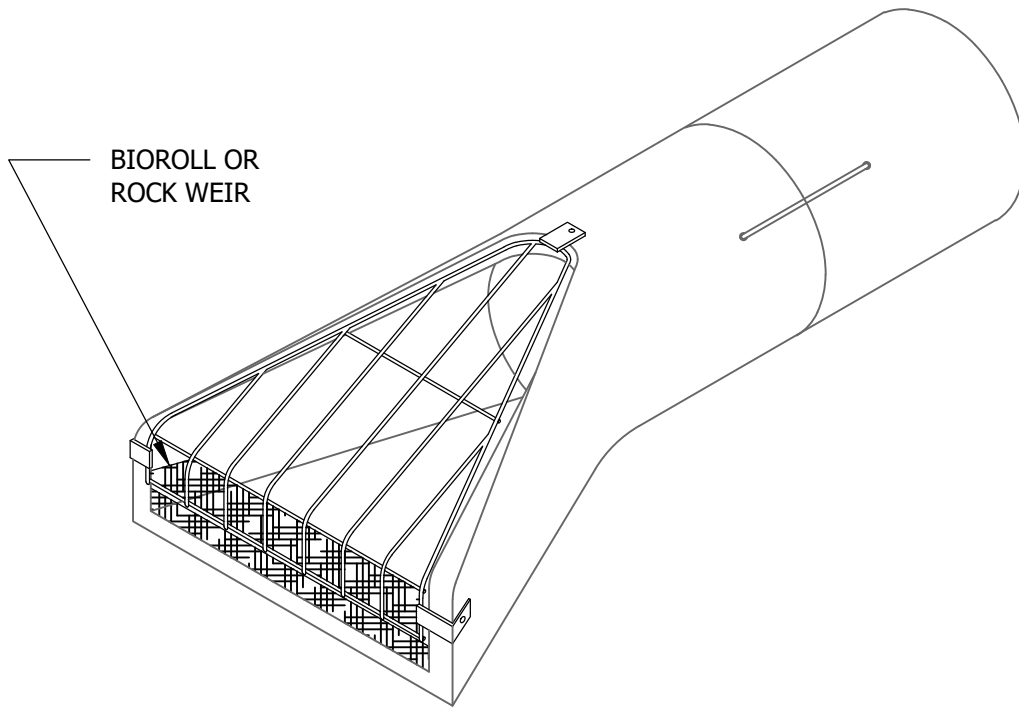
STANDARD DETAILS

PIPE CHECK
WOODEN WEIR

FOREST LAKE, MINNESOTA

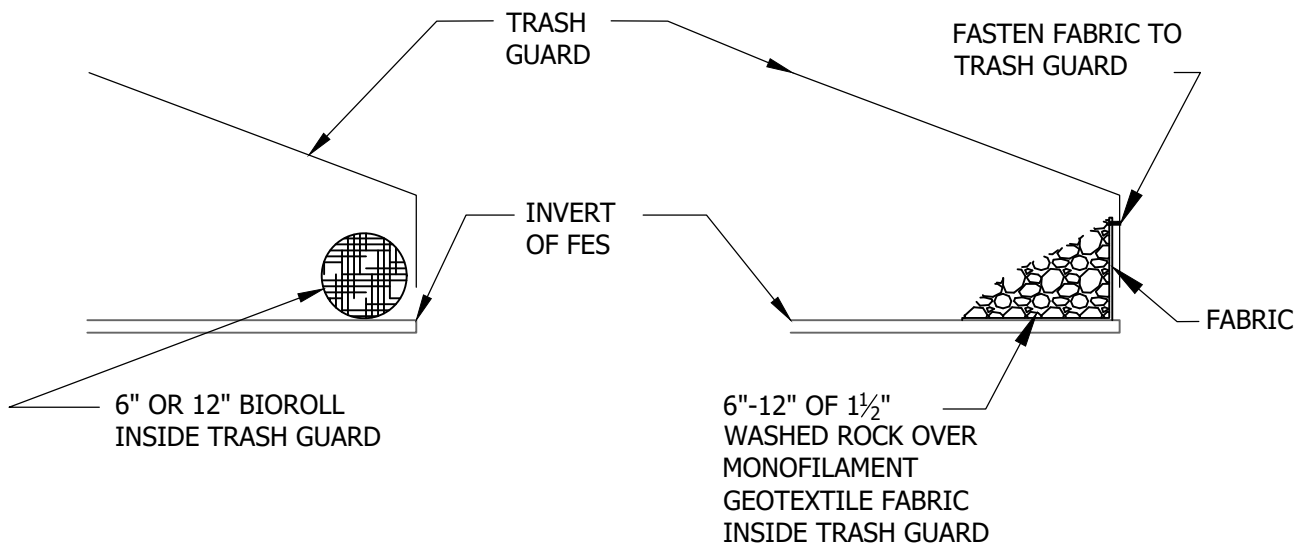
LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-6A



BIOROLL WEIR

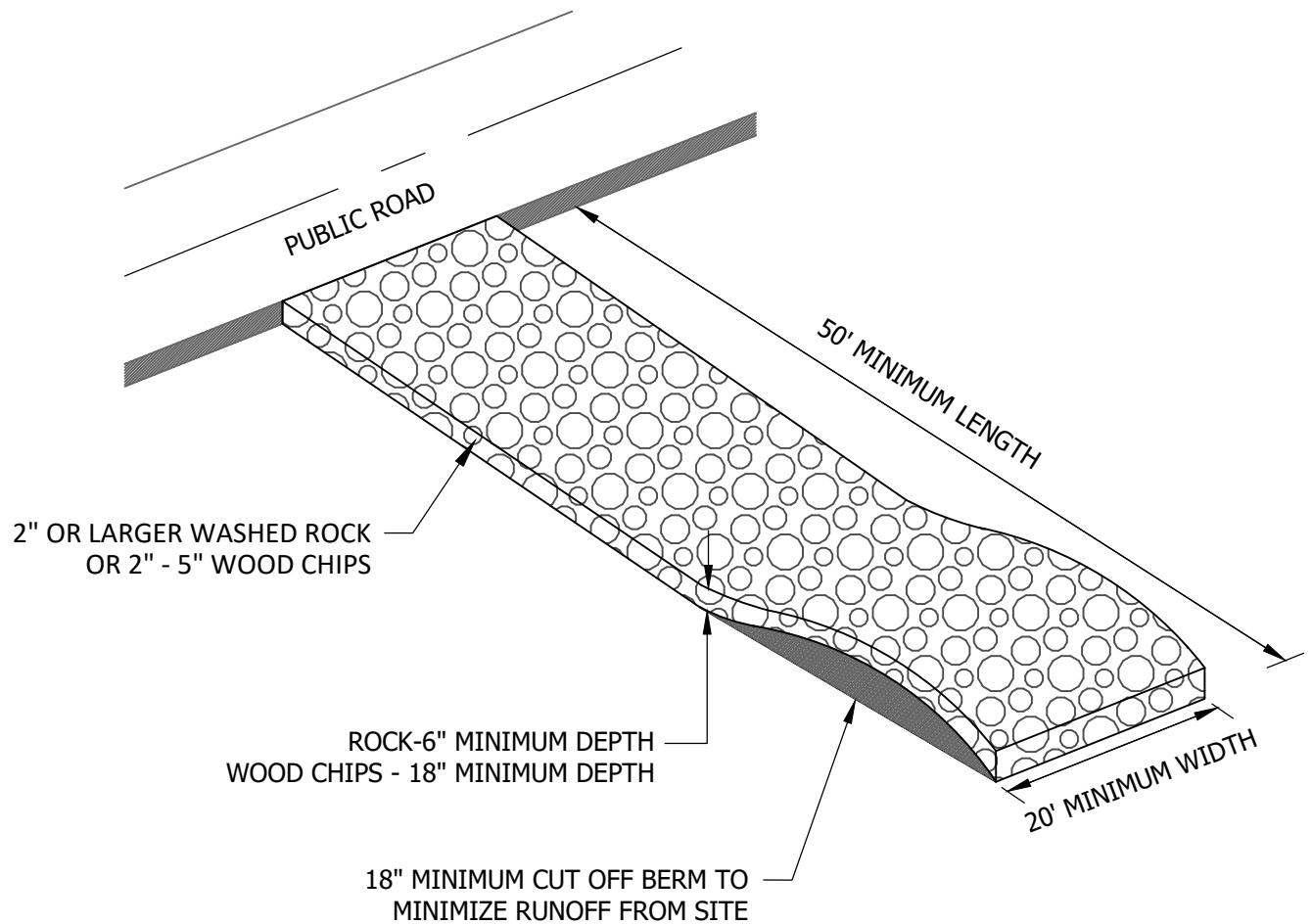
ROCK WEIR



STANDARD DETAILS
 PIPE CHECK
 BIOROLL WEIR, ROCK WEIR
FOREST LAKE, MINNESOTA

LAST REVISION:
 MAR 2007

CITY PLATE NO.
 ERO-6B



NOTES:

1. FILTER FABRIC SHALL BE PLACED UNDER ROCK OR MULCH TO STOP MUD MIGRATION THROUGH ROCK. FILTER FABRIC IS NOT REQUIRED UNDER WOOD CHIPS.
2. 80% OF WOOD CHIPS USED FOR CONSTRUCTION ENTRANCES MUST BE BETWEEN 2 INCHES AND 5 INCHES. NO CHIPPED-UP MANUFACTURED WOOD AND / OR CHEMICALLY TREATED WOOD IS ALLOWED.
3. ENTRANCE MUST BE MAINTAINED REGULARLY TO PREVENT SEDIMENTATION ON PUBLIC ROADWAYS. FUGITIVE ROCK OR WOOD CHIPS WILL BE REMOVED FROM ADJACENT ROADWAYS DAILY OR MORE FREQUENTLY AS NECESSARY.



Forest Lake
AS GOOD AS IT SOUNDS

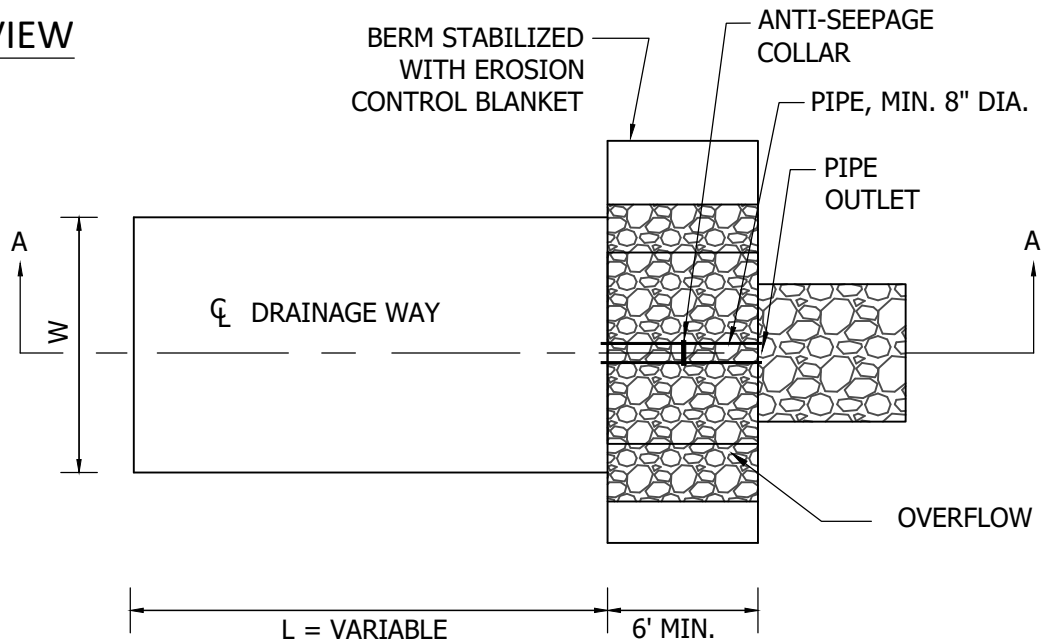
STANDARD DETAILS
CONSTRUCTION ENTRANCE
ROCK, WOOD CHIP

FOREST LAKE, MINNESOTA

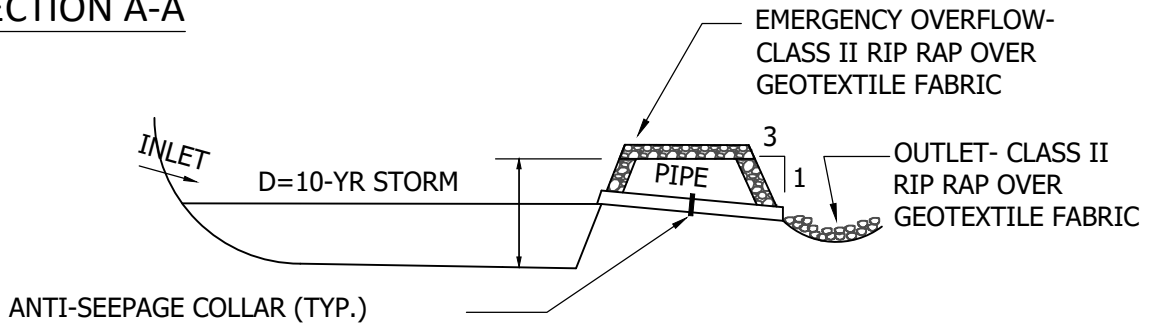
LAST REVISION:
MAR 2022

CITY PLATE NO.
ERO-7

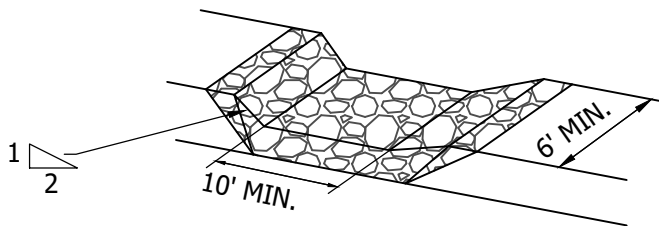
I. PLAN VIEW



II. SECTION A-A



III. BASIN EMERGENCY OVERFLOW



NOTES:
 BASIN USED FOR 10 ACRES DRAINAGE AREA OR MORE. DESIGN RUNOFF VOLUME IS FROM A 2-YR, 24-HR STORM PER ACRE DRAINED TO THE BASIN. BASIN VOLUME MUST BE A MIN. OF 1800 CUBIC FEET/ACRE. SEE PLANS/SPECIFICATIONS FOR BASIN DIMENSIONS AND PIPE SIZE AND SLOPE.



Forest Lake
 AS GOOD AS IT SOUNDS

STANDARD DETAILS
 TEMPORARY SEDIMENTATION BASIN
 PIPE OUTLET

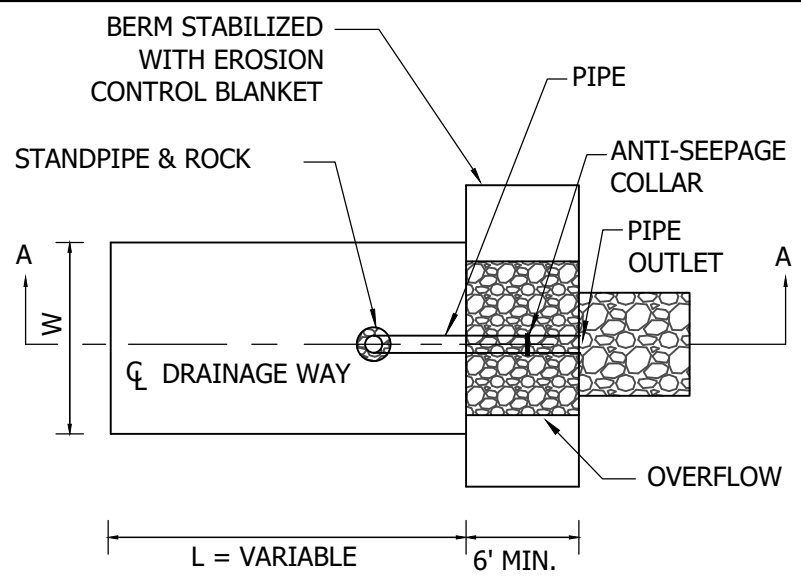
FOREST LAKE, MINNESOTA

LAST REVISION:
 MAR 2007

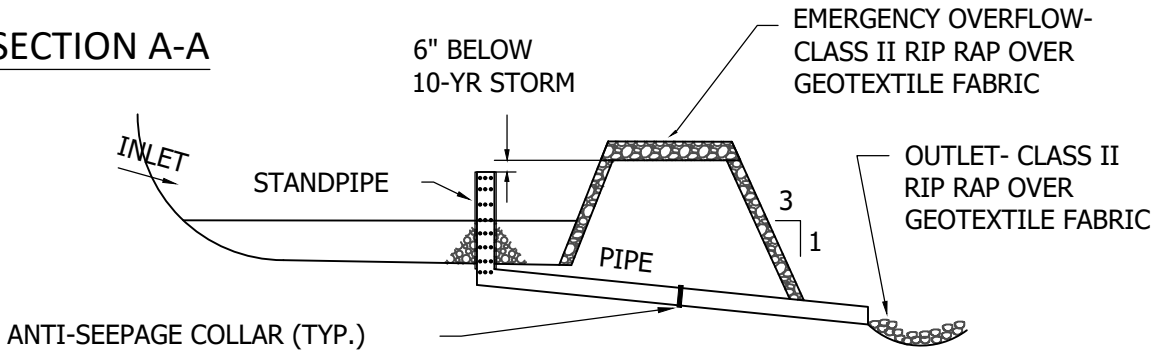
CITY PLATE NO.
 ERO-8A

I. PLAN VIEW

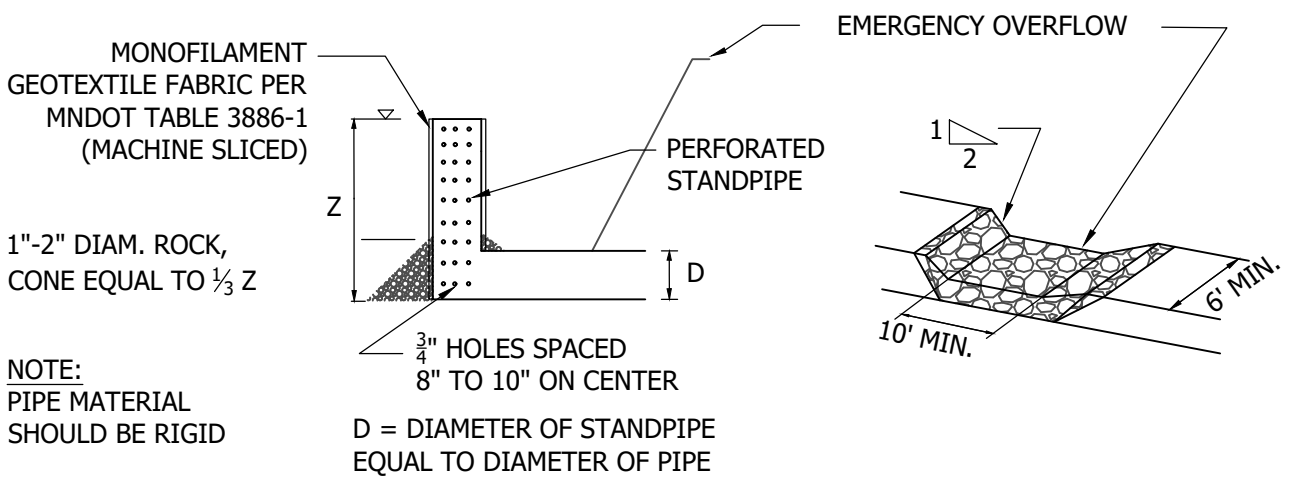
NOTES:
 BASIN USED FOR 10 ACRES DRAINAGE AREA OR MORE. DESIGN RUNOFF VOLUME IS FROM A 2-YR, 24-HR STORM PER ACRE DRAINED TO THE BASIN. BASIN VOLUME MUST BE A MIN. OF 1800 CUBIC FEET/ACRE. SEE PLANS/SPECIFICATIONS FOR BASIN DIMENSIONS AND PIPE SIZE AND SLOPE.



II. SECTION A-A



III. BASIN STANDPIPE AND EMERGENCY OVERFLOW



NOTE:
 PIPE MATERIAL SHOULD BE RIGID

D = DIAMETER OF STANDPIPE EQUAL TO DIAMETER OF PIPE

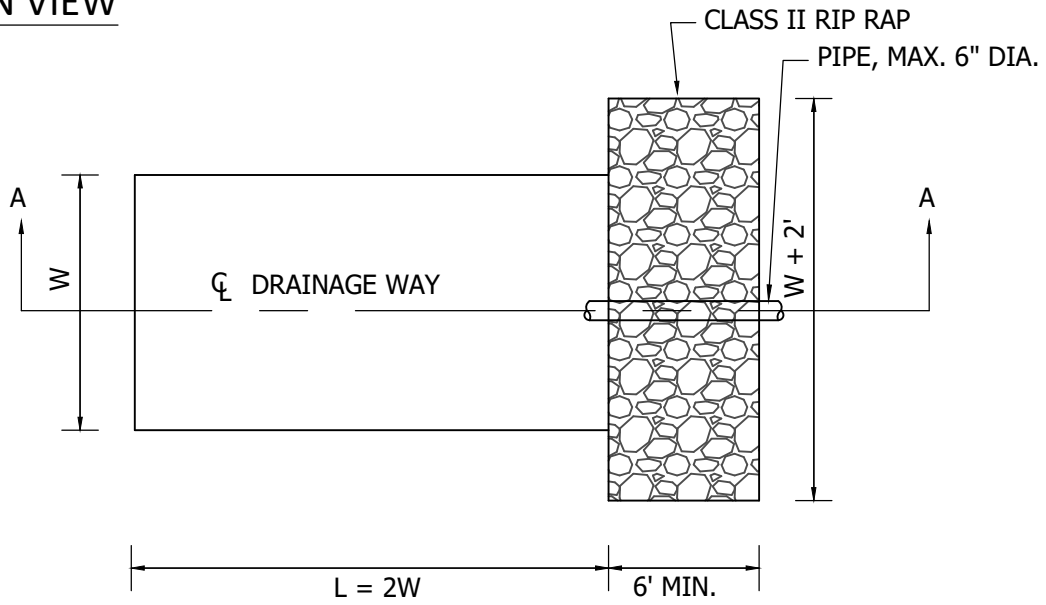


STANDARD DETAILS
 TEMPORARY SEDIMENTATION BASIN
 STANDPIPE OUTLET
FOREST LAKE, MINNESOTA

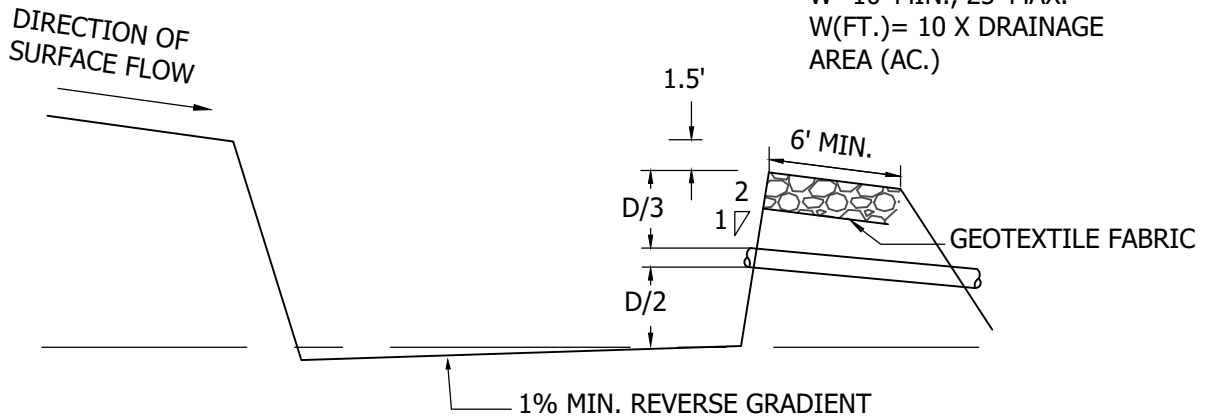
LAST REVISION:
 MAR 2007

CITY PLATE NO.
 ERO-8B

I. PLAN VIEW



II. SECTION A-A



NOTE:
D=3' MIN., 5' MAX.
W=10' MIN., 25' MAX.
W(FT.)= 10 X DRAINAGE
AREA (AC.)



Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS

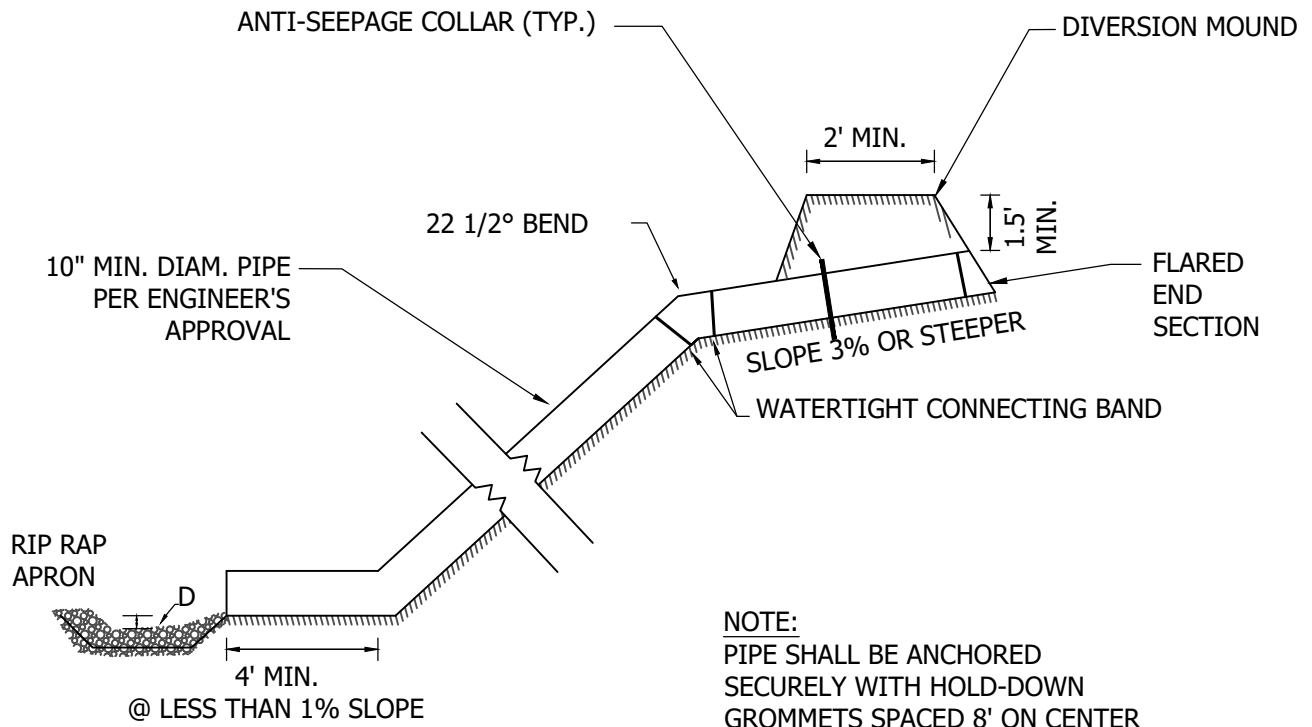
TEMPORARY SEDIMENT TRAP

FOREST LAKE, MINNESOTA

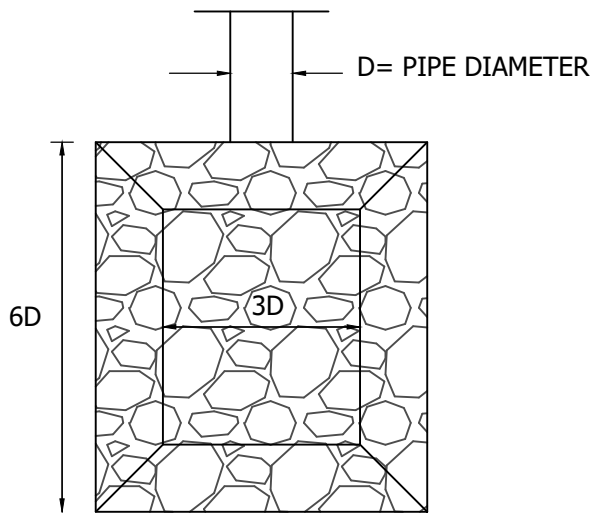
LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-9

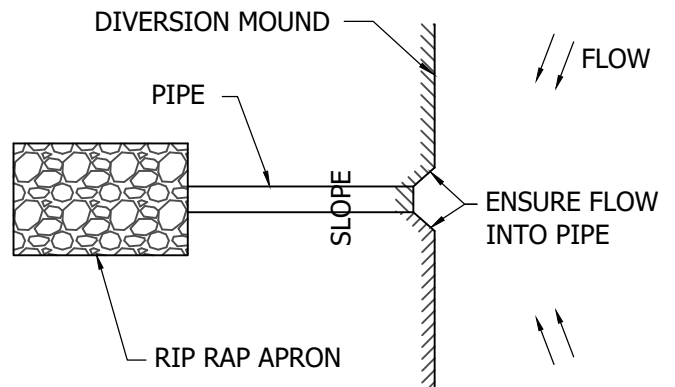
PROFILE VIEW



RIP RAP APRON PLAN



PLAN VIEW



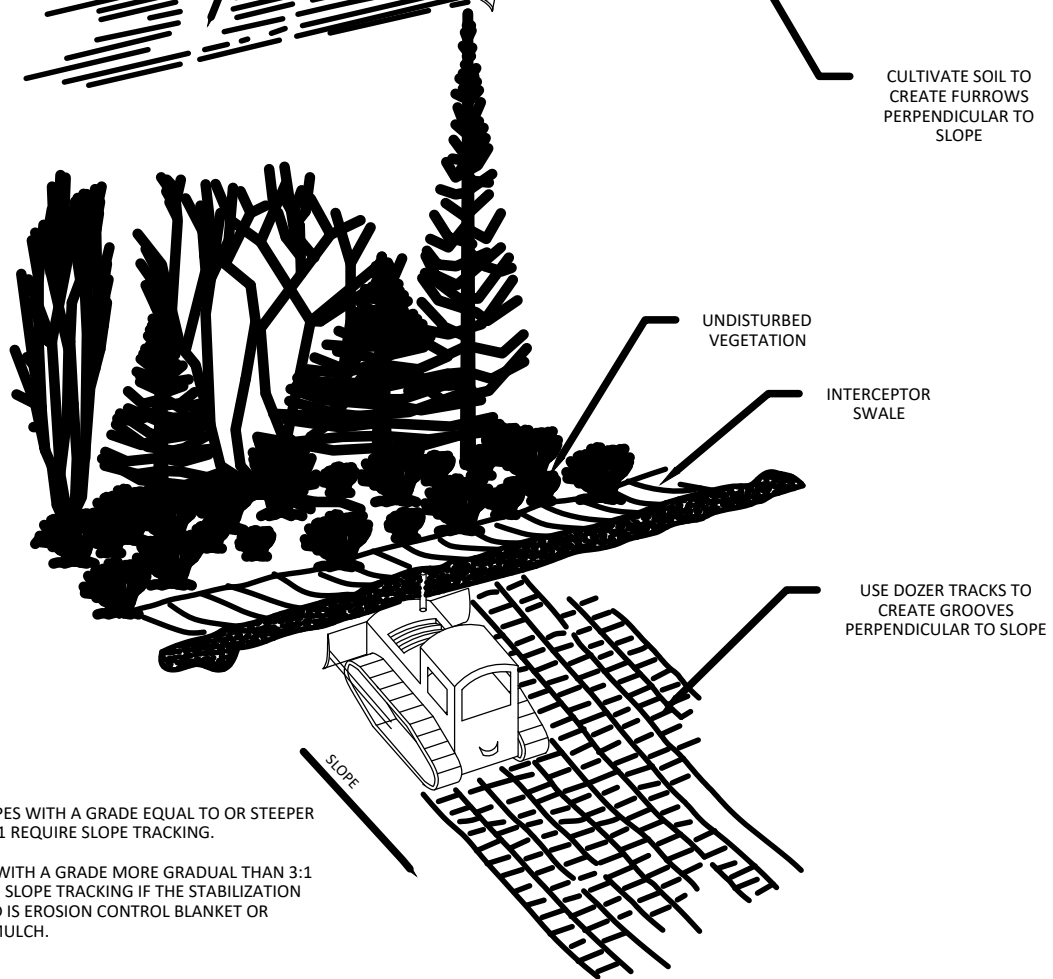
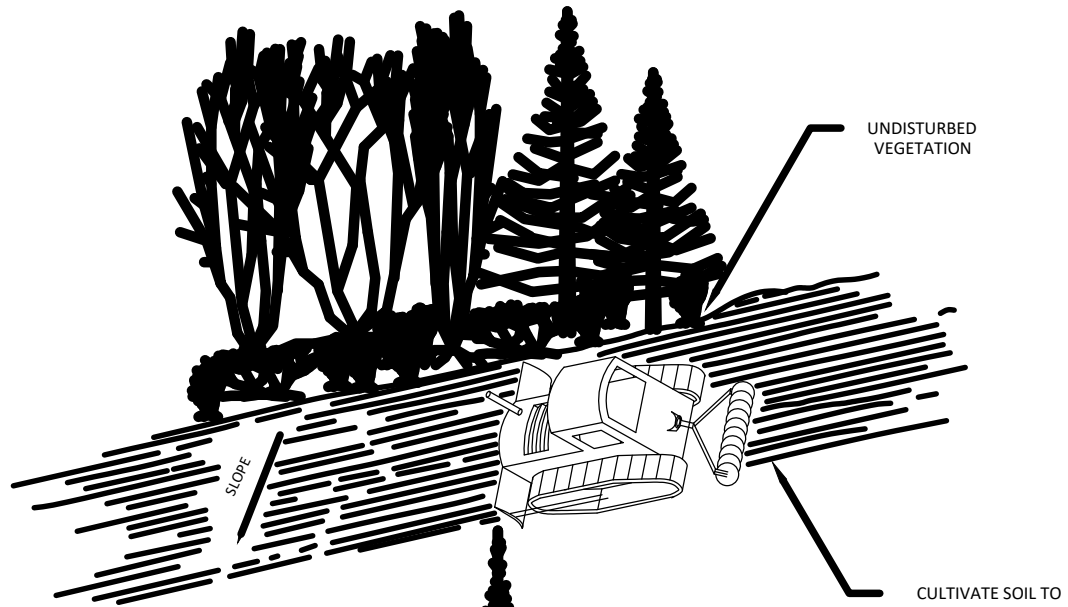
Forest Lake
AS GOOD AS IT SOUNDS

STANDARD DETAILS
DIVERSION MOUND AND
TEMPORARY PIPE DOWNDRAIN

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2007

CITY PLATE NO.
ERO-10



NOTE:
 ALL SLOPES WITH A GRADE EQUAL TO OR STEEPER THAN 3:1 REQUIRE SLOPE TRACKING.

SLOPES WITH A GRADE MORE GRADUAL THAN 3:1 REQUIRE SLOPE TRACKING IF THE STABILIZATION METHOD IS EROSION CONTROL BLANKET OR HYDROMULCH.



Forest Lake
 AS GOOD AS IT SOUNDS

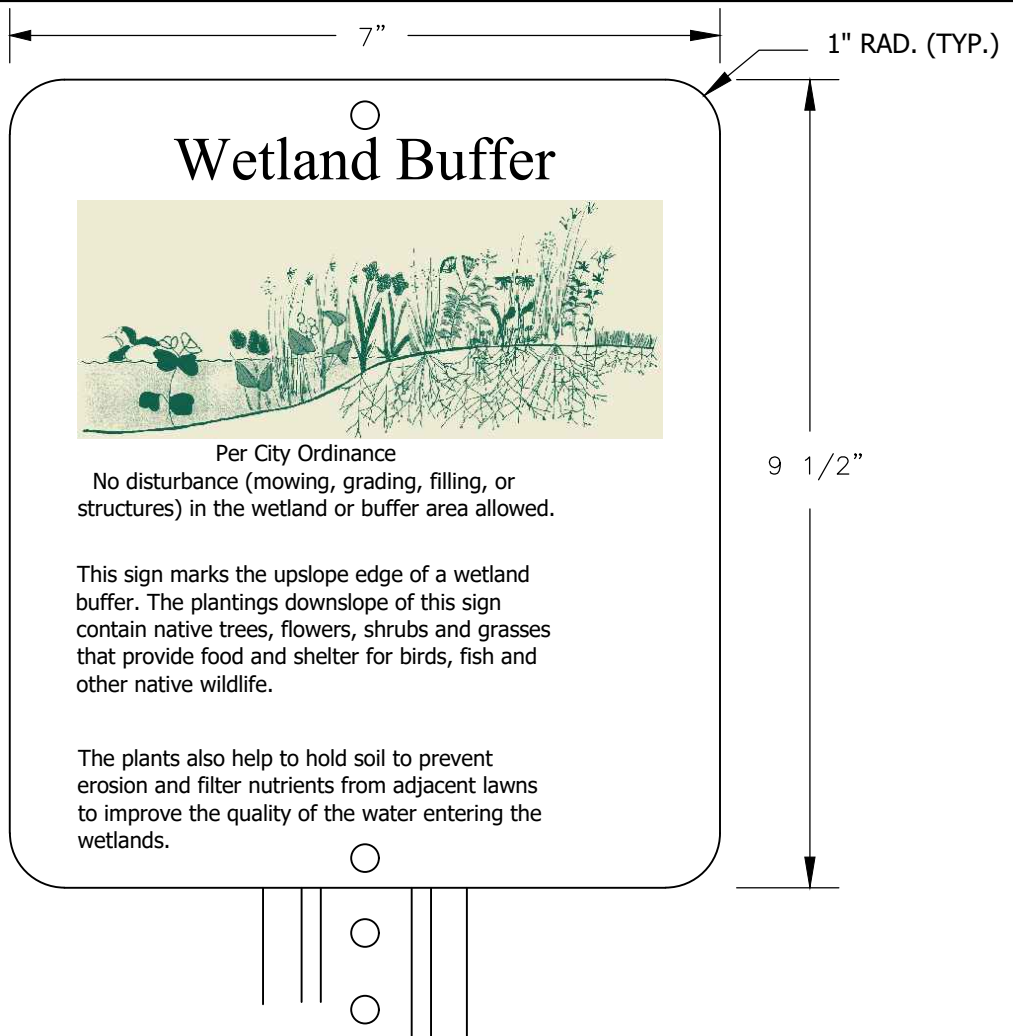
STANDARD DETAILS

SLOPE TRACKING

FOREST LAKE, MINNESOTA

LAST REVISION:
 MAR 2019

CITY PLATE NO.
 ERO-11



1. THE SIGN MUST BE:
 - a. 0.063 ALUMINUM BLANK,
 - b. BACKGROUND PANTONE: 155 (TAN)
 - c. BLACK VERBIAGE AND LOGO PRINTED ONE SIDE
 - d. PRE-DRILL HOLES IN MIDDLE TOP AND BOTTOM (AVOID VERBIAGE)
 - e. TRIM TO BORDER AS SHOWN ON SIGN ARTWORK TO INSURE ROUNDED CORNERS
2. THE MARKER SHALL CONSIST OF A FOUR INCH SQUARE TREATED, OR CEDAR POST, OR GREEN STEEL POST INSTALLED TO A HEIGHT OF FOUR FEET ABOVE GRADE, AND SET AT LEAST 42" INTO GROUND.
3. BOLT OR SCREW SIGN TO POST.
4. ONE SIGN SHALL BE PLACED PER LOT AT THE UPSLOPE EDGE OF THE REQUIRED BUFFER STRIP FOR THE WETLAND. PROPOSED LOCATIONS OF SIGNS SHALL BE SHOWN ON GRADING OR SITE PLAN. IN GENERAL, THE LOCATION OF SIGNS SHALL CAPTURE THE PORTION OF THE BUFFER THAT EXTENDS THE FURTHEST UPSLOPE INTO THE LOT.
5. ARTWORK AND VERBIAGE SHALL FACE PROPOSED HOME (STRUCTURE).
6. CONTACT CITY FOR POTENTIAL SIGN SOURCES.



Forest Lake
AS GOOD AS IT SOUNDS

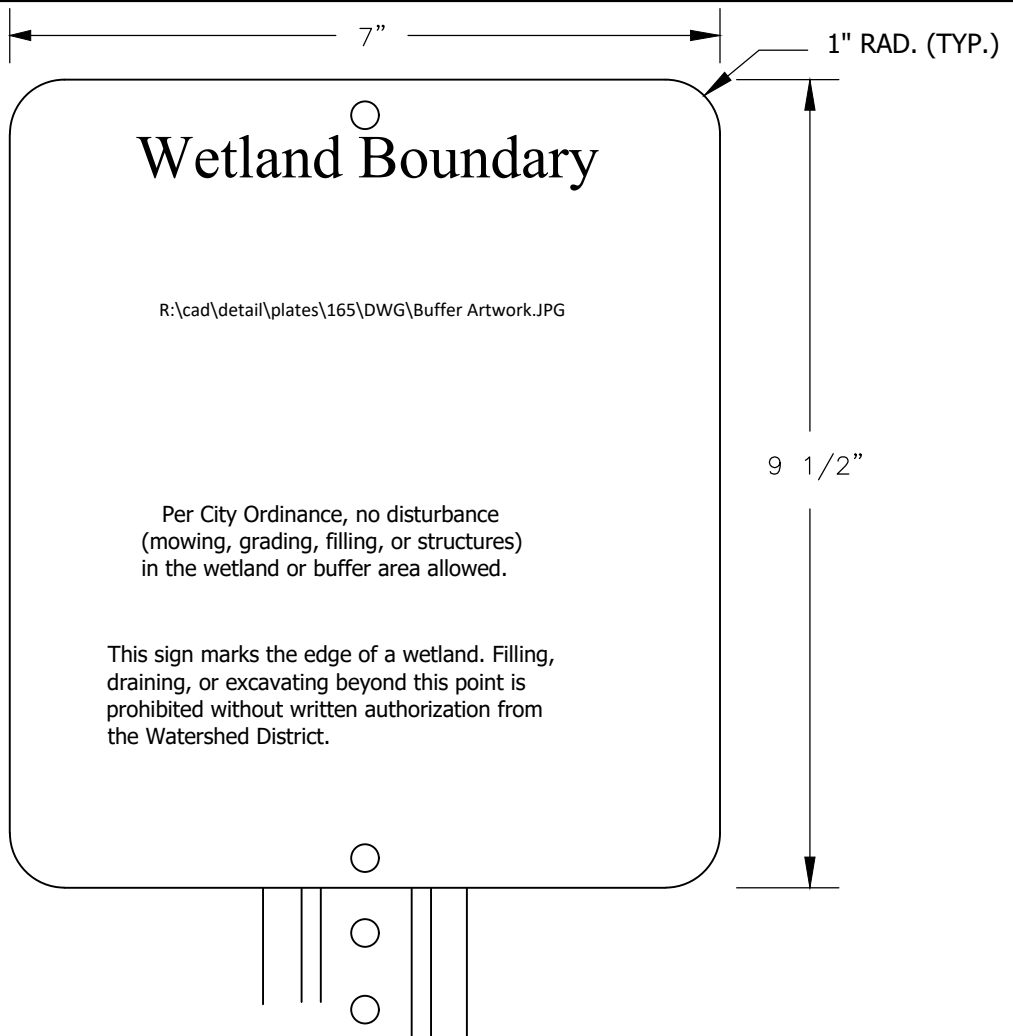
STANDARD DETAILS

WETLAND BUFFER SIGN

FOREST LAKE, MINNESOTA

LAST REVISION:
SEPT 2023

CITY PLATE NO.
GEN-3



1. THE SIGN MUST BE:
 - a. 0.063 ALUMINUM BLANK,
 - b. BACKGROUND PANTONE: 155 (TAN)
 - c. BLACK VERBIAGE AND LOGO PRINTED ONE SIDE
 - d. PRE-DRILL HOLES IN MIDDLE TOP AND BOTTOM (AVOID VERBIAGE)
 - e. TRIM TO BORDER AS SHOWN ON SIGN ARTWORK TO INSURE ROUNDED CORNERS
2. THE MARKER SHALL CONSIST OF A FOUR INCH SQUARE TREATED, OR CEDAR POST, OR GREEN STEEL POST INSTALLED TO A HEIGHT OF FOUR FEET ABOVE GRADE, AND SET AT LEAST 42" INTO GROUND.
3. BOLT OR SCREW SIGN TO POST.
4. ONE SIGN SHALL BE PLACED PER LOT AT THE UPSLOPE EDGE OF THE WETLAND BOUNDARY. PROPOSED LOCATIONS OF SIGNS SHALL BE SHOWN ON GRADING OR SITE PLAN. IN GENERAL, THE LOCATION OF SIGNS SHALL CAPTURE THE PORTION OF THE BOUNDARY THAT EXTENDS THE FURTHEST UPSLOPE INTO THE LOT.
5. ARTWORK AND VERBIAGE SHALL FACE PROPOSED HOME (STRUCTURE).
6. CONTACT CITY FOR POTENTIAL SIGN SOURCES.



Forest Lake
AS GOOD AS IT SOUNDS

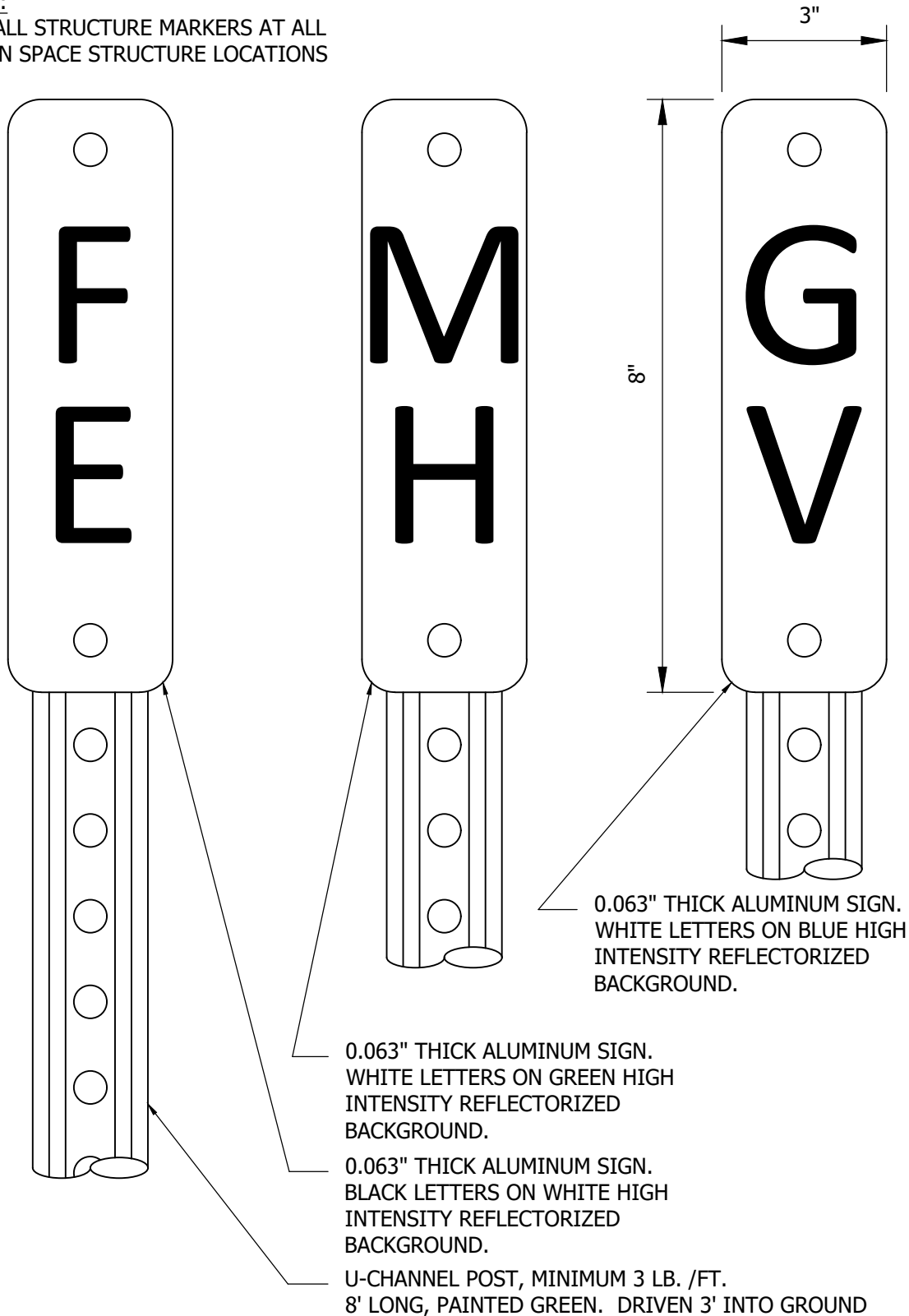
STANDARD DETAILS
WETLAND BOUNDARY SIGN

FOREST LAKE, MINNESOTA

LAST REVISION:
MAR 2023

CITY PLATE NO.
GEN-4

NOTE:
INSTALL STRUCTURE MARKERS AT ALL
GREEN SPACE STRUCTURE LOCATIONS



Forest Lake
AS GOOD AS IT SOUNDS

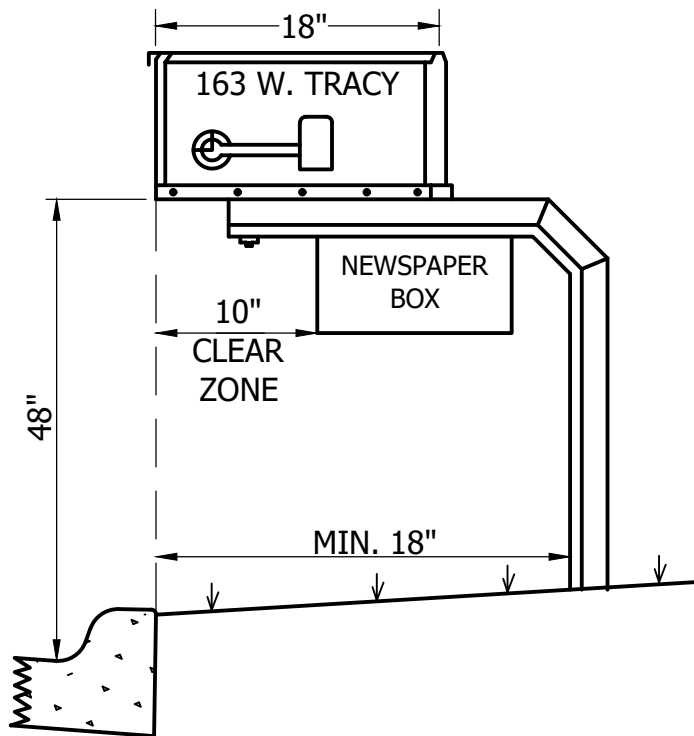
STANDARD DETAILS

STRUCTURE MARKER SIGNS

FOREST LAKE, MINNESOTA

LAST REVISION:
FEB 2023

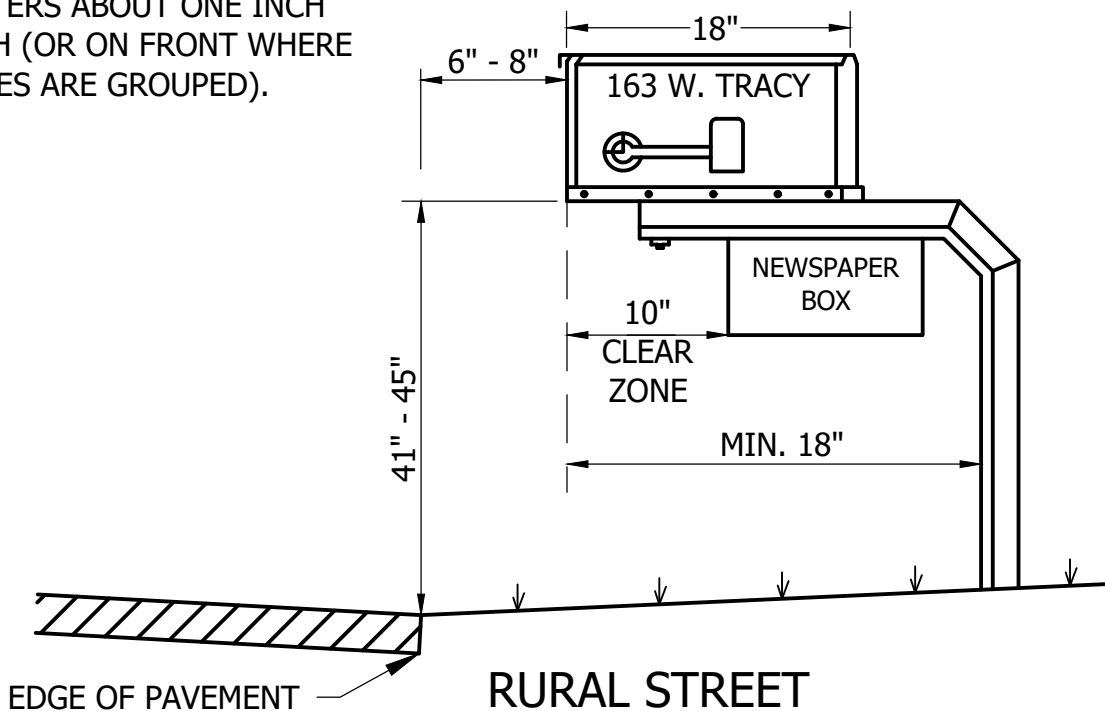
CITY PLATE NO.
GEN-5



NOTES:
DIMENSIONS AS PER U.S.
POSTAL SERVICE

ADDRESS MUST BE ON SIDE
OF BOX FROM WHICH
CARRIER APPROACHES IN
LETTERS ABOUT ONE INCH
HIGH (OR ON FRONT WHERE
BOXES ARE GROUPED).

URBAN STREET



RURAL STREET

EDGE OF PAVEMENT

STANDARD DETAILS

MAIL BOX INSTALLATION

FOREST LAKE, MINNESOTA



Forest Lake
AS GOOD AS IT SOUNDS

LAST REVISION:
MAR 2019

CITY PLATE NO.
GEN-6