ENGINEERING MANUAL
FOR
STANFORD TOWNSHIP

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Forward

In order to protect public health, safety and welfare, it is necessary to establish standards for engineering in the Township of Stanford, Isanti County, Minnesota.

This manual outlines specific requirements, materials and standards that will be incorporated into the preparation of plans and specifications for utility, street and other construction improvements within the Township.

Utility facilities and associated work shall be designed to conform to the “10 State Standards” and shall be constructed in accordance with City Engineers Association of Minnesota Standards Specifications except as modified by specific Township of Stanford requirements. Street surface improvements shall be designed to the standards of the Minnesota Department of Transportation design manuals and shall be constructed in accordance with the Minnesota Department of Transportation Standard Specifications except as modified by specific Township requirements.

Development plans and public facilities construction plans shall conform to Township of Stanford associated ordinances and comprehensive plans. Related to engineering, comprehensive plans include the surface water runoff control plan and the Township transportation plan with designated collector streets. The Township of Stanford has the authority to construct improvements as necessary with the costs of improvements allocated or assessed to properties for benefit.

Once the plat, plans and specifications and associated documents have been reviewed, approved, and signed, the Township will allow the developers, as defined in the Development Agreement, to proceed with the construction.

These standards are established as policy and as such may be subject to change by action of the Town Board.

The Township of Stanford Engineering Manual was approved by the Town Board on November 2, 2009.

A revised version of the Township of Stanford Engineering Manual was completed in January of 2024.

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Township Engineer

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TABLE OF CONTENTS

APPENDIX

A. Township of Stanford Standard Detail Plates
   - 100 Series Street
   - 400 Series Storm Sewer and Appurtenances
   - 500 Series Erosion Control and Land Restoration
   - 700 Series Curb and Gutter
   - 800 Series Barricades, Signals, Markers, etc.
   - 900 Series Public Utilities

B. Township of Stanford Policy on Stormwater Drainage Requirements

C. Standards for Street Construction

D. Standards for Signage, Striping, and Lighting

GLOSSARY OF TERMS

AASHTO	American Association of State Highway and Transportation Office
ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
AWWA	American Water Works Association
CEAM	City Engineer's Association of Minnesota
CMP	Corrugated Metal Pipe
HDPE	High Density Polyethylene
Mn/DOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
PID	Property Identification Number
PVC	Polyvinyl Chloride
RCP	Reinforced Concrete Pipe
SDR	Strength to Diameter Ratio

ENGINEERING MANUAL

I. Engineering Requirements

As set forth in various sections of the Township ordinances, developers of property within the Township of Stanford are required to submit certain plans and specifications for review and approval by the Township. These include such items as grading plans, drainage plans, topographic surveys, plats, street and utility plans and specifications. These plans and specifications shall be prepared by competent professionals.

The professional services required of the Developer may include one or more of the following professionals: architect, land surveyor, planner, soils (geotechnical) and civil engineer and testing service. The engineering services include not only preparation of plans and specifications, but field staking in order to assure the Township that the completed project is in conformance with the approved plans and specifications. The Township will provide inspection of the installation of the facilities at the Developer's expense.

Within the development contract, the Developer has a choice in determining how the required improvements will be handled. The Developer can either construct and finance the improvements, or request that they be installed under a public improvement project and be assessed against the benefiting properties. Approval of the choice is a Town Board matter.

If the Developer chooses to install the required public improvements within the development, the following procedures shall be followed:

1. The Developer shall submit plans, specifications, and copies of all design calculations to the Township for review and approval. These plans are to be prepared by a licensed professional civil engineer and shall be in accordance with Township standards as outlined herein. The Township guidelines shall be adhered to in design considerations. All sanitary sewer and watermain testing shall be completed and copies of service ties submitted to the Township prior to issuance of any service connection or building permits.

2. The Developer shall submit erosion and sediment control plans along with a Storm Water Pollution Prevention Plan to the Township for review and approval. No work is to begin until all erosion and sediment control methods are in place and approved by the Township.

3. The Developer shall furnish a separate Development Plan, which shows and lists house type, house pad front and back of pad elevations, garage floor elevations, lowest opening elevation, lowest floor elevation, drainage arrows and street elevations in front of the driveway.

4. The Developer will be responsible for not only plans and specifications preparation, but also for providing staking. Resident inspection of said improvements to assure compliance with the approved plans shall be completed by the Township.

5. Copies of all bids, change orders, and other associated project costs documents relating to the improvements shall be forwarded to the Township Engineer.

6. The Developer shall furnish to the Township the list of selected contractors and subcontractors being considered for retention by the Developer for any of the public improvements work in the development. The Township has the right to reject any contractor or subcontractor deemed unacceptable to the Township.

7. Any changes to the approved plans and specifications shall be approved by the Township Engineer in writing before work is started. If the change affects the project letter of credit by increasing the cost, the letter of credit shall be increased before the work can begin.

8. The Developer will hold a preconstruction meeting at the Town Hall prior to the start of any work on the development. The Township staff and Township Engineer along with the contractor and subcontractors, Developer's engineer, utility companies and other interested parties must be invited to the meeting. The Developer will be responsible for drafting pre-construction meeting minutes. The minutes shall be submitted to the Township Engineer for review, then distributed by the Developer to all parties who were in attendance at the meeting.

9. The Developer shall retain an independent testing service approved by the Town Board to perform the required material tests of the project. Copies of tests will be forwarded to the Township Engineer for review. The cost of this service will be the responsibility of the Developer.

   The Township shall be notified 24 hours in advance of all scheduled tests so its representatives can be present at the time tests are made. The required tests include utility installation, subgrade, base course, concrete placement, and bituminous pavement.

10. Upon completion of all the work required, the Township Engineer or his designated representative, a representative of the contractor and a representative of the Developer will make the required final inspections of all work. This includes a final inspection of all site grading, Class 5, concrete curb or gravel shoulders, bituminous base placement, and approval by the Township Engineer before any building permits will be issued. Before the

final payment is made to the contractor by the Developer, the Township Engineer shall be satisfied that all work is satisfactorily completed in accordance with the approved plans and specifications, and the Developer's engineer shall submit a written statement attesting to same. Acceptance of the completed work shall be made by motion of the Town Board upon the recommendation of the Township Engineer. The warranty letter of credit security may be released, subject to the following:

a. The Developer or the Developer's engineer must submit written certification to the Township Engineer stating that all public improvements have been completed in accordance with the approved plans and specifications.

b. The Developer's engineer shall provide the Township with a complete set of electronic files on computer disks and 2 sets of full size "as-built" plans for the Township records as outlined in this manual. These as-builts shall be submitted within 90 days after the completion of the improvements, and before any security is released.

c. The Developer's surveyor shall provide the Township with written certification that all corners of lots (iron monuments) have been placed.

11. Warranty Period – If within the time prescribed by law, by the contract documents and/or the Developer's Agreement any of the work is found to be unacceptable, the Developer shall correct it promptly unless the Township has previously accepted the work. The Developer shall give prompt notice after discovery of any unacceptable conditions to the contractor responsible for the project work.

Unless otherwise noted in the contract documents, the following requirements shall apply:

a. The Developer shall guarantee all work relating to utilities, appurtenances, material, and equipment furnished by him for a period of two (2) years from the date of written acceptance of the work or project.

b. The Developer shall guarantee all work relating to street construction including concrete curb and gutter, sidewalks, materials, and equipment furnished by him for a period of two (2) years from the date of written acceptance of the work or project. The streets will not be accepted prior to the bituminous wearing course being constructed.

c. The Developer shall provide a warranty letter of credit. The amount of the letter of credit will be determined by the Township Engineer based on 125% of the cost estimate of materials delivered to the project. The Developer shall include escrow funds as required by the Town Board for a portion of the letter of credit. The Developer will be required to deposit securities of the same amount and type within thirty (30) days of draws by the Township.

d. After all public improvements have been completed, properly inspected as specified above, and an acceptable maintenance guarantee provided, the project will be accepted by the Township and the Warranty Letter of Credit may be released.

II. Erosion Control Policy

1. Required Erosion Control Plan

Prior to commencing any earth disturbing activity in a development, the Developer shall prepare and submit an erosion control plan for approval by the Township Engineer. The plan shall be approved if it complies with Isanti County ordinance, the Township's Land Development Regulations, Road Ordinance, and the requirements contained herein. The Developer must also prepare and submit to the Township Engineer a Stormwater Pollution Prevention Plan (SWPPP) which meets the MPCA requirements.

2. Required Control Measures

The control measures shall conform to the MPCA's "Application for General Stormwater Permit for Construction Activity" (MN R100001) requirements and as specified herein;

a. The plan shall be suited to the topography and soils so as to create the least erosion potential.

b. The land shall be developed in increments of workable size on which adequate erosion and sediment controls can be provided and maintained during the construction period. Grading operations and other land disturbing operations shall be staged so that the area being developed is not exposed for long periods of time without stabilization.

c. Temporary vegetation and/or mulching shall be used to protect the areas exposed during the development per the time frames as required by the permit.

d. Permanent vegetation and structures shall be installed per the time frames as required by the permit. If grading is not completed until after the planting season has expired, temporary erosion control measures, including dormant seeding and mulching, shall be implemented.

e. Sediment basins (debris basins, sediment basins, silt basins, or silt traps) shall be installed and maintained to remove sediment from runoff waters from the land undergoing development. Storm sewer inlets shall be provided with debris guards and silt basins to trap sediment and avoid possible damage from blockage. The sediment shall be removed when necessary to maintain effectiveness of control measure. If sediment/siltation measures taken are not adequate and result in downstream sediment pollution, the Developer shall be responsible for cleaning out or dredging downstream water conveyance systems, storm sewers and ponds as necessary.

f. Before grading is commenced, all control measures shall be installed as shown on the approved plan.

g. Immediately after curb and gutter has been placed, cured, and backfilled, or construction of the gravel shoulder, approved erosion control measures shall be installed directly behind the curb and shoulders.

h. Erosion control practices shall comply with the Minnesota Pollution Control Agency Best Management Practices.

i. The Developer shall be responsible for cleaning and maintenance of the storm sewer system (including ponds, infiltration basins, pipes, catch basins, culverts, and swales) within the development and the adjacent off-site storm sewer system that receives storm water from the development. The Developer shall follow all instructions it receives from the Township concerning the cleaning and maintenance of the storm sewer system. The Developer's obligations under this paragraph shall end two (2) years after the public improvements in the development have been accepted by the Township.

j. The Developer shall be responsible for cleaning all streets in the development and adjacent to the development from sediment and debris from the development for a period of two (2) years from when the streets have been completed and accepted by the Township.

k. A temporary concrete washout area is required. These temporary washout areas must not allow any liquid concrete, including rinse water from concrete-chutes and washing of concrete tools, to contact the bare ground. The waste material must be disposed of off-site in an MPCA-approved manner. A concrete washout sign must be installed at each temporary washout facility.

3. Financial Guarantee

a. A portion of the Developer's letter of credit required by the Developer's agreement shall include a guarantee of compliance with erosion control measures and shall be furnished upon approval of the Developer's agreement before work commences. The financial guarantee shall remain in place until all the Developer's obligations under the erosion control plan have been satisfied.

b. If the Township draws upon the financial guarantee, the Developer shall within thirty (30) days of the draw, deposit with the Township additional security of the same type and amount that the Township has drawn. No further inspections will be conducted, and all work must stop within the development until the cash deposit for erosion control is restored to the pre-draw balance.

4. Street Sweeping

The Developer shall provide street sweeping within the development before the final acceptance is approved. If the construction operations within or out of the development cause debris on the existing streets, the Township Engineer may require street sweeping done by the Developer.

5. Enforcement

a. The Township or County may issue a stop work order halting all development work and building construction for noncompliance with the erosion control plan.

b. The Township may draw down the posted financial guarantee and perform any work necessary to achieve compliance with the erosion control plan. The Township will endeavor to give the Developer /Subdivider advance notice of such action.

III. Township Standard Plans

In order for the Township to have standardized construction and as-built plans, the guidelines listed below shall be followed:

1. General Requirements

a. The Developer must consider the requirements for plans found in the Land Development Regulation, Township and County Subdivision Ordinance, Road Ordinance and street construction standards attached herein.

b. Incorporated in the set of plans shall be a sheet indicating the entire project, with corresponding sheet numbers on each separate sheet and index.

c. All sheets shall be 22” x 34” standard. Half size 11” x 17” may be approved by the Township Engineer.

d. Plan and Profile sheets
Horizontal Scale 1” = 50’
Vertical Scale 1” = 5’
(Unless otherwise specified and approved by the Township Engineer)

e. General Details

i. North arrow
ii. Scale
iii. Date of preparation
iv. Proposed name of the development in which the roadway and utilities are to be constructed.
v. Proposed name of all streets
vi. Name of the plan preparer, Engineer, Surveyor and Owner
vii. Seal or signature of the preparer, Licensed Engineer and Licensed Land Surveyor.
viii. Roadway, sanitary sewer, watermain and storm sewer plan and profile shall be drawn at a scale of 1” = 50’ horizontal and 1” = 5’ vertical.
ix. Roadway cross-sections shall be drawn at a scale of 1” = 10’ horizontal and 1” = 5’ vertical.

f. Provide a topographic map of the proposed development at a scale of no smaller than 100 feet to the inch with contour intervals of no more than two feet showing the location of all hydric soils, wetlands, and waters of the state.

g. All detail drawings shall be on a separate sheet and referenced to the proper sheet.

h. The profile shall be directly below the plan with the stationing aligned as closely as practical. Stationing shall be shown on the plan view as well as the profile.

i. All parcels shall be properly labeled with lot and block numbers and plat name, or P.I.D. in unplatted areas. Developed parcels shall have their address shown on the plan. Bearings and distances for all existing roadway centerlines and right-of-way described above shall be shown.

j. All matchline breaks shall be clean with reference points clearly marked. All plans which are broken by a matchline shall be on the same or consecutive sheets.

k. Existing utilities shall be shown in both plan and profile, stationed, and labeled as existing.

l. Approximate locations of small utilities: gas, electric, telephone and cable lines shall be shown. Minnesota Statute requires locates.

m. Right of way and pavement or curb and gutter alignment data shall be shown.

n. Benchmarks shall be placed on all sheets. (N.G.V.D. 1929 Adj. datum)

2. As-Built Requirements

a. All as-built plans shall be in an electronic acceptable format on computer disk with unnecessary construction information removed (trees, shrubs, fences, etc.). Two sets of full size as-built plans shall be provided in addition to the disks.

b. As-built plans on all ponding areas and drainage swales and ditches are required. Plans shall indicate as-built ground elevations (spot shots) superimposed upon the proposed contours, normal water elevation, high water elevation, and the acre feet of storage if different from proposed plan for each ponding area along with the final storm sewer plans.

c. A licensed professional civil engineer shall sign and certify all as-built plans.

d. Show the contractor's name on the as-builts.

e. Show where fabric or insulation has been placed or correction to pavement section has been made in the streets on the plan portion of the as-builts.

f. Benchmarks shall be referenced on each sheet.

g. As-built elevations shall be established using conventional methods (non G.P.S.) with an accuracy of $\pm$ 0.05'. All elevations shall be based on N.G.V.D. 1929 Adj. datum.

IV. Township Standard Materials

In order to standardize certain construction materials and assure quality construction, we have adopted the following:

1. Storm Sewer and Drainage Pipe

a. All storm sewer pipe within any street right-of-way (not including driveway culverts) shall be reinforced concrete pipe of the class as shown on the plans. Pipe shall meet Mn/DOT 3236 Specification. Joints shall be flexible watertight meeting ASTM C-361.

b. Storm sewer pipe on private property or on easements not used for vehicle traffic may be corrugated high density polyethylene (HDPE) pipe.

   i. Corrugated high density polyethylene (HDPE) pipe and fittings shall meet the requirements of Mn/DOT specification 2503 (Corrugated Polyethylene Pipe Sewer).

c. Articulated Concrete Block, conforming to Mn/DOT 3604, or an engineer approved equivalent riprap is required at all storm sewer discharge pipes and pond overflows. Fabric blanket conforming to Mn/DOT 3733 (e.g. Mirafi 500 or 800) is required under the articulated block.

d. Erosion control (Wood fiber) blanket is required at all inlets. (See Mn/DOT Standard Plate No. 9102D) All erosion control blanket shall be fastened to the ground using bio-degradable staples or wood stakes. Metal staples will not be allowed.

e. The minimum size of cross culverts shall be 18” for storm sewer pipe.

f. Draintile pipe shall be perforated Thermoplastic Pipe or Corrugated Polyethylene Drainage Tubing conforming to Mn/DOT 3245 or 3278 respectively and shall be installed per Mn/DOT 2502 unless otherwise approved by City Engineer.

2. Metal Sewer Castings

a. Castings for storm manholes and catch basins shall be in accordance with the standard plates and schedule of structures. Unless otherwise specified, castings shall be equivalent to Neenah R-1733 for manholes and R-3250-1K for catch basins.

b. Castings for surmountable catchbasin curb shall be Neenah R-3501 TR/TL or equivalent. Yard inlet castings shall be Neenah R-4342 or equivalent.

3. Manhole and Catchbasin Structures

a. Manhole and catchbasin structures shall be in accordance with applicable Mn/DOT standard plates or standard plates as shown in the plans. All manholes and covers shall be reinforced for traffic loadings.

b. Manholes or catch basins identified on the plans as slab top shall be constructed from pipe manufactured to ASTM C-76 Standards, minimum Class 3 strengths.

c. Manholes identified on the plans as box structures shall be constructed from precast reinforced concrete box sections conforming to ASTM C-789 placed on end. Wall thickness and reinforcement shall be in accordance with ASTM C-789 Table 1 for box section under earth dead load and HS-25 live load conditions. Base and cover slabs shall have thickness and reinforcement to meet MnDOT HS-25 traffic loadings.

d. All manhole and catchbasin structures with builds greater than 4.0 feet from casting to invert shall have steps. Maximum distance from top of casting to first step is one and half (1½) feet.

e. All manholes that are located in green areas shall be marked with a steel marker post and “MH” indicator sign. All manholes that are located within a gravel road shall be adjusted to 1’ below the surface and shall be marked with an offset steel marker post that is located within the right-of-way.

4. Street Material

All materials shall be in conformance with Minnesota Department of Transportation Standard Specifications for Construction, 2020 edition and all subsequent revisions (Mn/DOT) or as modified herein in Appendix D.

a. All streets must be constructed and paved in accordance with Township Ordinances.

V. Testing Requirements

Materials shall be sampled and tested in accordance to the Mn/DOT Schedule of Material Control, except for as modified below. Utility systems shall be tested in accordance with the Standard Specifications for Watermain, Service Lines, Sanitary Sewer and Storm Sewer as published by the City Engineer's Association of Minnesota (CEAM). The Township Engineer shall be notified 24 hours in advance of the specific test.

1. Pipe Trench Compaction

a. Standard Proctor Density (ASTM D-698-78): Proctor samples will be obtained within the utility trenches for each type of soil encountered in construction.

b. Density Test Nuclear (ASTM D-2922): 1 test per lift of backfill, 1 test every 500 feet of pipe installed, minimum 1 test daily when backfilling.

c. Sand-Cone Method (ASTM D-1556): The Township Engineer may order density tests by the sand cone method.

2. Embankment Compaction

a. Standard Proctor Density (ASTM D-698-78): 1 test per source of material.

b. Density Test Nuclear (ASTM D-2922): 1 test per lift of embankment, 1 test every 500 feet of roadway fill, 1 test daily when constructing embankment.

c. Density Test Sand-Cone Method (ASTM D-1556): The Township Engineer may order density tests by the sand cone method.

3. Class 3 or 4 Aggregate

a. Standard Proctor Density (ASTM D-698-78): 1 test per source of material.

b. Gradation Test: 1 test per source of material.

c. Density Test Nuclear (ASTM D-2922): 1 test per lift of embankment, 1 test every 500 feet of roadway fill, 1 test daily when constructing embankment.

d. Density Test Sand-Cone method (ASTM D-1556): The Township Engineer may order density tests by the sand cone method.

4. Street Base Aggregate

a. Standard Proctor Density (ASTM D-698-78): 1 test per source of aggregate base, 1 test per 1000 tons of aggregate placed, 1 test daily when constructing base.

b. Gradation Test (ASTM D-422): 1 test per source of aggregate base, 1 test per 1000 tons of aggregate placed, 1 test daily when placing aggregate base.

c. Density Test (Nuclear ASTM D-2922): 1 test per 500 feet of roadway.

d. Test Rolling (MN/DOT 2111): Prior to placement of granular material, the Township requires the completion of a test roll on the street subgrade. The test roll shall conform to Mn/DOT 2111 except, the contractor shall provide a loaded tandem axle truck with a minimum nine (9) Ton axle load and gross weight of 25 tons. The contractor shall provide a weight ticket for the test roll vehicle to the Township Engineer during the test roll.

The test rolling shall be at the direction of the Township Engineer. A soils engineer and Township representative must be present during the test rolling and provide a written certification to the Township that the test passed or what corrections or recommendations are necessary if there is a failure.

The Township may also require test rolling of the aggregate base once the base section has been constructed.

5. Bituminous Tests

a. General: Bituminous tests are to be conducted by an independent Mn/DOT certified testing laboratory. One core will be taken for every 500 tons placed, or a minimum of 3 cores per job. Bituminous cores shall be tested for in-place density and thickness.

b. Marshall Densities and Field Densities (ASTM D-1559):
As required by Township Engineer.

c. Thickness: All cores shall be measured for in-place thickness.

6. Concrete Tests

a. General: When molding cylinders for strength tests, three cylinders are to be made according to ASTM C-31. One additional cylinder shall be molded when it is anticipated that surrounding air temperatures will fall below 40° Fahrenheit. Said cylinder shall be cured on site.

b. Compressive Strength (ASTM C-39): 1 set of 3 for every 1000 feet of curb and gutter constructed or 1 set of 3 for every 100 cubic yards of concrete placed or a minimum of 1 set of 3 daily when pouring concrete.

c. Percent Air Test (ASTM C-231): 1 test for every 1000 feet of curb and gutter constructed or 1 test for every 100 cubic yards of concrete placed or a minimum 1 test daily when pouring concrete.

d. Slump Test (ASTM C-143): 1 test for every 1000 feet of curb and gutter constructed or 1 test for every 100 cubic yards of concrete placed or a minimum 1 test daily when pouring concrete.

VI. Construction Requirements

1. Storm Sewer

a. Applicable Specifications:

i. Work shall conform to the Standard Utility Specifications as published by the City Engineers Association of Minnesota, 2023 revision, except as herein modified.

ii. Pipe sewers shall be installed in accordance with CEAM 2621 and Mn/DOT 2501, except as modified herein.

2. Casting Adjustments

All utility castings shall be adjusted as follows:

a. Sewer Manhole:

All storm sewer manhole castings shall be in place during the laying of the wear course. The castings shall be adjusted before the mat is laid and shall be not less than 1/8” nor more than 1/4” below finished grade. Cast iron adjustment rings will be allowed to make the final adjustment prior to wear course paving. Paving must be completed within 48 hours of making the adjustment.

b. Storm Sewer:

Storm sewer inlet castings shall be adjusted so the flow line is 2" below finished gutter line.

c. Grouting Adjusting Rings:

Whenever adjustment rings are provided, the contractor shall grout rings, place the castings, and remove all excess grout on the inside and outside of the manhole by wiping smooth with a gloved hand or similar instrument.

3. Streets

Street construction shall be in accordance with Minnesota Department of Transportation Standard Specifications for Construction, 2020 edition and all subsequent revisions (Mn/DOT) including the following:

Common excavation and embankment - Mn/DOT 2106

Common excavation and embankment density or compaction requirements are as follows: Roadway embankment shall be compacted by the method described as "Specified Density" as outlined in Mn/DOT Section 2106.3 Paragraph G.1 and Table 2106.3-4.

Aggregate base - Mn/DOT 2211 with compaction by the specified density method.

Plant mixed bituminous non-wear – Mn/DOT 2360.

Tack coat - Mn/DOT 2357

Plant mixed bituminous wear - Mn/DOT 2360.

Concrete curbing - Mn/DOT 2531 using B618 or Standard Plate 700.

Concrete curing and protection - Mn/DOT 2531.3G

The street shall be constructed in accordance with typical sections shown on Township Standard Plates as outlined in Appendix A and detailed in Appendix D. The final wear course shall not be constructed until at least one winter freeze/thaw season after the bituminous base construction is completed.

Before excess common excavation, borrow or other materials from projects are deposited or mined on private property, a grading, fill or mining permit is required by the County/Township, plus permission in writing from the property owner.

4. Bituminous Tests

a. General: Bituminous tests are to be conducted by an independent testing laboratory. One core will be taken for every 500 tons placed, or a minimum of 3 per job. Bituminous cores shall be tested for in-place density and thickness.

b. Rice Densities and Field Densities (ASTM D-1559)

c. Thickness: All cores shall be measured for in-place thickness.

VII. Storm Water Treatment Basins

1. Storm water conveyance, storage and treatment basins shall be designed in accordance with the Township of Stanford's policy on stormwater drainage as outlined in Appendix C. Typical basin construction and outlet structures are shown on the Township Standard Plates in Appendix A.

VIII. Miscellaneous

1. Proper notification of improvements shall be given by the Developer or his engineer to the responsible governmental agencies affected by said construction. All necessary permits shall be obtained prior to commencing any work. All special requirements of the responsible agencies shall be complied with.

2. The Developer's contractor shall furnish, erect, and maintain signs and barricades as provided in Mn/DOT 1710 "Barricades and Signs" to protect the public. The Township Engineer shall be notified 24 hours prior to the proposed partial blockage or closure of any street or public right-of-way. No street or public right-of-way shall be closed without the proper approval of the Township Engineer and appropriate agencies and emergency departments.

3. It is the responsibility of the Developer's contractor to protect and leave undisturbed those markers or monuments set for the subdivision of land.

4. The Developer and/or his contractor shall immediately repair or replace at his own expense any defective workmanship or material of which he is notified during the construction period, or within the warranty period following the date of final acceptance of the work, regardless of the approval and acceptance of the work.

5. A plan for the routing (Detour) of construction traffic shall be submitted to the Township Engineer for his approval. Roads (County, Township) that are utilized for access or egress to the construction site shall be kept free of unsuitable dirt and other debris resulting from said construction. Adequate dust control shall be maintained by the Developer's contractor.

6. The Township will require the contractor to submit a list of materials and respective suppliers as well as all tests of materials.

7. If any material or labor supplied by the contractor or Developer is rejected by the Township Engineer or his designated representative as defective or unsuitable, then such rejected material shall be promptly removed, disposed of off the job site, and replaced with approved material.

8. All street rights-of-way shall be cleared and grubbed to full width except as specifically directed.

9. Any utility and drainage easements adjacent to the street right-of-way shall be cleared and grubbed for the placement of utilities except as specifically directed.

10. Work shall not commence before 7:00 a.m. nor extend beyond 7:00 p.m. Monday through Friday. On Saturdays, the hours will be from 8:00 a.m. to 6:00 p.m. No work is to be done on Sundays. Hours and days of work may be modified based on need and approved by the Township Engineer.

11. Driveway grades shall be no greater than 8%.

APPENDIX A
Standard Detail Plates

TOWNSHIP OF STANFORD
STANDARD DETAIL PLATES

APPENDIX A
Township of Stanford Standard Detail Plates

SERIES 1 STREET

100 Local Residential Rural Street Section – 9 Ton
101 Local Residential Urban Street Section – 9 Ton
102 Residential Cul-De-Sac Rural Section
102A Residential Off-Set Cul-De-Sac Rural Section
103 Residential Cul-De-Sac Urban Section
103A Residential Off-set Cul-De-Sac Section
104 Driveway Detail: Rural
105 Driveway Detail: Urban
106 Mailbox Pullout Rural Section
107 Mailbox Location Urban Section
108 Mailbox Support

SERIES 4 STORM SEWER APPURTENANCES

400 Skimmer Structure
401 Skimmer Structure with Weir
402 Skimmer Structure Grate Cover
403 Typical Treatment Pond
403A Typical Infiltration Basin
404 Perforated Draintile Location Detail
405 Storm Sewer Standard Manhole
406 Slab-Top Manhole
407 Standard Storm Catch Basin/Manhole
408 48” Diameter Shallow Depth Catch Basin
409 Standard Storm Manhole – Yard Inlet
410 27” Precast Catch Basin Yard Inlet
411 24” X 36” Standard Catch Basin
412 Structure Casting (Mn/DOT 4110)
413 Storm Cover (Mn/DOT 4110)
414 Manhole Step (Mn/DOT 4180J)

SERIES 5 EROSION CONTROL & LAND APPURTENANCES

500 Articulate Concrete Block
500A Riprap Placement
501 Silt Fence
502 Wood Fiber Blanket Installation
503 Rock Construction Entrance
Mn/DOT 9102D Turf Establishment Areas (Culvert Ends)

SERIES 7 CURB & GUTTER

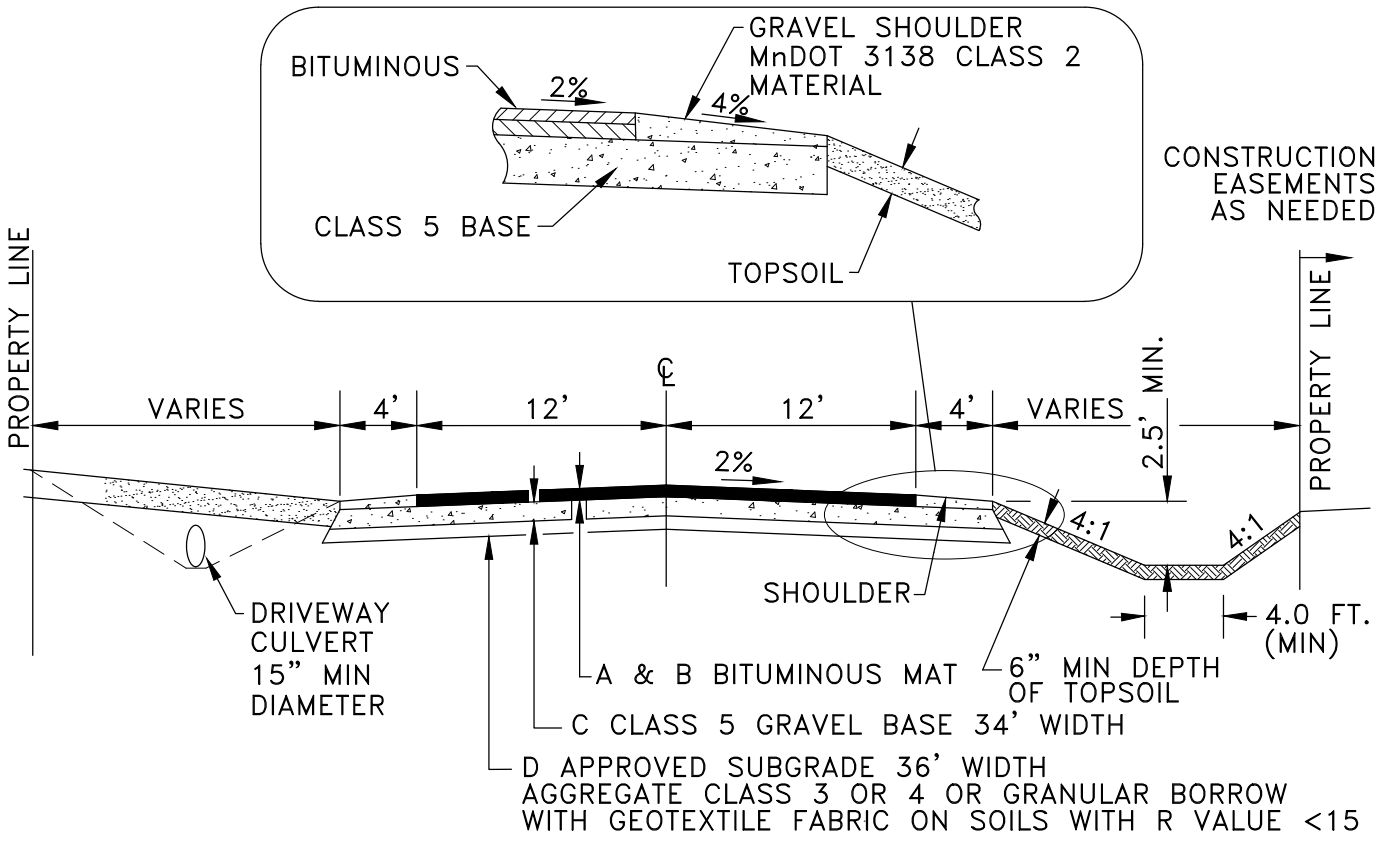
700 Surmountable Concrete Curb & Gutter
701 Curb Transition at Catch Basin
702 Inlet Casting
Mn/DOT 7100H Concrete Curb & Gutter (B618)

SERIES 8 BARRICADES, SIGNS, MARKERS, ETC.

800 Street Sign Installation
Mn/DOT 8002G Permanent Barricade

SERIES 9 UTILITIES

900 Location of Public Utilities



LEGEND				
	BITUMINOUS SURFACE		AGGREGATE BASE	SUBGRADE
SOIL R VALUE	WEAR 2350 LVWE45030C A*	NON-WEAR 2350 LVNW35030B B*	CLASS 5, OR 6 3138 C*	CLASS 3, OR 4 3138 D*
R-70	** 1 1/2"	** 2"	** 6"	-
R-30	1 1/2"	2"	6"	4"
R-20	1 1/2"	2"	6"	4"
R-15	1 1/2"	2"	6"	8"
R-10	1 1/2"	2"	6"	12"
R-5	1 1/2"	2"	6"	18"

* TO BE REVIEWED AND APPROVED BY QUALIFIED SOILS ENGINEER

** MINIMUM ALLOWABLE DESIGN THICKNESS, 100% CRUSHED

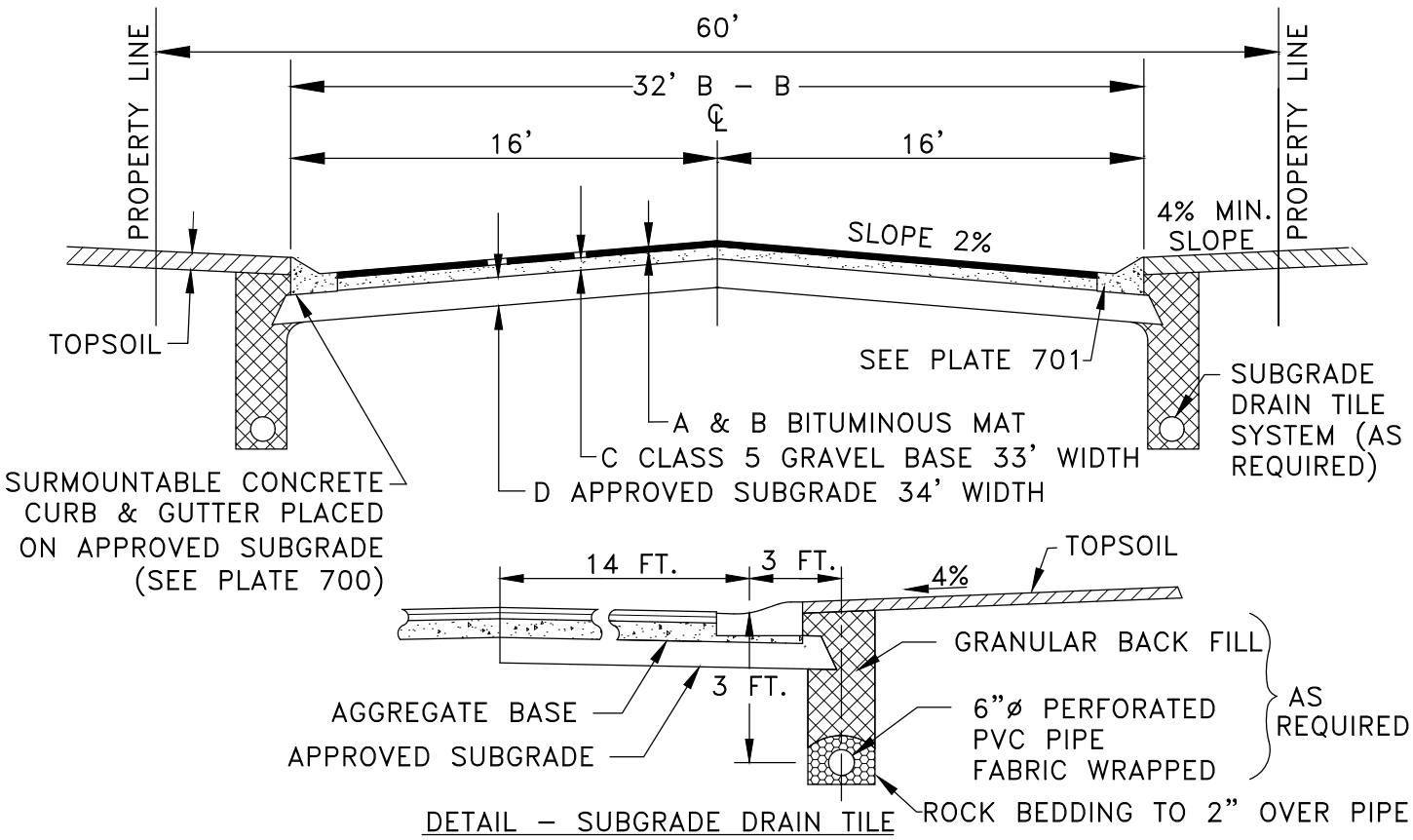
NOTES: R VALUE IS A MEASURE OF EMBANKMENT SOIL RESISTANCE STRENGTH AS DETERMINED BY THE HVEEM STABILOMETER METHOD

CUMULATIVE DESIGN LANE 18 KIP ESAL'S IS THE CUMULATIVE DAMAGE EFFECT OF VEHICLES DURING THE DESIGN LIFE OF A FLEXIBLE PAVEMENT.

LOCAL RESIDENTIAL RURAL STREET SECTION - 9 TON

NO SCALE

APPROVED - JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR-100



DETAIL – SUBGRADE DRAIN TILE

LEGEND				
	BITUMINOUS SURFACE		AGGREGATE BASE	SUBGRADE
SOIL R VALUE	WEAR 2350 LVWE45030C A	NON–WEAR 2350 LVNW35030B B	CLASS 5, OR 6 3138 C*	CLASS 3, OR 4 3138 D*
R–70	** 1 1/2"	** 2"	** 6"	–
R–30	1 1/2"	2"	6"	4"
R–20	1 1/2"	2"	6"	4"
R–15	1 1/2"	2"	6"	6"
R–10	1 1/2"	2"	6"	12"
R–5	1 1/2"	2"	6"	18"

* TO BE REVIEWED AND APPROVED BY QUALIFIED SOILS ENGINEER

** MINIMUM ALLOWABLE DESIGN THICKNESS, 100% CRUSHED

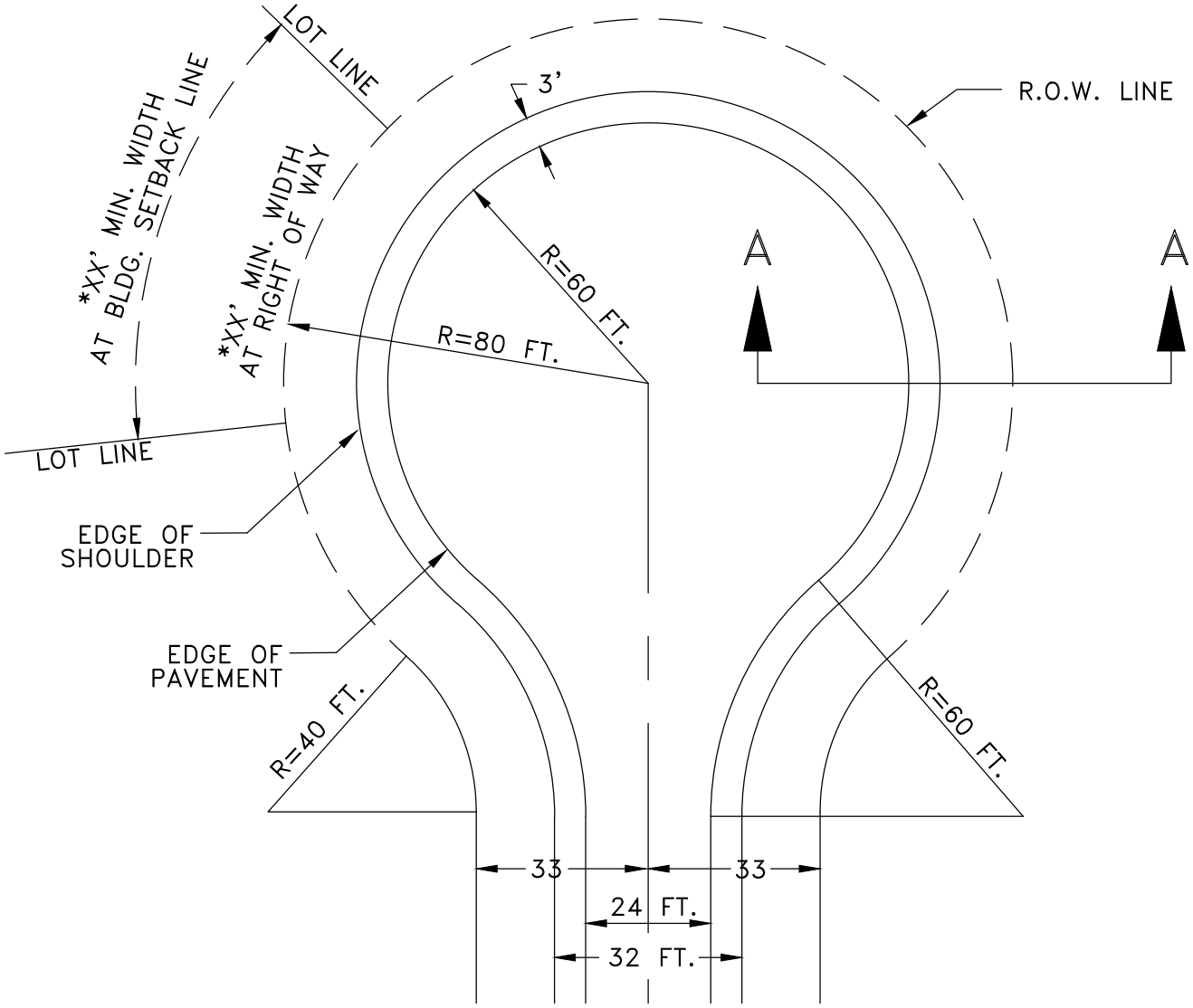
NOTES: R VALUE IS A MEASURE OF EMBANKMENT SOIL RESISTANCE STRENGTH AS DETERMINED BY THE HVEEM STABILOMETER METHOD

CUMULATIVE DESIGN LANE 18 KIP ESAL'S IS THE CUMULATIVE DAMAGE EFFECT OF VEHICLES DURING THE DESIGN LIFE OF A FLEXIBLE PAVEMENT.

LOCAL RESIDENTIAL URBAN STREET SECTION – 9 TON

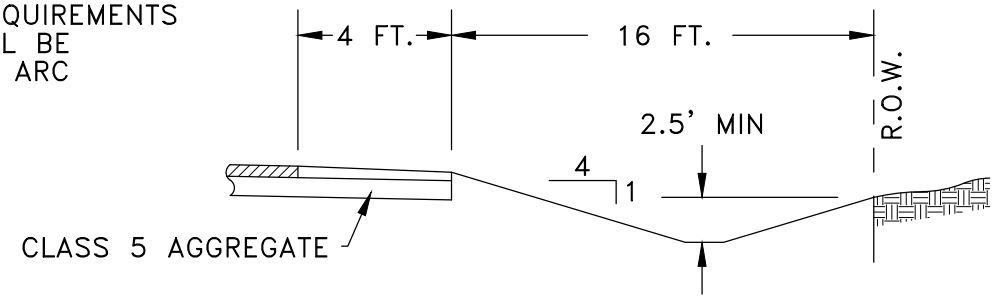
NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR–101



NOTE:

* MINIMUN LOT WIDTH REQUIREMENTS ON CUL-DE-SAC SHALL BE MEASURED ALONG THE ARC AS SHOWN.

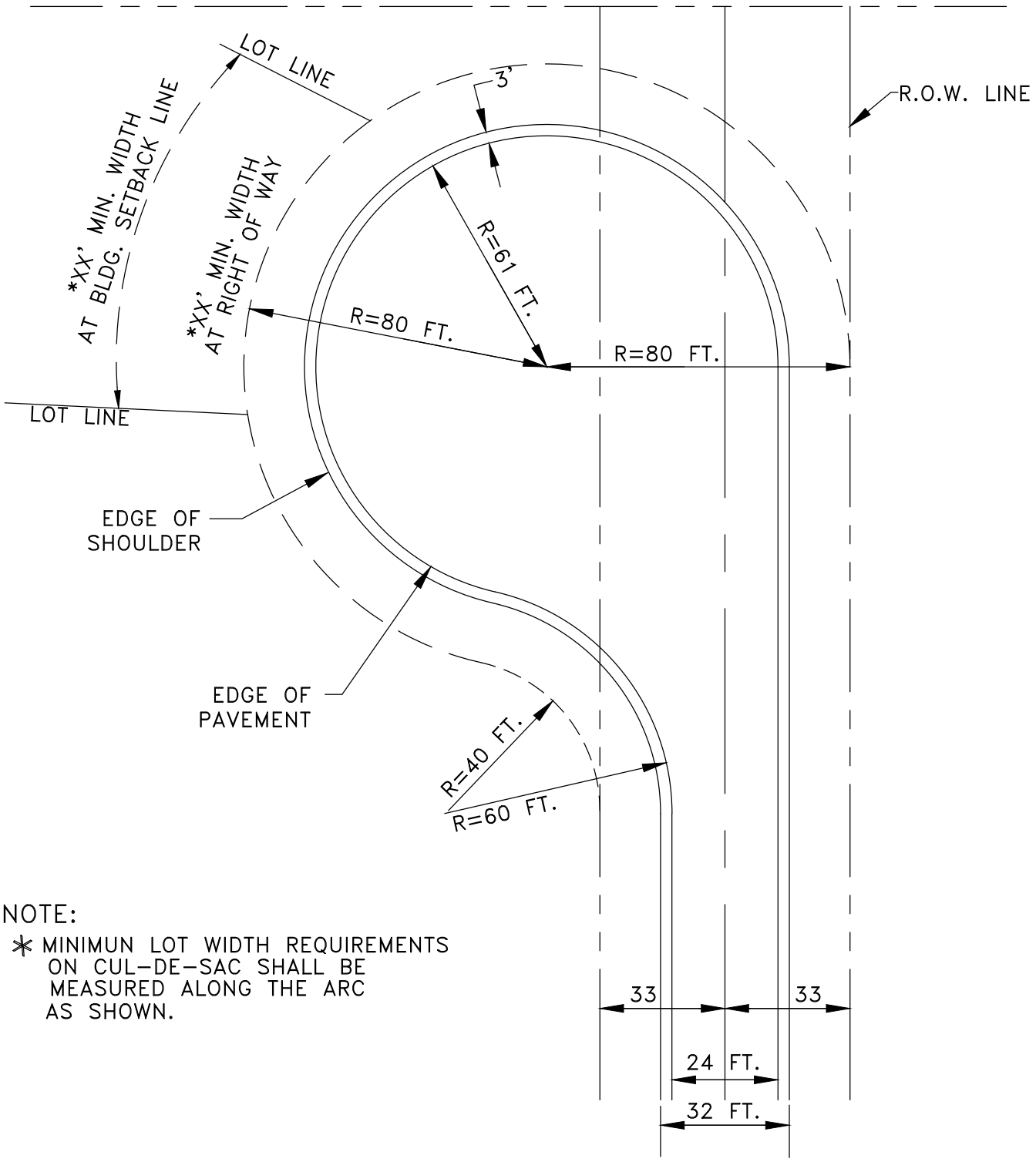


SECTION A-A

RESIDENTIAL CUL DE SAC RURAL SECTION

NO SCALE

APPROVED - JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR-102



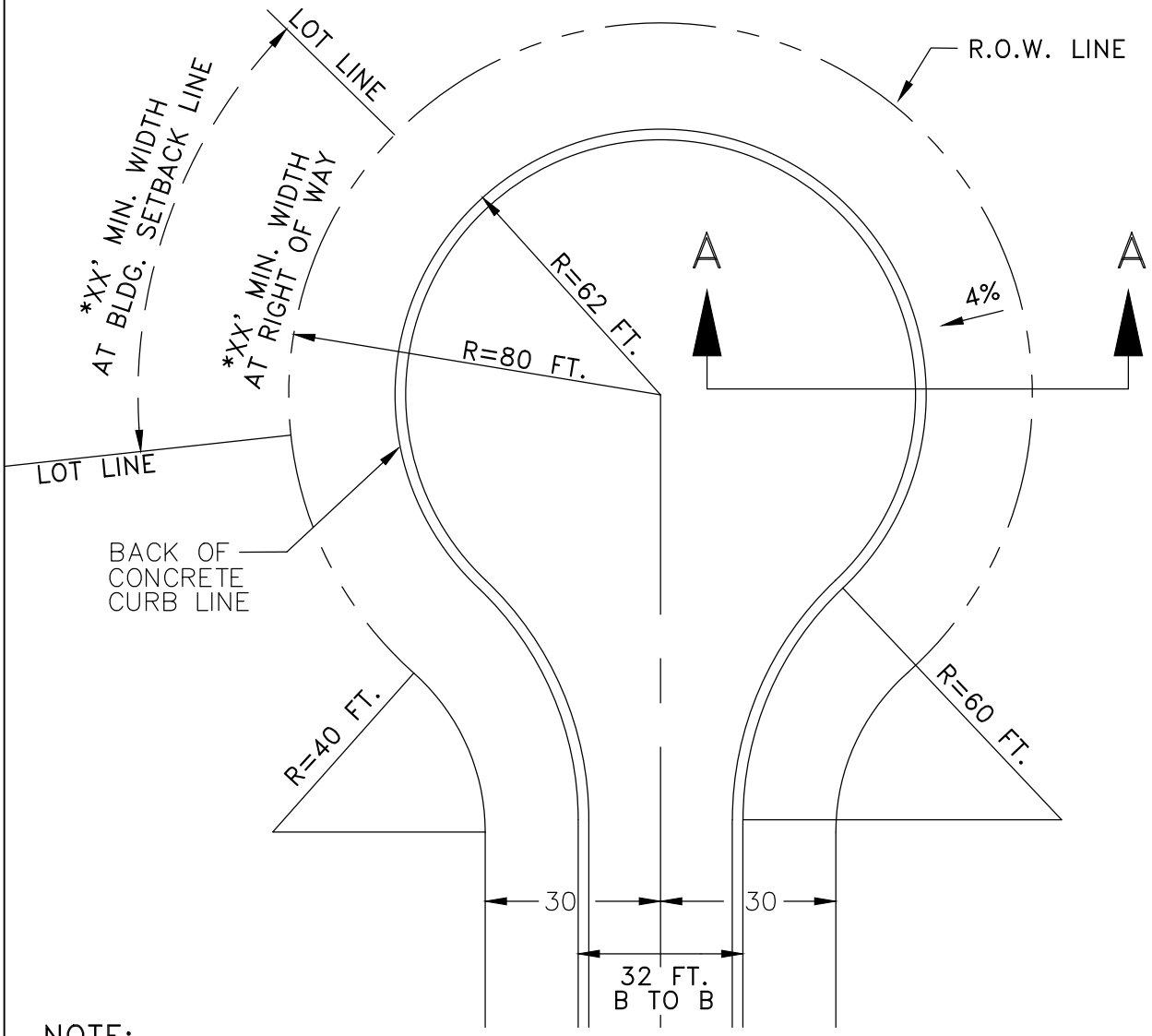
NOTE:

* MINIMUN LOT WIDTH REQUIREMENTS ON CUL-DE-SAC SHALL BE MEASURED ALONG THE ARC AS SHOWN.

RESIDENTIAL CUL DE SAC
RURAL SECTION

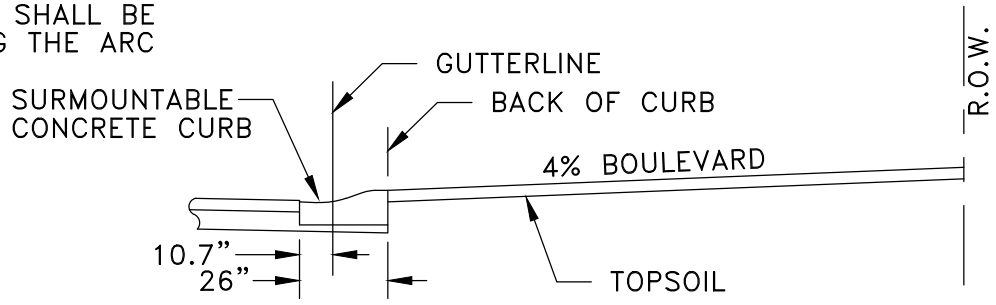
NO SCALE

APPROVED – JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR-102A



NOTE:

* MINIMUN LOT WIDTH REQUIREMENTS ON CUL-DE-SAC SHALL BE MEASURED ALONG THE ARC AS SHOWN.

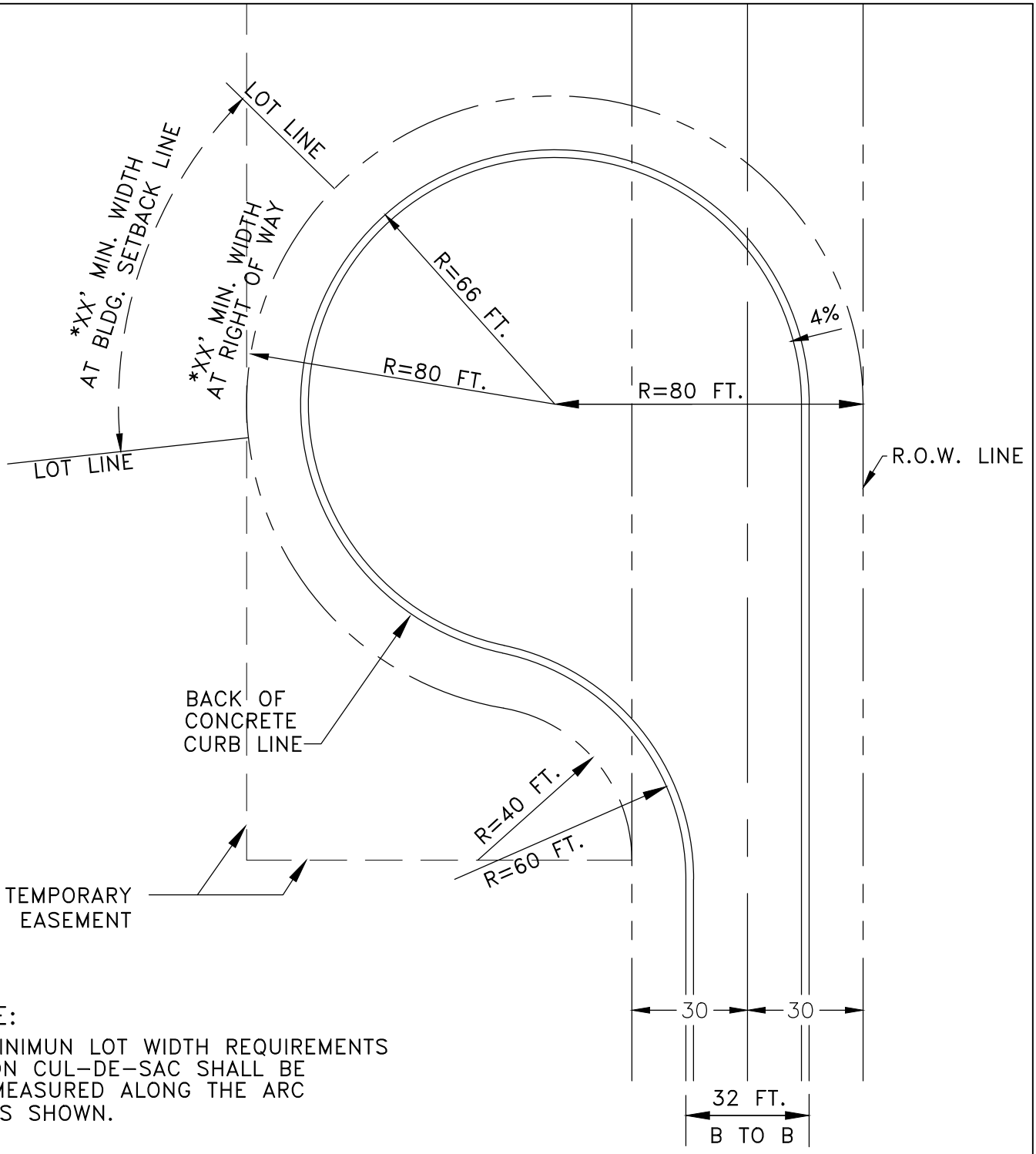


SECTION A-A

RESIDENTIAL CUL DE SAC URBAN SECTION

NO SCALE

APPROVED - JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR-103



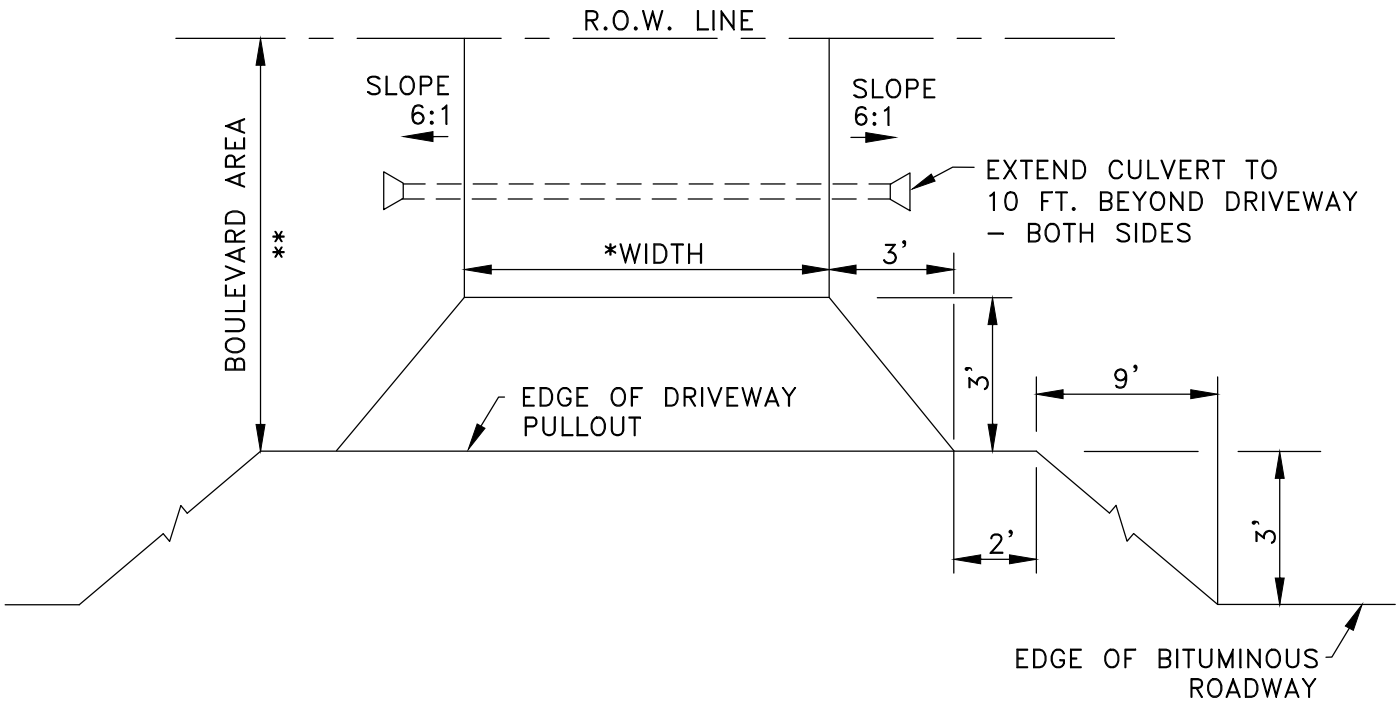
NOTE:

* MINIMUN LOT WIDTH REQUIREMENTS ON CUL-DE-SAC SHALL BE MEASURED ALONG THE ARC AS SHOWN.

RESIDENTIAL CUL DE SAC URBAN SECTION

NO SCALE

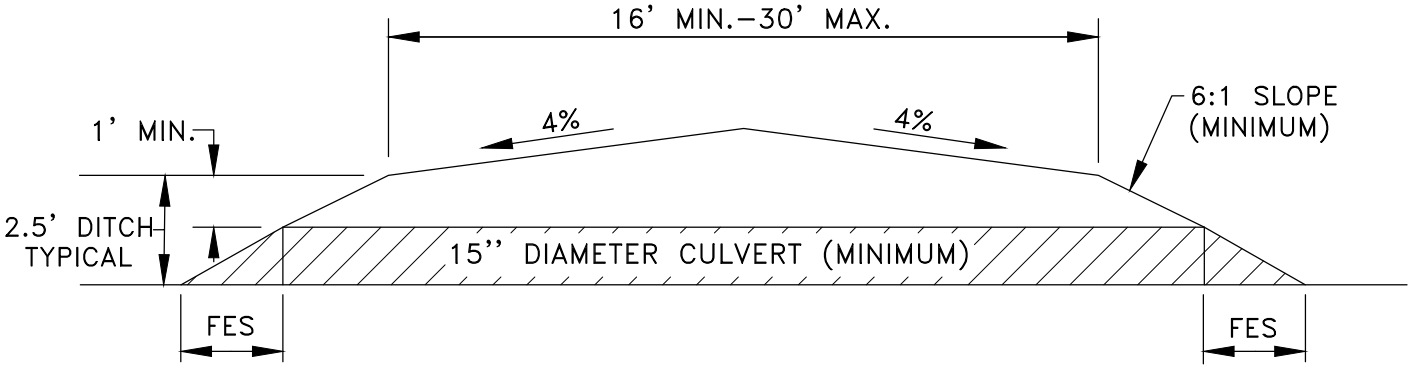
APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR-103A



* STANDARD WIDTH – 16 FT.
MAXIMUM WIDTH – 30 FT.

** DRIVEWAYS PAVED TO R/W OR HOUSE FRONT

PLAN VIEW

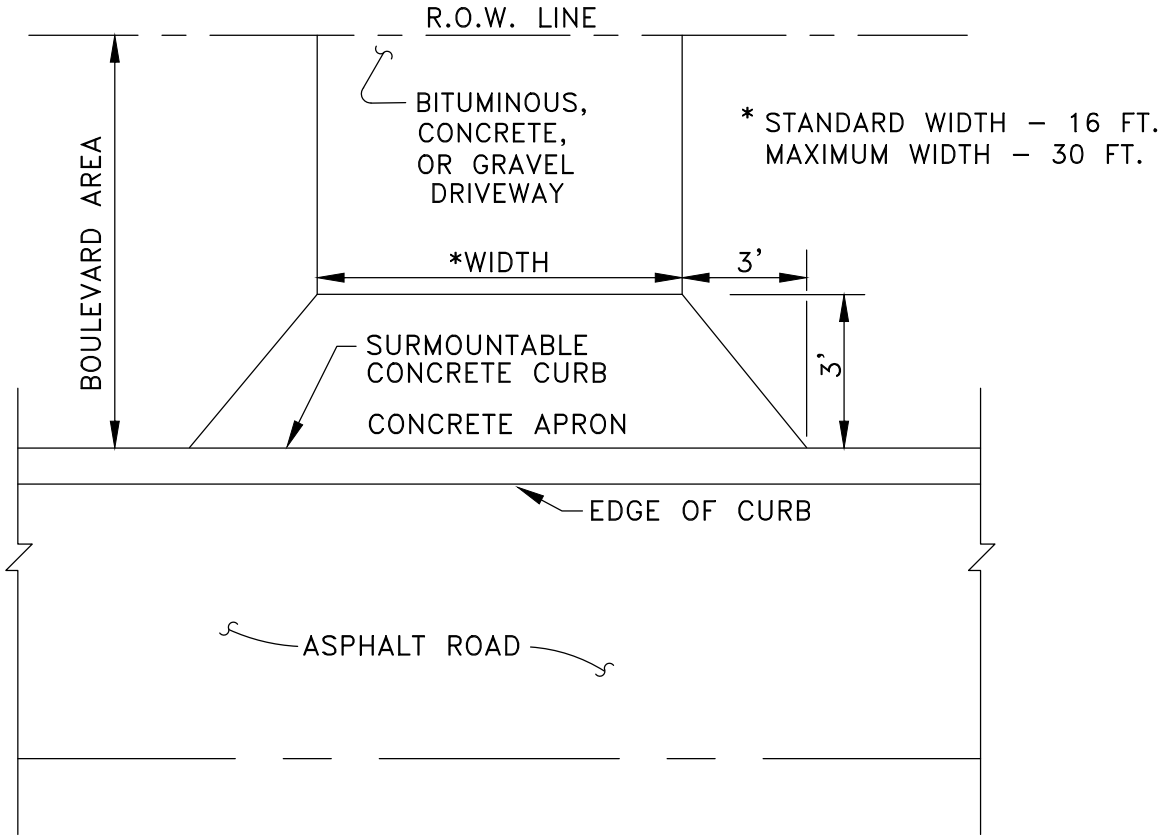


CROSS SECTION VIEW

RURAL DRIVEWAY SECTION

NO SCALE

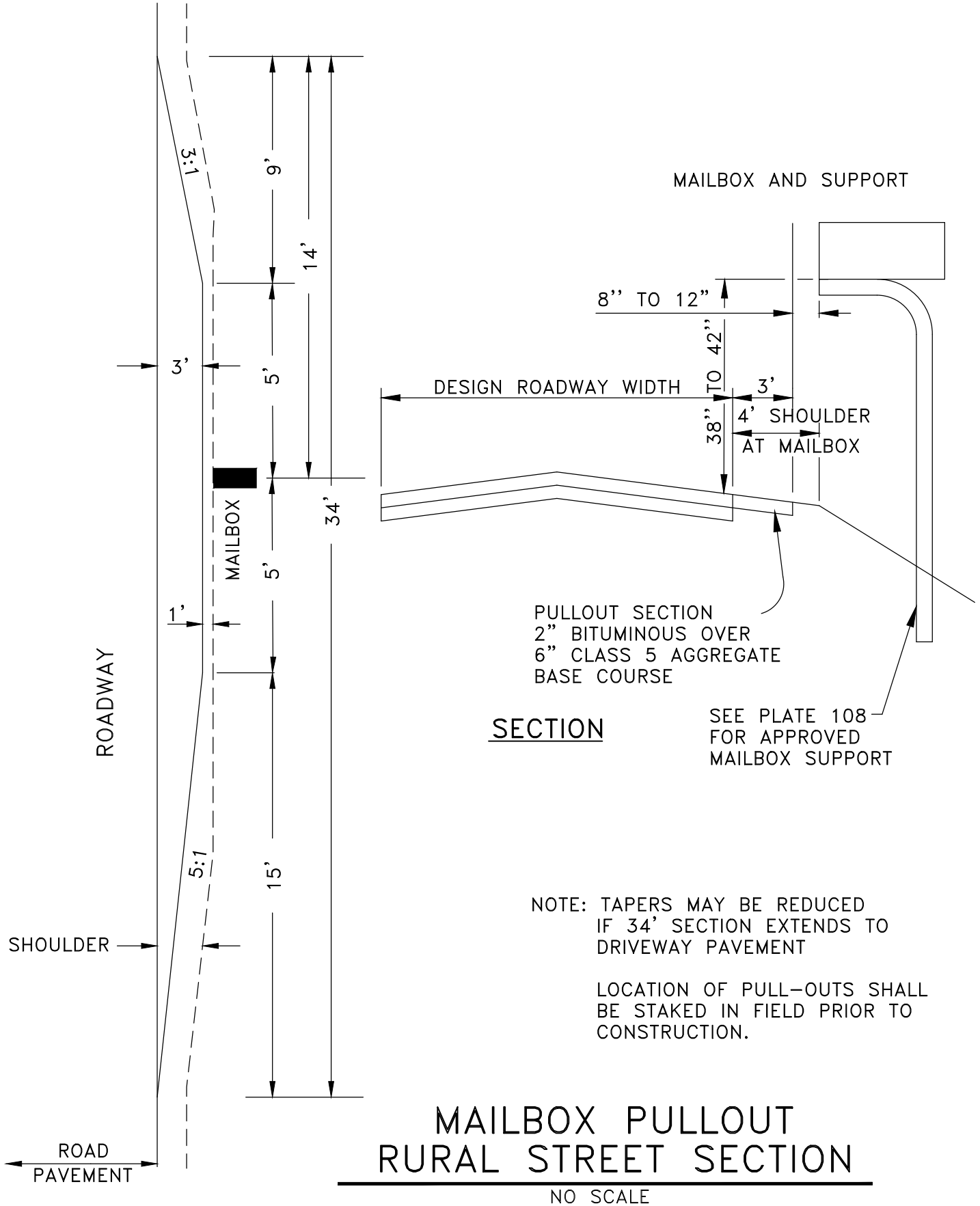
APPROVED – JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR–104



URBAN DRIVEWAY SECTION

NO SCALE

APPROVED – JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR–105



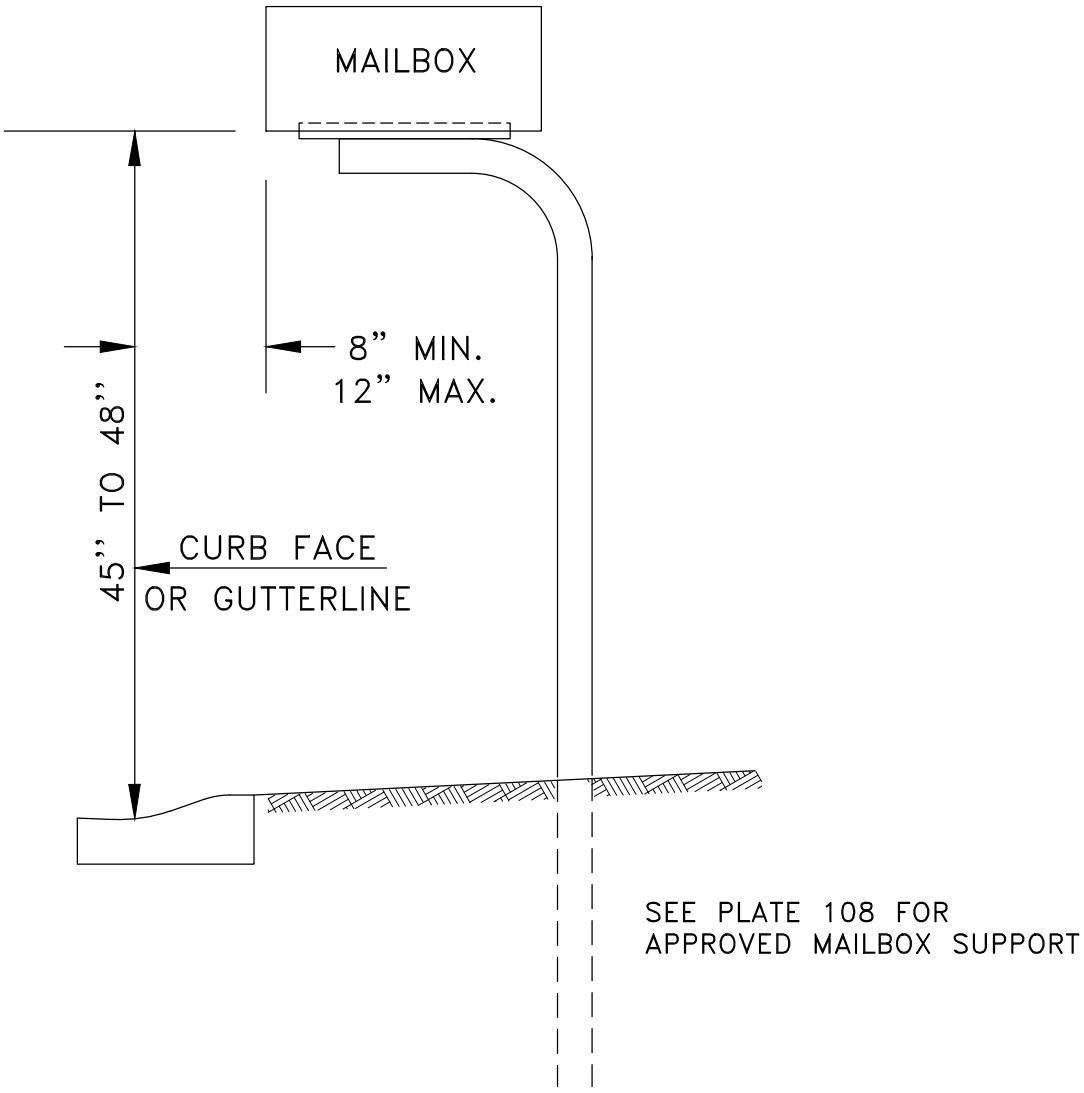
NOTE: TAPERS MAY BE REDUCED IF 34' SECTION EXTENDS TO DRIVEWAY PAVEMENT

LOCATION OF PULL-OUTS SHALL BE STAKED IN FIELD PRIOR TO CONSTRUCTION.

MAILBOX PULLOUT
RURAL STREET SECTION

NO SCALE

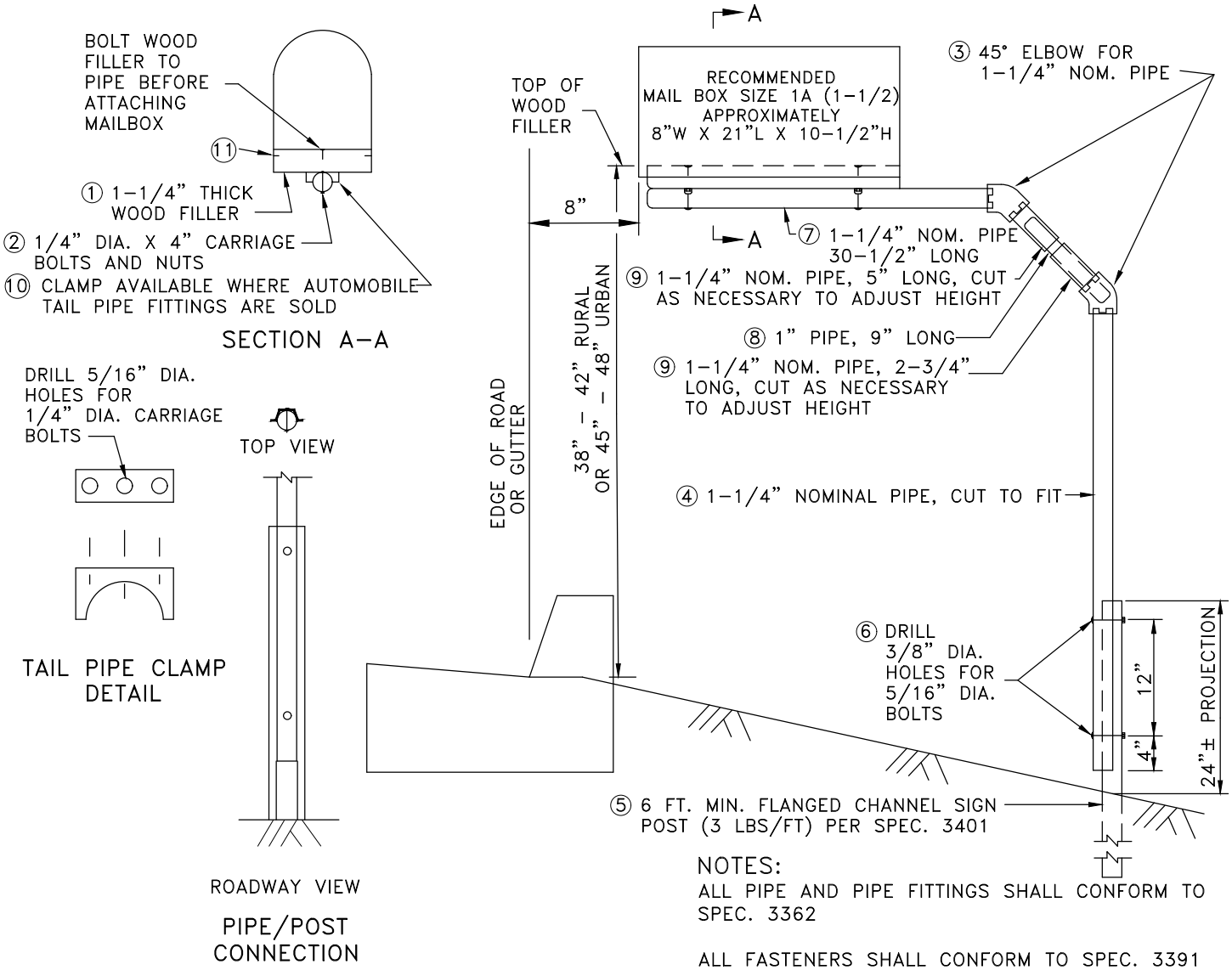
APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR-106



MAILBOX LOCATION
URBAN STREET SECTION

NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR–107



ITEM NO.	NUMBER REQUIRED	DESCRIPTION
1	1	1–1/2" THICK WOOD FILLER CUT TO FIT SNUG UNDER MAILBOX
2	2	1/4" DIA. X 4" LONG CARRIAGE BOLTS AND NUTS
3	2	45° ELBOW FOR 1–1/4" NOMINAL PIPE
4	1	1–1/4" NOMINAL PIPE, CUT TO FIT
5	1	6 FT. MIN. SIGN POST (3LBS_/FT.)
6	2	5/16" DIA. BOLT, NUT & LOCKWASHER
7	1	1–1/4" NOMINAL PIPE, 30–1/2" LONG
8	1	1" PIPE, 9" LONG
9	1	1–1/4" NOMINAL PIPE, 5" LONG 1–1/4" NOMINAL PIPE, 2–3/4" LONG
10	2	1–1/2" TAIL PIPE CLAMP
11	9	NO. 10 X 1" SHEET METAL SCREWS

NOTES:

ALL PIPE AND PIPE FITTINGS SHALL CONFORM TO SPEC. 3362

ALL FASTENERS SHALL CONFORM TO SPEC. 3391

ALL MATERIALS SHALL BE GALVANIZED PER SPEC. 3392

MAIL BOX LOCATIONS SHOULD BE STAKED BEFORE INSTALLATION FOR PROPER HEIGHT AND DISTANCE FROM THE ROADWAY. ONCE STAKED, THE INSTALLER MUST NOTIFY THE ENGINEER. THE ENGINEER WILL BE ALLOWED 48 HOURS TO REVIEW AND MODIFY THE STAKED LOCATIONS PRIOR TO FINAL INSTALLATION.

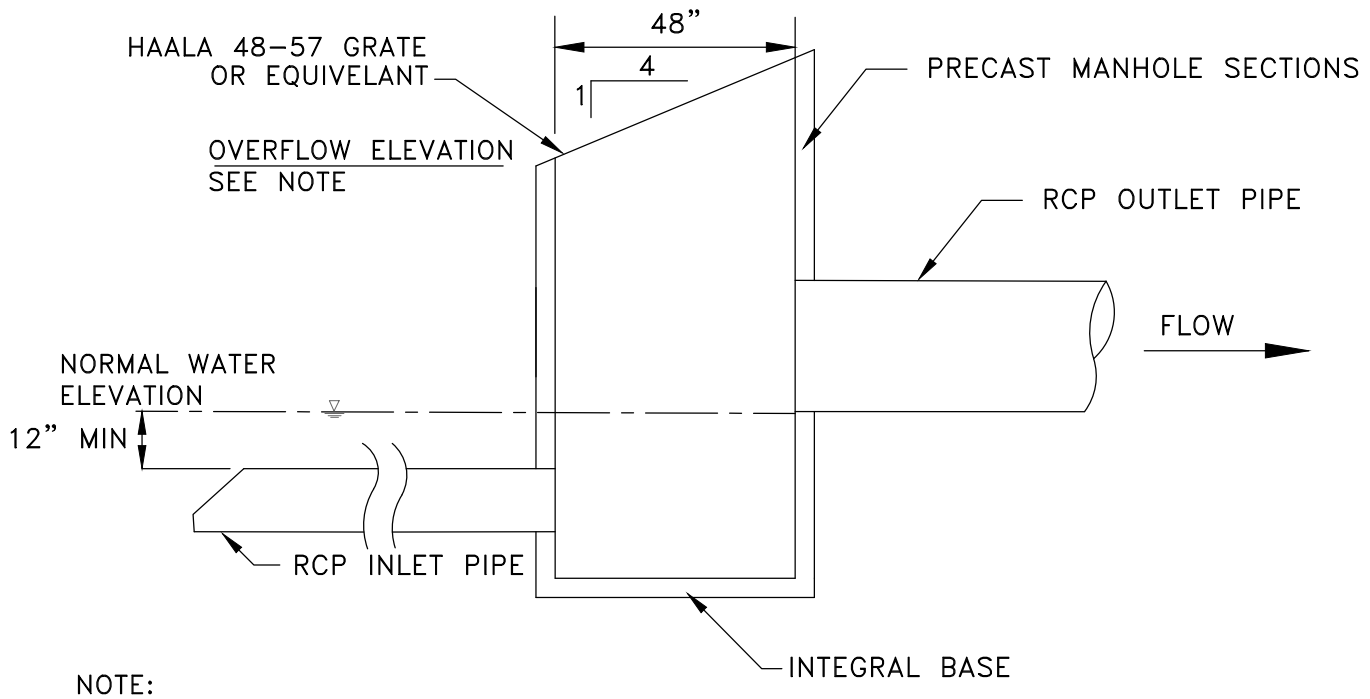
OTHER MnDOT APPROVED MAILBOX SUPPORTS MAY ALSO BE USED.

THE MAILBOX TO BE 8 INCHES TO 12 INCHES OUTSIDE THE EDGE OF SHOULDER OR 8 INCHES FROM THE FACE OF CURB.

MAILBOX SUPPORT

STEEL PIPE WITH FITTINGS AND STEEL FENCE POST
(SINGLE SUPPORT)
NO SCALE

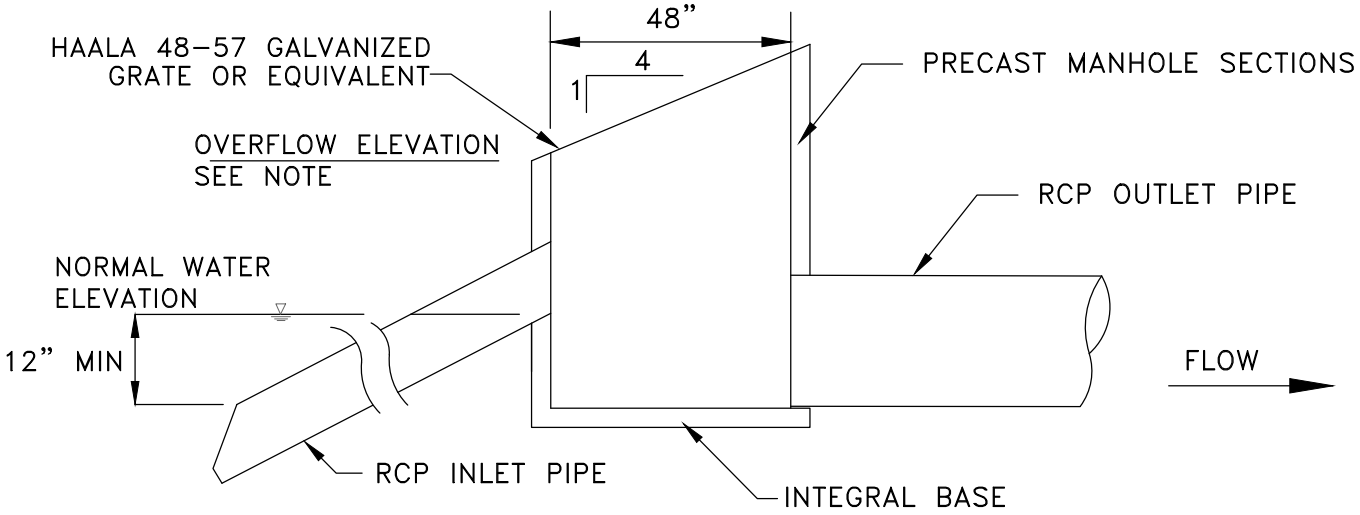
APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STR–108



NOTE:
THE OVERFLOW ELEVATION SHALL BE AT OR
ABOVE THE PEAK 2-YEAR STORM EVENT ELEVATION

SKIMMER STRUCTURE

NO SCALE

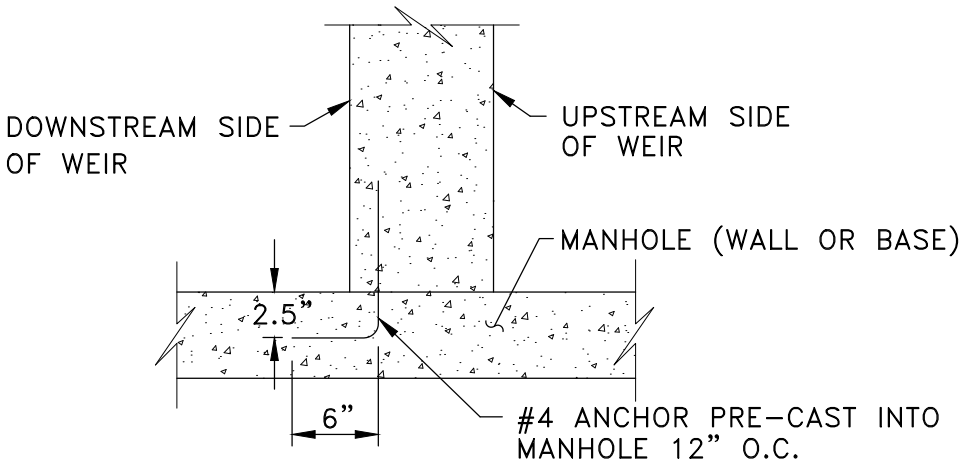


NOTE:
THE OVERFLOW ELEVATION SHALL BE AT OR
ABOVE THE PEAK 2-YEAR STORM EVENT ELEVATION

SKIMMER STRUCTURE

NO SCALE

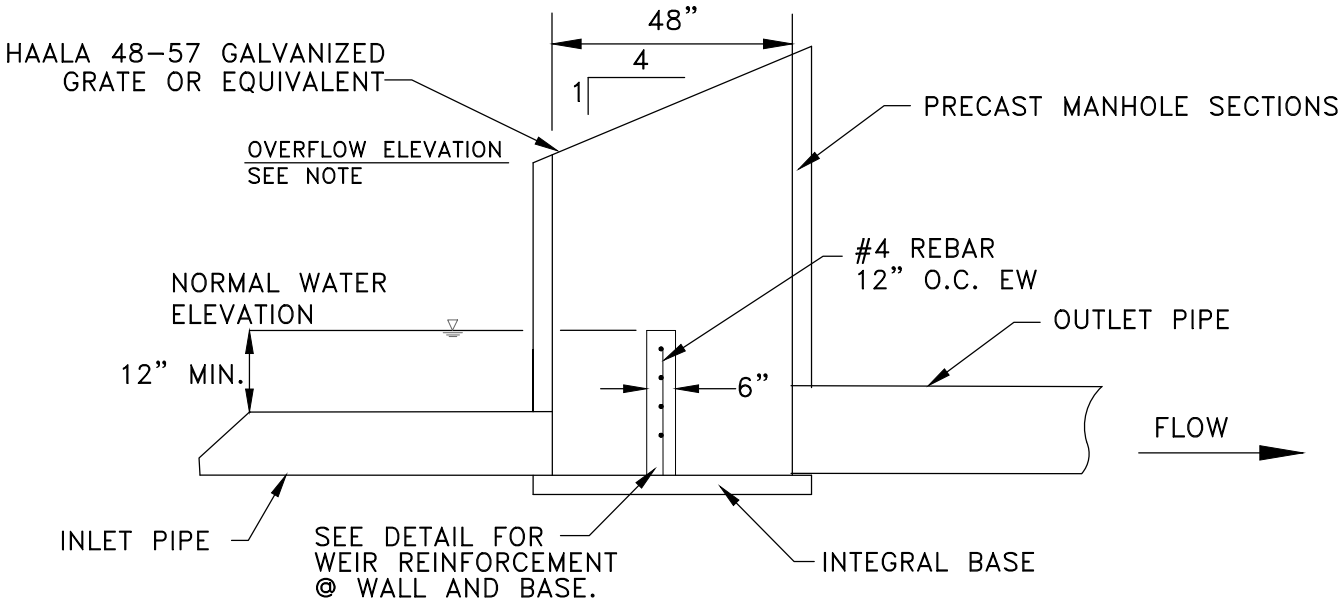
APPROVED - JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM-400



NOTE:

1. THE FOLLOWING MAY BE USED AS AN ALTERNATIVE TO THE PRE-CAST ANCHORS: HVA ADHESIVE ANCHOR SYSTEM, WITH HVA ADHESIVE CAPSULES AND #5 REBAR, AS MANUFACTURED BY HILTI CORP OR APPROVED EQUAL.
2. REINFORCEMENT BARS IN WEIR NOT SHOWN.

WEIR REINFORCEMENT @ WALL AND BASE



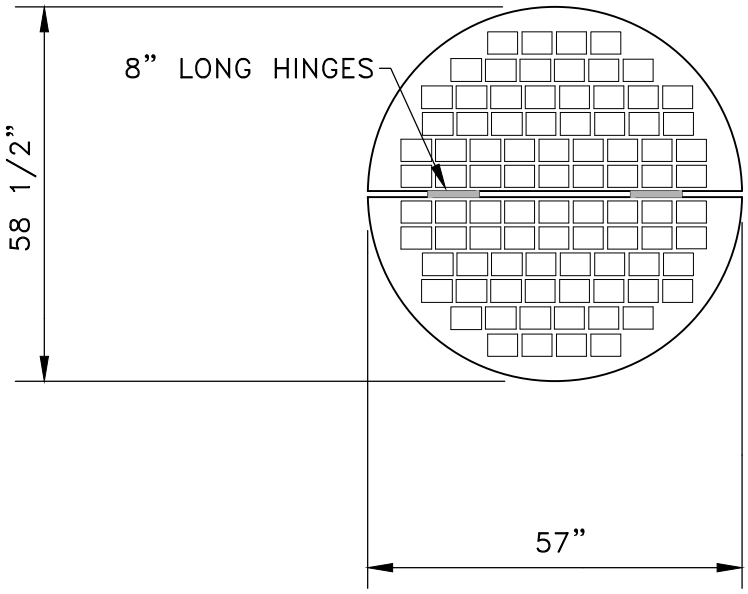
NOTE:
THE OVERFLOW ELEVATION SHALL BE AT OR ABOVE THE PEAK 2-YEAR STORM EVENT ELEVATION

SKIMMER STRUCTURE WITH WEIR

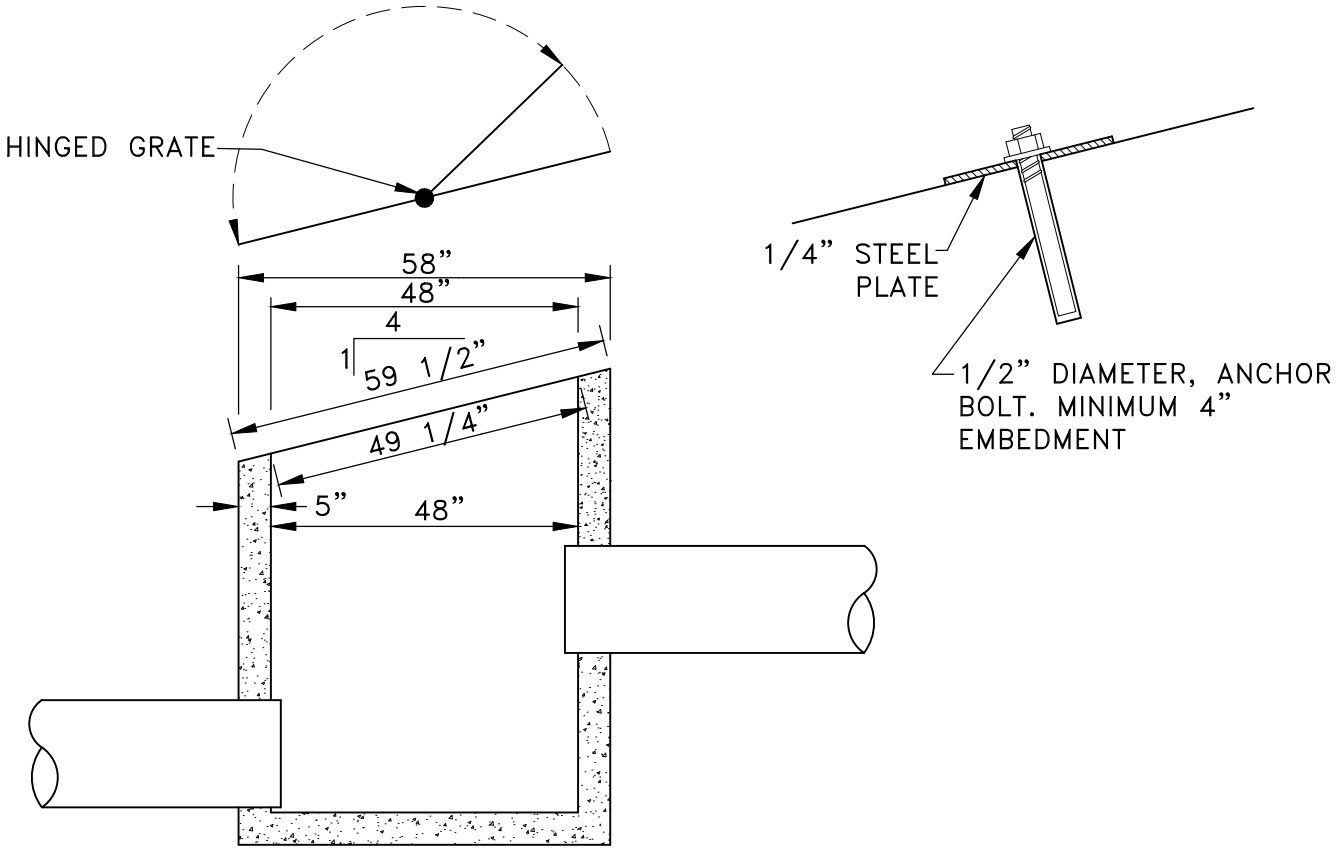
NO SCALE

APPROVED – JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM-401

HAALA 48–57 GALVANIZED GRATE OR EQUIVALENT



TOP VIEW



GRATE COVER FOR 48" DIA. OUTLET STRUCTURE

NO SCALE

APPROVED – JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM–402

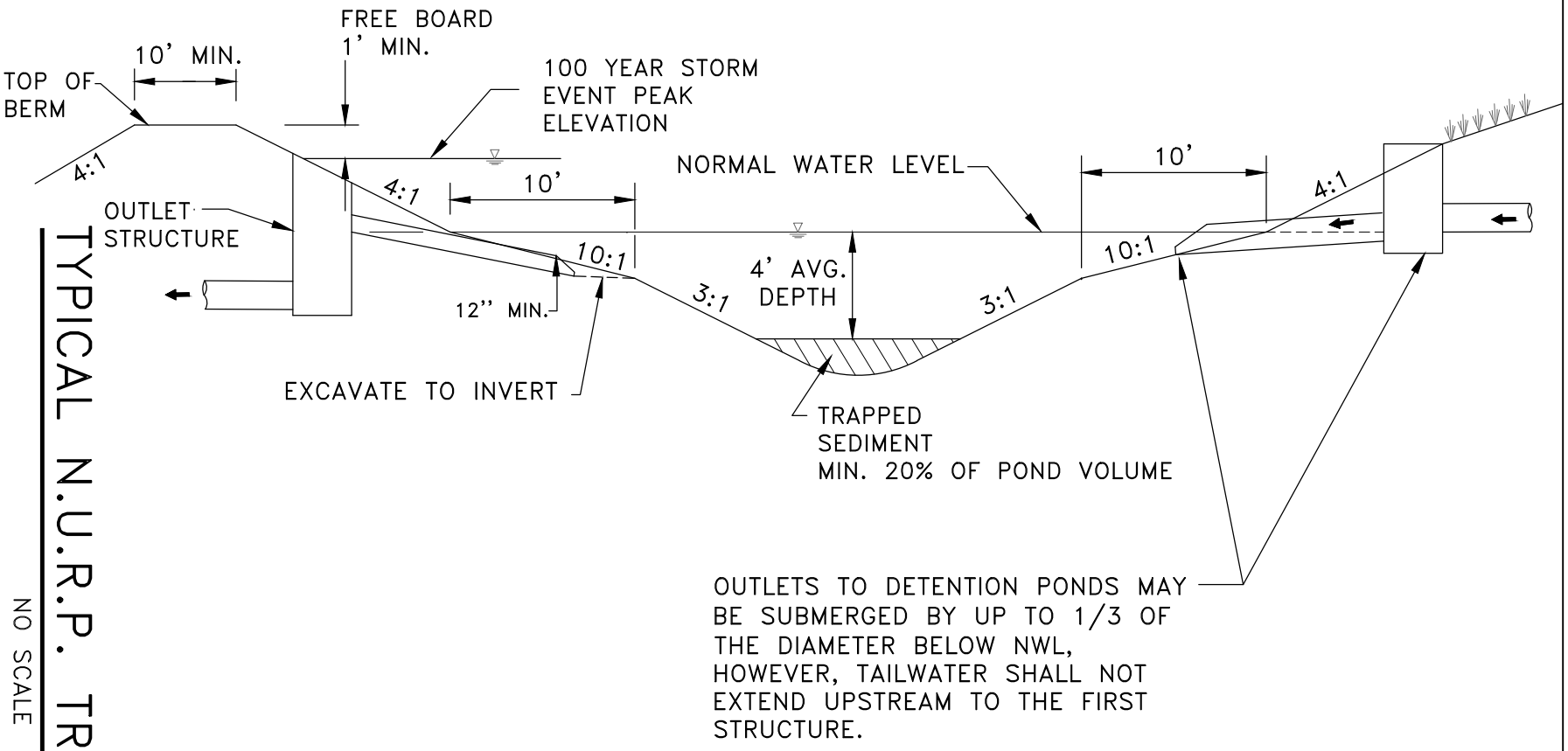
APPROVED – JDP
08/2009
REVISED

STANFORD TOWNSHIP

STANDARD PLATE NO.
STM-403

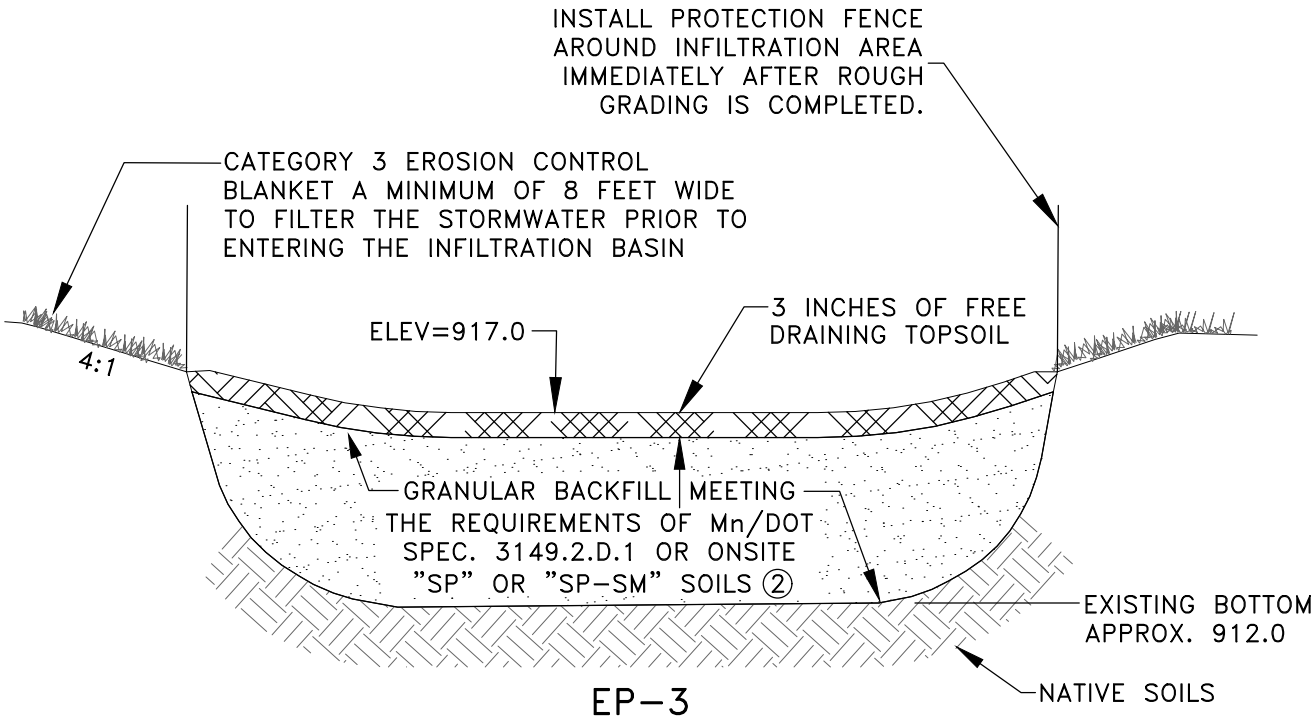
TYPICAL N.U.R.P. TREATMENT BASIN

NO SCALE



NOTE:

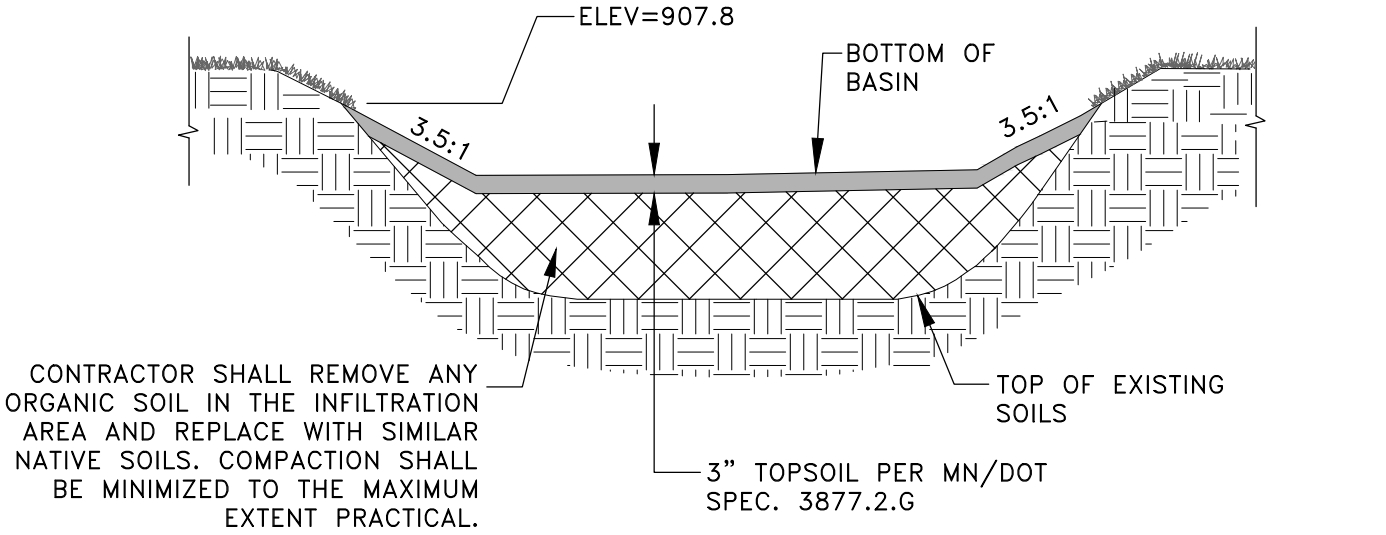
1. SLOPES SHALL BE NO STEEPER THAN THOSE SHOWN.
2. AN EMERGENCY RIPRAP OVERFLOW SHALL BE PROVIDED.
3. 10' WIDE ACCESS ROUTE TO BE PROVIDED TO SKIMMER STRUCTURE/RIPIRAP OVERFLOW
4. TOPSOIL SHALL BE PLACED ON POND SLOPES FOUR INCHES THICK TO A DEPTH OF FOUR FEET BELOW NORMAL WATER LEVEL.



EP-3

INFILTRATION BASIN SECTION ②

NOT TO SCALE



② CONTRACTOR SHALL PROTECT THE INFILTRATION BASIN WITH 48" HIGH ORANGE SAFETY FENCE PRIOR TO THE START OF CONSTRUCTION.

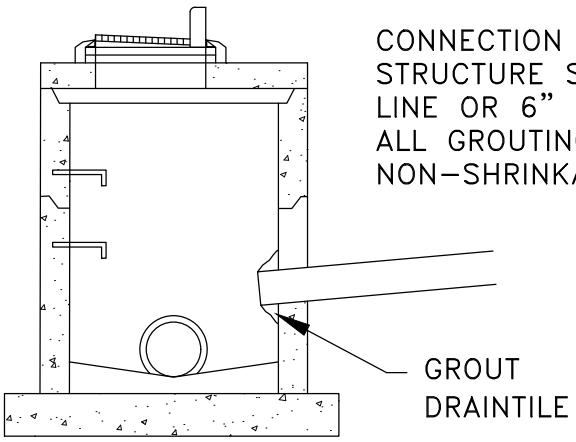
③ CONSTRUCTION EQUIPMENT SHALL BE MINIMIZED OVER THE FOOTPRINT OF THE BASIN. ONLY LOW PRESSURE, WIDE TRACKED EQUIPMENT SHALL BE USED FOR CONSTRUCTION.

④ SEE SHEET XXX FOR INFILTRATION BASIN RESTORATION REQUIREMENTS.

TYPICAL INFILTRATION BASIN ②③④

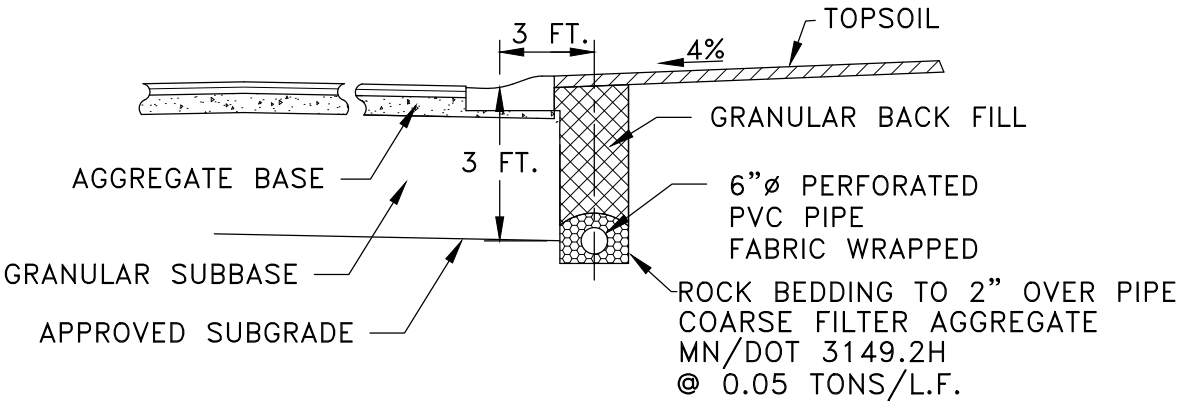
NO SCALE

APPROVED – SN 01/2024 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM-403A



CONNECTION TO STORM SEWER STRUCTURE SHALL BE AT SPRING LINE OR 6" MIN. ABOVE OUTLET ALL GROUTING MUST BE AN APPROVED NON-SHRINKABLE GROUT.

CONNECTION TO STORM SEWER

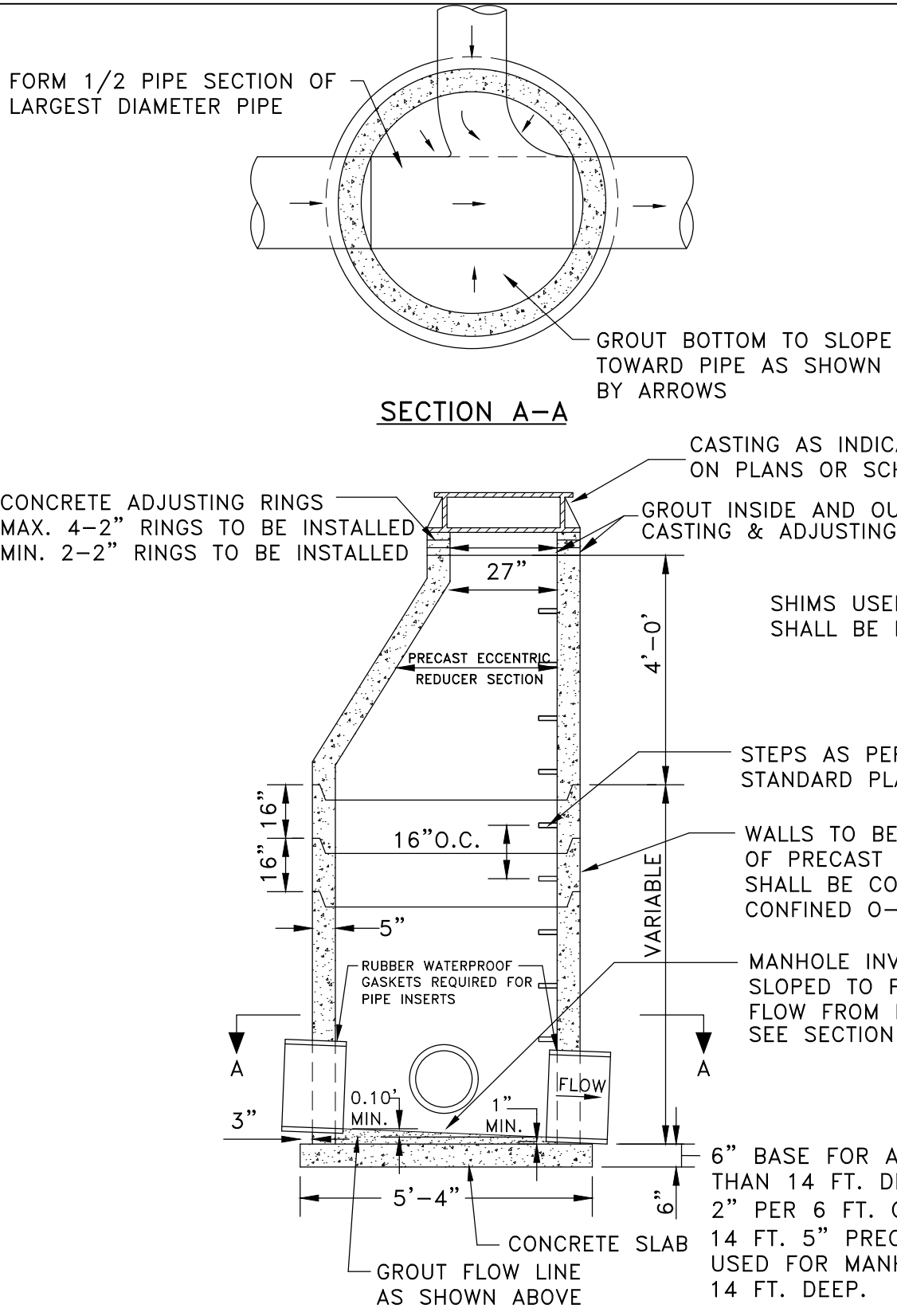


FILTER FABRIC WRAP SHALL BE MIRAF1 NONWOVEN (140 NL) EXXON NONWOVEN (GTF-130EX), AMOCO NONWOVEN (4545), OR APPROVED EQUAL.

PERFORATED DRAINTILE PIPE

NO SCALE

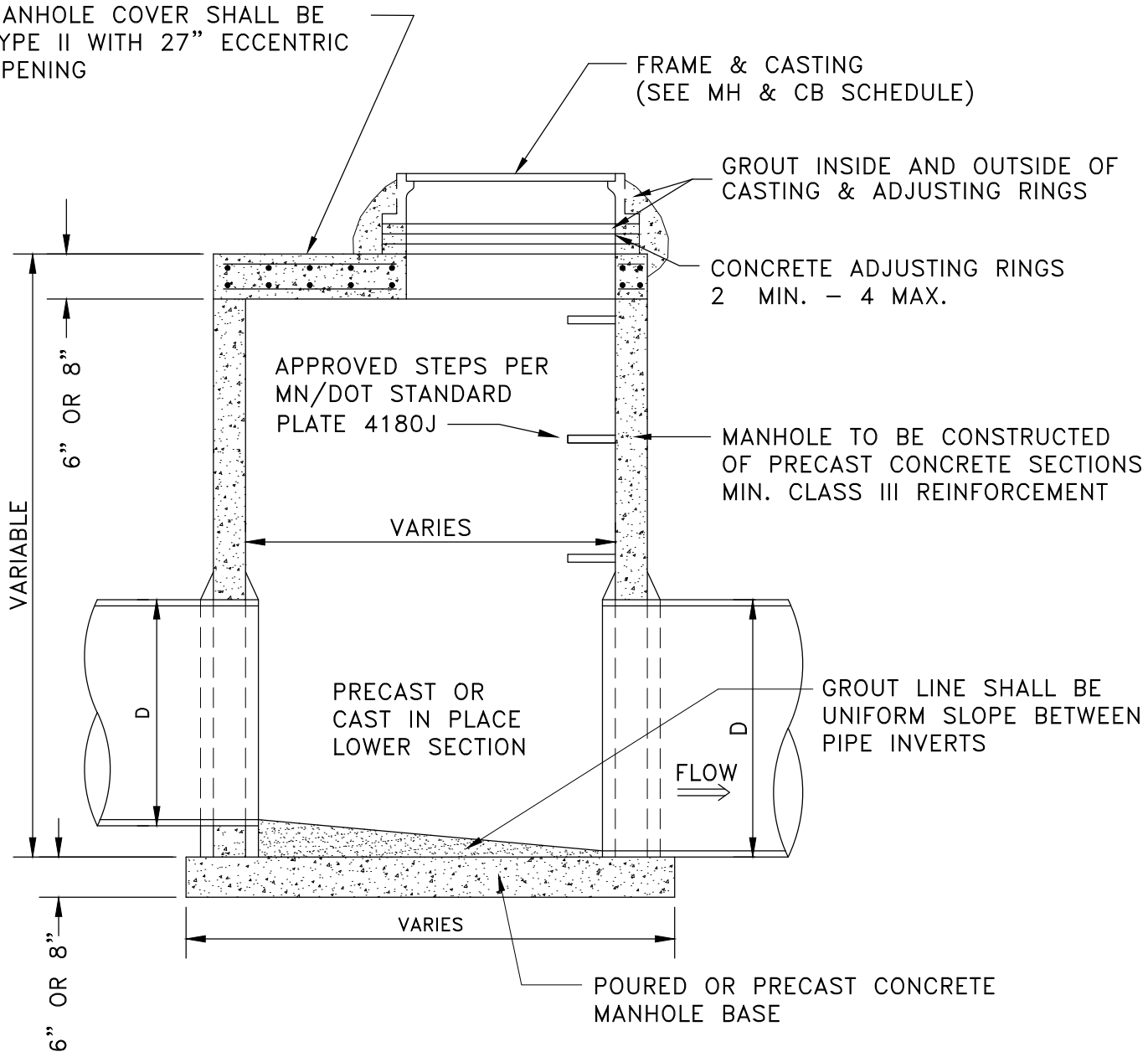
APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM-404



STORM SEWER STANDARD MANHOLE

NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM–405

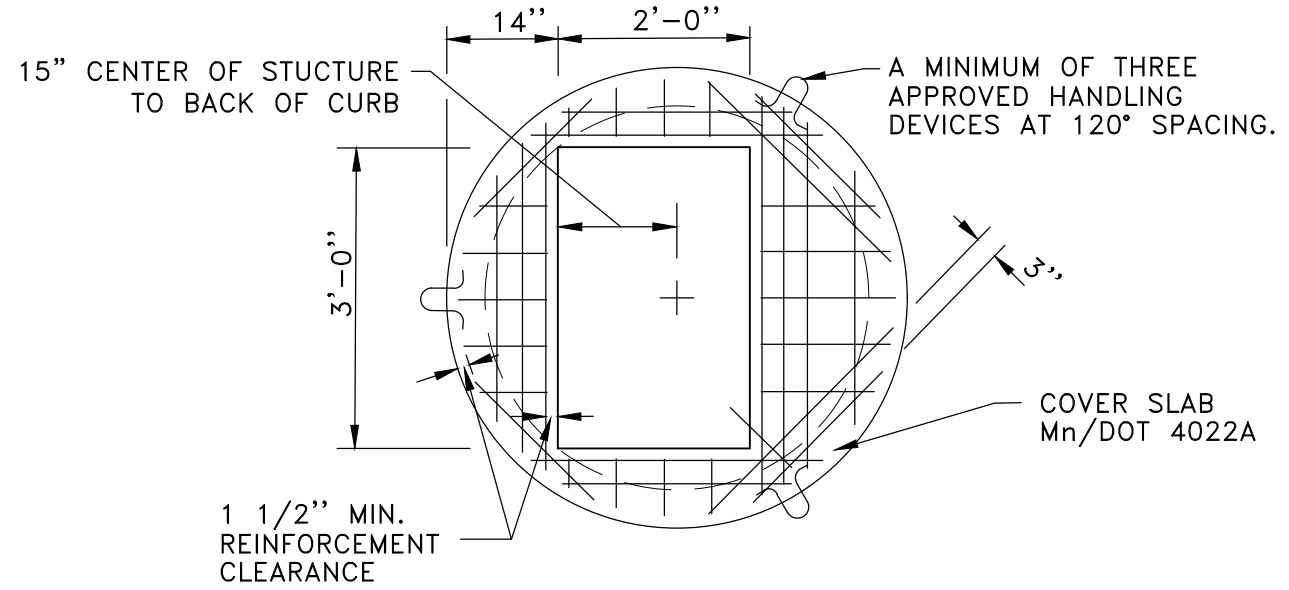


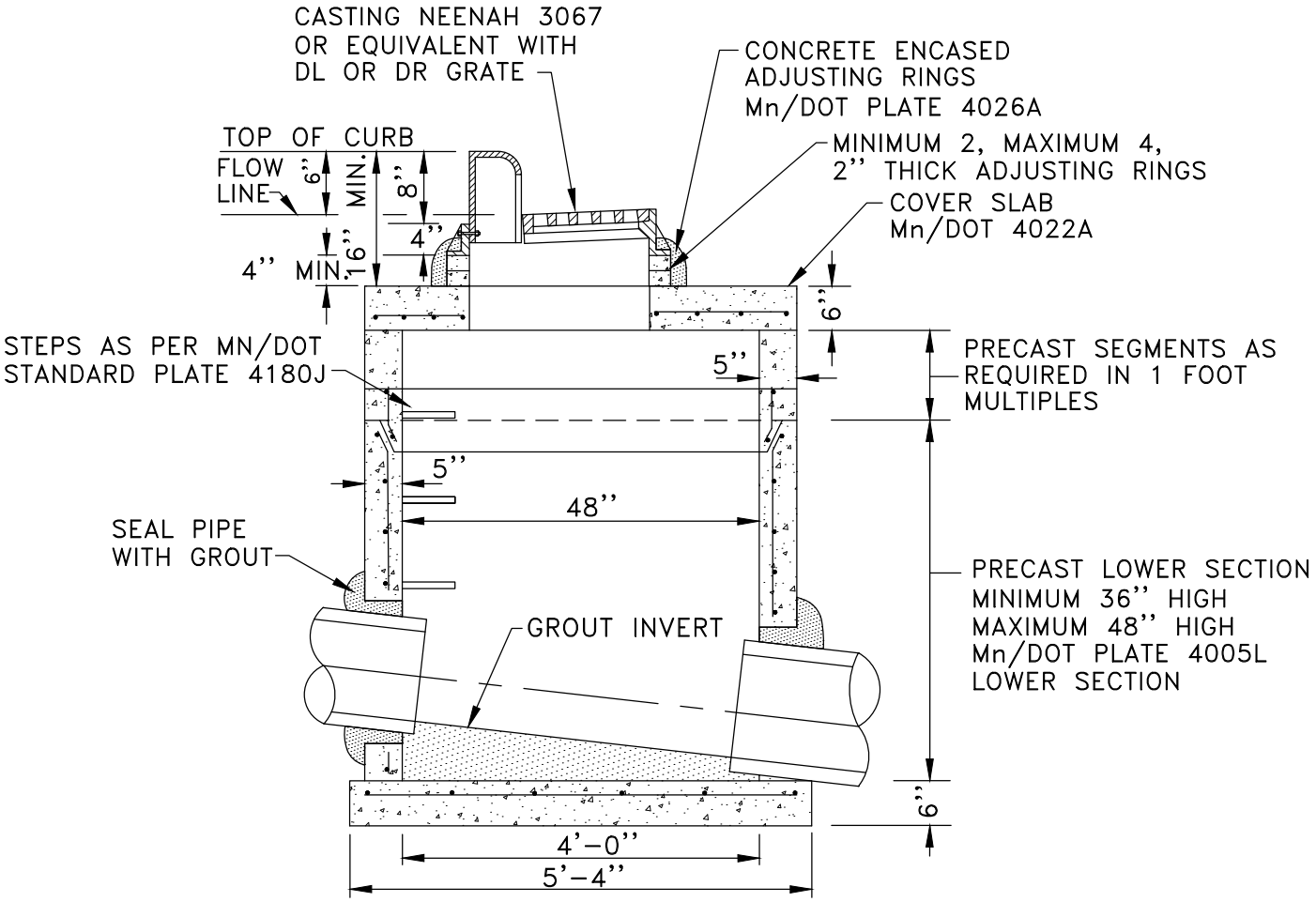
BASE 6" – 12 ft DEEP
8" – 12 ft TO 20 ft DEEP
10" – OVER 20 ft DEEP

SLAB TOP MANHOLE

(STORM SEWER)
NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM–406



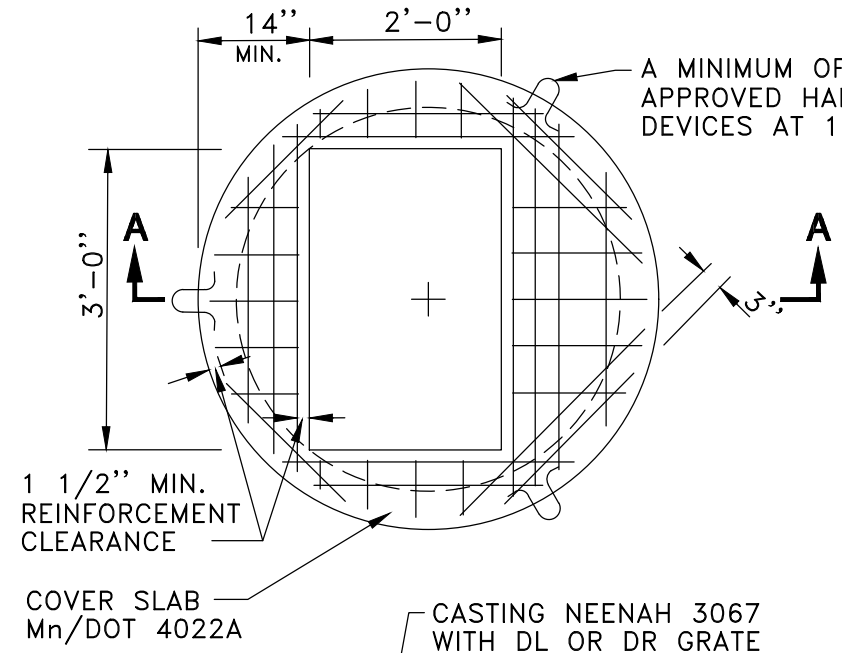


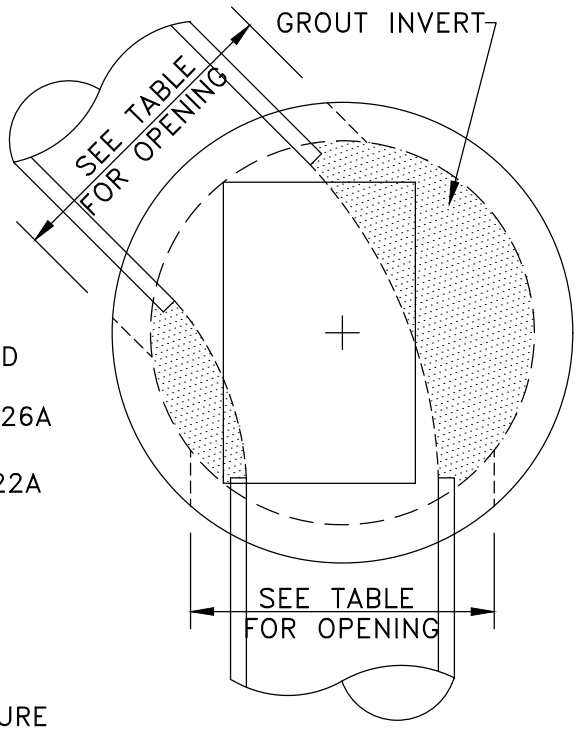
STANDARD STORM MANHOLE

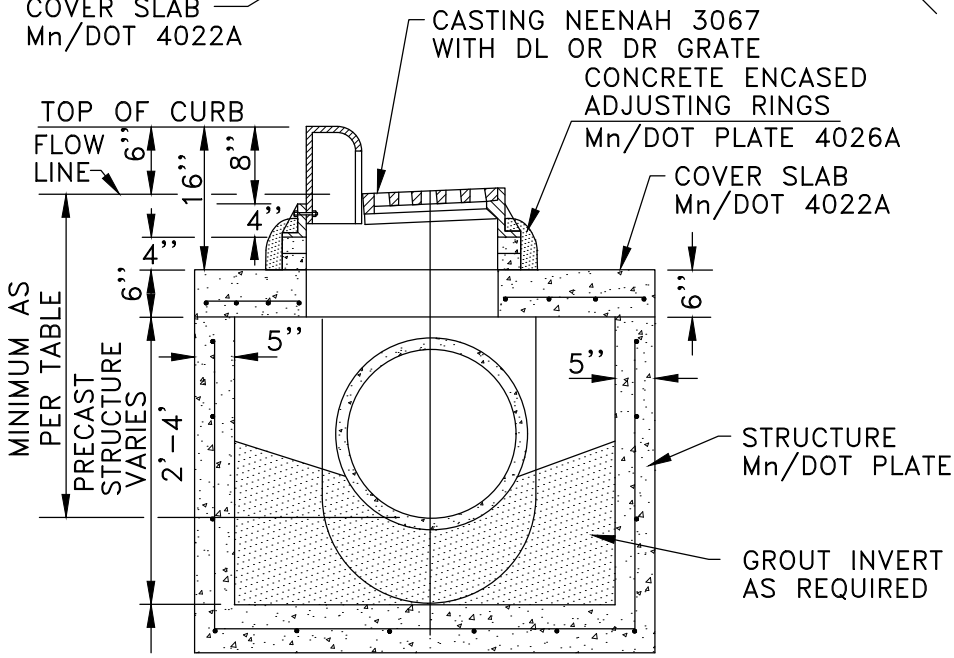
MINIMUM COVER FLOW LINE – TO TOP OF PIPE = 2 FEET

NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM–407







SECTION A–A

STANDARD OPENINGS	
PIPE DIA. (IN.)	OPENING SIZE (IN.)
15	24
18	26
21	30
24	34

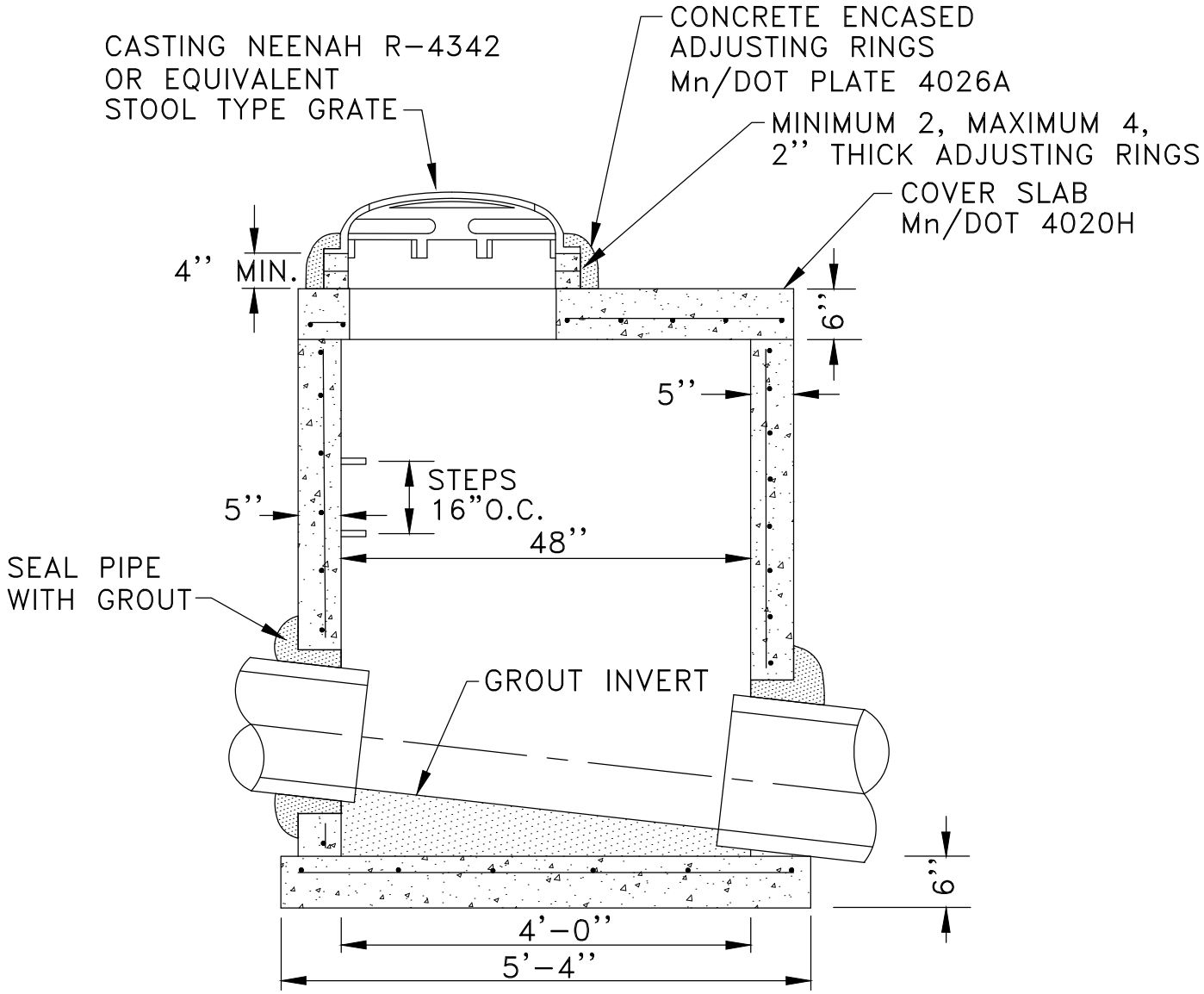
MINIMUM C.B. DEPTH – FLOW LINE TO INVERT		
PIPE DIA.	MIN. DEPTH	MINIMUM DEPTH WITH 2 RINGS
15	41 IN.	41 IN.
18	45 IN.	45 IN.
21	48 IN.	48 IN.
24	51 IN.	51 IN.

48 INCH DIAMETER SHALLOW DEPTH CATCH BASIN

MAXIMUM 24 INCH DIAMETER PIPE SIZE

NO SCALE

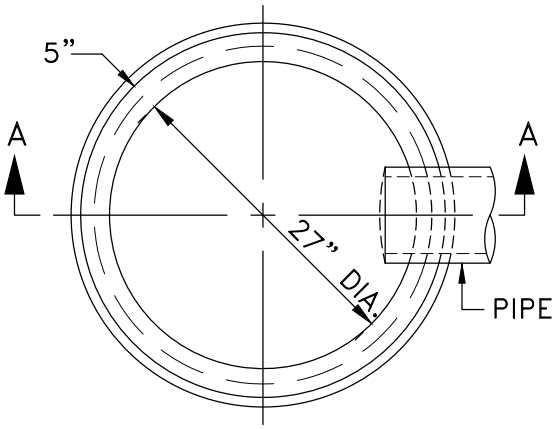
APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM–408



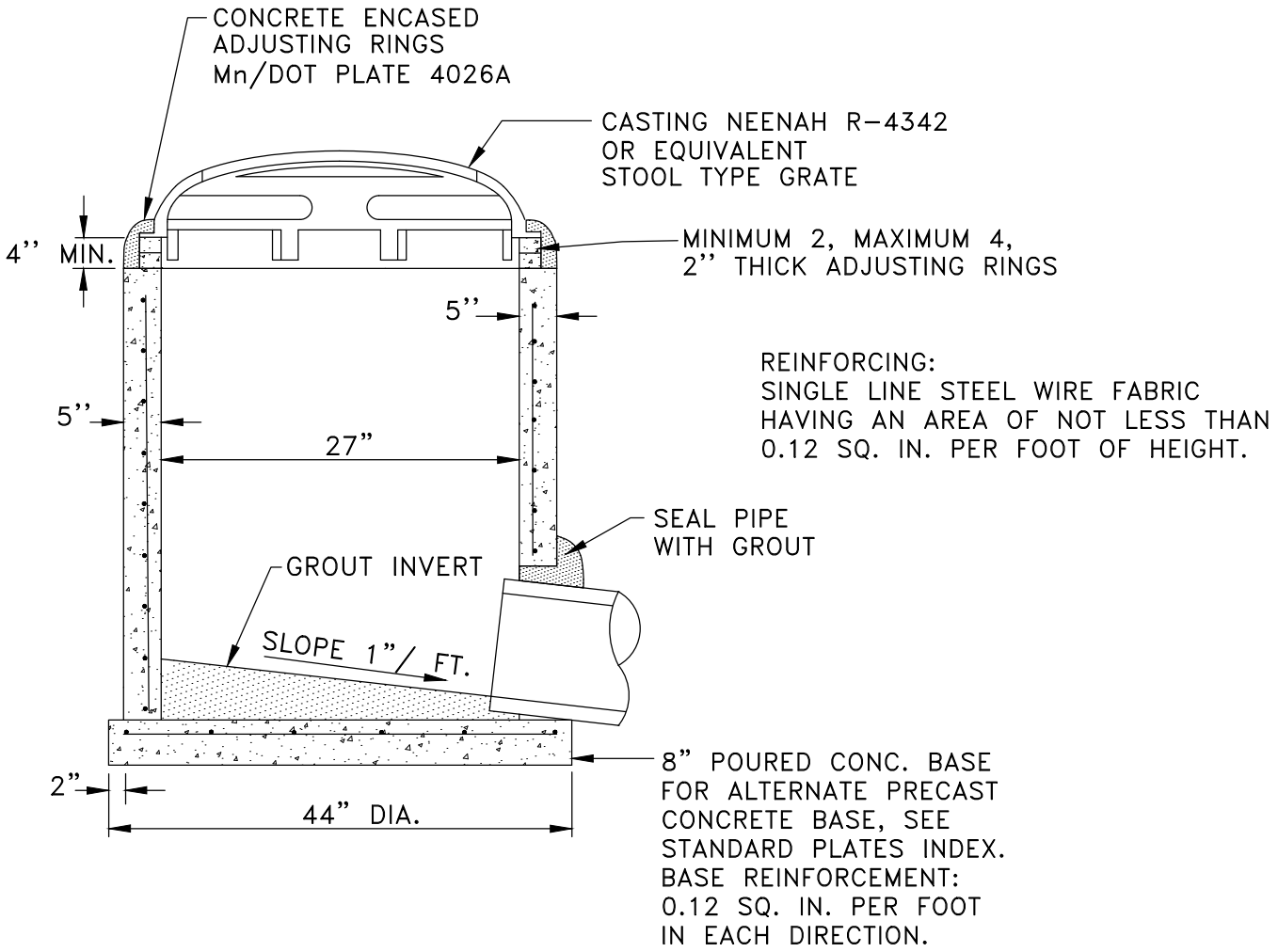
STANDARD STORM MANHOLE-YARD INLET

NO SCALE

APPROVED - JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM-409



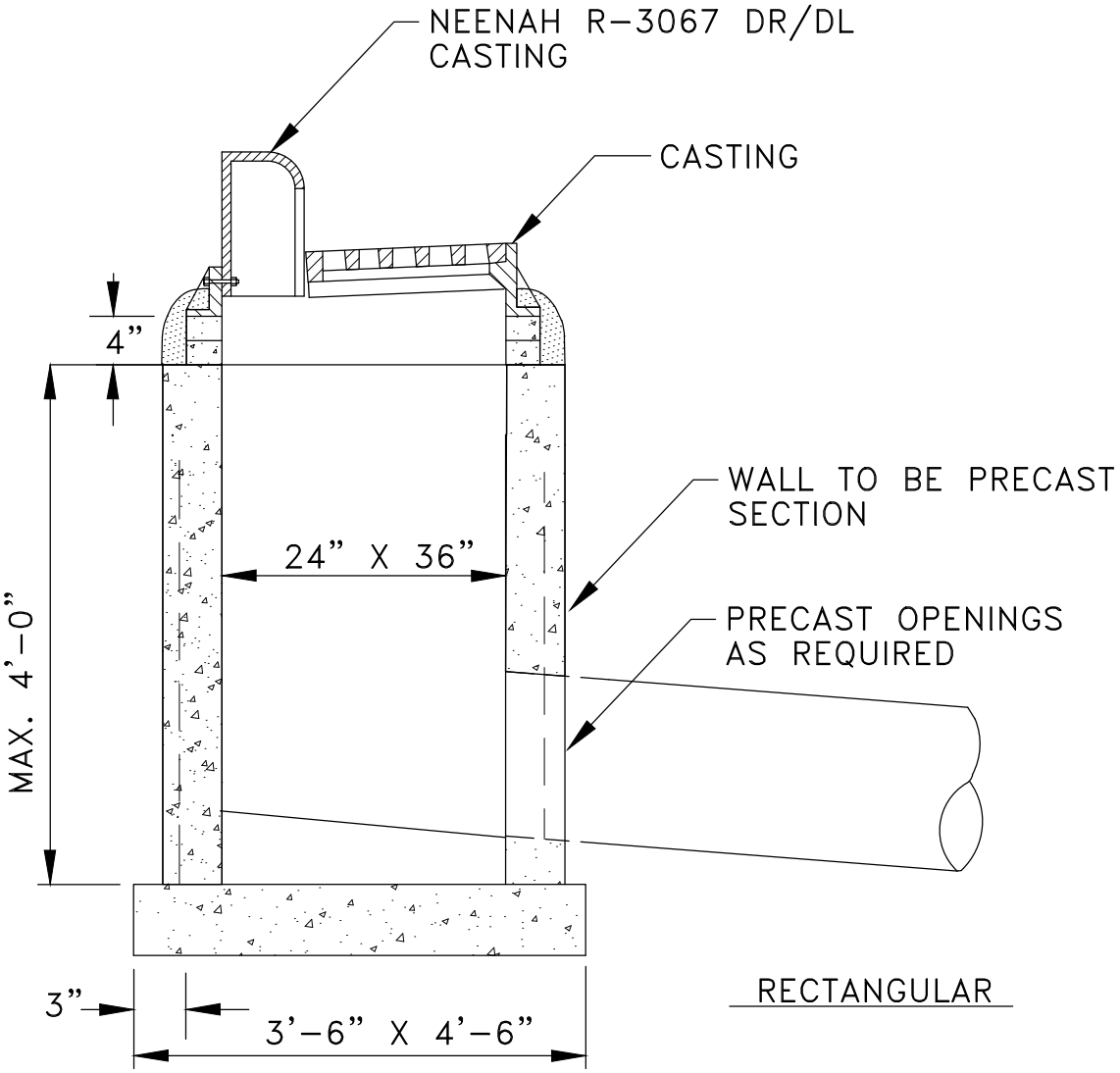
TOP VIEW



27" PRECAST CATCH BASIN YARD INLET

NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM-410



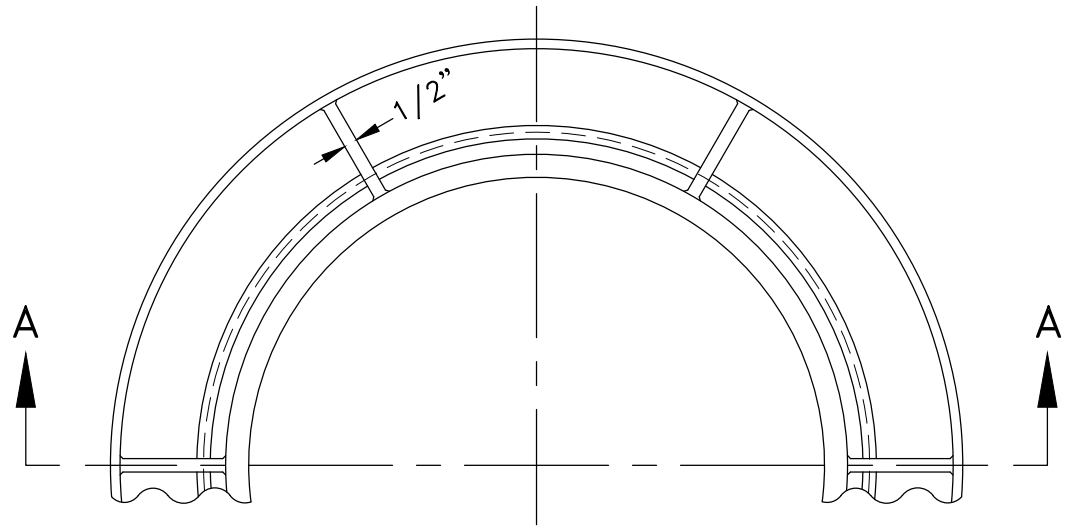
NOTE:

1. CONCRETE ADJUSTING RINGS MIN. 2-2" RINGS MAX 4-2" RINGS
2. CONCRETE BASE SHALL 6" POURED IN PLACE OR 5" PRECAST SLAB.

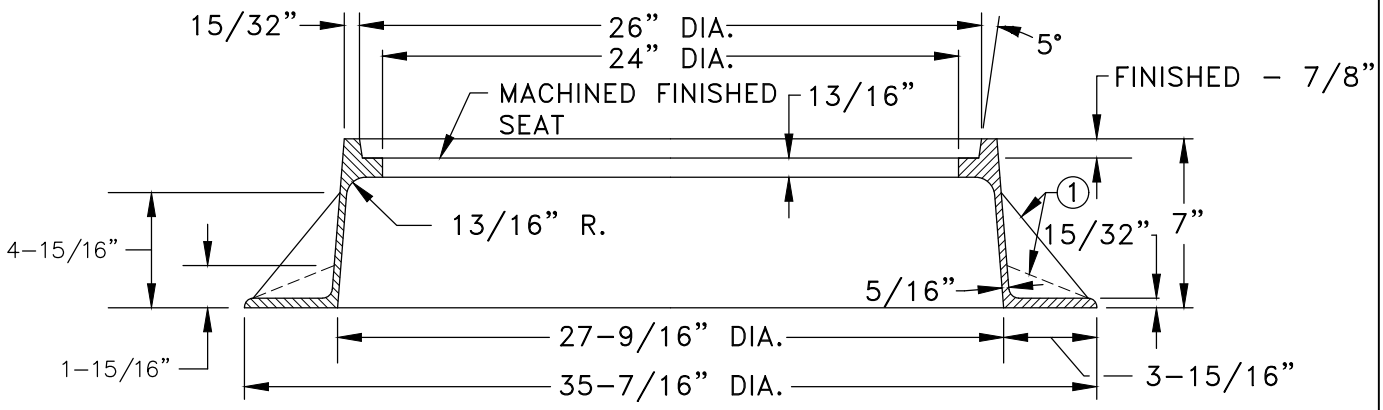
2' X 3' CATCH BASIN

NO SCALE

APPROVED - JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM-411



HALF TOP VIEW



SECTION A–A
NO. 700–7

7" CASTING NO. 700–7 (118 LBS.)

NOTES:

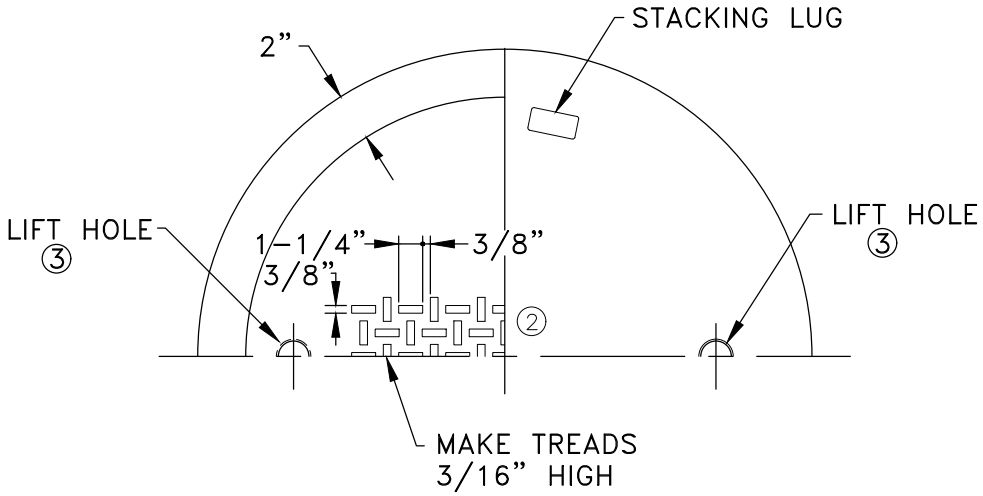
THIS RING CASTING TO BE USED IN CONJUNCTION WITH MANHOLE COVER NO. 716

① ALTERNATING GUSSETS (3 EACH).

STURCTURE CASTING (MnDOT 4110)

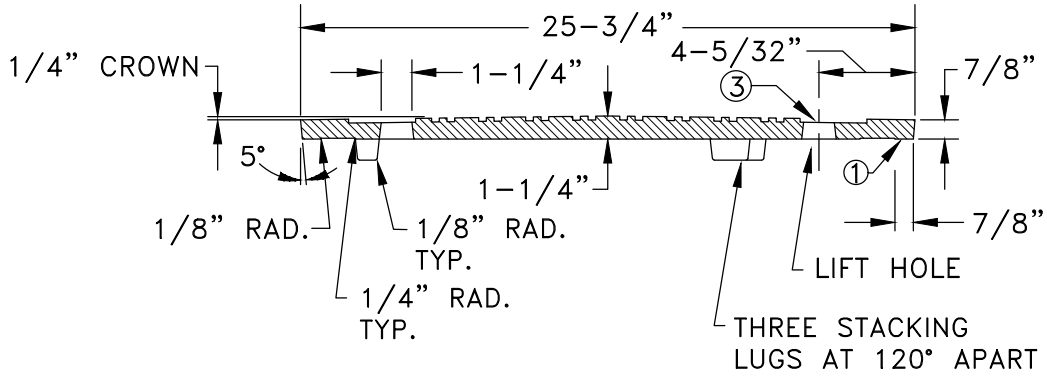
NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM–412



TOP VIEW BOTTOM VIEW

CASTING NO. 716



SECTION

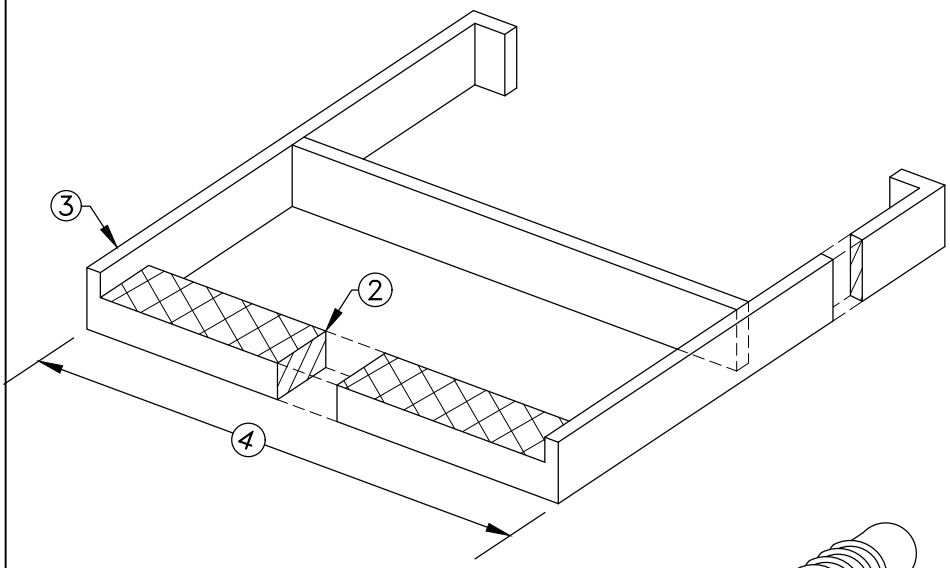
NOTES:

THESE COVERS TO BE USED WITH RING CASTING NO. 700-7.
① MACHINE FINISHED THICKNESS TO BE 13/16".
② COVER SHALL BE MADE OF GRAY IRON. CLASS 35B.
③ LIFT HOLE 1-1/4" DIA. AT THE TOP, 1-1/2" AT THE BOTTOM.

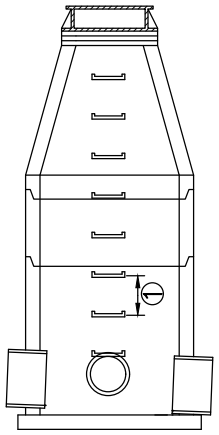
STORM COVER (MnDOT 4110)

NO SCALE

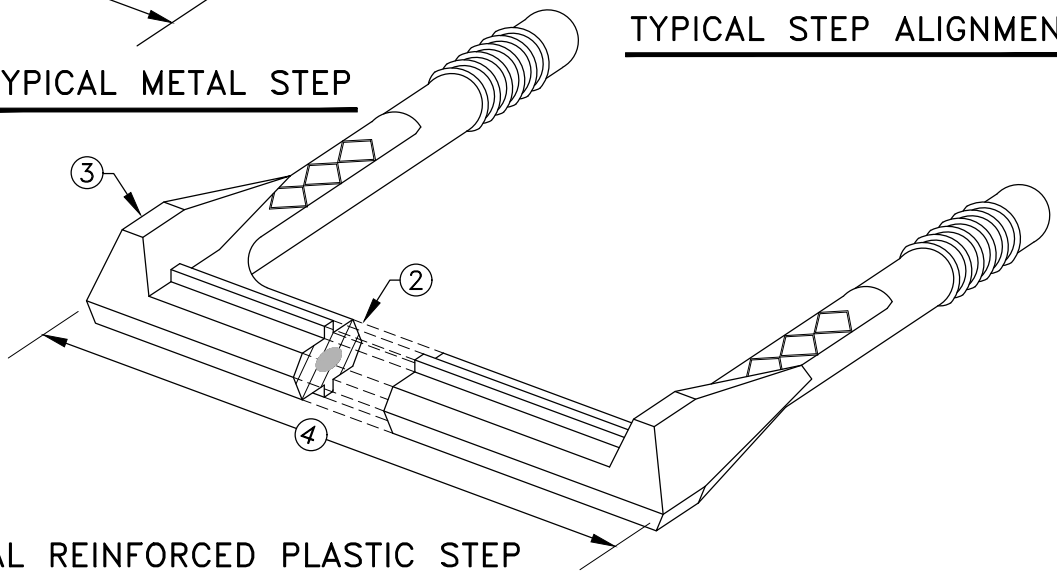
APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM-413



TYPICAL METAL STEP



TYPICAL STEP ALIGNMENT



TYPICAL REINFORCED PLASTIC STEP

NOTES:

STEPS SHOWN ARE BASIC DESIGN ONLY. FINAL CONFIGURATIONS MAY VARY FROM THESE DRAWINGS.

VARIATIONS IN THE ABOVE DESIGNS WHICH WILL NOT DECREASE STRENGTH WILL BE PERMITTED.

THE OFFICE OF MATERIALS, RESEARCH AND ENGINEERING WILL MAINTAIN A LISTING OF APPROVED MANHOLE STEPS. CURRENTLY APPROVED STEPS ARE ALUMINUM, CAST IRON AND STEEL REINFORCED PLASTIC. SELECTION OF APPROVED STEP DESIGN IS THE OPTION OF THE CONTRACTOR OR SUPPLIER.

ALUMINUM STEPS SHALL CONFORM TO ASTM 826–64A, ALLOY AA 514.0. EMBEDDED LEG SECTIONS SHALL BE GIVEN A NEOPRENE PROTECTIVE COATING OR EQUIVALENT FOR CORROSION PROTECTION. COATINGS SHALL BE APPROVED BY MATERIALS ENGINEERING.

EXCEPT AS OTHERWISE NOTED ON THIS PLATE, STEPS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C478.

STEPS SHALL BE EMBEDDED IN THE RISER OR CONICAL TOP SECTION WALL A MINIMUM DISTANCE OF 3 IN.

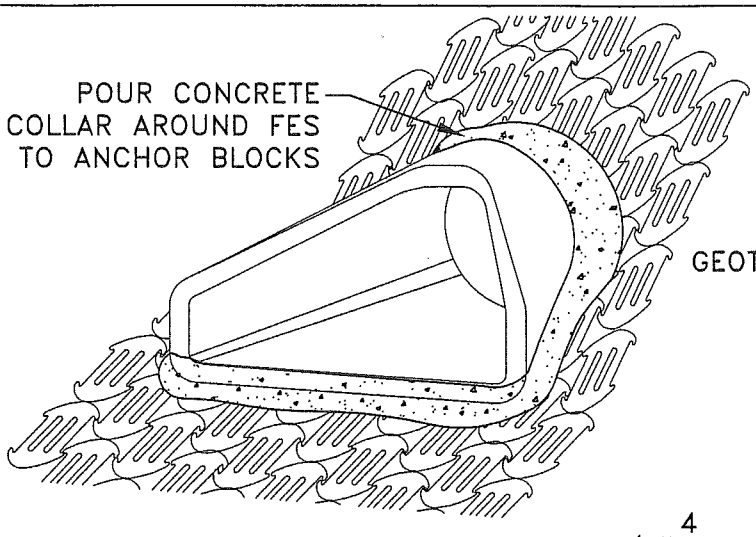
THE RUNG OR CLEAT SHALL PROJECT A MINIMUM CLEAR DISTANCE OF 4 IN. FROM THE WALL OF THE RISER OR CONE SECTION MEASURED FROM THE POINT OF EMBEDMENT.

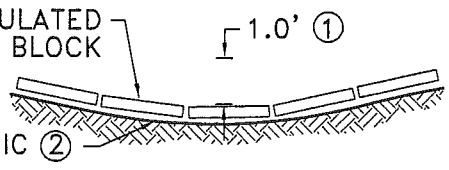
THE MIN CLEAR DISTANCE BETWEEN THE RUNG OR CLEAT AND THE OPPOSITE WALL OF THE MANHOLE RISER OR CONE SHALL BE 18 IN. MEASURED AT THE CENTER FACE OF THE STEP.

① STEPS SHALL BE SPACED AT A MAXIMUM DESIGN DISTANCE OF 16" APART.
② STEPS SHALL HAVE A MINIMUM CROSS SECTION DIMENSION OF 1 IN.
③ MINIMUM VERTICAL SIDE DIMENSION TO PREVENT FOOT FROM SLIPPING OFF IS 1/2"
④ THE MINIMUM WIDTH OF RUNGS OR CLEATS SHALL BE 10 IN.

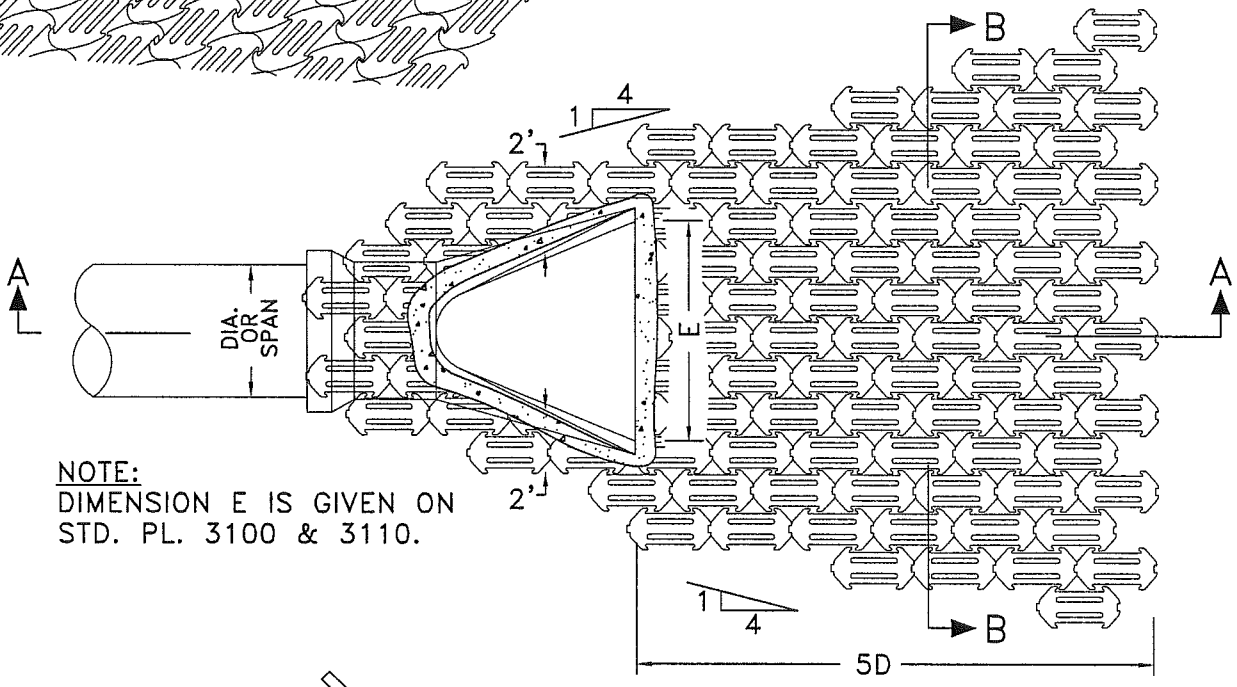
MANHOLE STEP (MnDOT 4180J)

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. STM–414



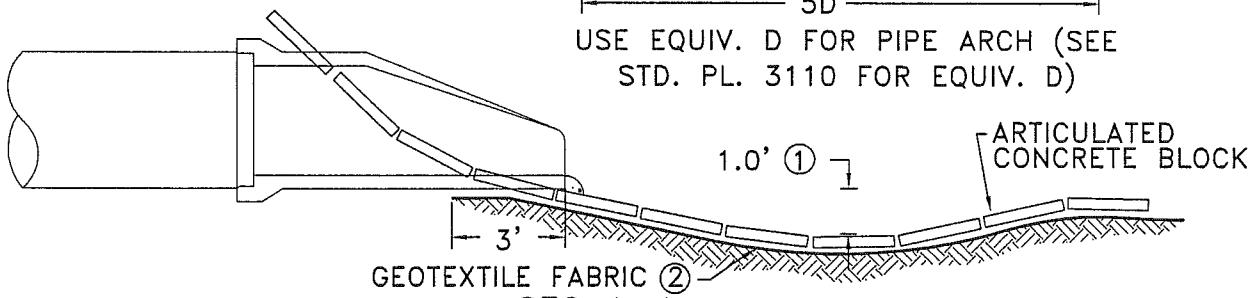


SEC. B–B



NOTE:
DIMENSION E IS GIVEN ON
STD. PL. 3100 & 3110.

USE EQUIV. D FOR PIPE ARCH (SEE
STD. PL. 3110 FOR EQUIV. D)



SEC A–A

ARTICULATED CONCRETE BLOCK SHALL BE A HANDPLACED INTERLOCKING CONCRETE BLOCK SYSTEM OR CABLE CONNECED CONCRETE BLOCK MAT.

① FOR PIPES GREATER THAN OR EQUAL TO 48", USE 2.0'

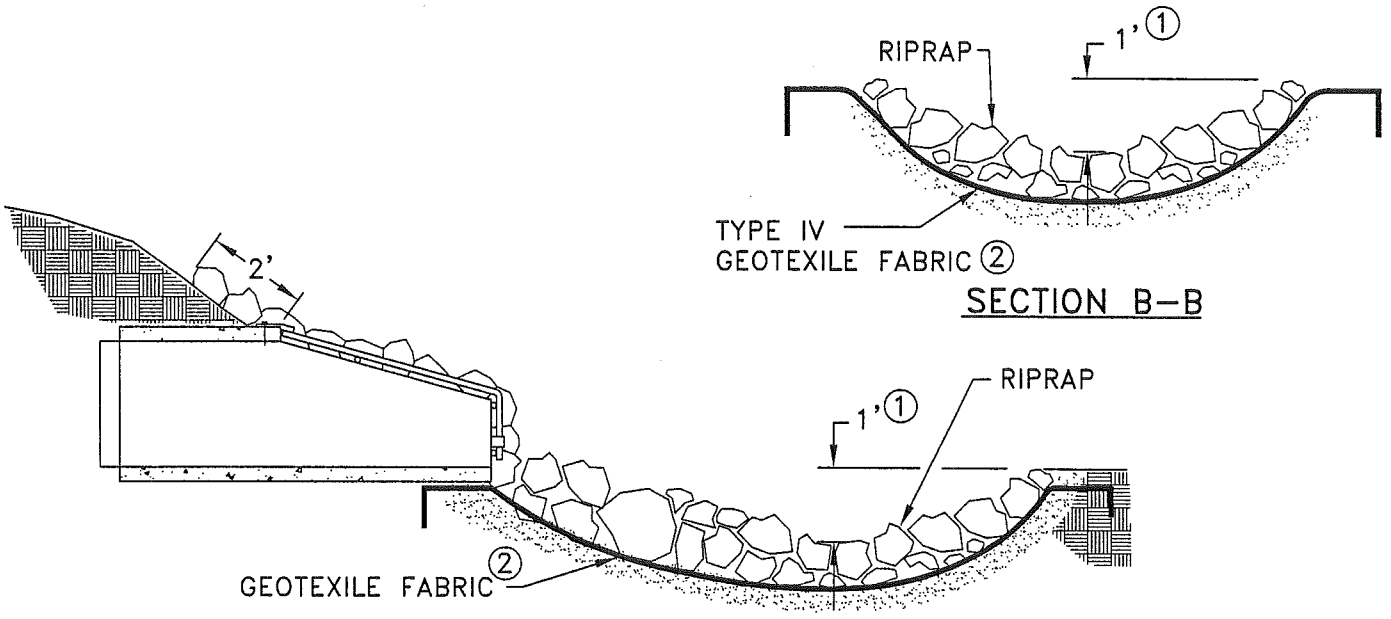
② GEOTEXTILE FABRIC PER Mn/DOT SPEC. 3733. FABRIC SHALL COVER THE AREA OF THE ARTICULATED BLOCK MAT AND EXTEND UNDER THE CULVERT APRON 3 FEET.

③ IF A CABLE CONCRETE SYSTEM IS USED, MULTIPLE MATS MUST BE TIED TOGETHER PER MANUFACTURERS SPEC. AND ALL CABLES PROTRUDING BEYOND THE FINISHED EDGES SHALL BE CUT FLUSH TO THE BLOCK.

ARTICULATED CONCRETE BLOCK AT R.C.P. OUTLET

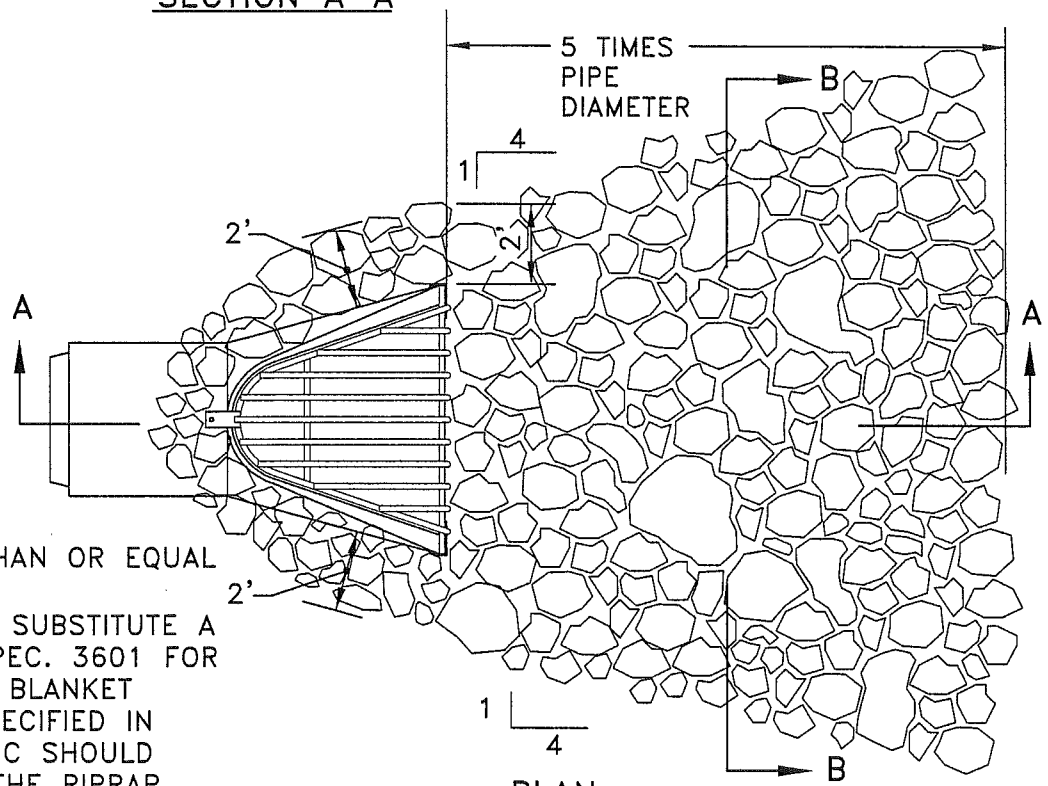
NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. EROS–500



SECTION B–B

SECTION A–A



PLAN

① FOR PIPES GREATER THAN OR EQUAL TO 48" USE 2.0'

② THE CONTRACTOR MAY SUBSTITUTE A GEOTEXTILE FABRIC, SPEC. 3601 FOR THE GRANULAR FILTER BLANKET UNLESS OTHERWISE SPECIFIED IN THE PLANS. THE FABRIC SHOULD COVER THE AREA OF THE RIPRAP AND EXTEND UNDER THE CULVERT APRON 3 FEET.

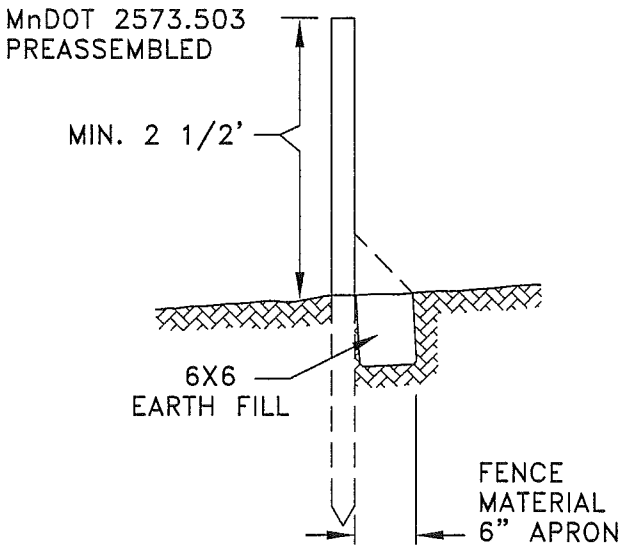
③ TRASH GUARD REQUIRED FOR 18" PIPE OR LARGER.

④ QUANTITIES AS PER MnDOT STANDARD PLATE UNLESS OTHERWISE SPECIFIED IN THE PLANS.

RIPRAP PLACEMENT

NO SCALE

APPROVED – JDP 07/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. EROS–500A



5' POSTS – 8' MAX. ON CENTER
MINIMUM 2' PENETRATION

REF. MnDOT 3886

SILT FENCE

NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. EROS–501

NOTE:

WOOD FIBER BLANKET SHALL BE PLACED AND STAPLED ACCORDING TO Mn/DOT SPECIFICATION 2575.3K2 WITH THE FOLLOWING EXCEPTIONS. ADJACENT STRIP EDGES SHALL BE OVERLAPPED A MINIMUM OF 6".

BIODEGRADABLE STAPLE STAKES (PLASTIC OR WOOD) SHALL BE USED IN PLACE OF METAL WIRE STAPLES.

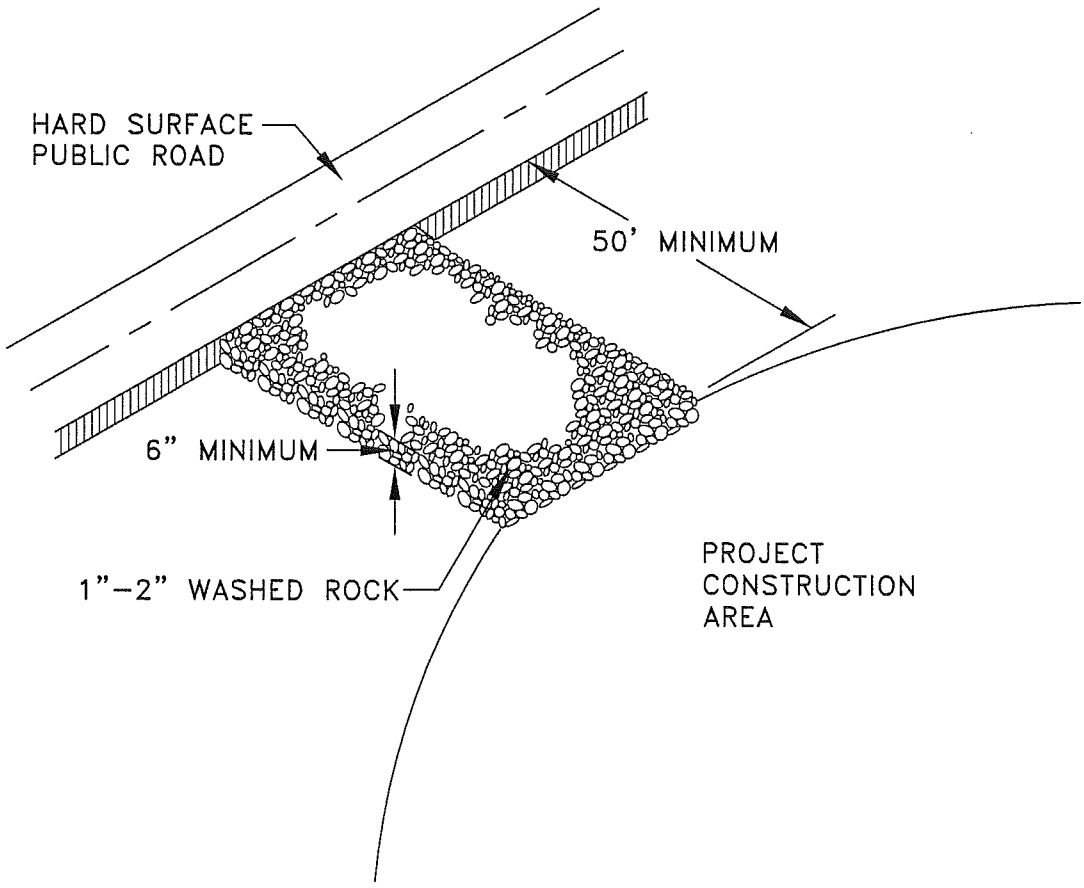
ECOSTAKES AND BIOSTAKES ARE ACCEPTABLE PRODUCTS FOR USE TO FASTEN WOOD FIBER BLANKET.

WOOD FIBER BLANKET INSTALLATION ON A CUT SLOPE

NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. EROS–502

SEDIMENT TRACK OUT CONTROL



* ALTERNATE DEVICES AND METHODS REQUIRE TOWNSHIP ENGINEER APPROVED PLANS.

ROCK CONSTRUCTION ENTRANCE

NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. EROS–503

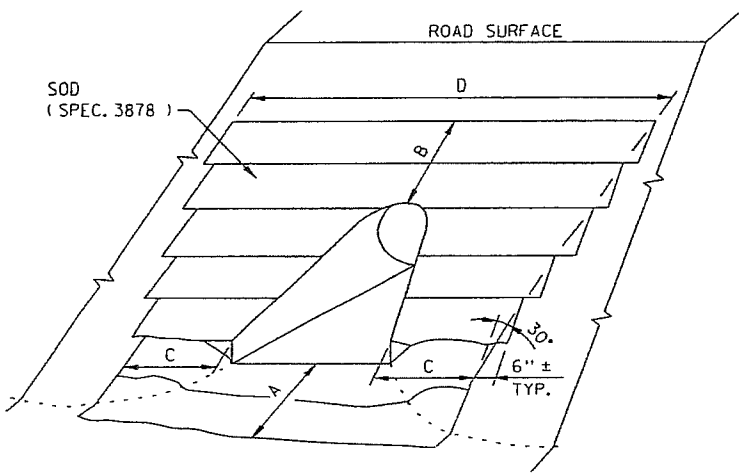
APPROVED Dec. 12, 1990
DIRECTOR
OFFICE OF TECHNICAL SUPPORT

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

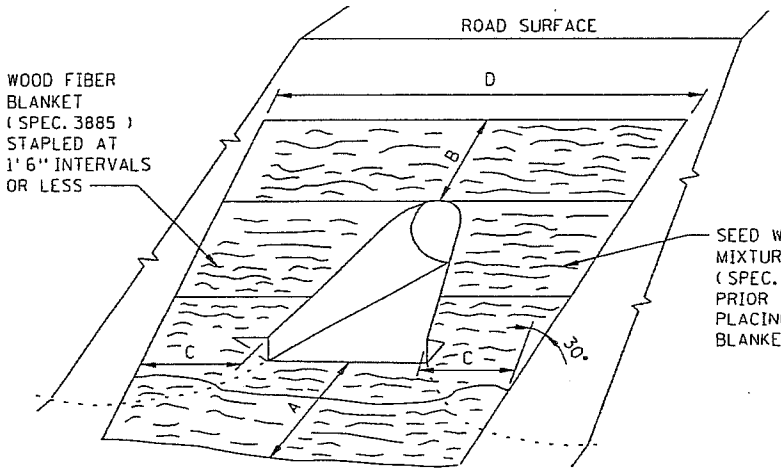
TURF ESTABLISHMENT AREAS
(AT PIPE CULVERT ENDS)

SPECIFICATION REFERENCE
2575

STANDARD PLATE NO.
9102D



SODDING DETAIL



MULCHING & SEED DETAIL

QUANTITIES (SQ. YDS.) AROUND CULVERT APRONS ①

INLET APRON						
CULVERT DIAMETER	SOD OR MULCH AREA (SQ. YDS.)		"A"	"B"	"C"	"D"
	METAL APRON	CONCRETE APRON				
15" & SMALLER	7	8	3'	1.5'	3'	13'
18"	11	10	3'	3'	3'	16'
24"	13	13	3'	3'	3'	18'
30"	19	19	3'	4.5'	3'	22'
36"	28	29	4.5'	4.5'	4.5'	27'
42"	36	34	4.5'	6'	4.5'	30'
48"	45	42	4.5'	7.5'	4.5'	34'
54"	54	47	4.5'	9'	4.5'	37'
60"	57	46	4.5'	9'	4.5'	39'
66"	58	50	4.5'	9'	4.5'	39'
72"	65	59	4.5'	10.5'	4.5'	41'
78"	78	75	6'	10.5'	6'	45'
84"	79	76	6'	10.5'	6'	45'
90"	—	77	6'	10.5'	6'	45'

OUTLET APRON						
CULVERT DIAMETER	SOD OR MULCH AREA (SQ. YDS.)		"A"	"B"	"C"	"D"
	METAL APRON	CONCRETE APRON				
15" & SMALLER	9	9	4.5'	1.5'	3'	13'
18"	11	11	6'	1.5'	3'	14'
24"	15	15	7.5'	1.5'	3'	16'
30"	19	20	9'	1.5'	3'	18'
36"	30	30	10.5'	1.5'	4.5'	23'
42"	36	34	12'	1.5'	4.5'	25'
48"	41	39	13.5'	1.5'	4.5'	27'
54"	47	41	15'	1.5'	4.5'	29'
60"	62	52	16.5'	1.5'	6'	33'
66"	63	56	16.5'	1.5'	6'	33'
72"	64	58	16.5'	1.5'	6'	34'
78"	65	62	16.5'	1.5'	6'	34'
84"	66	63	16.5'	1.5'	6'	35'
90"	—	65	16.5'	1.5'	6'	35'

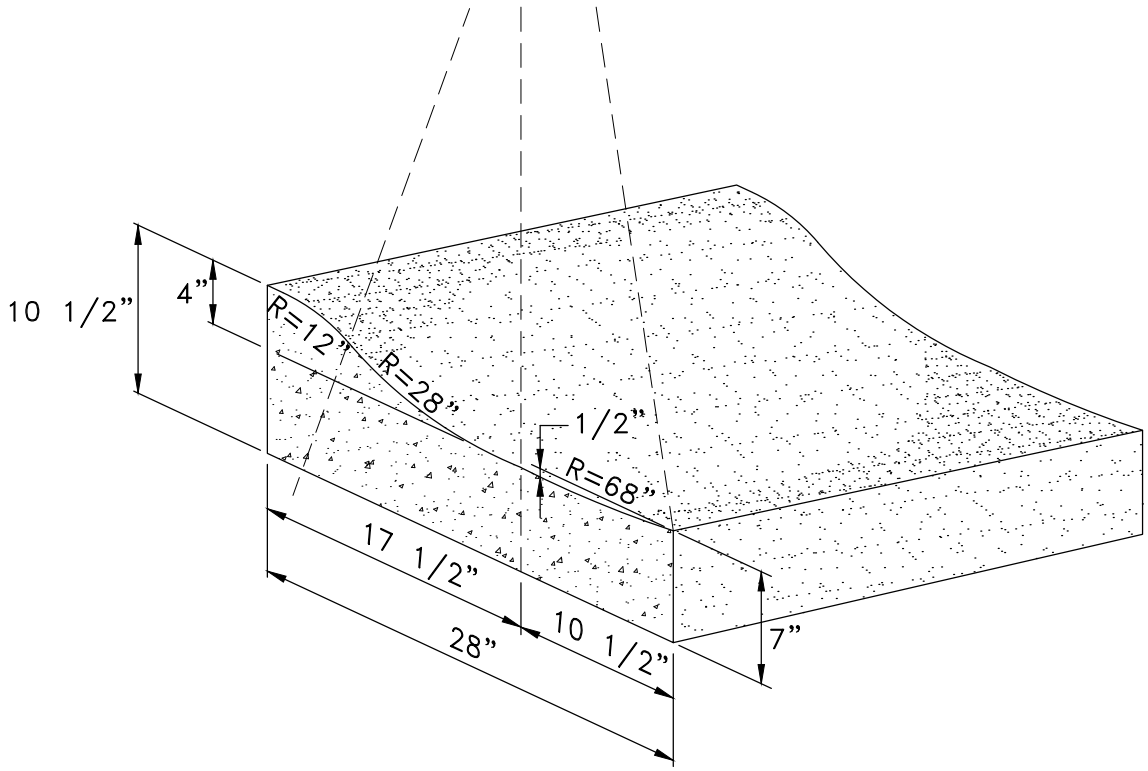
NOTES:

AREA SHOWN IN SQUARE YARDS IS FOR ONE CULVERT END. FOR PIPE ARCHES USE AREA OF EQUIVALENT DIAMETER PIPE.

AREAS AND DIMENSIONS ARE APPROXIMATE AND ARE BASED ON CULVERT SLOPES. BUT NO STEEPER THAN 2:1.

DETAILS ARE SHOWN FOR METAL APRON. THE SAME DIMENSIONS, EXCEPT DIMENSION "D", APPLY WHEN A CONCRETE APRON IS USED. DIMENSION "D" MAY VARY SLIGHTLY DUE TO DIFFERENT WIDTHS OF APRON FROM METAL AND CONCRETE. DIMENSION "D" SHOWN FOR 90" DIA. APRON IS FOR CONCRETE APRON.

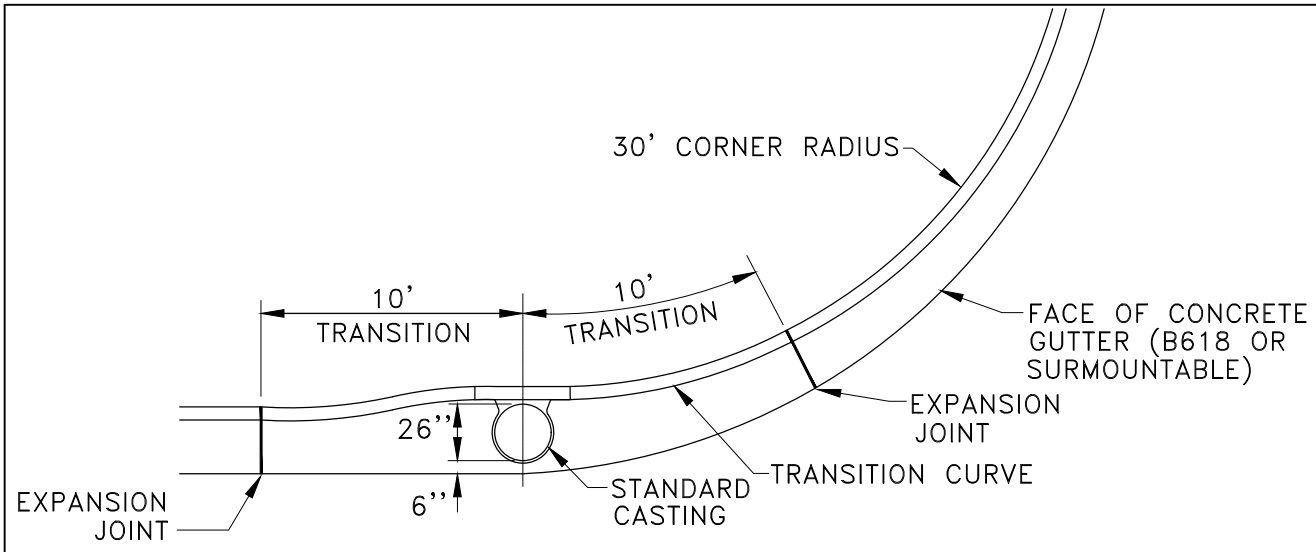
① ADDITIONAL QUANTITIES MAY BE SHOWN IN THE PLAN OR REQUIRED BY THE ENGINEER.



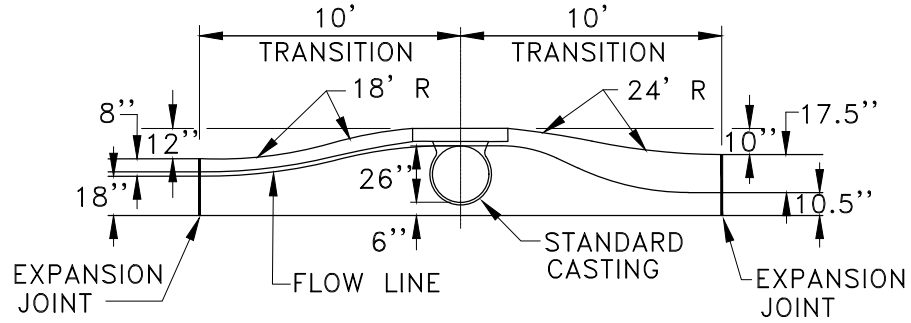
SURMOUNTABLE CURB AND GUTTER

NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. CURB 700



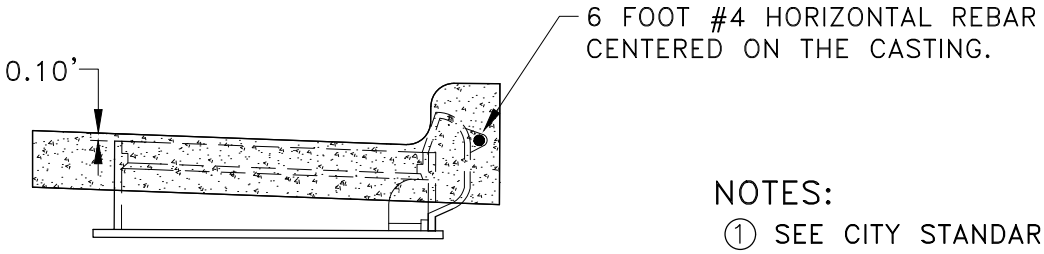
PLAN
(RADIUS CURB)



B618
CURB AND GUTTER

SURMOUNTABLE
CURB AND GUTTER

PLAN
(STRAIGHT CURB)



CURB REINFORCING
(DESIGN B CURB)

NOTES:

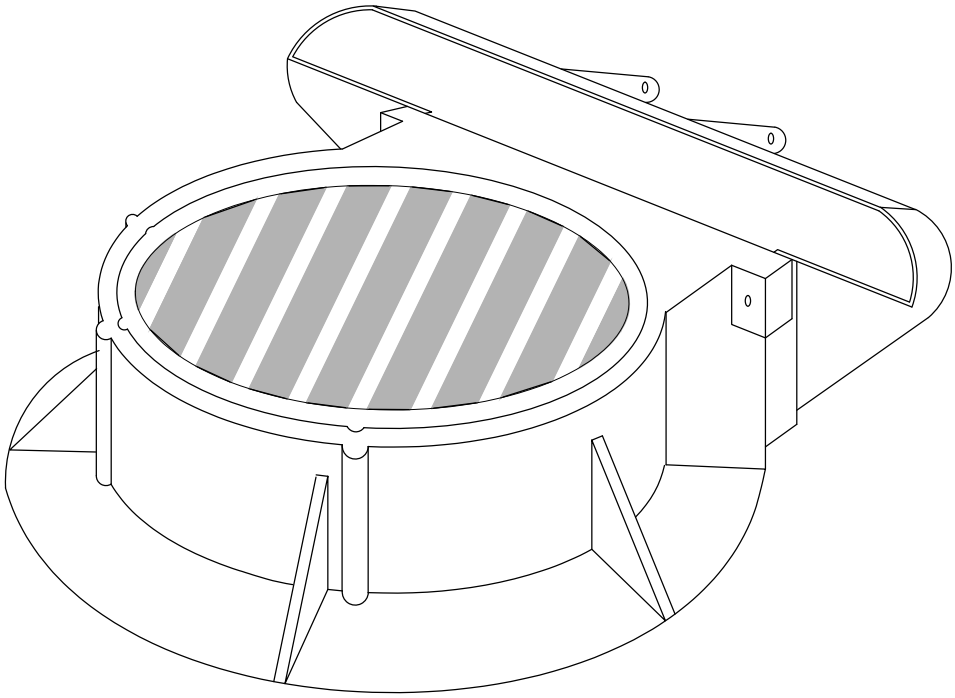
① SEE CITY STANDARD PLATE NO. 702 FOR INLET CASTING.

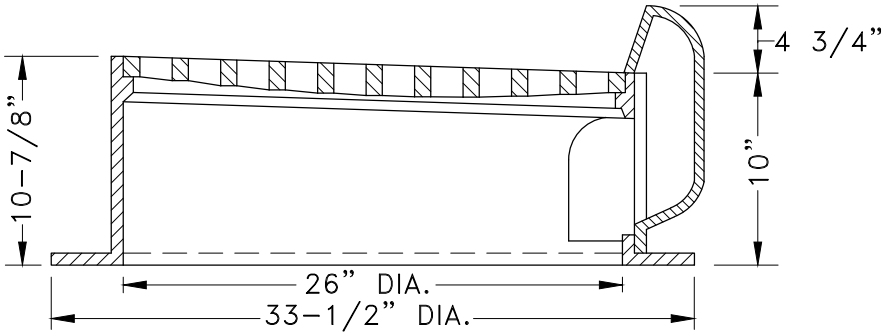
② PERIMETER GROUT NOT SHOWN. SEE CITY STANDARD PLATE NO. 407 AND 408.

CURB TRANSITION AT CATCH BASIN

NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. CURB 701



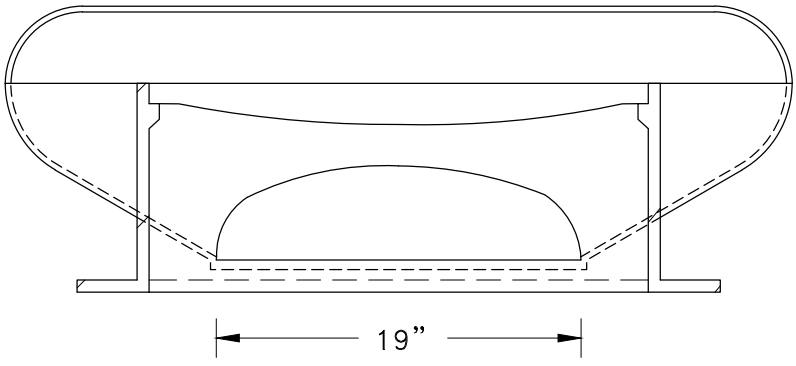


INLET ASSEMBLY

NEENAH FOUNDRY NO. R-3250-1K OR APPROVED EQUAL.

SEE CITY STANDARD PLATE 701 FOR CURB & GUTTER CONSTRUCTION AT CATCH BASIN.

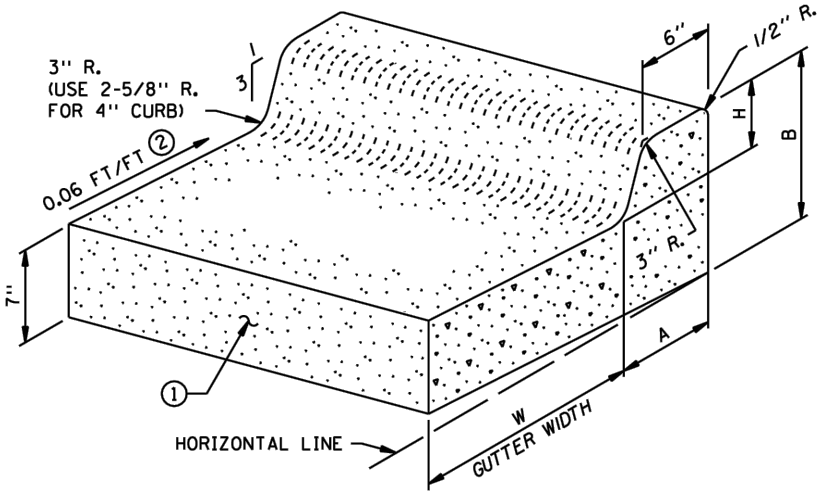
ESS BROTHERS CASTING 801M MODIFIED IS AN APPROVED EQUAL.



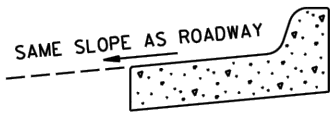
CURB TRANSITION AT CATCH BASIN

NO SCALE

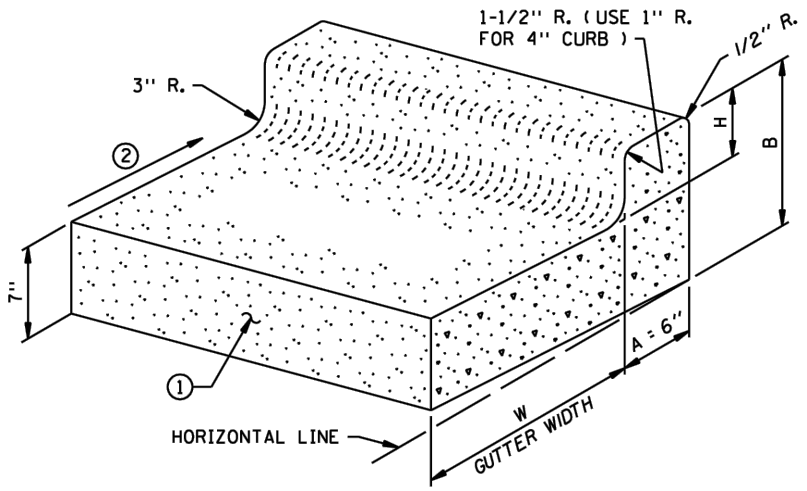
APPROVED – JDP 07/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. CURB 702



DESIGN B



REVERSE SLOPE GUTTER SECTION
(FORMS MAY BE TILTED)



DESIGN V

NOTES:

① LONGITUDINAL JOINT WHEN ADJACENT TO RIGID PAVEMENT OR BASE.

SEE STANDARD PLANS MANUAL FOR JOINT INFORMATION.

② SLOPE 0.06 FT/FT NORMAL, UNLESS OTHERWISE SPECIFIED. IF A DIFFERENT GUTTER SLOPE IS PERMITTED, THE FORM MAY BE TILTED.

DESIGN B			W = 12"			W = 18"			W = 24"			W = 30"			W = 36"		
DIMENSIONS			DESIGN NO.	CONCRETE		DESIGN NO.	CONCRETE		DESIGN NO.	CONCRETE		DESIGN NO.	CONCRETE		DESIGN NO.	CONCRETE	
H	A	B		CU. YDS. PER LIN. FT.	LIN. FT. PER CU. YD.		CU. YDS. PER LIN. FT.	LIN. FT. PER CU. YD.		CU. YDS. PER LIN. FT.	LIN. FT. PER CU. YD.		CU. YDS. PER LIN. FT.	LIN. FT. PER CU. YD.		CU. YDS. PER LIN. FT.	LIN. FT. PER CU. YD.
4	7-3/8"	11-1/2"	B412	0.0421	23.8	B418	0.0529	18.9	B424	0.0637	15.7	B430	0.0745	13.4	B436	0.0853	11.7
6	8"	13-1/2"	B612	0.0474	21.1	B618	0.0582	17.2	B624	0.0690	14.5	B630	0.0798	12.5	B636	0.0906	11.0
8	8-5/8"	15-1/2"	B812	0.0529	18.9	B818	0.0637	15.7	B824	0.0745	13.4	B830	0.0853	11.7	B836	0.0962	10.4
9	9"	16-5/8"	B912	0.0559	17.9	B918	0.0667	15.0	B924	0.0775	12.9	B930	0.0883	11.3	B936	0.0991	10.1
10	9-3/8"	17-5/8"	B1012	0.0589	17.0	B1018	0.0697	14.4	B1024	0.0805	12.4	B1030	0.0913	11.0	B1036	0.1021	9.8

DESIGN V			W = 12"			W = 18"			W = 24"			W = 30"			W = 36"		
DIMENSIONS			DESIGN NO.	CONCRETE		DESIGN NO.	CONCRETE		DESIGN NO.	CONCRETE		DESIGN NO.	CONCRETE		DESIGN NO.	CONCRETE	
H	A	B		CU. YDS. PER LIN. FT.	LIN. FT. PER CU. YD.		CU. YDS. PER LIN. FT.	LIN. FT. PER CU. YD.		CU. YDS. PER LIN. FT.	LIN. FT. PER CU. YD.		CU. YDS. PER LIN. FT.	LIN. FT. PER CU. YD.		CU. YDS. PER LIN. FT.	LIN. FT. PER CU. YD.
4	6"	11-3/8"	V412	0.0396	25.3	V418	0.0504	19.9	V424	0.0612	16.4	V430	0.0720	13.9	V436	0.0828	12.1
6	6"	13-3/8"	V612	0.0426	23.5	V618	0.0534	18.7	V624	0.0642	15.6	V630	0.0750	13.4	V636	0.0858	11.7
8	6"	15-3/8"	V812	0.0457	21.9	V818	0.0565	17.7	V824	0.0673	14.9	V830	0.0781	12.8	V836	0.0889	11.3
9	6"	16-3/8"	V912	0.0472	21.2	V918	0.0580	17.2	V924	0.0688	14.5	V930	0.0796	12.6	V936	0.0904	11.1
10	6"	17-3/8"	V1012	0.0487	20.5	V1018	0.0595	16.8	V1024	0.0703	14.2	V1030	0.0811	12.4	V1036	0.0919	10.9

APPROVED MARCH 11, 1994

R H. Cardpd

ACTING STATE DESIGN ENGINEER

STATE OF MINNESOTA
DEPARTMENT OF TRANSPORTATION

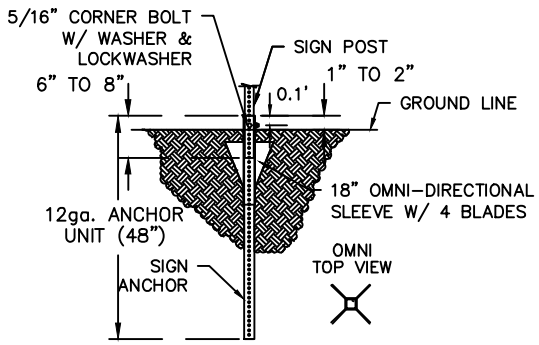
CONCRETE CURB AND GUTTER

DESIGN B AND DESIGN V

SPECIFICATION REFERENCE
2531

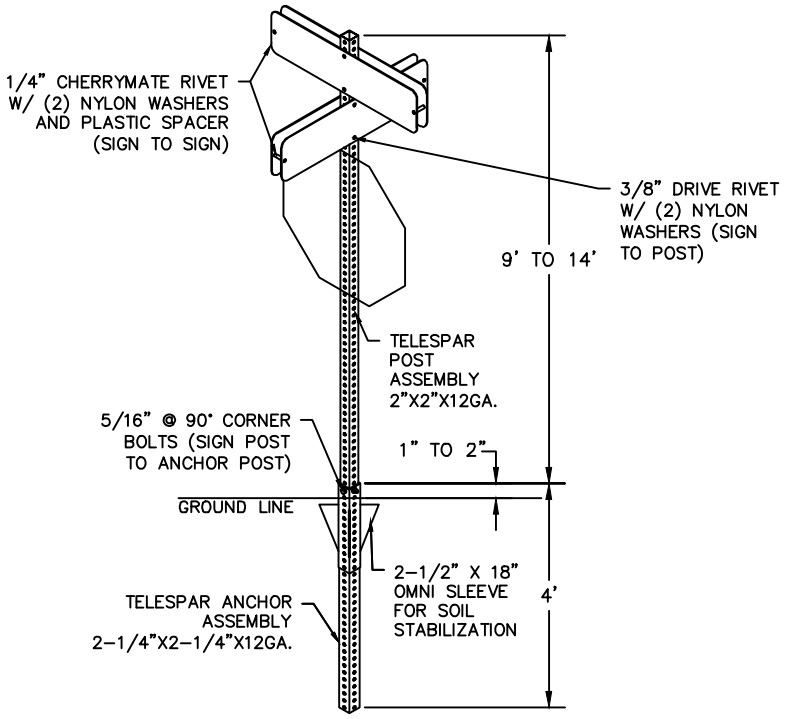
REVISION DATE
2-28-05

STANDARD PLATE NO.
7100H



TELESPAR ANCHOR DETAIL

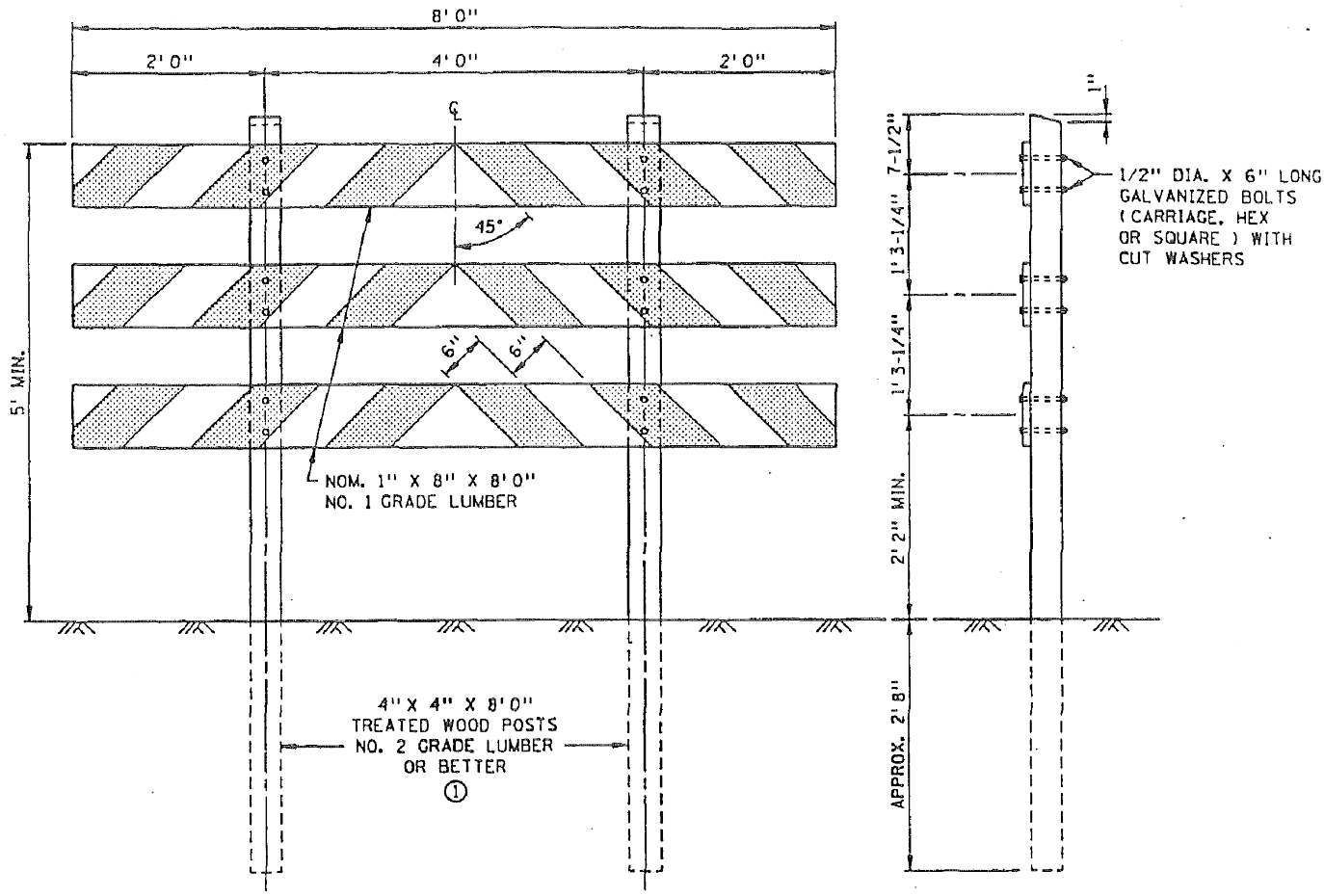
NOT TO SCALE



STREET SIGN INSTALLATION

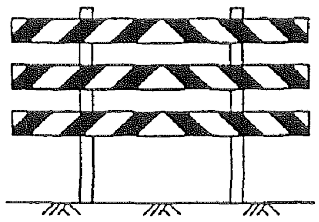
NO SCALE

APPROVED – JDP 08/2009 REVISED 01/2024	**STANFORD TOWNSHIP**	STANDARD PLATE NO. TRAF 800

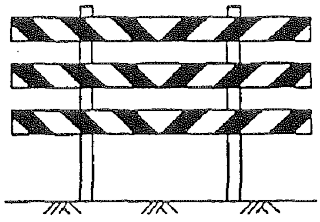


ELEVATION
(TURNS PERMITTED SHOWN)

END VIEW



TOTALLY CLOSED ROADWAY
TURNS PERMITTED



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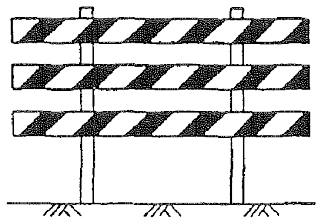
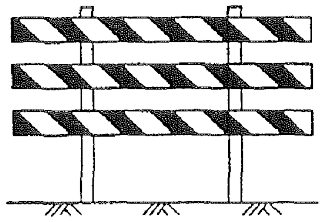
NO TURNS PERMITTED



TOTALLY CLOSED ROADWAY
LEFT TURN ONLY



TOTALLY CLOSED ROADWAY
RIGHT TURN ONLY

NOTES:

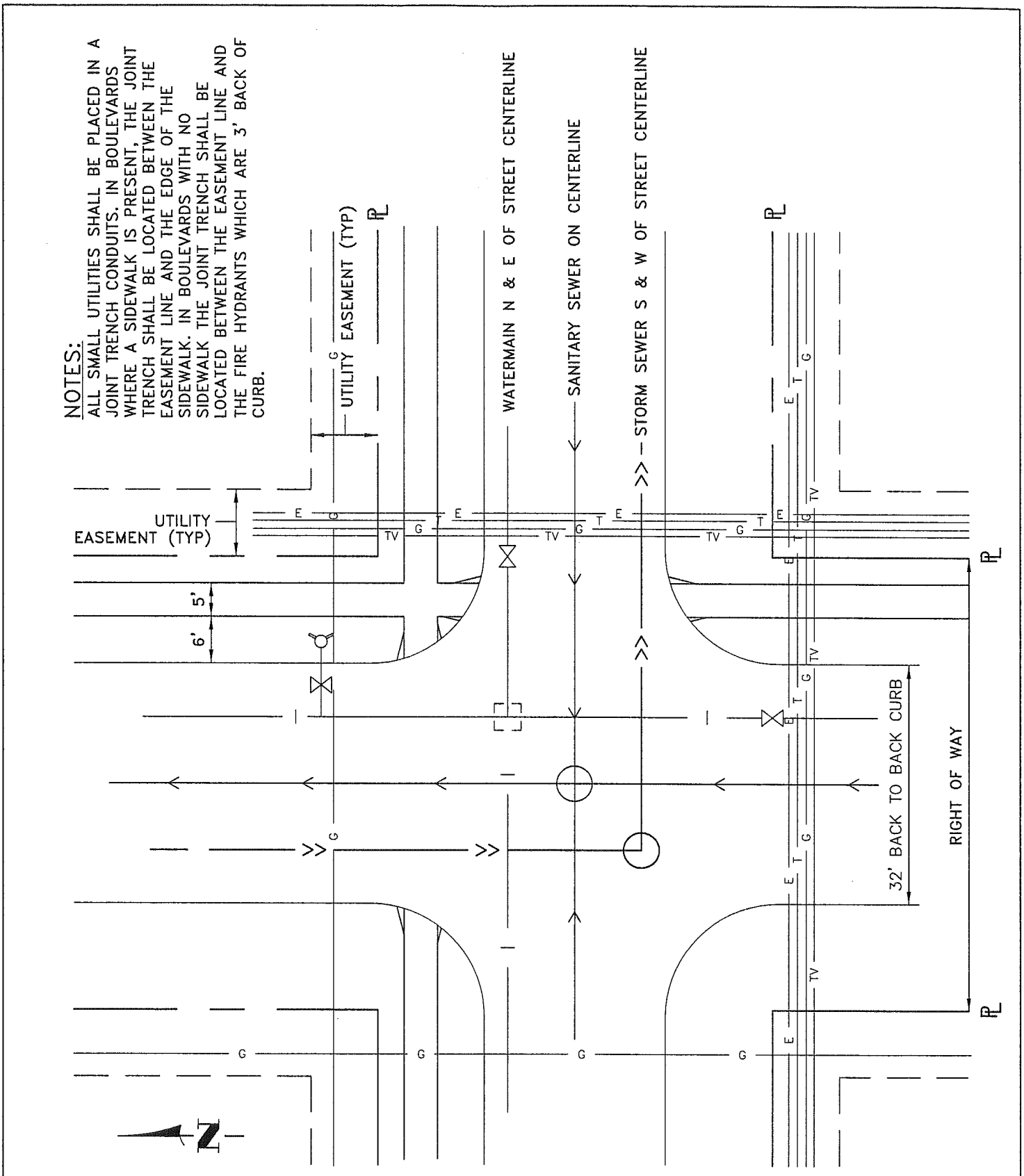
THE BARRICADE BOARD FACE SURFACES SHALL BE FULLY REFLECTORIZED IN ALTERNATE SILVER-WHITE AND RED STRIPING, USING REFLECTIVE SHEETING CONFORMING TO THE REQUIREMENTS OF SPEC. 3352.2A2b, STANDARD NO. 2.

PRIOR TO INSTALLING THE REFLECTIVE SHEETING, THE BARRICADE BOARDS SHALL BE GIVEN A COMPLETE COATING OF WHITE WOOD PRIMER PAINT FOLLOWED BY A SECOND COAT OF WHITE EXTERIOR PAINT APPLIED ONLY TO THE SURFACES NOT COVERED WITH REFLECTIVE SHEETING.

THE BARRICADE BOARDS SHALL BE COMPLETELY PAINTED AND REFLECTORIZED SHEETING APPLIED BEFORE BEING INSTALLED ON THE POSTS.

① ALTERNATE MATERIALS FOR POSTS MAY BE USED WHEN APPROVED BY THE OFFICE OF TRAFFIC ENGINEERING.

APPROVED AUGUST 8, 1995 Gerald J. Rodrick STATE DESIGN ENGINEER	STATE OF MINNESOTA DEPARTMENT OF TRANSPORTATION PERMANENT BARRICADE	SPECIFICATION REFERENCE 2554	STANDARD PLATE NO. 8002G



LOCATIONS OF PUBLIC UTILITIES

NO SCALE

APPROVED – JDP 08/2009 REVISED	**STANFORD TOWNSHIP**	STANDARD PLATE NO. MISC 900

APPENDIX B
Stormwater Requirements

TOWNSHIP OF STANFORD
POLICY ON STORMWATER DRAINAGE REQUIREMENTS

APPENDIX B: STORMWATER DRAINAGE REQUIREMENTS

Storm drainage design shall conform to Federal, State and Isanti County ordinances, codes, regulations and requirements, the requirements of Stanford Township Policy on Storm Water Drainage requirements and the Local Watershed Management Organization. In addition, the Isanti County Local Water Management Plan and Comprehensive Plan are to be utilized on projects in Stanford Township. Documents are available on the Isanti County Website: www.co.isanti.mn.us

The Township has an agreement with the Township Engineer and Isanti County to provide development reviews and site inspection services.

POLICY ON STORMWATER DRAINAGE
REQUIREMENTS

STANFORD TOWNSHIP

1.0 Purpose and Intent

This policy is intended to provide Developer's Engineers with a standardized format for submittal of drainage plans and calculations to the Town for review. A standardized format will provide the following:

- Reduce preparation time for submittals by providing direct guidelines for Developer's Engineers to follow

- Reduce review time required by the Town's Engineer by insuring a complete and comprehensive drainage plan and calculations are submitted

- Ensure that the Town will receive the best possible protection of its resources, which could be adversely affected by inadequate stormwater management planning

2.0 Incorporation by Reference

Protecting Water Quality in Urban Areas (Best Management Practices for Minnesota) prepared by the Minnesota Pollution Control Agency, Division of Water Quality, latest edition, shall be incorporated by reference into this policy.

Recommendations set forth in the above referenced manual shall be implemented by the Developer's Engineer. All recommendations set forth within the above referenced manual shall be termed "required" when applicable unless otherwise amended by this policy.

3.0 State and Federal Requirements

State and Federal Ordinances, Codes, Regulations, and Requirements shall be adhered to by the Developer.

4.0 Calculations and Considerations

A. General Hydrology

Hydrologic analysis of storm water runoff for the planning and design of flows in storm sewers, ditches, streams, and channels to lakes, detention basins, and wetlands shall be made using generally accepted hydrograph methods.

Determination of total runoff volume should follow the USDA-SCS curve number method which incorporates land use and hydrologic soil groups.

Specific step-by-step process can be found in the Soil Conservation Service (SCS) publication National Engineering Handbook: Chapter 4, SCS Hydrology (1972), and Hydrology Guide for Minnesota (1992). Peak runoff rates should be determined through the use of the SCS method incorporating "time of concentration" for both pre and post development conditions.

Then the storm water should be routed through the drainage area, that is, mathematically the peaks and volumes are followed as they move in a wave progressively downstream.

"Design Storms" or storm volumes for hydrologic analyses shall be based upon Hershfield, D.M., 1961, Rainfall Frequency Atlas of the United States for Durations of 30 minutes to 24 hours and Return Periods from 1 to 100 years, Technical Publication Number 40 (TP-40) along with the supplementary documents entitled: Oberts, G. L., 1984, Surface Water Management: Precipitation Frequency Analysis for the Twin Cities Metropolitan Area, Metropolitan Council, Publication Number 10-84-007 and Fredrick, R.H., 1977, Five-to-Six-Minute Precipitation Frequency for the Eastern united States, NOAA Technical Memorandum NWS HYDRO-35, Office of Hydrology, Silver Spring, Maryland.

The rational method may be used to determine peak runoff rates for primary systems. Construction of a hydrograph should be undertaken which characterizes the movement of surface water as a function of time and precipitation. Rainfall intensity shall be determined by using the current ATLAS 14 IDF curves.

The minimum time of concentration shall be 10 minutes for drainage areas with tributary areas, 7 minutes without tributary areas. When a portion of the drainage area is highly impervious, the drainage area shall be evaluated both with and without tributary area to verify that just the highly impervious area does not result in greater peak discharge than the area evaluated as a whole.

B. Rainfall

Usually the standard 24-hour SCS rainfall distribution will be used to calculate the peak discharge rates and levels. The following rainfall values shall be used in calculations for Stanford Township:

Event	Rainfall (inches)
1-year, 24 hour	2.47
2-year, 24 hour	2.84
10-year, 24 hour	4.21
25-year, 24 hour	5.22
50-year, 24 hour	6.07
100-year, 24 hour	6.99

C. Curve Numbers

Table 1 lists the minimum allowable Curve Numbers (CN) which shall be used for design. Hydrologic soil groups shall be determined based upon the Soil Survey for Isanti County, Minnesota as published by the United States Department of Agriculture Soil Conservation Service in Cooperation with Minnesota Agricultural Experiment Station.

D. Flood Protection

Consistent with state and federal regulations, Stanford Township requires that the level of flood protection along all ditches, detention basins, lakes, streams, and wetlands be established based upon the 1 percent (100-year frequency) flood. Land use within floodplains shall be regulated in accordance with state floodplain zoning regulations.

The following freeboard values are required for Stanford Township:

- Landlocked Basins (no outlet) 3 feet (Established high water)
- Non-landlocked basins 1.5 feet (100-year frequency)

E. On-Site Detention Basins

It is the policy of Stanford Township to require developments to control storm water quantity and quality through a management approach of detention basins. Detention basins, whether on-site or regional in nature, shall be designed in accordance with the Mn/DOT Drainage Manual requirements and based off conditions in the most current Construction Stormwater Permit.

F. Storm Sewer

1. Storm sewer sizing shall use the Mn/DOT Drainage Manual with design based upon the 10-year storm event utilized. Inlet capacities and roadway spread at each inlet shall be determined. The maximum allowable roadway spread at any inlet shall be one-half of the traveled lane.

   Storm sewer inlets shall be spaced to insure that not more than ½ of the traveled lane is inundated during the 10-year storm event. Manning's equation shall be utilized to determine the flow in the street at each catchbasin for verification of actual spread. A manning's n of 0.016 shall be utilized for asphalt pavement. Additionally, grate inlet capacities shall be verified at the maximum allowable depth of flow to verify that the proposed grates will pass the 10-year flows. When appropriate, bypass flows shall be considered in calculations.

2. Storm sewer systems shall also meet the following requirements:

   a. Maintain a minimum velocity of 3 fps for 10-year storm event.

   b. Maintain a minimum cover of 2 feet from top of pipe to top of casting, conveyance flow elevation.

   c. Maintain a minimum of 3 feet of final cover over corrugated high-density polyethylene (HDPE) pipe. See engineering guidelines to determine when HDPE is allowed.

   d. Maintain a minimum of 1.5 feet of final cover over RCP in areas not used for vehicle traffic.

   e. Storm sewers inverts, which outlet to detention basins, shall be placed at the normal water elevation of the basin. Storm sewers may be submerged to a maximum of 1/2 the pipe diameter below the basin normal water elevation.

5.0 General Requirements - Grading, Drainage, and Erosion Control Plan

Grading, Drainage, and Erosion Control Plans shall be provided by the Developer in accordance with this manual. Several items critical to the review of the drainage system must be adequately depicted on the plan by the Developer's Engineer. The following key elements must be depicted on the plan:

A. Existing and proposed contours at a minimum of 2-foot intervals. A 1-foot contour interval or proposed spot elevations shall be used where conditions dictate. The determination of contour interval shall be made based upon clarity and readability of the plans.

B. Basin locations as depicted by the proposed contours. Normal level and 2-year, 10-year, and 100-year flood water levels shall be depicted on the plan for each basin. Detention basins are required at each ditch and storm sewer outfall point from the proposed plat. Perimeter berm elevation and width shall be clearly labeled on plan sheets.

   Permanent detention basins may be utilized as construction detention basins, provided they are cleaned after permanent erosion control measures are established. Design features of the detention ponds shall be as described in the BMP Manual.

C. Locations of silt fence, bale checks, erosion control blanket, rock construction entrances, storm drain inlet protection, outlet projection, rip rap, temporary seeding, permanent seeding, sod, mulch, or other erosion control features proposed to be implemented for the project.

D. Storm sewer facilities, when utilized, shall be adequately depicted on the drawings. As a minimum, the following must be shown on the plan:

1. Storm sewer pipe length, grade, type of material, and size between each catch basin and manhole.

2. Catchbasin and manhole structural data including size or diameter, and depth. A typical section depicting each different type of catchbasin, or manhole used shall be shown on the drawing. Type of casting utilized shall be referenced for each catchbasin or manhole. Elevations for the top of inlet and each invert shall be referenced on the drawing.

3. A typical curb section for urban design streets shall be shown on the drawing.

4. If ditch sections are used, a typical section shall be shown on the drawing depicting the bottom width and side slopes of the ditch.

5. Details of skimming structures utilized.

E. Individual lot grading shall insure positive drainage. Lot grading shall clearly depict a minimum design slope of 2%. Slopes of 1% to 2% may be allowed on a case-by-case basis with approval from the Town Engineer. Under no circumstances will slopes less than 1% be allowed.

6.0 Storm Drainage System Submittal Requirements

A. The stormwater drainage report shall be comprised of the following sections to provide the Town Engineer with adequate base information for which to review the report. The following data must be included in the report:

1. Title Page. The title page shall list the project name, project location, date prepared, and preparer's name, title, and company.

2. Signature Page. The report shall be signed by a licensed professional engineer.

3. Table of Contents. The table of contents must provide a description of the major categories of the report and list each hydrograph and reservoir report presented in the report.

4. Stormwater Summary. The summary must provide descriptions of items critical to the review of the entire report. Assumptions and results of the calculations shall be included in the summary. As a minimum, the following items must be discussed in the summary:

a. Pre–development site conditions (Existing)
    i. Total site area
    ii. Delineation of sub-drainage areas, as appropriate.
    iii. For each drainage area, or sub–drainage area, provide the following information:
        1. Area in acres
        2. Curve number (with justification)
        3. Time of Concentration (with justification)
        4. Runoff rate and runoff volume

b. Post Development Site Conditions (Proposed)
    i. Total site area
    ii. Delineation of sub-drainage areas, as appropriate.
    iii. For each drainage area, or sub–drainage area, provide the following information:
        1. Area in acres
        2. Curve number (with justification)
        3. Time of Concentration (with justification)
        4. Runoff rate and runoff volume

c. Comparison of pre-development to post-development runoff rates and volumes.

d. Discussion of temporary and permanent erosion control measures utilized.

e. A discussion of the storm sewer system, if applicable, to include a summary of flows to each catchbasin and the depth of water over each catchbasin during the ten-year event.

5. Drainage maps depicting pre-development and post-development conditions. The maps may be 22" x 34" plans but shall also be provided on 11" x 17" reductions. The plans shall delineate drainage area and sub-drainage area boundaries. All areas shall be labeled and referenced to those presented in the report.

6. Easement areas shall encompass the 100-year water surface elevation for all retention and detention areas.

7. Computer printouts of all hydrograph and reservoir files shall be included at the back of the report for reference.

7.0 Glossary

Critical Storm

Critical Storm means that rainfall event whose distribution and duration results in a runoff volume and rate establishing the appropriate level of protection.

Freeboard

Is the vertical difference between the lowest floor of proposed buildings and the critical 100-year storm event elevation or established high water level.

Level of Protection

The amount of secondary storm water runoff capacity required to avoid flood damage and provide adequate public safety.

Level of Service

The amount of primary storm water runoff capacity required to avoid unusual hardship or significant interference with normal public activities (transportation, sanitary, or utilities).

Normal Level

For basins, that water elevation maintained by a natural or man-made outlet.

NURP

Nationwide Urban Runoff Program (USEPA, 1983).

100-Year Storms

Rainstorms of varying duration (e.g. 2-, 6-, 24- or 48-hour) and intensities expected to recur on average once every hundred years (1% frequency probability).

On-Site Detention

A method of temporarily storing storm water runoff at a development site in the form of wet basins.

Primary Capacity

The volume and/or rate of storm water runoff is defined as that level of service provided by the primary system.

Primary System

The primary system conveys runoff from the more frequent events such as the 2 to 10-year events. In general, the system is composed of swales, ditches, gutters, and storm sewers.

Secondary Capacity

The volume and/or rate of storm water runoff in excess of the primary capacity and defined as that level of protection provided by the secondary system.

Secondary System

The system is composed of all the pathways that runoff takes when the capacity of the primary system is exceeded and in general is composed of streets, swales, ditches, storm sewers, detention basins, creeks, streams, and rivers.

Storm Water Runoff

The flow on the surface of the ground, resulting from precipitation in the form of rainfall or snowmelt.

Table 1
Stanford Township Minimum Runoff Curve Numbers

Cover Description	Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	**A**	**B**	**C**	**D**
Fully developed urban areas (vegetation established)				
Open space (lawns, parks, golf courses, cemeteries, etc.				
Grass Cover > 75%	39	61	74	80
Grass Cover < 75%	49	65	77	82
Impervious areas:				
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)	98	98	98	98
Streets and roads:				
Paved; curbs and storm sewers (excluding right-of-way)	98	98	98	98
Paved; open ditches (including right-of-way)	83	89	92	93
Gravel (including right-of-way)	76	85	89	91
Dirt (including right-of-way)	72	82	87	89
Water Surface:	100	100	100	100
Urban Districts:				
Commercial and business	NA[1]	92	94	95
Industrial	NA[1]	88	91	93
Residential districts by average lot size:				
1/8 acre of less (town houses)	NA[1]	85	90	92
1/4 acre	NA[1]	75	83	87
1/3 acre	NA[1]	72	81	86
1/2 acre	NA[1]	70	80	85
1 acre	59	68	79	84
2 acres and greater	55	65	77	82
Developing Urban Areas				
Newly graded areas (pervious areas only, no vegetation)	77	86	91	94
Undeveloped areas				
Agricultural land (all current uses)	55	65	77	82
Pasture, grassland, or range – continuous forage for grazing	49	65	77	82
Meadow – continuous grass, protected from grazing and generally mowed for hay	30	58	71	78
Brush – brush-weed-grass mixture with brush the major element	35	56	70	77
Woods – grass combination (orchard or tree farm)	43	65	76	82
Woods	36	60	73	79

[1]Use of Type A soil is not allowed for this hydrologic condition.

APPENDIX C
Standard Specifications

TOWNSHIP OF STANFORD
STANDARD SPECIFICATIONS
FOR
STREET CONSTRUCTION
STANFORD TOWNSHIP, ISANTI COUNTY

Township Standards

INDEX

1.00 SUMMARY OF CONTENTS

1.01 Introduction

These Standard Specifications are provided to meet the following objectives of the Township for Street Construction.

A. Provide a written description of what is expected with regard to plan preparation and subsequent construction.

B. Provide uniform standards for street construction for all Developers.

C. Aid the Township in the review of Developers submittals.

D. Provide the Township with streets that are functional, safe and have a public value.

These Specifications are divided into several sections, each of which is utilized at different stages of a project. All sections must be referenced to ensure a smooth project line is obtained and also to ensure that a beneficial final product is received by the Township. The following paragraphs provide a summary of each individual section. The individual sections provide detailed requirements for use to complete improvements within Stanford Township, Isanti County, Minnesota.

1.02 General Requirements Section

This section gives a broad overview of the improvement requirements. All work shall conform to the latest edition of the Minnesota Department of Transportation (Mn/DOT) Standard Specifications for Highway Construction unless modified in supplemental specifications. This is to ensure that a uniform set of guidelines is followed during construction. Most Contractors are familiar with the Mn/DOT Specifications, and therefore, will know what is expected of them.

1.03 STRICTER PROVISIONS. To the extent any requirement contained herein is less strict than any other requirement which may apply by ordinance or otherwise, the stricter requirement shall apply. However, the Town Board may expressly agree to alter the requirements of these Specifications as part of a development agreement entered into between the Town and Developer if the Town Board determines such alteration is appropriate to respond to the circumstances of a particular situation or is otherwise in the public interest.

1.04 Submittal Procedures and Construction Plan Requirements Section

This section informs the Developer of the plan submittal requirements established by the Township. The requirements for the number of drawings, when to submit

the drawings and what should be shown on the drawings are outlined in this section.

1.05 Design Considerations Section

The design considerations section informs the Developers Engineer of the guidelines to follow in the design of the street and drainage systems. The majority of the items listed are safety related items. Items such as cul-de-sac length and right-of-way width are items with significant public safety implications requiring review and approval by the Town Engineer. This is to provide for the safe conveyance of motorists in the Township. The design standards listed also take into account maintenance items such as snow removal.

1.06 Description and Construction Requirements and Construction Materials Section

The Description and Construction Requirements and the Construction Materials Sections both reference the Mn/DOT Standard Specifications as previously mentioned. The Mn/DOT Specifications were written to cover construction of streets in a wide variety of locations. For instance, Turf Establishment can be accomplished in many different ways. These sections instruct specifically what seed mix is to be used, at what rate to apply it, and how much to fertilize it to obtain the best results in Stanford Township.

1.07 Construction Staking, Observation and Testing Requirements Section

This section is intended to specify the staking, observation, and testing requirements, which shall be followed during the construction phase to ensure that the final product meets the design requirements. This gives the Township a high degree of certainty that the final product is serviceable and of high quality. This allows Contractors to know 1) what is expected for construction staking; 2) when Township site reviews are required; and 3) what tests are expected of them and at what frequency testing is to occur.

1.08 Standard Construction Details Section

This section is intended to provide a graphical representation of the design requirements for various street sections. They are intended to be utilized together with the design standards section to provide a complete picture for the Developer. These sections are commonly copied onto the drawings to aid the Contractor in construction. A copy of these standard construction details is available electronically from the Township Engineer.

1.09 COSTS. All costs associated with complying with these Specifications, including all testing and inspections, shall be the responsibility of the developer or other person, entity, or group responsible for constructing the Street (collectively referred to herein as the “Developer”). The developers shall also be required to

fully reimburse the Town for all professional costs and expenses it may incur to oversee, inspect, or otherwise ensure compliance with these Specifications.

2.00 GENERAL REQUIREMENTS

2.01 All new roads or streets shall be dedicated to the public within a plat or roadways previously established, which the Town Board is being asked to open and maintain as a Town road, shall be constructed in accordance with all of the Standard Specifications for Street Construction or Improvement contained herein.

Roads used to access a plat will be improved in accordance with all of the standard specifications for street construction.

Roads outside of plats shall be subject to these specifications unless expressly made so by the terms of a development agreement or by other action of the Town Board.

2.02 All work shall conform to Minnesota Department of Transportation Standard Specification for Construction, 2020 Edition with all supplements except as modified herein.

2.03 All work shall be completed in a workman like manner in accordance with typical industry standards.

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

2.05 Minimum design standards shall meet:

A. All streets must be paved. All lots must front on a paved street to township standards.

B. An obstacle free zone shall be provided adjacent to Streets in accordance with the standards of the Minnesota Department of Transportation Road Design Manual.

C. All boulevards shall have at least 6 inches of topsoil (black dirt) placed on them and be seeded or sodded.

D. Streets shall be logically related to the topography so as to produce usable lots and reasonable grades. Arrangement of Streets in new plats shall make provisions for the appropriate continuation of the Streets into adjoining areas as reasonably needed to accommodate future development. Where these streets may continue into adjoining areas the following notice sign shall be installed by the Developer. “Notice this

street may be extended beyond this point in the future. Further information may be obtained by contacting the Township Clerk."

E. Access shall be given to all lots and outlots in the subdivision or plat, and to adjacent unsubdivided parcels, unless the topography clearly indicates that such connection is not feasible. Reserved strips and land-locked areas shall not be created.

2.06 PAVEMENT DESIGN. The Street shall be designed in accordance with Standard Details Appendix A with a minimum of 6" of aggregate base, Class 5, 100% crushed aggregate, 2 inches of bituminous non-wearing course, and 1-1/2 inches of bituminous wearing course, Some developments, especially commercial or industrial sections, may be subject to thicker pavement sections and/or wider street sections to facilitate special traffic conditions or to accommodate certain subgrade soil classifications.

2.07 CUL-DE-SACS. The Town Board may allow a cul-de-sac if the Street is platted solely to provide future access into adjoining parcels or where topography or other conditions justify their use. Dead end streets shall have a 60' radius cul-de-sac constructed on them with an 80' radius right-of-way. Cul-de-sac islands are not allowed.

2.08 SHOULDERING. Shouldering shall meet specifications for Class 2 Aggregate.

2.09 Definitions:

Owner: Owner shall mean the person(s), company, corporation, etc. that enter into a "Developers Agreement" with Stanford Township for the purpose of construction of public improvements on lands under the ownership and control of said persons(s), company, corporation, etc.

Engineer: Engineer shall mean the Owner's Licensed Professional Engineer.

Township Engineer: Township Engineer shall mean the Licensed Professional Engineer(s) under contract to the Township to serve in that capacity.

Approved Plans: Shall mean all Plans and Specifications and information required to be shown thereon per the Stanford Township Ordinances, along with these Standard Specifications.

3.00 SUBMITTAL PROCEDURES AND CONSTRUCTION PLAN REQUIREMENTS

3.01 The Owner shall submit a complete set of Grading, Drainage and Erosion Control Plans and Street Construction Drawings together with required supplementary information for improvements to be constructed within Stanford Township. The drawings shall be submitted with the subdivision Preliminary Plat for Township review. The drawings shall be revised, if required, after review by the Township

Engineer and Town Board and resubmitted. Four sets of construction drawings shall be submitted with both the Preliminary Plat and Final Plat. Preliminary Plats and Final Plats will not be approved until this requirement has been satisfied. The Construction Drawings shall be in compliance with the requirements and standards as set forth herein.

3.02 The Grading, Drainage and Erosion Control Plans and Preliminary Street Construction Drawings shall be complete and submitted with the Preliminary Plat. The drawings shall be on standard 22" x 34" sheets. The street and storm sewer information shall be drawn on plan and profile style sheets. Street cross sections will be required for the Final Plat submittal only and shall be drawn with vertical and horizontal grid lines. The following minimum information shall be depicted on the Grading, Drainage and Erosion Control Plans and Street Construction Drawings:

A. General

1. North arrow
2. Scale with bar-graph
3. Date of preparation
4. Proposed name of the subdivision in which the street is to be constructed.
5. Proposed name of all streets.
6. Name of the plan preparer, Engineer, Surveyor, and Owner.
7. Seal or signature of the preparer, Licensed Engineer, and Surveyor.
8. The Grading, Drainage and Erosion Control Plan shall be drawn at a maximum scale of 1” = 50’. The plan shall include the entire boundary of the plat.
9. Street and storm sewer plan and profiles shall be drawn at a maximum scale of 1" = 50' horizontal and 1" = 5' vertical.
10. Street cross sections shall be drawn at a scale of 1" = 10' horizontal and 1" = 5' vertical.
11. Benchmark(s) based on USGS datum within the proposed subdivision boundary.

B. Existing conditions

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

2. When any existing street provides access to a proposed subdivision street, all existing access points to that street shall be shown for a distance of 500 feet on either side of the proposed

intersection. The existing accesses shall be labeled as to width, type, and condition.

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

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

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

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

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

C. Proposed Conditions

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

   a. Bearings and distances of all tangent sections,

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

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

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

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

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

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

6. The Grading, Drainage and Erosion Control Plan shall show the proposed contours at two-foot intervals. The Township Engineer may require one-foot intervals where conditions require more grade information. The plan shall also show all proposed temporary and permanent erosion control features.

D. Supplemental Information

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

2. A site-specific Stormwater Management Plan shall be prepared by a properly trained (Mn/DOT, U of M) Certified Stormwater Management Plan preparer or a Licensed Professional Engineer and submitted to the Township Engineer with the street construction drawings. Drainage calculations shall be performed in accordance with the design considerations section of this standard. The report shall include the minimum items:

   a. **Title Page.** The title page shall list the project name, project location, date prepared, and preparer's name, title, and company.

b. **Table of Contents.** The table of contents must provide a description of the major categories of the report and also list each hydrograph and reservoir report presented in the report.

c. **Summary.** The summary must provide descriptions of items critical to the review of the entire report. Assumptions and results of the calculations shall be included in the summary:

- Pre-Development Site Conditions (Existing)
  - Total site area
  - Delineation of sub-drainage areas, as appropriate
  - For each drainage area, or sub-drainage area, provide the following information:
    1. Area in acres
    2. Curve number (with justification)
    3. Time of Concentration (with justification)
    4. Runoff rate and runoff volume

- Post-Development Site Conditions (Proposed)
  - Total site area
  - Delineation of sub-drainage areas, as appropriate
  - For each drainage area, or sub-drainage area, provide the following information:
    1. Area in acres
    2. Curve number (with justification)
    3. Time of Concentration (with justification)
    4. Runoff rate and runoff volume

- Comparison of pre-development to post-development runoff rates and volumes when rate control is required.

- Discussion of temporary and permanent erosion control measures utilized.

- A discussion of the storm sewer system, if applicable, to include a summary of flows to each catchbasin and the depth of water over each catchbasin during the ten-year event.

d. **Drainage maps:** Drainage maps depicting pre-development and post-development conditions. The maps may be 22” x 34” plans but shall also be provided on 11” x 17” reductions. The plans shall delineate drainage area and sub-drainage area boundaries. All areas shall be labeled and referenced to those presented in the report.

e. **Computer Printouts:** Drainage maps of all hydrograph and reservoir files shall be included at the back of the report for reference.

4.00 DESIGN CONSIDERATIONS

4.01 Storm Water: The methodology presented in the National Engineering Handbook Section 4 (1972), prepared by the USDA, is the hydrologic practice to be used for determining storm water drainage and ponding within the Township. Both Pre and Post runoff conditions are to be evaluated and ponding provided for 2 year and 100-year event storm water runoff difference. The post rate of runoff shall not exceed the pre-rate of runoff. The difference must be ponded for the 2-year and 100-year storm event.

The Mn/DOT Drainage Manual and Standards SCS 24-hour rainfall shall be used to design culvert capacity under roadways and driveways for the 50-year storm water event without overtopping of the roadway.

The construction of Nationwide Urban Runoff Program (NURP) ponds is required to treat the concentrated storm water runoff from hard surfaces such as but not limited to roadway and parking lots where pollutants can conceivably be deposited. The pond volume required below the outlet elevation (dead storage) shall be equal to or greater than the volume of runoff produced by a 2.5-inch rainfall event. The runoff volume shall consider the entire area contributing to the pond, however, the minimum permanent pool volume must be greater than or equal to the volume produced from 0.5 inches of runoff from all impervious areas in the contributing watershed.

The Best Management Practice Manual and the Township's Standard Specifications shall be used as a guide for the design and construction of these ponding devices for removal of sediments and surface pollutants.

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

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

RURAL DESIGN

CLASSIFICATION	R/W WIDTH	ROAD TOP WIDTH	STREET SURFACE EDGE TO EDGE
Local	66'	32'	24'
Cul-de-sac turnaround	80' radius	63' radius	

URBAN DESIGN

CLASSIFICATION	R/W WIDTH	PAVED STREET WITH CURB BACK TO BACK
Commercial/Industrial	80'	46'
Local	60'	32'
Cul-de-sac turnaround	80' radius	62' radius

4.04 Streets shall intersect at right angles or within ten degrees. Intersections having more than four corners shall be prohibited. Adequate right-of-way for future intersections and streets shall be dedicated with the Final Plat. A 2% maximum grade shall extend 100 feet from all intersections or as deemed necessary by the Engineer.

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

4.06 Street design speed shall be based upon the functional classification of the street. Horizontal and vertical alignment shall be designed to accommodate a minimum 55 mile per hour design speed for collector streets unless otherwise approved by the Commissioner of Transportation, and a 35 mile per hour design speed on all other streets. The minimum curve radius, without super elevation, shall be 450 feet for local streets at 35 miles per hour. Where the required radius cannot be met, a maximum superelevation of 2.5% will be allowed.

4.07 Centerline gradients of urban street sections shall have a minimum vertical gradient of 0.6 percent and a maximum gradient of 6.0 percent. Rural street sections may have a minimum vertical gradient of 0.5 percent and a maximum gradient of 6.0 percent. Rural street section ditch inverts shall have a minimum vertical gradient of 1.0%.

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

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

4.10 Residential street intersections shall be rounded by a radius of not less than 30 feet. Corners of entrances to the turnaround portions of cul-de-sacs shall be rounded by a radius of not less than 60 feet. The corner radius to arterial and collector streets shall not be less than 40 feet.

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

4.12 The maximum allowable cul-de-sac length shall be reviewed by the Township Engineer. The length of the cul-de-sac shall be measured along the centerline from the nearest intersection to the center point of the cul-de-sac. Cul-de-sac streets shall only be allowed where one or more of the following criteria have been met:

A. Area topography or other physical site conditions warrant a cul-de-sac, dead-end design.

B. A through street is not physically feasible.

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

Cul-de-sacs shall be formed with a 2% cross slope or a 2% continual slope from the center point of the cul-de-sac. Concrete curb & gutter will be required on urban sections only, a minimum of a 0.75% flow line grade around the perimeter of the cul-de-sac shall be maintained.

4.13 Utilities shall be located within easements. Disturbed areas shall be restored upon completion of utility construction.

5.00 DESCRIPTION AND CONSTRUCTION REQUIREMENTS

5.01 Clearing and Grubbing:

All work related to this item shall be performed in accordance with the Minnesota Department of Transportation Standard Specifications for Construction, Section

2101 as modified herein. All trees, shrubs, brush, stumps, roots, windfalls, and other plant life, including dead and decayed matter, that exist within the entire street right-of-way width shall be removed from site and disposed of in accordance with Isanti County regulations. Items listed above which are specifically designated to remain as shown on the approved Plans shall be preserved.

At a minimum all clearing and grubbing operations shall extend into the back slope of the ditch cross section or to the right-of-way line.

5.02 Subgrade Preparation:

All work related to subgrade preparation shall conform to the Minnesota Department of Transportation Standard Specifications for Construction, Section 2112 as modified herein. Subgrade preparation shall consist of preparation of the street subgrade after installation of all underground work and prior to placing the design section as depicted in the appendix of this Specification. The required density in the top three feet of the subgrade shall be a minimum 100% of standard proctor density. Cohesive soils shall be compacted in lifts not exceeding 3" loose thickness and at a moisture content of $\pm$ 10% of optimum moisture content.

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

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

Aggregate shall be placed to the dimensions as shown on the construction details in the appendix of this Specification. In-place density shall be a minimum of 100% standard proctor density.

5.04 Bituminous Placement: Bituminous materials shall be furnished and installed in accordance with the Minnesota Department of Transportation Standard Specifications for Construction Section 2360 as modified herein.

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

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

The Control Strip Method of compaction may be used as an alternate to the Specified Density Method with permission of the Township Engineer; however, cores are still required.

5.05 Pipe Culverts and Pipe Sewer: All pipe culverts and pipe sewers shall be furnished and installed in accordance with the provisions of the Minnesota Department of Transportation Standard Specifications, Section 2501and Section 2503. Pipe culverts shall be a minimum of 18” in diameter and pipe sewers shall be a minimum of 15" in diameter and sized based upon a Licensed Engineer's recommendation. All pipe culverts and pipe sewers, except driveway culverts, located within the right-of-way shall be reinforced concrete pipe. Driveway culverts must be corrugated steel or approved by Township Engineer.

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

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

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

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

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

5.10 Turf Establishment: All disturbed areas not surfaced shall be topsoiled, seeded, mulched, disc anchored and fertilized in accordance with the Minnesota Department of Transportation Standard Specifications for Construction, Section 2105 and Section 2575. These areas include but are not limited to in-slopes,

ditches, backslopes, boulevards, temporary construction easements, disturbed lot areas, and permanent construction easements. Topsoil shall be placed to a minimum of four inches and maximum of eight inches in-place compacted depth. All areas shall be graded to drain per the approved Plans.

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

5.12 Sediment dirt and dust shall be controlled by the Developer by means or methods to contain within the project limits. Watering or other approved means to minimize nuisance for existing residents.

6.00 CONSTRUCTION MATERIALS

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

6.02 Aggregate Base and Surface: Aggregate base and surface courses shall be Class I or Class V in accordance with Section 3138 of the Minnesota Department of Transportation Standard Specifications for Construction.

A. Class I aggregate surfacing shall be modified to 12-20% passing #200 sieve.
B. Class V aggregate base shall be modified to 5-10% passing #200 sieve.
C. Class V aggregate surfacing shall be modified to 7% to 12% passing #200 sieve.
D. Street shouldering material shall be Class 2, 100% Virgin Aggregate, meeting Mn/DOT Specification 3138, where street grades do not exceed 4%.

6.03 Bituminous Mixture: Materials required under this section shall be in accordance with the Minnesota Department of Transportation Standard Specifications for Construction Section 2360.

Bituminous mixture for base course shall be Low Volume (LV), Non-Wear, with aggregate size 3 (¾" maximum size) and specified asphalt binder grade 58-34. Bituminous mixture for wearing courses and surfacing shall be (Low Volume), Wear with aggregate size 4 (½" maximum size) and a specified asphalt binder grade 58-34. Bituminous mixture containing recycled mixture may be utilized for Non-Wearing courses only. Asphalt binder grade shall be adjusted per Specification 2360 for recycled mix.

A tack coat shall be applied between pavement courses and to contact surfaces between pavement and abutting concrete or bituminous edges. Bituminous

material for tack coat shall be CSS-1 (emulsified asphalt) or approved equal applied at a minimum rate of 0.05 gallons per square yard.

6.04 Pipe Culverts and Pipe Sewers:

A. Corrugated steel pipe shall conform to Minnesota Department of Transportation Standard Specification for Construction, Section 3226 and to Minnesota Department of Transportation standard plate 3040. Pipe shall be 2–2/3" x ½" corrugation, minimum 16 gauge. Bands shall be 10½" minimum width, same thickness and coating as the pipe.

B. Reinforced concrete pipe shall be in accordance with Section 3236 and of the size and class on the approved construction drawing. Reinforced concrete aprons shall conform to Section 3236 and be utilized for all "daylight" situations. Pipe joint sealer materials shall be preformed rubber, Type A, in accordance with Section 3726. Connections shall be made with bell and spigot joints. Clamp-on-bands shall not be allowed. Pipe couplers shall be subject to rejection upon failure to conform to any requirements of this specification.

6.05 Manholes and Catchbasins: Manholes and catchbasins shall conform to Minnesota Department of Transportation Standard Specifications for Construction Section 2506.

A. Catch basin structures shall be 27" Reinforced Concrete unless otherwise approved by the Town Engineer.

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

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

D. Off-street catchbasin manhole and catchbasin inlets shall be per standard plate 409 and 410.

6.06 Stormwater outlet construction structures shall be precast concrete structures with reverse grade pipes.

6.07 Concrete Mats and Geotextile Fabric: Concrete Mat and geotextile fabric shall conform to the Minnesota Department of Transportation Standard Specifications for Construction, Section 2515, 3604 and Section 3733. Concrete mats shall be open cell precast blocks with a Type IV geotextile fabric.

6.08 Signs and Markings: All signs and markings will be provided and installed by the developer to meet Township and County standards.

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

A. Seed mixture shall be in accordance with Section 3876, mixture number 240, 250, or 260 applied at the rate of 100 lbs. per acre as directed by the Township Engineer.

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

C. Sod shall be low maintenance in accordance with Section 3878.

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

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

F. Wood Fiber Blanket shall meet the requirements of Mn/DOT Specification 3885. Shall be used in areas where slope is greater than 4:1 and anchored with biodegradable pegs.

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

6. 10 All materials to be utilized for construction and not specifically detailed above shall be in accordance with the Minnesota Department of Transportation Standard Specifications for Construction and Supplemental Specifications.

7.00 CONSTRUCTION STAKING, OBSERVATION AND TESTING REQUIREMENTS

7.01 Construction Staking

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

Street grade hubs shall be placed at a maximum of 100 feet on center and shall be required at a maximum of 50 feet on center for all curves. The street grade hubs shall be placed along the street on each edge of pavement at the spacing stated above.

7.02 Township Observation: The Township Engineer and/or his/her representative shall observe the work to insure compliance with and conformance to Township Standards and approved plan. The Township Engineer shall observe the work at the following times during construction and prior to proceeding with the next phase of construction:

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

B. Upon completion of site clearing and grubbing.

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

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

E. During placement of stormwater structures.

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

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

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

The Township Engineer shall be notified by the Owner 24 hours in advance to schedule site reviews for the above mentioned times. The

Township Engineer may, at his/her discretion, perform additional site reviews. The Developer shall provide access to the site for the Engineer or his/her representative to perform his/her site reviews.

7.03 Construction Materials Testing

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

1. Compaction tests shall be performed in the embankments, sub-base and the base materials. A minimum standard proctor density of 100% is required on all base materials located within the upper three feet of the proposed finished grade of the street and a standard proctor density of 95% is required on materials below this level. An in-place compaction testing rate of one test per 500 feet of street in each sub-base and base materials shall determine the minimum number of tests required. Testing shall be performed in accordance with the Minnesota Department of Transportation Grading & Base Manual at the rates indicated above.

2. Compaction shall be by the Ordinary Compaction Method. Acceptance testing shall be performed by driving a fully loaded tandem truck gross weight of 25 tons over street prior to placement of aggregate material and bituminous material. The Township Engineer reserves the right to require soil borings or excavation to verify unsuitable material is removed from the subgrade. If there appears to be insufficient compaction, the Township reserves the right to order additional compaction tests.

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

4. Core samples are required in both the Non-Wear and Wear Course and shall be taken at random location for every 500 tons placed. The cores shall determine thickness of pavement and be used to measure density of the core by Rice Test (Maximum Density). A minimum of three cores shall be provided on each layer. Cores shall be taken, and asphalt repaired within 48 hours of the paving.

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

8.00 STANDARD CONSTRUCTION DETAILS

The Developer shall construct all streets to the sections shown on the Standard Construction Details, which are attached to these Specifications.

9.00 ACCEPTANCE

The Developer shall construct all streets to the sections shown on the Standard Construction Details, which are attached to these Specifications.

9.01 GENERAL

If the Developer fails to reasonably allow for inspections if such inspections are required by the Town Board, the Street will not be accepted and the Developer will be required, at his/her own expense, to either reconstruct the portion of construction not inspected, or place a 10-year performance bond with the Town in the amount equal to the estimated cost of the repair. Any work considered unacceptable shall be subject to Mn/DOT Specification 1512. The Developer shall be responsible for maintaining a Street until the Town Board adopts the street by resolution. The developer may be required to provide a performance bond or letter of credit in the name of the Town in an amount set by the Town Board to warranty the work for a period of two years following acceptance by the Town. If the Town Board adopts a resolution to open and maintain a Street as a Town road within a required warranty period, the Developer shall remain obligated to immediately repair or replace at his/her own expense any work caused by faulty workmanship or materials during the warranty upon notification by the Town.

9.02 FINAL ACCEPTANCE. Final acceptance of the work to construct or improve a Street shall only occur after the established warranty period.

APPENDIX D
Signage, Striping, and Lighting

STANDARD SPECIFICATIONS
FOR
SIGNAGE, STRIPING, AND LIGHTING

TOWNSHIP OF STANFORD

TABLE OF CONTENTS

STANDARD SPECIFICATIONS
FOR
SIGNAGE, STRIPING, AND LIGHTING

TOWNSHIP OF STANFORD

1.00 GENERAL REQUIREMENTS

1.01 Specification Reference:

All traffic control devices shall conform and be installed in accordance with the "Minnesota Manual of Uniform Traffic Control Devices" (MN MUTCD) and Part 6, "Field Manual for Temporary Traffic Control Zone Layouts", Mn/DOT 2564, 3352 & 3401, Minnesota "Standard Signs Manual", the Mn/DOT "Traffic Engineering Manual", and as modified herein.

All pavement markings shall be installed in accordance with the "Minnesota Manual of Uniform Traffic Control Devices" (MN MUTCD), Mn/DOT 2582, the Mn/DOT "Traffic Engineering Manual", the Traffic Control Layouts/Typical Traffic Control Layouts in the Plans, and as modified herein.

All lighting shall be approved by the Township and adhere to the Subdivision Ordinances, Mn/DOT 2545, and as modified herein. The Mn/DOT "Road Design Manual" and AASHTO "Roadside Design Guide" should be referenced when considering placement of the lighting structures within any Right-of-Way or clear zone.

1.02 Definitions:

Owner: Owner shall mean the person(s), company, corporation, etc. that enter into a "Developers Agreement" with the Township of Stanford for the purpose of construction of public improvements on lands under the ownership and control of said person(s), company, corporation, etc.

Engineer: Engineer shall mean the Owner's engineer.

Town: Town shall mean the Township of Stanford.

Town Engineer: Town Engineer shall mean the engineer designated by the Township as such.

2.00 MATERIALS

2.01 Signage:

A. All signs deemed necessary by the Town Engineer will be supplied and installed by the Developer. Owners will be financially responsible for all required signs.

B. All Type C and Type D signs (except stop and street name signs) shall be placed on galvanized flanged channel signposts (U-Posts) conforming to Mn/DOT 3401. The posts shall have a minimum nominal mass of 2.5 per foot and 3/8" diameter holes punched according to the Minnesota Standard Signs Manual.

C. All Type C and Type D, delineator, and marker sign base and face materials shall be extruded aluminum and conform to Mn/DOT 2564 and 3352. Refer to the Mn/DOT Traffic Engineering Manual, the Mn/DOT Standard Signs Manual, and/or the MN MUTCD for signage type, color, size, and layout.

D. All Type C and Type D regulatory and warning signs shall be sized according to the MN MUTCD Conventional Road (CR) or Standard classification. These signs shall have Diamond Grade VIP sheeting (ASTM Type IX) with series C lettering (except No Parking signs).

E. If a sign structure is to be located within the clear zone as shown in the Mn/DOT Road Design Manual Table 4-6.04A and the speed limit is greater than 40 mph, the sign structure shall meet FHWA breakaway requirements.

F. Stop signs and street name signs shall be mounted on a 2-3/8" O.D., 12 gauge cold rolled galvanized steel tubular posts. The street name signs shall be double faced, notched, and mounted in an E450 bracket and placed above the stop signs on the same post.

G. Street name plates at the intersections of arterial, collector, or minor collector streets shall be 9" plates. All name plates at the intersections of local-to-local streets shall be 6" plates. These plates shall have high intensity prismatic sheeting (ASTM Type IV) with series B lettering.

H. No Parking signs shall be spaced a minimum of 400' apart or so as not to create visual "clutter". No Parking signs shall be 18"x18" plates when placed within the Right-of-way. 12"x12"

plates are recommended in private driveway areas. All No Parking signs shall have Engineering Grade or Commercial Grade sheeting (ASTM Type I).

I. Fluorescent Yellow or Fluorescent Yellow Green signs shall have ASTM Type HP FLY or HP FLYG sheeting respectively.

J. All temporary traffic control equipment shall be in accordance with Part 6 of the MN MUTCD.

2.02 Striping:

A. All pavement markings shall be High Solids Water-Based Traffic Paint in conformance with Mn/DOT 3591 and shall be covered with treated glass beads in conformance with Mn/DOT 3592 for retroreflectorizing the paint.

2.03 Lighting:

A. When required, Developer's will be responsible for supplying and installing all streetlights. The developer will be financially responsible for all required lights for a period of 24 months of operation after installation has been accepted by the Township.

B. A cobra head style luminaire mounted on a 30' tall pole shall be used in all commercial and industrial areas. When approved by the Township, a 15' tall decorative luminaire may be used.

C. If a lighting structure is to be located within the clear zone as shown in the Mn/DOT Road Design Manual and the speed limit is greater than 40 mph, the lighting structure shall meet FHWA breakaway requirements.

D. All lighting fixtures shall be guaranteed by the manufacturer for a period of 5 years.

E. All lighting fixtures shall be equipped with cutoff shielding to minimize skylight pollution.

3.00 DESIGN LAYOUT

3.01. Signage:

A. No regulatory, warning, street name or any other permanent traffic control signs will be placed until the street(s) has been paved with at least the bituminous base course.

B. Signs along streets with urban sections and speed limits of less than 40 mph shall have a lateral offset of 2' from the face of the curb to the edge of the sign panel and shall have a vertical clearance of 7' from the ground to the bottom of the sign panel.

C. Lateral offsets of signs placed along streets with rural sections or speed limits of 40 mph or greater shall be 12' from the edge of the shoulder or face of curb and shall have a vertical clearance of 7' from the ground or 5' from the elevation of the traveled roadway whichever is greater, unless further considerations require otherwise (i.e. degree of horizontal curves, Right-of-Way limits, etc).

D. Placement of stop signs shall be marked in the field by the Developer's Engineer. Stop signs shall be placed beyond the through traffic clear zone when possible. See Mn/DOT Road Design Manual Table 4-6.04A for clear zone distances.

E. All temporary traffic control layouts shall be in accordance with Part 6 of the MN MUTCD.

3.02. Striping:

A. Permanent pavement markings are required on all arterial and collector streets and streets identified by the Town Engineer.

B. Temporary pavement markings are required when permanent markings are not feasible, and the road is open to public traffic. Temporary markings are required prior to opening the road to traffic and shall include all centerlines, edge (fog) lines, and lane lines.

C. Crosswalk pavement markings shall consist of two parallel 12" wide white lines when crossing local streets at an intersection. All other crosswalk crossings shall be marked using a zebra pattern crosswalk (3' wide x 6' high, white blocks spaced 3' apart). The crosswalk blocks shall be spaced so that they avoid the wheel path.

D. Stop bars are required at the intersections of all arterial, collector, or minor collector streets unless crosswalk markings exist or are to be installed at the intersection. Stop bars shall be located in the field by the Town Engineer.

3.03. Lighting:

A. The Town Board shall determine when street lighting is required.

4.00 STANDARD PLATES

Standard Plates are included in Appendix A of the Stanford Township Engineering Manual. Where standard plates are not shown for a particular circumstance, the Owner's engineer shall insure the design and installation procedure meets the requirements of this specification.