

Manual of Design and Construction Standards

City of Waconia

Adopted: February 2025
Last Amended: May 2026



Real People. Real Solutions.

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I. Introduction

This manual outlines certain requirements, materials, and standards that should be incorporated into the preparation of plans and specifications for city infrastructure, including sanitary sewer, storm sewer, watermain, street construction, sidewalk/trail construction, and landscaping. The requirements contained in this document are minimum general requirements for construction within the City of Waconia. The City Engineer or City staff may require additional information and increase the minimum requirements on any project. All projects and submittals require approval by the City Planning Commission and City Council. Conditions of these approvals may exceed the requirements outlined in this manual.

Additional permits and/or requirements of other government agencies may exceed requirements contained in this manual.

This manual is NOT a specification in itself. Developers and their Engineers in charge of construction activity within the City are required to prepare a complete and competent set of specifications for their work.

This manual is intended as a reference source of information, standards and data. Particular sections or information in this manual may be incorporated into project specifications by reference as deemed appropriate by the City, provided this manual is made available to those to whom the reference is intended. Developers and their Engineers must comply with the requirements outlined in this manual.

In the event City Ordinances, City Codes, or outside agency requirements differ from what is included herein, the more stringent requirement shall apply.

II. Design Guidelines

A. Definition of Terms

Alley: A public or private way which afford a secondary means of vehicular access to abutting property and which is not intended for general traffic circulation and which is generally considered for the use of service vehicles and lines, such as water, sewer, gas, and electrical poles. Alleys may consist of gravel, asphalt or best management practices to assist in stormwater compliance.

Benchmark: A permanent or semi-permanent physical mark of a known elevation. The elevation shall be tied to the U.S.G.S. Sea Level Datum.

**Best
Management
Practices:**

The most effective and practicable means of erosion prevention and sediment control, and water quality management practices that are the most effective and practicable means of to control, prevent, and minimize degradation of surface water, including avoidance of impacts, construction-phasing, minimizing the length of time soil areas are exposed, prohibitions, pollution prevention through good housekeeping, and other management practices published by state or designated area-wide planning agencies.

Block: An area of land within a subdivision which is entirely bounded by streets or by a combination of streets, railroad right-of-way, public parks, or cemeteries, the exterior boundary or boundaries of the subdivision, or the shoreline of a river or lake.

Boulevard: That portion of the street right-of-way between the curb line and the property line utilized for small utilities, snow storage and City maintained boulevard trees.

Builder: The person applying for and receiving a building permit to perform the work requested in said permit.

Building

Setback Line: A line parallel to a street between which line and the nearest street right-of-way line no building or structure may be erected or placed.

City: City of Waconia, Carver County Minnesota.

City Council:	Governing body of the City of Waconia.
City Engineer:	The duly appointed City Engineer of the City of Waconia or his/her designated representatives.
Construction Activity:	Activities including clearing, grading, and excavating, that result in land disturbance of equal to or greater than one acre, including the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one acre. This includes a disturbance to the land that results in a change in the topography, existing soil cover, both vegetative and nonvegetative, or the existing soil topography that may result in accelerated stormwater runoff that may lead to soil erosion and movement of sediment. Construction activity does not include a disturbance to the land of less than five acres for the purpose of routine maintenance performed to maintain the original line and grade, hydraulic capacity, and original purpose of the facility.
Contractor:	A person under contract with the City or Developer to install municipal or public improvements.
County:	Carver County, State of Minnesota.
Cul-de-Sac:	See Street, Cul-de-Sac.
Developer:	A person or firm that develops land through construction of public and/or private improvements. The developer may be the owner and/or developer.
Double Frontage:	A lot with two public streets forming a boundary (not a corner lot).
Easement:	A grant or authorization by a property owner or developer for the use of a designated part of their property by the public, a corporation, or persons for a specific purpose such as utilities, drainage ways, roadways, walkways, trails, buffers, and berms.
Escrow:	The deposition of funds in an account maintained by the City specifically for the purpose of ensuring fulfillment of certain obligations assumed by the section.

- Grade:** The average elevation of the finished ground.
- Grade:**
(Percentage of) The rise or fall of a street in feet and tenths of a foot for each one hundred (100) feet of horizontal distance measured at the centerline of the street.
- Final/
Finish Grade/Lot:** Required record drawing of each lot determined by approved Final Grade Plan. Must be submitted after inspection by Public Services inspection and approval.
- Plat:**
(Approved) A final plat that has been accepted by the City Council and is recorded at the Carver County Court House.
- Public
Improvement:** Any drainage facility, roadway, parkway, park, sidewalk, pedestrian way, tree, lawn, off-street parking area, lot improvement, sign, signal system or other facility for which the local government may ultimately assume the responsibility for maintenance and operation, or which may affect an improvement for which the City responsibility is established.
- Lot:** The smallest unit of a subdivision individually numbered or designated on the plat for purpose of description, recording, conveyance, development and taxation.
- Lot:**
(Corner) A lot situated on the intersection of two streets.
- Lot:**
(Depth) A mean horizontal distance between a street right-of-way line and the opposite rear line of the lot measured in the general direction of the side lot lines.
- Lot:**
(Line) The line forming the boundary of a lot.
- Lot:**
(Width) The horizontal distance between the side property lines of a lot measured at the building setback line.

Lot & Sight Triangle:	Required area “sight triangle” to visually see vehicles, pedestrian, non-motorized transit before conducting turning movements, whether signed or non-signed intersections. See Detail 11-612.
LSWMP:	Local Surface Water Management Plan. This is also referred to as a Surface Water Management Plan, or a SWMP.
MS4 Permit:	MPCA general permit authorizing the discharge of stormwater associated with small municipal separate storm sewer systems (MS4) under the NPDES/SDS permit program.
NPDES Construction Stormwater Permit:	
	MPCA general permit authorizing the discharge of stormwater associated with construction activity under the NPDES/SDS program.
NPDES MS4 Permit:	
	MPCA general permit authorizing the discharge of stormwater associated with construction activity under the NPDES/SDS program.
Plans:	The approved drawings which include plan views, profiles, cross sections, working drawings, details, and supplemental drawings, or exact reproductions thereof, which show the location, character, dimensions, extent, limits and all else necessary to complete the work covered by the project.
Plans: (Record)	The corrected or adjusted construction plans that accurately show the finished final distances, elevations, dimensions, details and all other changes to reflect the actually completed work as constructed.
Right-of-Way:	A strip of land acquired by reservation, dedication, prescription, or condemnation and intended to be occupied by a street, alley, trail, water line, sanitary sewer, and/or other public utilities or facilities. The usage of the term “right-of-way” for land platting purposes shall mean that every right-of-way hereafter established and shown on a final plat is to be separated and distinct from the lots or parcels adjoining such right-of-way and not included within the dimensions or areas of such lots or parcels. Right-of-Way intended for public facilities or any other use involving maintenance by a public agency

shall be dedicated to public use by the owner of the land being platted on which such right-of-way is established.

Specifications: The body of written directives, provisions, and requirements made pertaining to the methods or manner of performing the work, the quantities, and the quality of materials to be furnished under the contract; and outlining the obligations and responsibilities of the parties to the contract; and setting forth the method of payment and the duration of the work.

Standard

Details: Detailed drawings or plates approved by the City.

Street:

(Arterial) A Street of considerable continuity, which is used primarily for heavy through traffic between major traffic generation areas.

(Boulevard) A broad thoroughfare with landscape, sidewalk, or pedestrian improvements, often with a landscaped median or center divider that functions as a linear open space. May contain sidewalk and trail.

(Collector) A feeder street which provides connection primarily between arterial streets and minor streets. Collector streets include the principal entrance streets to a residential development and the principal streets for circulation within such development. Must contain sidewalk or trail as determined by City Sidewalk and Trail Plan.

(Cul-de-Sac) A local street with only one outlet and having an appropriate terminus for the safe and convenient reversal of traffic movement. Sidewalk system must be connected to the Cul-de-Sac.

(Local) A minor street, the principal function of which is to provide access to individual parcels of property. Cul-de-sacs and marginal access streets are to be considered local streets. All local streets will contain a 6' sidewalk on one designated side and must link with other existing sidewalk systems.

(Parkway) A divided thoroughfare having controlled access with landscape, trail, or pedestrian improvements with a landscaped center island that functions as a linear open space. May contain sidewalk and trail.

Street:

(Right-of-Way) The distance between property lines measured at right angles or

Width) radially to the centerline of the street.

Street:

(Width)

The width of the improved surface of the street as measured at right angles or radially to the centerline of the street from curb face to curb face, or on a street without curbs from the outside edge of the improved shoulder to outside edge of improved shoulder.

Structure:

Anything constructed or erected that requires location in or on the ground or is attached to something having location on the ground.

Transportation

Plans/Studies:

Previous studies approved by City Council determining local and regional corridor connections in part by City staff, City Engineer, County staff, and County Engineer determining corridor, traffic volumes, design and access spacing or improvements.

Tree:

(Evergreen)

Any living, self-supporting woody perennial plant which at maturity attains a trunk diameter of at least three (3) inches or more when measured at a point four (4) feet above ground level and normally displays green leaves or needles throughout the year. Section 900.07 of the City Code states the minimum height for newly planted evergreen trees is 6 feet.

Tree:

(Ornamental)

Any living, self-supporting woody perennial plant which at maturity attains a trunk diameter of at least three (3) inches or more when measured at a point four (4) feet above ground level and normally attains an overall height of at least fifteen (15) feet, usually with one main stem or trunk with multiple branches.

Tree:

(Overstory)

Any living, self-supporting woody perennial plant which at maturity attains a trunk diameter of at least two and a half (2.5) inches or more when measured at a point six (6) feet above ground level and normally attains an overall height of at least fifteen (15) feet, usually with one main stem or trunk and many branches.

Tree:

(Significant)

Any healthy tree measuring six (6) inches in diameter or larger at a height of thirty-six (36) inches above ground for deciduous trees, and measuring six (6) inches in diameter or larger at a distance of thirty-

six (36) inches above ground for coniferous trees (see City Code Section 900.06.8).

B. Specification Reference

1. General Conditions

- i. The “Standard General Conditions of the Construction Contract” (latest version), and Supplementary Conditions shall govern the work of all persons engaged in the performance of work in the City of Waconia.
- ii. The General Conditions are prepared by the Engineers Joint Contract Documents Committee, issued and published jointly by the American Council of Engineering Companies, the American Society of Civil Engineers, and the National Society of Professional Engineers,

2. Watermain, Sanitary Sewer, and Storm Sewer Construction

- A. Watermain, sanitary sewer and storm sewer construction shall conform to the current edition of the applicable provisions of the “Standard Utilities Specification for Trench Excavation and Backfill/Surface Restoration Watermain and Service Line Installation and Sanitary Sewer and Storm Sewer Installation” as published by the City Engineers Association of Minnesota, (CEAM).
- B. Copies of the Standard Utilities Specification are available to download free of charge from: www.ceam.org .
- C. The standards and guidelines in this manual shall serve to supplement or modify the referenced specification. Portions of referenced specifications not specifically affected by the supplemented information of modification shall remain in effect as originally written.

3. Grading, Street, and Surface Improvements

- i. All of Divisions II and III, and any specifically referenced Division I sections of the Minnesota Department of Transportation (Mn/DOT), “Standard Specifications for Construction”, current edition, together with all the Supplemental Specifications and Mn/DOT Technical Memoranda in force thirty (30) calendar days prior to bid date and referencing the use of English units of measure, shall apply to all construction performed in the City of Waconia except as modified in this document. Unless noted, the requirements in this document are in addition to the Mn/DOT Specification section being referenced.

Mn/DOT Division

Applicable

I	Only when specifically referenced
II	Always
III	Always

- ii. References to the standard specifications shall serve to supplement or modify the referenced specification. Portions of referenced specifications not specifically affected by the supplemented information or modification shall remain in effect as originally written.

4. Trail Requirements

- i. Trail design shall conform to the requirements of the most current edition of the “MnDOT Bikeway Facility Design Manual” produced by the Minnesota Department of Transportation. All pedestrian ramps for trails and sidewalks shall meet the requirements as maintained by MnDOT at <http://www.dot.state.mn.us/ada/design.html>.

5. Construction Requirements

The Contractor shall always maintain the following documents on site during construction:

- i. The applicable edition of Mn/DOT Standard Specification for Construction.
- ii. Any Supplemental Specifications to the applicable edition of Mn/DOT Standard Specification for Construction.
- iii. Any Technical Memoranda specifically referenced or linked to the execution of the Contract Documents.
- iv. Mn/DOT Standard Plates Manual.
- v. The applicable edition of the Minnesota Manual of Uniform Traffic Control Devices (MN MUTCD)
- vi. Current Plans
- vii. Current Specifications

C. General Engineering Requirements

1. Developers of property within the City of Waconia are required to submit plans and specifications for review and approval by the City Engineer. These include such items as grading plans, drainage plans, topographic surveys, plats, street plans, utility plans, drainage calculations, project specifications, operation and maintenance plans, and development agreements.
2. Any changes or modifications to the approved plans or approved specifications shall be submitted to the City, via digital format, to be approved by the City Engineer before they are implemented.
3. The City or its Engineer will provide periodic onsite inspections of the new development/reconstruction work as directed. The cost of all inspections and related items will be charged back to the Developer. The City must be notified a minimum of 48 hours in advance of all tests required. Failure to notify or to provide adequate notice will require the tests to be repeated and a second trip charge, including staff time.
4. The City shall be contacted a minimum of 48 hours prior to any work occurring within City right-of-way, work occurring on City owned or publicly owned property, or work related to connecting to City utilities. Information pertaining to fees, permit costs, and security are found in the City's Fee Schedule, Ordinance 1100.
5. All road closures or disturbances must be approved by the City as well as any other applicable jurisdictional agency. All traffic control measures must conform to the latest edition of the MN Manual of Uniform Traffic Control Devices (MMUTCD). Notification of all closures must be made to the City and local emergency services departments twenty-four (24) hours prior to any work. If City supplied, follow fee schedule, Ordinance 1100.
6. Detailed design plans and computations for construction of retaining walls 4 feet or greater in height are required to obtain and building permit and shall be submitted to the City for review. Plans shall include proposed top and bottom of wall elevations at significant changes to horizontal or vertical alignment. All drawings shall be certified and signed by a professional engineer registered in the state of Minnesota. Record Plans as outlined in Section III shall also be submitted for retaining walls.
7. All existing paved surface connections in the vicinity of the proposed project shall be indicated on plans, (i.e. driveways, adjacent intersections, and roads).

8. All existing and proposed buildings or building pads, setback lines, lots, right-of-way, easements, and parking areas shall be indicated on plans.
9. The proposed top of foundation elevation shall be indicated on plans, as well as preliminary grading information such as spot grades and contours.
10. A concrete barrier curb shall border all paved areas. For areas draining away from paved area, a ribbon curb or drop curb shall be utilized.
11. All proposed sidewalks or bike paths shall be shown.
12. All roadway improvements (i.e., turn lanes, deceleration lanes, etc.) shall be shown.
13. All local streets that are classified as an arterial, boulevard, or collector are to be designed to meet or exceed MN/DOT standards for 30 MPH vertical and horizontal curve data.
14. The proposed on-site and off-site water distribution system with pipe diameters, including hydrants, shall be shown.
15. The proposed on-site and off-site collection system for the stormwater and sanitary sewer system shall be shown, including pipe diameters.
16. Proposed stormwater runoff management basins shall be indicated, including the proposed high-water elevation.
17. Wetland delineations and buffers for on site wetland areas shall be indicated.
18. Existing and proposed 2-foot contours within 100 feet of site boundary shall be indicated.
19. All floodplain areas shall be delineated. Indicate the limits and elevation of the 100-year floodplain and floodway.
20. All proposed electric lines, structures, parking lot lighting and street lighting shall be indicated.
21. The total acreage of the development shall be indicated and a solid, heavy line must indicate all boundary lines of the proposed development or subdivision.
22. Survey data such as angles, bearings, dimensions, curve data, etc., shall be shown for all proposed and existing exterior lines and roadway centerlines.

23. All offsite improvements shall be illustrated at a preliminary level.
24. Existing County and State roadways are NOT to be open cut. The City will review the need for open cutting of local roads on a case by case basis. Utilities, which are to be augured or directionally drilled, shall be specified on the plan.

III. Plan Standards

A. General Requirements

1. One electronic copy of all proposed projects shall be submitted to the City.
Scale: Max horizontal scale 1" = 50' (half 1"=100')
Max vertical scale 1" = 10'
2. See www.waconia.org for site plan review requirements, preliminary plat application, final plat application, and other permit/application forms.
3. Each plan sheet shall be clearly labeled with the original date, revision date, sheet number, project name, identification of improvement, certification signature, registration/license number and other appropriate information.
4. Benchmarks shall be placed on all profile views. Mark all the locations of benchmarks on the plan view. (Top nut of hydrant and manholes are preferable).
5. All plans shall be drawn using the Carver County Coordinate System.
6. After completion of construction, all manholes, catch basins, outlet control structures, emergency overflows (EOF's), hydrants and other elements of the project shall be re-measured with an as-built survey. The plans shall be corrected and modified to show the correct distances, elevations, dimensions and any other change in the specific details of the plans. All changes and modifications on the record plan shall be drawn to scale to accurately represent the work as constructed. Incorrect elevations, distances, etc. shall be lined out from the original plan sheets and redrawn as necessary to complete the record plan. City provided asset ID numbers are to be placed on record drawings.
7. To complete the record plans, GPS coordinates shall be provided and all gate valves shall be tied with at least two ties, using the following priority:
 - i. Fire hydrants.
 - ii. Manholes.
 - iii. Catch basins, if curb and gutter is constructed.
 - iv. Storm and Sanitary Clean-outs.
 - v. Street Lighting and Components.

8. To complete the record plans, GPS coordinates shall be provided and all services shall be tied with at least two (2) ties, using the following priority:
 - i. Fire hydrants.
 - ii. Manholes, catch basins.
9. To complete the record plans, sufficient as-built topographic survey shots shall be provided over all basins to accurately verify constructed elevations are within grading tolerances specified.
10. Record plans shall be submitted to the City Engineer for review. All review comments shall be addressed and requested items shall be incorporated into the drawings.
11. All record plans shall be clearly legible drawings, accurately drawn to scale. Proper notes and statements as required in this manual shall be placed on the plans. The record plans shall be submitted to the City in the form of a hard copy and an electronic copy.

B. Title Sheet

1. The Title Sheet should have a location map which clearly shows the project location in relation to other readily identifiable landmarks such as major roads. The location map must have a north arrow. The map does not need to be to scale.
2. An index of the construction plan sheets shall be placed on the title sheet.

C. Plan and Profile - General

STANDARD PLATE SHOWING EACH "STANDARD SYMBOLS"

1. The construction plan should be divided as follows:
 - i. Street Plan and Storm Sewer Plan – Street and storm sewer construction items (including reuse irrigation, if applicable).
 - ii. Utility Plan – Sanitary sewer, watermain & forcemain construction
 - iii. Grading & erosion control plans, (SWPPP).

2. All match line breaks shall be clean with reference points clearly marked. All plans, which are broken by a match line, shall be on the same or consecutive sheets.
3. Approximate locations of gas, electric, and telephone lines shall be shown.
4. North shall be oriented to the top of the page or to the right.
5. Stationing should increase from left to right.
6. When possible, duplicate stationing should be avoided. Where multiple alignments exist, the beginning station of each alignment should begin with the next even number of 10 or 100.
7. When establishing the stationing for a project, the general guideline to be followed is that stationing should increase from south to north or west to east. When possible, stationing should start at an intersecting street centerline or other well-established landline.

D. Plan View - Utilities

1. Typically, pipe systems should be labeled/numbered from downstream upwards. Intersection drainage structures should be labeled in a clockwise direction.
2. Sanitary sewer should be labeled with letters in circles.
3. Storm sewer, including reuse irrigation, should be labeled with numbers in circles or ovals
4. Provide station and offset of all tees, crosses and bends.
5. Provide station, offset, and elevation at the ground in parentheses under all hydrants.
6. Show dimension of centerline and parallel utilities.
7. All sanitary services shall be drawn on the plan to the constructed length with the length, size, and type noted. Indicate if trenchless construction is used.
8. All water services shall be drawn on the plan to the constructed length with the length noted if other than to the easement. Indicated if trenchless construction is used.

E. Plan View - Street

1. All streets shall be clearly labeled.
2. Curb and gutter shall be drawn using three lines.
3. Manholes, catch basins, and water valves should be shown on street sheets.
4. Show curb and gutter opening dimensions when different than the typical section.
5. Any tip out curb shall be clearly labeled.
6. Show radius of curb returns to back of curb. When multiple radii of the same size are used, they can be labeled using a general note.

F. Profile View - Utilities

1. All sewer, watermain and reuse irrigation shall be shown in profile with the appropriate information for structure IDs, structure diameters, casting types, rim and invert elevations, pipe diameters, materials, and grades.
2. The profile shall be directly below the plan view with the stationing aligned as closely as practical. Stationing shall be shown on the plan view as well as on the profile.
3. All hydrants, gate valves, and tees shall be stationed on the profile.
4. Existing utilities being replaced are not shown in the profile except at connection points. Utilities, which may conflict with proposed improvements, shall be shown.
5. Show structure label in circle or oval.
6. Show station and offset (offsets need not be noted for structures placed on the centerline).
7. Use R= for rim elevation.
8. Use I= for invert elevation. Show elevation, pipe size and direction on invert notes.
Example: I=1096.02 (18") N.
9. Crossing with other existing or proposed utilities shall be clearly identified in the profile.

G. Plan View – Grading and Drainage

1. Location of existing natural features, including: tree lines, wetlands, water bodies, drainage channels, bluffs, etc.
2. Existing and proposed contour information (2 feet minimum resolution) for the proposed tract and within 100 feet of the site boundary. Additional existing topographic information may be required based on the City Engineer's review of proposed improvements and potential impact on upstream or downstream properties.
3. Any FEMA identified 100-year flood plain boundary within the site.
4. Location of existing stormwater conveyance mechanisms within the site boundaries, including pipes, manholes, catch basins, ditches, streams, ponds, etc.
5. Proposed utilities (sanitary sewer, watermain and drainage system), including: site grading, storm sewer and catch basin location, pond or bioretention area locations, any other stormwater related items; pond normal water level and high water levels, emergency overflow locations and elevations, proposed low opening and low floor elevations.
6. Wetland delineation and mitigation areas.
7. Proposed lot, right-of-way and easement lines.
8. Any additional requirements noted in Section V, Section VI, and Section VII.

H. Miscellaneous Sheets

1. Construction detail sheets should contain all applicable City standard details needed to construct the project. Refer to Appendix A.
2. Cross section sheets may be required by the City Engineer for the design of higher functional class roadways or for local roadways through difficult topography.

IV. Summary of Major Design Items

A. Storm Sewer

1. Storm Sewer Pipe

- i. Material (In Public ROW or connected to basin) RCP
- ii. Material (Private or in Green Spaces) HDPE
- iii. Culvert Material.....RCP, HDPE, or
CMP (Private Driveways)
- iv. Minimum Diameter (Mainline Pipe).....15-Inch
- v. Minimum Diameter (CB Leads)12-Inch
- vi. Minimum Depth of Cover Under Curb/Pavement.....3.0 Feet
- vii. Minimum Depth of Cover Under Green Spaces2.0 Feet
- viii. Aprons.....Anchored & Matching Pipe Material Type

2. Manholes / Catch Basins

- i. Type..... Precast Concrete
- ii. Minimum Structure Depth Under Curb/Pavement....4.0 Feet
- iii. Minimum Structure Depth In Green Spaces3.0 Feet
- iv. Sump Structures Prior to Any Outfall or BMP
- v. Casting Type
 - a) Solid R-1642-B (Stamped “Storm Sewer”)
 - b) Inlet in Paved Areas R-3067-V

c) Inlet in Green Areas R-4342

3. Drain tile

- i. Material PVC Schedule 40 Perforated
- ii. Minimum Diameter 4-Inch
- iii. Maximum Cleanout Spacing 200 Feet
- iv. Sump Pump Connections Required for All New Lots

4. Stormwater Reuse - See Current "Stormwater Reuse Standardization Policy"

B. Stormwater Design

1. Pipe

- i. Design Frequency 10-Year
- ii. Minimum Pipe Velocity 2.5 fps
- iii. Maximum Pipe Velocity (Mains) 15 fps
- iv. Maximum Pipe Velocity (Outlets) 6 fps

2. Wet Sedimentation Basin

- i. Pretreatment Sump Manhole w/ Baffle Prior
To All Pipe Connections
- ii. Highwater Level Design Frequency 100yr 24hr
- iii. Landlocked HWL Design Frequency Back-to-back
100 yr 24hr
- iv. Minimum Basin Depth to NWL 3
- v. Maximum Basin Depth to NWL 10
- vi. Maximum Side Slope 3:1

- vii. Safety Bench Length 10 Feet
- viii. Safety Bench Slope 10:1
- ix. Permanent Volume..... 1,800 cf/ac drainage area
- x. OCS Elevation 100yr HWL
- xi. Emergency Surface Overflow.....0.5' above OCS
- xii. Top Of Berm 1.0' above EOF
- xiii. Maintenance Access8' width

3. Filtration Ponds / Bioretention Areas

- i. Pretreatment Pretreatment Device Such As A
Vegetated Filter Strip, Small Basin,
Water Quality inlet, Forebay, or
Stormwater Treatment Device
- ii. Highwater Level Design Frequency..... 100yr 24hr
- iii. Maximum Basin Depth to OCS..... 1.5 Feet
- iv. Maximum Side Slope 3:1
- v. OCS Elevation 100 yr HWL
- vi. Emergency Surface Overflow.....0.5' above OCS
- vii. Top of Berm 1.0' above EOF
- viii. Maintenance Access8' width

4. Low Floor Requirements

- i. Low Opening of New and Existing Structures.....2 Feet from HWL
- ii. Low Floor of New and Existing Structures.....1 Foot from HWL
- iii. Low Opening if No EOW3 Feet from HWL

- iv. Low Road ElevationAbove HWL
- v. Low Road w/ Landlocked Water Body...3' Above 2 100-Yr Events

5. Drainage Swales

- i. Maximum Side Slope3:1
- ii. Maximum Side Slope in Right-of-Way4:1
- iii. Minimum Grade with Draintile.....0.5%
- iv. Minimum Grade without Draintile1.0%
- v. Minimum Bottom Width4 Feet

6. Stormwater Reuse - See Current “Stormwater Reuse Standardization Policy”

7. Operation, Inspection, and Maintenance – See Current City MS4 Stormwater Pollution Prevention Program (SWPPP)

C. Water Supply

1. Watermain Pipe

- i. Material (Open Cut Main)..... C900/C905 PVC DR 18
- i. Material (Trenchless Main)..... HDPE or Fusible DR 18
C900/C905 PVC
- ii. Material (Hydrant Lead) DIP
- iii. Minimum Diameter
 - a) Looped8-Inch
 - b) Dead End / Cul-De-Sac w/ 6 or fewer homes6-Inch
 - c) Hydrant Lead.....6-Inch
- v. Pipe Class (4-Inch to 12-Inch) DR18

- vi. Pipe Class (14-Inch to 24-Inch)..... DR21
- vii. Minimum Cover7.5 Feet
- viii. Location Opposite Side of the Sidewalk
- ix. Fittings Mechanical Joint or Flanged DIP
- x. Tracer Wire / Tracer Wire Access Box.. See Standard Details

2. Service Pipe

- i. Material (1-Inch) Type K Copper or PE SDR 9
- ii. Material (>1-Inch & <4-Inch)..... PE
- iii. Material (4-Inch & Larger DIP
- iv. Minimum Diameter1-Inch
- v. Corp Stop, Curb Stop, Curb Box See Section 9
- vi. Copper Fittings Compression Type Only
- vii. Tracer Wire / Tracer Wire Access Box.. See Standard Details

3. Hydrants

- i. Type..... Waterous Pacer Type WB-67
- ii. Bury Depth.....8 Feet
- iii. Maximum Spacing 400 Feet (or at every intersection)

4. Valves

- i. Type (<12").....Resilient Seat Valves Meeting AWWA C-509/C-515
- ii. Type (12-Inch or Larger).....Butterfly Valves Meeting AWWA-504
- iii. Maximum Area Isolated by Valving (Residential).....20 Homes

- iv. Max. Area Isolated by Valving (Com./Ind.).....2 Businesses
- v. Gate Valve Adaptors & Adjustable Gate Extension Stems Required

5. Testing Requirements

- i. Compaction Tests on Backfill Placement During Pipe Installation
- ii. Pressure.....150 psi for 120 Minutes w/ 0 Pressure Loss
- iii. Disinfection.....0 Coliform Detected After Disinfection & Flushing
- iv. Conductivity.....Electric Conductivity for All Pipes w/ Tracer Wire

D. Sanitary Sewer

1. Mainline Gravity Pipe

- i. Material PVC
- ii. Minimum Diameter8-Inch
- iii. Minimum Grade
 - a) 8-Inch 0.40%
 - b) 10-Inch 0.28%
 - c) 12-Inch 0.22%
 - d) 15-Inch 0.15%
 - e) 18-Inch 0.12%
 - f) 21-Inch 0.10%
 - g) 24-Inch 0.08%
 - h) 30-Inch 0.058%
 - i) 36-Inch 0.046%

- iv. Pipe Class (0' to 16' depth) SDR 35
- v. Pipe Class (16' to 25' depth) SDR 26
- vi. Pipe Class (>25' depth) C900 / DIP CL 50
- vii. Location Centerline of Street

2. Service Pipe

- i. Material PVC
- ii. Minimum Diameter Residential 4-Inch
- iii. Minimum Diameter Commercial/Industrial 6-Inch
- iv. Minimum Grade 1.0% (2.0% Preferred)
- v. Pipe Class SDR 26
- vi. Maximum Distance w/o Cleanout 90 Feet
- vii. Tracer Wire / Tracer Wire Access Box..See Standard Details

3. Manholes

- i. Type Precast Concrete
- ii. Maximum Inlet / Outlet Difference 1 Foot
- iii. Minimum Manhole Depth 8 Feet
- iv. Outside Drop minimum 2 Feet
- v. Outside Drop Material DIP
- vi. Casting Type R-1642-B (Stamped "Sewer")
- vii. Maximum Spacing 400 Feet
- viii. Flow Line Inverts 8/10ths Rule

- ix. Drop Across Inverts0.1 Feet
 - x. Adjusting RingsMinimum of 2 / Maximum of 6
4. Lift Station & Forcemain
- i. See Current “Sanitary Sewer Lift Station Standardization Policy”
5. Testing Requirements
- i. Compaction Tests on Backfill Placement During Pipe Installation
 - ii. Jet and Clean Entire System
 - iii. Televising and Provide Reports and Videos of All Mainline Pipes
 - iv. Air Testing...4 psi Pressure (Refer to Specifications for Duration)
 - v. Mandrel Max...5% Deflection 30 Days After Backfilling/Paving

E. Streets, Sidewalks, and Trails

1. Pavement
- i. Width (Urban Residential, Low Volume).....28 Feet
 - ii. Width (Urban Residential, High Volume).....34 Feet
 - iii. Width (Collector, Parkway, Arterial).....Varies
(40 Feet Minimum)
 - iv. Cul-de-sac Radii Minimum45 Feet
 - v. Cul-de-sac Length of Street Maximum500 Feet
 - vi. Temporary Cul-de-sac Minimum Radii30 Feet
 - vii. Temporary Cul-de-sac Maximum Length.....750 Feet
 - viii. Typical Section / Material Types.....See Details and
Section XI

- ix. Minimum Longitudinal Grade.....0.5% (1.0% Preferred)
- x. Intersection Angles90 Degrees
- xi. Crown Minimum.....2.0%

2. Curb & Gutter

- i. Material..... Concrete
- ii. Type
 - a) New Residential (Mainline Roads) Mountable
 - b) New Residential (At Inlets & Intersections)..B6-18
 - c) Replacement Residential Mountable or B6-18
 - d) Commercial/Industrial B6-18
 - e) Parking Lots..... B6-12

3. Sidewalks

- i. Width.....6 Feet (7 Feet if Adjacent to a Wall or Fence)
- ii. Section . 4.0 Inches Concrete w/ 6.0 Inches Aggregate Base
- iii. Maximum Longitudinal Grade5.0%
- iv. Maximum Cross Slope2.0%
- v. Pedestrian RampsConcrete w/ Truncated Domes

4. Trails

- i. Width..... 8 Feet (10 Feet for Regional Trails)
- ii. Section..... 3.0 Inches Bituminous
w/ 6.0 Inches Aggregate Base
- iii. Pedestrian RampsConcrete w/ Truncated Domes

5. Miscellaneous

- i. Design VehicleCity Aerial Fire Truck
- ii. Sight Triangles at Intersections..... Evaluated Case-by-case
- iii. Driveway Material Type.....Concrete or Bituminous
- iv. Driveway Width (Residential)12 Feet to 24 Feet
- v. Maximum Driveway Width (Com./Ind.).....30 Feet
- vi. State Aid Design May Be Required for Planned MSA Streets
- vii. Striping May Be Required on Collector or Planned MSA Streets
- viii. Cold Weather Protection Plan Required for Temps Below 40 Degrees
- ix. No Paving or Concrete Placement Shall Occur After November 1st

6. Testing Requirements

- i. Road Subgrade..... Roll Test
- ii. Aggregate Base (If Required by City).....Compaction & Gradation
- iii. ConcreteAir, Slump, & Strength Tests
- iv. Bituminous.....Gradation, Bit. Extraction, Density, Asphalt Content

V. Grading

A. Geotechnical Investigation

A geotechnical investigation and analysis shall be performed. This shall consist of soil borings to provide general information on subsurface soil conditions and groundwater elevations and an engineering analysis including recommendations for site grading to support the proposed buildings, streets, and utilities.

B. Compaction Requirements

1. Embankment and backfill soils shall be compacted as recommended in the Geotechnical report. If no report is available, all embankment grading shall be compacted using the Specified Density Method as follows:
 - i. Under areas with proposed paved or structural improvements, Specified Density Method:
 - a) 100% Standard Proctor dry density within 3 feet of the proposed sub-grade or building pad hold-down elevation.
 - b) 95% of the maximum Standard Proctor dry density below 3 feet from the proposed subgrade or building pad hold-down elevation when the total fill depth is less than 8 feet.
 - c) 98% of the maximum Standard Proctor dry density below 3 feet from the proposed subgrade or building pad hold-down elevation when the total fill depth is 8 feet or more.
 - ii. Under areas with no proposed paved or structural improvements, Quality Compaction Method.

C. Slopes/Grades

1. No final graded slopes shall be steeper than 3 feet horizontal to 1 foot vertical (3:1) and shall be no steeper than 4:1 in areas that are to be mowed.
2. Driveway grades shall be less than 10% and greater than 1%.
3. Lots shall be graded to provide drainage away from building locations at a minimum slope of 2%.

4. The minimum allowable grade in non-paved areas is 2%. A 1% grade may be allowed in swale areas if draitile is installed.
5. Maximum drainage swale length shall be 400 feet to one point unless approved by the city engineer.
6. All handicapped accessible facilities shall be required to follow the slope requirements of the current "ADA Standards for Accessible Design" manual.

D. Topsoil – Sodding and Seeding

1. Grading and construction plans shall include a Topsoil Management Plan which complies with all provisions of the Carver County Watershed Management Organization Topsoil Management Plan. This includes establishing the topsoil standard, topsoil sampling and testing, subsoil preparation and soil bed preparation.
2. All pervious areas outside of building pad areas shall be scarified to a depth of 6 inches after site grading and before topsoil placement. The ripping/tilling shall occur at a maximum width of 24 inches between rips. After soil ripping, heavy equipment use on de-compacted soil shall be minimized.
3. Topsoil moved during construction shall be redistributed in turf establishment areas to a minimum depth of six (6) inches with wide-tracked vehicles to minimize compaction to the maximum extent practical. Disturbed boulevard areas shall be seeded and mulched or sodded as required by the City.

E. Drainage

1. See Stormwater Management section (Section VII).
2. Positive site drainage shall be maintained during construction. Water shall not be allowed to pond on the site soils during construction except at permanent and temporary sedimentation basins. Temporary drainage swales and/or culverts shall be constructed to drain depressions until the storm sewer is constructed. After construction, site drainage shall comply with the approved grading and drainage plan.
3. Pond depths shall be excavated a minimum 1 foot below the design bottom elevation to provide storage for sediment accumulation during construction.

F. As-Built Grading Plan

Upon completion of the grading operations, an as-built grading plan shall be submitted to the City. This plan shall show the existing grades of all lot corners, pads, drainage swales, created wetlands and ponding/bioretenion areas. The plan shall certify that all swales and ponding/bioretenion areas are within drainage and utility easements and are constructed according to the City-approved plans. In addition, the grading plan shall indicate a minimum basement floor elevation necessary to serve each lot with gravity flow sanitary sewer, as well as minimum low floor and low opening elevations as required in Section 7. Two benchmarks shall be shown on the as-built grading plan. No building permits shall be issued until this plan has been submitted and approved by the City.

G. Grading Permit

Grading is reviewed and approved as part of the overall plan approval process.

H. Tree Preservation

It is the intent and desire of the city to protect, preserve and enhance the natural environment and beauty of the City by encouraging the resourceful and prudent development of wooded areas and with respect to specific site development, to retain as far as practical, substantial tree stands which can be incorporated into the development. The City recognizes that preservation and replanting of trees is important on new development sites in order to maintain a healthy and desirable community. The City also recognizes that a certain amount of tree loss is an inevitable consequence of the urban development process. Additional information on tree preservation regulations can be found in City Code Section 900.06.8.

It is the policy of the City to preserve natural woodland areas throughout the City. During the preliminary planning phase the county's Minnesota Land Cover Classification System (MLCCS) mapping shall be evaluated for natural area impact minimization. Substantial tree stands shall be incorporated into the overall landscape plan in order to 1) prevent soil erosion and sedimentation, 2) improve air quality, 3) reduce noise pollution, 4) conserve energy through natural insulation and shading, 5) control the urban heat island effect, 6) increase property values, 7) protect privacy by maintaining and establishing buffers between conflicting land uses, and 8) provide habitat for wildlife.

1. Clear Cutting - No clear cutting shall be permitted except as approved by the City as part of an approved development plan.
2. Evaluation Standards

The following standards shall be used in evaluating development plans:

- i. Prior to the submittal of development plans, a tree survey of the site shall be prepared by a registered landscape architect, licensed forester or other professional approved by the City. This survey shall include the species, size, and condition of the trees.
 - ii. To the extent practical, site design shall preserve woodland areas and significant trees. Special priority for tree preservation shall be given to areas within floodplains, wetlands, stream corridors, wooded slopes, and along collector and arterial roadway corridors.
 - iii. Minimizing tree loss shall be achieved by a combination of the following:
 - Realignment of streets, utilities, and lot lines.
 - Consideration of alternative utility configurations such as the use of grinder pumps, force mains, or revised home elevations to minimize grading.
 - An increase in street grade up to 10% when the applicant can demonstrate that significant tree preservation is directly related to the modification.
 - Private retaining walls.
 - Variation in street radius and design speed.
 - Modified grading plans.
 - iv. Trees designated for preservation shall be protected by snow fences, or other means approved by the City, at the critical root zone (CRZ) with clearly marked signage specifying that the area is off limits for construction activities, prior to building permit acquisition. The CRZ shall be defined as that area inside a circle around the tree, the radii of which shall be one foot for each one-inch diameter of tree caliper size, measured at breast height.
 - v. At the City's discretion, conservation easements may be required to protect designated tree preservation areas. Such easements shall be permanently marked and signed as a conservation area with low profile monumentation. Signage/monumentation shall be ordered and installed by the City and invoiced to the Developer.
3. Penalty - The loss, removal, or death of any protected and/or significant trees due to construction activities will require replacement at the rate of two (2) caliper inches per each inch of diameter at breast height (DBH) of the lost, removed, or killed trees. The replacement trees shall be at least two and one-half (2½) caliper inches.

I. Landscaping

1. Landscaping shall be as provided in the Landscaping Chapter of the Waconia Municipal Code.
2. Landscaping Plan shall provide details for establishment and management, including number and location of plantings, hatches for seed mixes and sod, and schedules for installation and irrigation.
3. No more than one-fourth (¼) of the trees to be planted may be from any one (1) species, unless recommended by the City of Waconia. The complement of trees fulfilling the requirements of this policy shall be not less than twenty-five (25) percent deciduous and not less than thirty-three (33) percent coniferous.
4. All required trees shall be installed prior to receiving a Certificate of Occupancy. If it is determined that permitting occupancy prior to completion and acceptance of required improvements is in the best interest of the City, financial guarantees acceptable to the City shall be provided to ensure timely installation.
5. A landscaping warranty shall be provided by the Developer. This shall be a one-year warranty for commercial/industrial sites and a two-year warranty for residential developments. Planting inspections shall be completed by City Staff upon the initial planting and at yearly intervals.
6. The following is a list of acceptable tree and shrub types. The City shall approve all plantings and locations.

<u>Common Name - Trees</u>	<u>Family</u>	<u>Genus</u>	<u>Species</u>
River Birch	Betulaceae	Betula	nigra
Blue Beech	Betulaceae	Carpinus	caroliniana
Ironwood	Betulaceae	Ostrya	virginiana
Hackberry	Cannabaceae	Celtis	occidentalis
Northern White Cedar	Cupressaceae	Thuja	occidentalis
Yellow Wood	Fabaceae	Cladrastis	kentukeya
Honeylocust	Fabaceae	Gleditsia	triacanthos
Kentucky Coffeetree	Fabaceae	Gymnocladus	dioicus
White Oak	Fagaceae	Quercus	alba
Swamp White Oak	Fagaceae	Quercus	dicolor
Northern Pin Oak	Fagaceae	Quercus	ellipsoidalis
Bur Oak	Fagaceae	Quercus	macrocarpa
Eastern Pin Oak	Fagaceae	Quercus	palustris
Northern Red Oak	Fagaceae	Quercus	rubra
Bitternut Hickory	Juglandaceae	Carya	cordiformis
Shagbark Hickory	Juglandaceae	Carya	ovata

American Basswood (Linden)	Malvaceae	Tilia	americana
Littleleaf Linden	Malvaceae	Tilia	cordata
Concolor Fir	Pinaceae	Abies	concolor
Black Hills Spruce	Pinaceae	Picea	glauca 'Densata'
Austrian Pine	Pinaceae	Pinus	nigra
Ponderosa Pine	Pinaceae	Pinus	ponderosa
Scotch Pine	Pinaceae	Pinus	sylvestris
Ornamental Crabapples	Rosaceae	Malus	Sp.
American Plum	Rosaceae	Prunus	americana
Black Cherry	Rosaceae	Prunus	serotina
Bigtooth Aspen	Salicaceae	Populus	grandidentata
Red Maple	Sapindaceae	Acer	rubrum
Autumn Blaze Maple	Sapindaceae	Acer	freemanii 'Jeffersred'
Sugar Maple	Sapindaceae	Acer	saccharum
Hot Wings Maple	Sapindaceae	Acer	tataricum
Ohio Buckeye	Sapindaceae	Aesculus	glabra
American Elm	Ulmaceae	Ulmus	americana

<u>Common Name - Shrubs</u>	<u>Family</u>	<u>Genus</u>	<u>Species</u>
American Elderberry	Adoxaceae	Sambucus	canadensis
American Highbush Cranberry	Adoxaceae	Viburnum	trilobum
Smooth Sumac	Anacardiaceae	Rhus	glabra
American Hazelnut	Betulaceae	Corylus	americana
Beaked Hazelnut	Betulaceae	Corylus	cornuta
Pagoda Dogwood	Cornaceae	Cornus	alternifolia
Gray Dogwood	Cornaceae	Cornus	racemose
Red Osier Dogwood	Cornaceae	Cornus	sericea
Black Chokeberry	Rosaceae	Aronia	melanocarpa
Common Ninebark	Rosaceae	Physocarpus	opulifolius
Chokecherry	Rosaceae	Prunus	virginiana
American Pussy Willow	Salicaceae	Salix	discolor

7. The following is a list of prohibited tree types.

<u>Common Name - Trees</u>	<u>Family</u>	<u>Genus</u>	<u>Species</u>
Ginkgo	Ginkgoaceae	Ginkgo	Biloba
Boxelder	Sapindaceae	Acer	Megundo
Eastern Cottonwood	Salicaceae	Populus	Deltoides
Lombardy Poplar	Salicaceae	Populus	Nigra Italica

VI. Erosion Control and Sediment Control

A. General

1. The purpose of this Section is to protect the public health, safety, property and general welfare of the citizens of the City and to conserve the soil and water-related resources through the control of erosion and sediment during land disturbing activities. It is the goal of the City of Waconia to prevent all sediment from leaving construction sites.
2. In addition to the requirements and guidelines listed in this section, all eligible site disturbing activities are required to submit for all appropriate permits, including the following:
 - i. MPCA's General Stormwater Permit for Construction Activity (MN R100001) as required by the National Pollutant Discharge Elimination System (NPDES).
<https://www.pca.state.mn.us/water/construction-stormwater>
 - ii. Carver County Water Rules Permit ensuring conformance with County Code.
<https://www.co.carver.mn.us/departments/public-services/planning-water-management/water-management/permits-rules>

B. Activities Subject to Erosion and Sediment Control Measures

With the exception of agricultural lands used mainly for the production of food, general farming, livestock and poultry enterprises, nurseries, forestry, etc., the following activities are subject to the provisions of this section:

1. Construction activity that results in land disturbance of equal to or greater than one (1) acre or if a project is part of a common plan of development or sale that ultimately will disturb greater than one (1) acre.
2. Construction activities disturbing more than 10,000 square feet of land within a shoreland protection zone.
3. Any other land disturbing activity for which the City determines to have substantial erosion potential (i.e. steep slopes, drainage ways, proximity to wetlands, rivers, and lakes, etc.).

C. Erosion and Sediment Control Plans

1. All land disturbing activities covered by this Section shall be required to have an approved Storm Water Pollution Prevention Plan (SWPPP). The plans shall be submitted for review and approval concurrently with all other development plans.
2. The SWPPP shall meet the requirements of NPDES permitting and contain sufficient information necessary for the City to determine that adequate control measures are proposed.

D. Performance Standards

In general, this Section does not require the use of any particular method to control erosion and sedimentation. The City shall evaluate the proposed measures to determine if they follow current “Best Management Practices” and engineering standards, as well as meet all requirements of the MPCA’s NPDES stormwater permit for construction activity.

1. General Requirements

- i. The smallest practical area of land shall be exposed at any given time during construction and shall be exposed for the shortest period of time practical.
- ii. All development shall consider the natural limitations of the topography and soil as to create the best potential for preventing soil erosion. Areas of deep cuts and high fills should be avoided when possible, and natural contours should be followed as closely as possible.
- iii. Erosion and sediment control measures shall be coordinated during the different stages of development. All downstream perimeter measures shall be installed prior to commencement of any earth moving activities. A note shall be included in the plans indicating that these measures shall be installed by the contractor and inspected by the City prior to the commencement of any site work.
- iv. Natural vegetation and plant covering shall be retained whenever practical. Areas immediately adjacent to natural watercourses and wetlands shall be left undisturbed. Temporary vegetation, mulching, blanketing or other cover shall be used to protect critical areas and permanent vegetation shall be installed as soon as practical.

- v. At the discretion of the City, additional erosion and sediment control measures may be required when working within watersheds of impaired waters or waters with identified total maximum daily loads (TMDLs).

2. Erosion and Sediment Control Standards

- i. The natural drainage system shall be used to the extent practical for storage, volume reduction and conveyance of runoff (although pretreatment may be necessary).
- ii. A combination of sediment basins, silt traps, buffers and/or temporary ponding areas shall be used to control erosion and prevent sediment from leaving the construction site.
- iii. Inlet protection is required at all inlets on the site, as well as at inlets on adjacent streets that may receive sediment-laden runoff, to prevent sediment from entering the storm sewer system and downstream water bodies.
- iv. Erosion and sediment controls may include, but are not limited to: silt fencing, rock construction entrances, straw mulch, vegetation, sediment basins, check dams, temporary and permanent blankets, hydromulching, regular street sweeping, etc. Disturbed areas that have not been worked on for a 7-day period must be stabilized with approved methods.
- v. All slopes to be graded at or steeper than 3:1 shall have a temporary erosion control blanket or other approved erosion control installed immediately after completion of grading.
- vi. All soil stockpiles shall have perimeter protection and temporary seeding.
- vii. Energy dissipation must be installed at pipe outlets within 24 hours of connection.
- viii. Pond Emergency Overflows (EOFs) shall be permanently reinforced.
- ix. Silt fence shall be installed along constant contours. Where not possible, silt fence to be broken and hooked upslope to slow water and provide localized ponding.
- x. No continuous slope of 4:1 or greater shall be left unbroken for more than 75 feet. A check shall be used to break slope until vegetation is established (silt fence, biorolls, etc.).

- xi. Proposed conveyance swales shall have temporary erosion control blanket and/or ditch checks at a minimum of every lot line, depending on potential channel velocities. Additional checks may be required for areas with excessive velocity potential.
- xii. When necessary, a channel and berm shall be constructed at the foot of exposed slopes to control runoff. The channeled water shall be diverted to a sediment control device.
- xiii. Stormwater shall be directed offsite so as not to cause downstream erosion or nuisance conditions. Additional downstream measures may be required at the discretion of the City engineer.
- xiv. Dewatering operations shall discharge into a sediment control device for sediment removal and energy dissipation prior to ultimate discharge. Excessive sediment-laden water will not be permitted to leave the site.
- xv. The site and all erosion and sediment control devices must be inspected weekly (or within 24 hours of a rainfall event of 0.5" or more) during active construction. Inspection logs shall be kept onsite and may be requested by the City for verification.

3. Dust Control Measures

- i. Temporary mulching or seeding shall be applied to open soil to minimize dust.
- ii. Barriers such as snow fences, commercial wind fences and similar materials shall be used to control air currents and blowing soil if the City determines it is necessary.
- iii. Exposed soil shall be watered, as necessary, to control dust as directed by the City.

E. **Maintenance of Erosion and Sediment Control Measures**

- 1. To guarantee continuous maintenance of erosion control systems, the developer shall provide escrow funds or a letter of credit in an amount determined by the City.
- 2. The cleanup and restoration needed on adjoining properties, City streets, storm sewers, etc., due to sediment leaving the development, shall be the responsibility

of the developer. Sediment tracked offsite by vehicles shall be swept, or otherwise removed, within 24 hours of occurrence.

3. The developer shall be responsible for maintaining all erosion and sediment control devices in a condition that will ensure that they will function properly, including: removal of sediment when accumulation reaches 1/3 of silt fence height, or ½ of ditch check, inlet protection or sediment basin design capacity.
4. The site and all erosion and sediment control devices must be inspected weekly (or within 24 hours of a rainfall event of 0.5" or more) during active construction. Any device deemed inadequate, or any instance of sediment leaving the site, must be corrected by the end of the next business day. Inspection logs shall be kept onsite and may be requested by the City for verification. If required maintenance measures are not employed, the result shall be a walk-through with a Carver County Soil and Water representative and with City Staff. Actions determined at this walk-through shall be completed immediately or an issuance of a Stop Work Order will occur. If not managed or taken care of, fees for services completed by City Staff are applicable to City Ordinance 1100.
5. All temporary erosion and sediment control devices shall be removed within 30 days of final stabilization. Verification of MPCA NPDES permit Transfer and/or Notice of Termination (N.O.T.) shall be submitted to the City.

VII. Stormwater Management

A. General

1. In addition to the requirements and guidelines listed in this section, all development and redevelopment must meet the requirements of the following when applicable:
 - i. MPCA's General Stormwater Permit for Construction Activity (MN R100001) as required by the National Pollutant Discharge Elimination System (NPDES).
<https://www.pca.state.mn.us/water/construction-stormwater>
 - ii. Carver County Water Rules Permit ensuring conformance with County Code.
<https://www.co.carver.mn.us/departments/public-services/planning-water-management/water-management/permits-rules>
2. Drainage and Utility Easements shall be provided over all wetlands, wetland buffers, conveyances providing drainage for more than one property (i.e. swales, culverts, sewer, etc.), stormwater management facilities used to meet governmental requirements (including access), 5 feet along side lot lines, 10 feet along front and back lot lines, and 10 feet along property lines.
3. All drainage systems shall be designed to accommodate stormwater runoff from all areas, including offsite contributing areas. If bypassing offsite flow is not feasible, the Engineer should be contacted early in the planning process to determine the desired solution on a case-by-case basis.
4. There shall be no compensation for storm sewer oversizing. Any increase in pipe size or additional depth necessary to perpetuate the drainage system shall be completed at the developer's expense. County or State highway improvements that are linked to a development may have cost sharing or oversizing costs if the project is tied to a regional transportation improvement.
5. All stormwater management calculations submitted for review shall include sufficient information to evaluate the changes to the stormwater drainage characteristics within the watershed areas affected by the proposed land disturbing activity. The applicant shall provide a **Stormwater Runoff Management Report** summarizing the overall drainage patterns and how requirements are being met. At a minimum, the report shall include routing calculations proving rate control, water

quality calculations indicating required reductions in runoff volume, water quality calculations indicating reduction in Total Suspended Solids (TSS) and Total Phosphorus (TP), stage-storage relationships proving required storage, and geotechnical analysis indicating soil types. The City may require the Developer to provide any additional information or data needed to complete the review.

6. The stormwater calculations submitted for review shall use standard hydrological and hydraulic analysis methods that are acceptable to the City. Calculations, which use unproven methodologies or apply proven methodologies incorrectly shall be determined by the City to be unacceptable and shall be returned for correction and resubmitted.
7. Maintenance agreements will be required for any stormwater runoff management facilities used to meet governmental requirements. Fees are established in City Ordinance 1100 for the City to assume inspection, management and maintenance of permeable pavements, filtration basins with Iron Enhanced Sand and systems placed for storm water reuse as a method of meeting water quality requirements. The City can provide its Maintenance Policy for meeting Development requirements.

B. Activities Subject to Storm Management

1. Construction activity that results in land disturbance of equal to or greater than one (1) acre or if a project is part of a common plan of development or sale that ultimately will disturb greater than one (1) acre.
2. Construction activities disturbing more than 10,000 square feet of land within a shoreland protection zone.
3. Any other land disturbing activity for which the City determines to have substantial erosion potential (i.e. steep slopes, drainage ways, proximity to wetlands, rivers, and lakes, etc.).
4. Other activity as required by the Carver County Water Management Organization or the State of Minnesota.

C. Stormwater Quality and Quantity Requirements

1. Proposed peak runoff rates shall be limited to existing peak runoff rates for the 2, 10, and 100 year – 24 hour rainfall events, utilizing the most current precipitation data available. The analysis shall be computed using SCS TR-20 or SCS TR-55 methodology. Additionally, the City reserves the right to require further outflow

reduction to ensure the combined runoff from piecemeal development does not compound to greater than the original condition.

2. Proposed improvements must result in a net reduction (on an annual average basis) of stormwater runoff discharge volume (unless precluded by limitations indicated in the NPDES Construction Stormwater Permit), Total Suspended Solids (TSS), and Total Phosphorus (TP).
3. On any project where the sum of the new impervious surface and the fully reconstructed impervious surface equals one or more acres, the water quality volume must be treated as follows:
 - i. For construction activity (excluding linear projects), the water quality volume must be calculated as one (1) inch times the sum of the new and the fully reconstructed impervious surface.
 - ii. For linear projects, the water quality volume must be calculated as the larger of one (1) inch times the new impervious surface or one-half (0.5) inch times the sum of the new and the fully reconstructed impervious surface. Where the entire water quality volume cannot be treated within the existing right-of-way, a reasonable attempt to obtain additional right-of-way, easement, or other permission to treat the stormwater during the project planning process must be made. Volume reduction practices must be considered first. Volume reduction practices are not required if the practices cannot be provided cost-effectively. If additional right-of-way, easements, or other permission cannot be obtained, owners of construction activity must maximize the treatment of the water quality volume prior to discharge.
 - iii. Volume reduction practices (e.g., infiltration or other) to retain the water quality volume on-site must be considered first when designing the permanent stormwater treatment system. Wet sedimentation basins and filtration systems are not considered volume reduction practices. If infiltration is prohibited (as outlined by the NPDES CSW and MS4 Permits), a wet sedimentation basin or filtration basin may be used.
 - iv. For non-linear projects, where the water quality volume cannot cost effectively be treated on the site of the original construction activity, the owners of the construction activity shall identify locations where off-site treatment projects can be completed. If the entire water quality volume is not addressed on the site of the original construction activity, the remaining water quality volume must be addressed through off-site treatment.

- v. Off-site treatment project areas shall be selected in the following order of preference:
 - a) Locations that yield benefits to the same receiving water that receives runoff from the original construction activity.
 - b) Locations within the same Department of Natural Resource (DNR) catchment area as the original construction activity.
 - c) Locations in the next adjacent DNR catchment area up-stream.
 - d) Locations anywhere within the permittee's jurisdiction.
 - e) Off-site treatment projects must involve the creation of new structural stormwater BMPs or the retrofit of existing structural stormwater BMPs, or the use of a properly designed regional structural stormwater BMP.
 - f) Off-site treatment projects must be completed no later than 24 months after the start of the original construction activity.
- 4. If an existing area has no outlet, or discharges to an area downstream with no outlet, the allowable post-development discharge shall be evaluated on a case-by-case basis. The developer may be required to pay for additional off-site drainage improvements to ensure adequate downstream drainage is maintained and nuisance conditions are not initiated.
- 5. In addition to requirements listed in the NPDES Construction Stormwater Permit, wet retention ponds shall also meet the following:
 - i. The pond shall have a safety bench extending from the edge of the water into the pond 10 feet with a slope of 10:1.
 - ii. The maximum pond slopes above and below the safety bench shall be no greater than 3:1 (horizontal to vertical).
 - iii. Any weir wall contained in an OCS shall have a keyed-in bottom, sealed sides, and shall be identified as such on the plans.
 - iv. One foot of freeboard shall be provided between the surface overflow and the top of the berm around the pond.
 - v. Berms constructed for pond containment shall have a compacted clay core. Top of dikes shall be minimum 8 feet wide, and a slope stability

analysis shall be required when in excess of 10 feet tall.

- vi. Interior pond slopes must be seeded with native seed meeting MnDOT Specifications. To reduce future maintenance and pond cleaning, landscaping, tree plantings, and tree preservation shall not occur on pond slopes and berms.
6. A 20-foot-wide Drainage and Utility easement shall be provided for all new stormwater management facilities to provide access for maintenance. The maintenance access location shall be identified on the plans and graded at a maximum slope of 12%. In some cases, a 12-foot-wide hard surfaced access may be required for access purposes.
7. Offsite areas contributing runoff to, or receiving runoff from, the site will be analyzed as appropriate to ensure no negative impacts will be associated with the development.

D. Low Floor/Low Opening Requirements

Low floor and low opening elevations shall be designed to meet the following:

1. Low opening of new and existing structures must have a minimum of 2 feet of separation from pond high water level.
2. Low floor of new and existing structures must have a minimum of 1 foot of vertical separation from pond high water level.
3. In cases where an emergency overflow (overland or pipe) is not feasible, the low opening vertical separation is increased to 3 feet.
4. Low road elevation shall be no lower than the 100-year HWL. For Landlocked water bodies the low road elevation shall be a minimum of 3 feet above the back-to-back 100-year storm events.

E. Storm Sewer Design

1. Storm sewer runoff shall be calculated with the Rational Method and the appropriate Intensity-Duration-Frequency (IDF) curves for the area.
2. Storm sewers shall be designed to maintain a gravity-flow condition for the 10-year IDF curve.
3. Trunk systems must pass the 100-year event without catch basin grate surcharge.

4. Design Velocities (10-year):
 - i. Internal storm sewers – 2.5 f/s to 15 f/s
 - ii. If a maximum velocity of 6 f/s cannot be maintained at the outfall, appropriate energy dissipation must be provided in accordance with the MnDOT Drainage Manual.
 - iii. Maximum channel and stream velocities shall be based on soil erodibility. Permanent channel reinforcement may be required, as approved by the city engineer.
5. Minimum storm sewer size shall be fifteen (15) for mainline pipe. Minimum storm sewer size for catch basin leads and culverts shall be twelve (12) inches.
6. Minimum orifice size shall be six (6) inches in all areas.
7. Storm sewers shall be laid straight in both horizontal and vertical planes between structures unless otherwise approved by the City.
8. All exposed storm sewer pipe ends shall have a flared-end section with a trash guard. Riprap with fabric shall be provided at all culvert outfalls for energy dissipation.
9. Storm sewers of differing diameters shall join at structures only. The invert elevations shall be adjusted to maintain the storm sewer hydraulic efficiency by matching the 0.8 diameter grade line elevations of the differing diameters for all diameter storm sewers to the maximum extent practical.
10. Inlets shall be provided so that surface water is not carried across or around street intersections and shall be spaced sufficiently as to not impede traffic due to flooded street conditions. Gutter spread analysis and grate inlet analysis may be required at the discretion of the City to ensure spread does not exceed 66% of the driving lane during the 10-year event. Inlets shall be provided at all low points and every attempt should be made to place at lot lines. An emergency overflow path shall be provided for low point catch basins.
11. Minimum depth of cover under paved areas shall be three (3) feet or as directed by the City to ensure pipe bells do not encroach on the aggregate base of the road section. Minimum depth of cover in green spaces shall be two (2) feet.

12. Draintile shall be placed along the back of all curb and connected to all curb inlets. Cleanouts shall be installed on all draintile lines greater than 300 feet between inlets, with a maximum spacing of 200 feet between cleanouts.
13. Sump pump connections shall be provided for all new lots. Connections may be provided by street draintile or a separate rear yard system.
14. Manholes shall be required as follows:
 - i. Where the storm sewer changes direction (horizontal or vertical).
 - ii. Changes in shape or size of pipe.
 - iii. Junctions of pipes
 - iv. Maximum spacing shall be four hundred (400) feet for sewers forty-two (42) inches diameter and smaller and five hundred (500) feet for sewers forty-eight (48) inches and larger.

F. Materials

1. As specified in the standard details and as follows:
2. Storm sewers shall be reinforced concrete pipe conforming to ASTM C-76 Wall B standards for round pipe or ASTM C-507 for elliptical pipe. Alternate materials will be considered in green areas if requested by the developer or engineer. Pipe joints of alternate materials that are not gasketed or connected to a standard manhole must be wrapped with fabric and sealed with tile tape.
3. Storm sewer pipe joints shall be "O" ring joints conforming to ASTM C-361.
4. Manholes, catch basins and inlets shall be pre-cast reinforced concrete conforming to ASTM C-478. Voids between the storm sewer pipe and manhole, catch basins, or inlet sections shall be filled with non-shrink grout.
5. Draintile shall be perforated Schedule 40 pipe complying with MnDOT 3278. Place cleanouts at pipe ends with a locatable metal watertight cap.
6. Castings
 - i. Inlet and catch basin frame and grates in paved areas shall be Neenah R-3067-V, or approved equal.

- ii. Inlet and catch basin frame and grates in non-paved areas shall be Neenah R-4342, or approved equal.
 - iii. Manhole frame and closed grates shall be Neenah R-1642-B, or approved equal, embossed with the City logo and the words "Storm Sewer".
7. Steps shall be Neenah R-1981-J, or approved equal, sixteen (16) inches on center.
 8. Chimney seals shall be external type Infi-Shield Uni-Band. Internal chimney seals will be considered in certain conditions.

G. Construction Requirements

1. Trench widths at the top of the excavation may vary depending upon the depth of the trench and the nature of the material encountered. However, the maximum allowable width of the trench at the level of the top of pipe shall be the outside diameter of the pipe plus twenty-four (24) inches.
2. When the bottom of the trench is soft, or where in the opinion of the City, unsatisfactory foundation conditions exist, the Contractor shall excavate to a depth to insure proper foundation. The excavation shall be brought up to grade with thoroughly compacted materials.
3. The bottom portion of the trench within three (3) feet of the finished ground surface shall be compacted to 95% of maximum proctor density. The top three (3) feet of the trench shall be compacted to 100% of maximum proctor density.
4. A minimum of two (2) and a maximum of six (6) adjusting rings, with a full bed of mortar between each, shall be used for manholes, catch basins, and inlets. Chimney seals shall be installed on all storm structures.
5. Lifting holes in structure sections and sewer pipe shall be plugged with concrete lift plugs and coated with bituminous material to form a watertight seal.
6. Headwalls and spillways are required and can be pre-cast or poured in place. All headwalls and spillways shall be designed in accordance with Mn/DOT Standard Specifications.
7. Pre-cast flared-end sections with trash guards are required on all retention-detention pond inlets and outlets.
8. The last 3 sections of all storm sewer outlets shall be tied.

9. Wing walls or flared-end sections are required on all storm sewers or culverts under driveways or roadways.
10. Prior to placing the storm sewer into service the system shall be cleaned by flushing and vacuuming the system. Sedimentation and debris shall not be washed through the system.
11. One (1) year after the completion of grading activities, ponds shall be pumped down to the bench level, inspected for sediment at inlets, cross-sectioned to confirm that they have been constructed to the proper volume and shape. Record plans shall be prepared for all ponding areas.
12. The City shall inspect all storm sewer construction before it is covered.

H. Testing Requirements

Closed Circuit Television – Storm sewers shall be cleaned and televised as required by the City. All runs of sewer between manholes shall be straight and true. Test results, logs, reports and videotapes shall become the property of the City.

VIII. Wetlands, Flood Plains, & Shore Lands

A. General

1. In addition to the requirements and guidelines listed in this section, all development and redevelopment must meet the requirements of the following when applicable:
 - i. MPCA's General Stormwater Permit for Construction Activity (MN R100001) as required by the National Pollutant Discharge Elimination System (NPDES).
<https://www.pca.state.mn.us/water/construction-stormwater>
 - ii. Carver County Water Rules Permit ensuring conformance with County Code.
<https://www.co.carver.mn.us/departments/public-services/planning-water-management/water-management/permits-rules>
2. Drainage and Utility easement shall be provided over all watercourses, drainageways, channels, streams, wetlands, lakes, and buffers for all new development.
3. Where any proposed plat adjoins a water body (lake, pond, river, stream, etc.) that flows only intermittently, the City may require that a strip of land running along all sides that are contiguous to such lake, pond, or stream, be dedicated to the City for public use, or subject to a perpetual easement in favor of the City for the purpose of protecting its hydraulic efficiency and natural character and beauty. There shall also be granted to the City the right of ingress and egress from the dedicated land. Conservation easements may also be utilized along buffer areas as required by the CCWMO or City. Each adjoining easement or water body must be signed as outlined in the final plat review or as detailed in the Developers Agreement.
4. The dedication of Conservation Easements as they relate to Water Quality and existing natural resources may also be required from County or State agencies.

B. Wetland Protection

1. The City of Waconia is the acting LGU for review and approval of wetland impacts within its boundaries per the Wetland Conservation Act (WCA).

2. A certified wetland delineator shall submit documentation to the existence or non-existence of wetlands located on the subject property and request an LGU-approved “no-loss” or “boundary determination”, as appropriate.
3. Included in the submittal will be a completed Minnesota Routine Assessment (MnRAM), Version 3.0, or floristic quality assessment for functional value determination.
4. The Developer is responsible for acquiring all necessary permits for proposed wetland drainage, fill, or excavation. Such permits shall include but are not limited to: US Army Corps of Engineers, MN DNR, WCA, and CCWMO. All permits shall be obtained prior to any wetland impacts commencing.
5. Wetland buffer signs shall be required for all wetlands that abut private property.
6. A surety is required when the development includes wetland mitigation. Contact the City for required amounts.

C. Flood Plain and Shore Land Provisions

1. Local shoreland controls must regulate placement of structures in relation to high water elevation. Where state-approved, local floodplain management controls exist, structures must be placed at an elevation consistent with the controls.
2. The shoreland area shall include all land within one thousand (1,000) feet of the ordinary high water mark of a protected water of ten (10) acres or more, within three hundred (300) feet of a river or stream, or the landward extent of a flood plain on such a river or stream, whichever is greater.
3. Shoreland management classification system. In order to guide the wise development and utilization of shorelands of protected waters for the preservation of water quality, natural characteristics, economic values and the general health, safety and welfare, protected waters in and around the city have been given shoreland management classifications. The public waters and watercourses of the city have been classified by the commissioner of natural resources. Any proposed development within the Shoreland Overlay District shall be reviewed by City Staff to ensure compliance with the standards within Section 900.06.7 of the City Code.
4. The purpose of the Flood Plain Overlay regulations is to promote public health, safety, and general welfare by preserving the natural characteristics and functions of watercourses and floodplains in order to moderate flood and storm water impacts, minimize losses and disruptions caused by flooding, improve water quality, reduce soil erosion, protect aquatic and riparian habitat, provide recreational

opportunities, provide aesthetic benefits and enhance community and economic development.

5. The Flood Plain Overlay regulations apply to all lands within the jurisdiction of the city that lie within the boundaries of the floodway, flood fringe and general floodplain districts. The boundaries of these districts are determined by scaling distances on the FIRM, or as modified in City Code Section 900.06.6. Flood Plain Overlay Regulations.
6. Any proposed development, grading or redevelopment in, near and/or around the Flood Plain Overlay District shall be subject to the standards identified in City Code Section 900.06.6. The developer/land owner shall work with city staff to identify the applicable flood plain district and how to conform with the existing regulations.

D. Other

1. Additional regulations apply to any property that contains a bluff or steep slopes. Local shoreland controls must regulate placement of structures in relation to high water elevation. Where state-approved, local floodplain management controls exist, structures must be placed at an elevation consistent with the controls.
2. The Developer shall work with City staff to determine if a bluff or steep slopes exist and to ensure compliance with the applicable local regulations.

IX. Water Supply

A. General

1. Watermains shall be extended to the development property lines as required by the City and all necessary fire hydrants (as required in the Uniform Fire Code) shall be provided. Extensions of the public water supply systems shall be designed to provide public water service to each lot with the minimum distance necessary. Watermains shall be routed so as to provide a loop of the City water system, promoting water quality and fire safety. There shall be no compensation to the developer to provide additional looping and to provide for the perpetuation of the system.
2. Design information from the City's water model will not be given. Designers shall field verify static and residual pressures near the project site and flow test nearby hydrants. City public works staff must be notified of the testing and must be present during the test.
3. Based on City policy, the City will pay material oversizing of the pipes plus 20% for material handling as compensation for watermain oversizing. The City shall determine the price of all materials based on current industry costs.
4. Any building that has a fire suppression system installed in it will be required to have a 6 inches or greater water supply line and separate supply lines for domestic and fire service.
5. The need for a fire suppression system must be verified with the local building inspector.
6. Fire department connection lock box locations to be verified with the Fire Chief. Lock boxes must be purchased from the City of Waconia.
7. Easements across lots or centered on rear or side lot lines shall be provided for utilities where necessary and shall be at least twenty (20) feet wide for water easements. Watermain installed a depths greater than ten (10) feet require wider easements. These widths will depend on depth, site conditions, and soil types and shall be approved by the Engineer.

B. Materials

1. Materials shall be as specified in the standard details and as follows:

2. Open Cut Watermain Materials

- i. Polyvinyl Chloride (PVC) Pressure Pipe shall be used for watermains unless otherwise approved.
 - a) PVC pipe shall meet the requirements of AWWA C900 and C905 as appropriate for the diameter specified.
 - b) Minimum pipe dimension ratio and pressure class shall be as follows unless otherwise shown on the plans:

	<u>DR</u>	<u>Pressure Class</u>
4" – 12" :	18	235 psi
14" – 24" :	21	200 psi

- c) Pipe shall be made of compounds conforming to ASTM D1784 with a cell classification of 12454.
 - d) Gasketed joints shall be bell and spigot type meeting the requirements of ASTM D3139 and ASTM F477. Nitrile gaskets are required on sites with fueling stations.
 - e) PVC water pipe shall be colored blue in accordance with all applicable industry color standards for potable water piping.
 - f) PVC pipe shall have DIP outside diameter, unless otherwise approved.
- ii. Ductile iron pipe watermain, when approved by the City, shall be in accordance with ANSI Specification A-21.51. All pipes shall be furnished with standard thickness cement mortar lining conforming to ANSI Specification A-21.4. All pipes shall have push-on joints as specified in AWWA C-111 and shall be electrically conductive. Minimum class of pipe to twelve (12) inches in diameter shall be Class 52 and minimum class over twelve (12) inches in diameter shall be Class 51. Alternate material types will be considered if requested by the Developer / Engineer.

3. Trenchless Watermain Construction Material

- i. Fusible C900/C905 PVC
 - a) Butt joint fused PVC pressure pipe conforming to the current requirements of AWWA C900 (DR 18) for pipe diameters 4.0-inch

through 12.0-inch or AWWA C905 (DR 21) for pipe diameters 14.0-inch through 24.0-inch. However, structurally stronger pipe may be required to ensure resistance to pulling stresses. Pipe shall be manufactured in ductile outside diameters. The pipe and components shall meet the requirements of ANSI/NSF 61 for the conveyance of potable water.

b) Pipe fusing shall meet manufacturer requirements.

ii. High Density Polyethylene (HDPE) Pipe

a) The pipe to be used shall be (HDPE) pressure pipe conforming to the requirement of AWWA C-906 of a 160 psi working pressure. The grade used shall be resistant to aggressive soils or corrosive substances present. Unless otherwise specified, the dimensions and tolerances of the pipe barrel shall conform to ductile iron pipe equivalent outside diameters.

b) The dimension ratio (DR) shall be 11.

c) HDPE pipe shall have butt-fused joints.

4. Water Service Pipe

i. 1-inch diameter shall be polyethylene (PE) service pipe conforming to Grade PE-3408 or PE-4710 and shall be rated for 200 psi working pressure, SDR9. SDR 9 CTS (Copper Tube Size) is also allowed as an alternative for services. Service must be installed with tracer wire.

ii. Copper pipe, if approved by the Engineer, shall conform to ASTM B88, Seamless Copper Water Tubing, Type K, Soft Annealed Copper.

iii. Service larger than 1-inch diameter shall be polyethylene (PE) service pipe conforming to Grade PE-3408 or PE-4710 and shall be rated for 200 psi working pressure, SDR9. SDR 9 CTS (Copper Tube Size) is also allowed as an alternative for services. Service must be installed with tracer wire.

5. The Contractor shall furnish and install polyethylene encasement and galvanic cathodic protection on all ductile iron main and all appurtenances in accordance with the referenced specification.

6. Fittings shall be ANSI Specification A-21.10, cast or ductile iron, mechanical joint or flanged, and shall conform to the same specifications as the ductile iron pipe.

7. All fittings, valves, hydrants, etc. shall be secured during installation utilizing COR-BLUE T-BOLTS or approved equal.
8. All furnished items including valves, hydrants etc. shall be constructed using stainless steel bolts.
9. Joint restraints shall be megalug or approved equal.
10. Gate valves shall be resilient seat valves conforming with AWWA C-509 or AWWA C-515.
11. Butterfly valves conforming with AWWA-504 for 150 psi minimum working pressure shall be used on water main twelve (12) inches in diameter and larger.
12. Hydrants shall be Waterous Pacer type WB-67 and shall conform to the following requirements:
 - i. Two 2-1/2 inches hose connections w/ Nat. Std. threads.
 - ii. One 4-1/2 inches pumper connection w/ Nat. Std. threads.
 - iii. 5-1/4 inches valve opening
 - iv. 6-inch diameter hub w/ mechanical joint fittings.
 - v. 1-1/2 inches pentagon operating nut.
 - vi. 8 feet-0 inches cover.
 - vii. 16 inches traffic section.
 - viii. Counter-clockwise opening.
 - ix. Epoxy coated base.
 - x. 304 Stainless steel base bolts.
 - xi. Bronze cross arm and epoxy coated upper and lower valve washers.
13. All fittings shall have been manufactured in the year of construction or prior calendar year.

14. Stainless steel saddles shall be provided for all corporation stops larger than 1.5 inches.
15. Curb boxes shall be eight feet long at full extension and shall be adjusted as required to match finished grade. Curb boxes shall be provided with a stationary rod.
16. All copper fittings shall be compression type. Flared type will not be allowed.
17. Air release valves shall be A.R. I. Model D-040 air and vacuum release valve minimum 1-inch size.
18. All threaded items used in the City of Waconia, including but not limited to mechanical joint connectors, flanged joint connectors, mainline valves, saddles, corporation stops, hydrants, and air release valves shall be furnished to the nominal size as specified with ENGLISH threads. Should the Contractor choose to supply any items with metric threads, the Contractor shall supply full shop drawings of the item(s) with special attention drawn to the metric thread designation proposed.

19. Utilities Location System

i. Tracer Wire

- a) All wire shall be rated for direct burial use at 30 volts. The insulation color shall meet the APWA color code standard for identification of buried utilities (blue for water, green for sewer). High density polyethylene (HDPE) insulation shall be ROHS compliant and utilize virgin grade material.
- b) Tracer wire for open cut trench installation shall be #12 AWG copper clad steel (CCS) wire with 30 mil HDPE insulation, as manufactured by Copperhead Industries, or approved equal.
- c) Tracer wire for directional drilling applications shall be #12 AWG Extra High Strength CCS wire with 45 mil HDPE insulation as manufactured by Copperhead Industries, or approved equal. The Contractor shall use a smaller wire gauge if increased breaking strength is needed.
- d) Tracer wire for pipe bursting, bore and jack or slip lining applications shall be SoloShot™ tracer wire, 7 x 7 stranded CCS with 50 mil HDPE insulation as manufactured by Copperhead Industries or approved equal.

- ii. At-Grade Access Boxes
 - a) Tracer wire access boxes for at-grade installation shall be SnakePit as manufactured by Copperhead Industries, or approved equal. Covers shall be cast iron, with locking pentagon nut and appropriate labeling, and color coded per utility. Covers shall have two tracer wire terminals inside the cover, with a removable electrical shunt between the terminals.
- iii. Test Stations
 - a) Tracer wire test stations to be installed at hydrants shall be Cobra T2 test station as manufactured by Copperhead Industries, or approved equal. The test station shall have two terminals with jumper, and shall include an HDPE or stainless steel flange for mounting to the hydrant. The test station shall be mounted on a 24.0-inch length of 1.0-inch diameter schedule 40 PVC pipe.

20. Galvanic Cathodic Protection

- i. Galvanic Anodes
 - a) Each anode shall be furnished with a lead wire attached to one end of the steel core. The entire connection shall be insulated with an electrical potting compound. The cable attached to the anode shall be No. 12 AWG, Type TW or THWN solid, single conductor copper.
 - b) Each anode shall conform to the following chemical composition:

Element	Percentage
Aluminum	0.010 Maximum
Manganese	0.50 to 1.30
Copper	0.02 Maximum
Nickel	0.001 Maximum
Zinc	0.05 Maximum
Iron	0.03 Maximum
Silicon	0.05 Maximum
Other	0.05 Each or 0.30 Maximum Total
Magnesium	Remainder

- c) The anode shall be prepackaged in a permeable cloth bag filled with a mixture of 75% ground hydrated gypsum, 20% powdered bentonite, and 5% anhydrous sodium sulfate.

ii. Cables

- a) All cables for test stations shall be Type THWN, stranded, copper, size as shown on the plans.
- b) All cables for pipe joint bonds shall be Type HMW/PE, stranded, copper, sized in accordance with the design criteria.

C. Construction Requirements

1. Watermain shall be placed with a minimum of seven and one-half (7.5) feet of cover over the top of the pipe.
2. Bollards must be installed to protect hydrants which are located within parking lots. Distance must be a minimum of 3 feet from hydrant and gate valve.
3. When the bottom of the trench is soft, or where in the opinion of the City representative, unsatisfactory foundation conditions exist, the Contractor shall excavate to a depth to insure proper foundation. The excavation shall be brought up to grade with thoroughly compacted materials.
4. The bottom portion of the trench within three (3) feet of the finished ground surface shall be compacted to 95% of maximum proctor density. The top three (3) feet of the trench shall be compacted to 100% of maximum proctor density.
5. Water services shall be extended from the main to the right-of-way line. One-inch services shall be the minimum required waterline.
6. All water services shall end at either a valve or curb stop. Service extensions beyond the service valve or curb stop are the responsibility of the parcel owner.
7. Tracer wire shall be provided on all PVC and HDPE watermain pipe, including services. Installation shall comply with Detail 8-313 for the general water plan, Detail 9-307 for hydrants and Details 9-309 and 9-310 for services.
8. Lock box location needs to be shown.
9. All watermains shall be flushed to the satisfaction of the City to remove debris from the line before being placed into service.
10. All hydrants and leads shall be wrapped with 8 mil polyethylene encasement material.

11. The City shall inspect all water supply facilities before they are covered.

D. Stormwater Reuse or Irrigation Mains

1. See Stormwater Reuse Standardization Policy.
2. A permit application must be accompanied by a drawing and plans for the installation. The applicant will be responsible to restore the disturbed areas to a condition acceptable to the City.
3. Meter and meter reading equipment shall be maintained by the City. Costs associated with the meter and reading equipment shall be the responsibility of the owner or association. In the event of any damage to the meter or reading equipment, it is the responsibility of the owner or association to pay costs related to repairs/replacement and restoration.

The City of Waconia shall be responsible for installation and removal of said irrigation meters within the time period to be determined by the City of Waconia, largely dependent upon weather conditions. In the event that a private maintenance company would like to perform start-up or shut down duties, they are required to contact the Public Services Department.

Prior to installation of the irrigation meter, annual proof of RPZ or backflow prevention testing and compliance must be provided to the City of Waconia and the City Inspection Office. Contact the Public Services Utility Supervisor to provide annual testing data at 952-442-2615 or PublicServices@waconia.org.

An annual fee of \$50.00 is required for each seasonal/irrigation meter.

4. The City of Waconia shall NOT be responsible for irrigation lines. The City will not maintain the lines, repair any leaks, nor be responsible for maintenance or any costs associated irrigation lines.

E. Testing Requirements

1. Pressure – Each section of watermain shall be subjected to a hydrostatic pressure of 150 psi, measured by a gauge at the lowest hydrant, for 120 minutes. The test will be considered successful when there is zero loss of hydrostatic pressure for a period of two hours. The gauge used to evaluate the pressure shall be graduated in one-pound increments.

2. Disinfection – Before being placed in service, the complete watermain installation shall be disinfected and flushed, and after the final flushing the water shall be tested for bacteriologic quality and found to meet the standards prescribed by the Minnesota Department of Health. Disinfection materials and procedures, and the collection of testing of water samples, shall be in accordance with the provisions of AWWA C-651 and as will meet the requirements of the Minnesota Department of Health.

The Contractor shall provide notice to the City when sample is ready to be taken. Contractor shall contact a City approved agent to collect and perform the test. Coliform bacteria shall not be present in the water sample. A copy of the test results indicating a satisfactory sample shall be given to the City prior to opening valves, which will connect the new pipe to the public system.

3. Qualified individuals shall perform all testing required in these guidelines. The Developer shall pay for all tests required in these guidelines. Copies of the test results shall be submitted to the Public Services Utility Supervisor: PublicServices@waconia.org.

F. Water Services

1. Tapping of any watermain must be cleared through the City. Hydrants and curb stops are to be operated by City of Waconia employees only.
2. Trench widths at the top of the excavation may vary depending upon the depth of the trench and the nature of the material encountered. However, the maximum allowable width of the trench at the level of the top of pipe shall be the outside diameter of the pipe plus 24 inches.
3. When the bottom of the trench is soft, or where in the opinion of the City representative, unsatisfactory foundation conditions exist, the Contractor shall excavate to a depth to insure proper foundation. The excavation shall be brought up to grade with thoroughly compacted materials.
4. The bottom portion of the trench within three (3) feet of the finished ground surface shall be compacted to 95% of maximum proctor density. The top three (3) feet of the trench shall be compacted to 100% of maximum proctor density.
5. House service pipe must be laid with sufficient waving to allow not less than one foot extra length per two hundred (200) feet and in such a manner as to prevent rupture by settlement.

6. Water service lines shall be PE SDR 9 (or type "K" copper if approved by the engineer) with compression fittings and a minimum of 1 inch in diameter for residential installations. For runs longer than one hundred (100) feet, 1.5 inches PE shall be extended from the main to beyond the back of curb. Multi-family, commercial and industrial connections shall be evaluated on a case by case basis. Alternate material types will be considered if requested by the Developer / Engineer.
7. All service lines 4 inches and greater will be ductile iron pipe, having continuity straps or C900 PVC pipe.
8. Hydrostatic test requirement is holding one hundred and fifty (150) psi for two hours.
9. Cul-de-sacs or dead ends servicing six (6) or fewer residential homes shall be serviced with 6 inch watermain rather than 8 inch unless it is looped.
10. Water shall be installed at a minimum depth of seven and one-half (7.5) feet.
11. Watermain valve spacing shall be such that no more than 20 residential units or 2 commercial / industrial units will be vulnerable to a single watermain break.
12. Hydrants shall be placed at each intersection and spacing shall not exceed 400 feet
13. Joints are not allowed within ten (10) feet of the building.
14. The curb stop must be brought to proper grade.
15. Curb stops shall be placed midway between the side property lines to reduce the possibility of the curb stop being placed in a driveway. However, if the curb stop is located in the driveway, it must have a 6-inch Ford Meter Box to protect the top of the curb stop. See Standard Detail 9-308.
16. Bent curb stops shall be replaced by the Contractor.
17. All joints and connections shall be left uncovered until inspected and tested at normal water line pressure.
18. No water pipe shall be connected with any pump, well tank, or piping that is connected with any other water supply other than the municipal system.
19. No person shall permit water from the water system to be used for any purpose except upon his own premise unless written consent is first obtained from the City.

20. No water service pipe shall be laid under a building or permanent structure.

21. Only City utility staff members are permitted to operate valves.

22. Approved Corporation Stops, Curb Stops, Tapping Saddles and Curb Boxes

- i. All water service pipe and appurtenances shall use compression type connections. Flare type connections are not allowed. The following will be considered as the basis for quality of products:

WATER SERVICE PIPE & APPURTENANCES					
ITEM:	SERVICE PIPE SIZE	COMPRESSION TYPE Valves & Fittings			
		For TYPE K COPPER & POLYETHYLENE PIPE			
		FORD MODEL #	A.Y. McDONALD / SMITH BLAIR MODEL #	MUELLER MODEL #	
Corporation Stop		FORD	A.Y. McDONALD	MUELLER	
	3/4"	FB1000-3-Q	4701BQ	B-25008	
	1"	FB100-4-Q	4701BQ	B-25008	
	1.25"	FB1000-5-Q	4701BQ	B-25008	
	1.5"	FB1000-6-Q	4701BQ	B-25008	
Tapping Saddle		FORD	FORD	SMITH-BLAIR SMITH-BLAIR	MUELLER
		for WMN	DIP for WMN	PVC	
			for DIP WMN	for PVC WMN	
	3/4"	F202	FS303	313 372	N/A
	1"	F202	FS303	313 372	N/A
	1.25"	F202	FS303	313 372	N/A
1.5"	F202	FS303	313 372	N/A	
Curb Stop		FORD	A.Y. McDONALD	MUELLER	
	3/4"	B44333MQ	6104Q	P-25155	
	1"	B44444MQ	6104Q	P-25155	
	1.25"	B44555MQ	6104Q	P-25155	
	1.5"	B44666MQ	6104Q	P-25155	
Curb Box	1.25" Diam. for 3/4" to 1.25" Curb Stops	FORD 8'- EM2-80-56	A.Y. MCDONALD 5614	N/A	
Curb Box	2" Diam. for 1.5" to 2" Curb Stops	FORD 8'- EM2-80-57	A.Y. MCDONALD 5615	N/A	

X. Sanitary Sewer

A. General

Sanitary sewer main shall be extended to the development property line as required by the City with no additional compensation to the Developer. Public sanitary sewer main and service connections shall be approved by the City and installed to provide service to each lot with the minimum distance necessary. Service cleanouts and inspection manholes shall be provided as directed by the City.

Easements across lots or centered on rear or side lot lines shall be provided for utilities where necessary and be at least twenty (20) feet wide for sewer easements. Sanitary sewer installed at depths greater than ten (10) feet shall require wider easements. These widths will depend on depth, site conditions, and soil types and shall be approved by the Engineer.

Based on the City policy, the City will pay material oversizing of the pipes plus 20% for handling as compensation for oversizing. The City shall determine the price of all materials based on current industry costs.

Minimum invert elevations shall be set on all trunklines and all stubs to minimize the gravity flow potential to the adjacent sites without developing prohibitive main-line sewer depths. The developer shall not be reimbursed for the costs associated with extra depth construction.

Construction requirements for lift stations and forcemain are provided in the City's Sanitary Sewer Lift Station Standardization Policy.

B. Materials

1. Materials shall be as specified in the standard details and the following:
 - i. Polyvinyl chloride pipe (PVC) shall be used for gravity sewers 8 inches through 15 inches diameter up to a maximum cover of twenty (20) feet and shall conform to ASTM Specification D-3034. A continuous extrusion process using Type 1, Grade 1 material as defined in ASTM Specification D-1784, shall be used to produce pipe. SDR 35 pipe shall be used up to twenty (20) feet in depth; SDR 26 shall be used from twenty (20) feet to thirty (30) feet in depth. Materials for depths exceeding thirty (30) feet shall be evaluated on a case by case basis.

- ii. Over 15-inch Diameters: Smooth-walled polyvinyl chloride pipe and fittings shall conform with the requirements of ASTM F679 with a minimum wall thickness for a minimum pipe stiffness of 46, for depths less than 18.0-feet, unless otherwise specified in the plans. A minimum pipe stiffness of 115 shall be used for depths exceeding 18.0-feet, unless otherwise specified on the plans.
 - iii. Minimum SDR 26 for all service pipe and service wyes is required.
- 2. Manholes shall be pre-cast reinforced concrete conforming to ASTM C-478. All structures shall have pre-cast pipe connection openings with watertight resilient rubber boots for the pipe to manhole connections.
- 3. Exterior chimney seals are required on all sanitary manholes. Chimney seals shall be external as manufactured by Infi-Shield, or equal. Internal chimney seals may also be required when manholes are located adjacent to a wetland or body of water.
- 4. Castings shall be Neenah R-1642-B, or approved equal, embossed "Sanitary Sewer". See Standard Detail 10-001.
- 5. Steps shall be Neenah R-1981-J, or approved equal, 16 inches on center.
- 6. Air release valves shall be A.R.I. Model D-020 air and vacuum release valve, minimum 2-inch size.
- 7. Tracer wire shall meet the requirements of Section 9. 2.S, Utility Location System.

C. Construction Requirements

- 1. Trench widths at the top of the excavation may vary depending upon the depth of the trench and the nature of the material encountered. However, the maximum allowable width of the trench at the level of the top of pipe shall be the outside diameter of the pipe plus twenty-four (24) inches.
- 2. When the bottom of the trench is soft, or where in the opinion of the City representative, unsatisfactory foundation conditions exist, the Contractor shall excavate to a depth to insure proper foundation. The excavation shall be brought up to grade with thoroughly compacted materials.
- 3. The bottom portion of the trench within three (3) feet of the finished ground surface shall be compacted to 95% of maximum proctor density. The top three (3) feet of the trench shall be compacted to 100% of maximum proctor density.

4. A minimum of two (2) and a maximum of six (6) adjusting rings, with a full bed of mortar between each, shall be used for manholes.
5. Lifting holes in structure sections and sewer pipe shall be plugged with concrete lift plugs and coated with bituminous material to form a watertight seal.
6. Sewer services shall be extended, at a minimum, from the main to the street right-of-way line. Sewer services may be placed directly into manholes only in cul-de-sacs.
7. Outside drop manholes are required when influent pipe is more than 24 inches above the manhole invert. The outside drop pipe and the first pipe section upstream of the drop shall be DIP Class 52 pipe with stainless hardware and shall have galvanic cathodic protection. See Section 9.2. T. for cathodic protection requirements.
8. Inside drop manholes are NOT allowed.
9. Prior to placing the sanitary sewer into service the system shall be cleaned by flushing and vacuuming the system. Sedimentation and debris shall not be washed through the system.
10. In areas where uncompleted sanitary sewer manholes are subject to flooding, the contractor shall make the sanitary sewer system watertight by using pneumatic balls.
11. The City shall inspect all sanitary sewer construction before it is covered.
12. Tracer Wire
 - i. Tracer wire shall be provided on all sanitary sewer, including all services.
 - ii. Installation shall comply with Section 9.2.S, Utility Location System and with Detail 10-300 for the general sewer plans, Details 10-301 and 10-302 for services and Detail 10-303 for manholes.

D. Testing Requirements

1. Closed Circuit Television - All sanitary sewers shall be cleaned and televised. All runs of sewer between manholes shall be straight and true. Test results, logs, reports and videotapes shall become the property of the City.

2. Air Testing – The air test shall be made when the sewer is clean. The line shall be plugged at each manhole with pneumatic balls. Low pressure shall be introduced into the plugged line until the internal pressure reaches 4.0 PSI greater than the average back pressure of any ground water pressure that may submerge the pipe. At least two minutes shall be allowed for the air temperature to stabilize before readings are taken and the timing started.
3. The portion being tested shall pass if it does not lose air at such a rate as to cause the pressure to drop from 3.6 to 3.0 PSI in less time than one-half minute per inch in diameter of the pipe tested.
4. Mandrel – Maximum 5% deflection for all PVC pipe, thirty (30) days after installation.
5. Qualified individuals shall perform all testing required in these guidelines. The Developer shall pay for all tests required in these guidelines. Copies of the test results shall be submitted to the City.

E. Sewer Service Requirements

1. Four (4) inch sanitary sewer services are required on residential homes. The City must approve commercial applications.
2. Pipe must be PVC SDR 26 for residential and commercial installations.
3. The sewer service line must be installed at a minimum depth of ten (10) feet, except if greater depth is required for gravity service to the residence or commercial building.
4. Services shall be installed at a slope not less than $\frac{1}{4}$ inch per foot.
5. Ninety (90) degree bends are not permitted on a sanitary sewer service. The use of two forty-five (45) degree bends and a length of pipe to make a sweeping bend is permitted.
6. Use of a rubber donut gasket or furnco to connect to City sewer is NOT acceptable. An 8-inch x 6-inch glued fitting is acceptable.
7. Glued or mechanical gasketed joints are acceptable, however they must pass the air test, five (5) psi for five (5) minutes.

8. Cleanouts must be installed at least every ninety (90) feet on lengthy sewer services. Cleanouts must also be installed wherever a bend is installed. Cleanout caps must be metal and watertight.
9. If any pipe is laid across a septic tank, the tank must be filled and the portion of the pipe over the tank must be D.I.P.
10. All excavations required for the installation of the building sewer shall be open trench work unless otherwise approved by the City.
11. Whenever possible, the building sewer shall be brought to the building at an elevation below the basements floor. The depth shall be sufficient to afford protection from frost.
12. No sewer service line shall be installed under a building or permanent structure.
13. Sanitary sewer services shall be placed midway between property lines to reduce the possibility of the service being located under a driveway.
14. Tracer wire shall be installed to the end of the sewer service stub as described in Section VI, Underground Utility Location System and as shown on Standard Detail 10-301.

XI. Streets

A. Dedication

Streets shall be dedicated on the plat to the public. The location and design of streets shall consider existing and planned streets, accommodate anticipated traffic circulation, topography conditions, runoff of stormwater, public convenience, safety, and the proposed land uses of the property to be served. Private streets are also allowable on a case-by-case basis.

B. Design Guidelines

1. Public street right-of-way and pavement widths shall be consistent with the comprehensive plan and official map and shall conform to county and state standards for trunk highways and county roads. If no such plans or standards are applicable, right-of-way widths for local streets shall not be less than the following:

<u>Classification</u>	<u>Right-of-Way Width (feet)</u>	<u>Pavement Width (feet) Measured from back of curb</u>
Arterial	100 - 150	44 Min.
Parkway	80	42 Min.
Collector	80	40 Min.
Local Street	50 - 66	28-34

Right-of-way widths at the discretion of City staff or its Engineer may be increased to meet Traffic Management Plans or to provide additional parking, traffic calming, etc. as necessary to promote health, safety, and general welfare.

2. Standard Street Section

- i. A geotechnical investigation and analysis shall be performed, and it shall provide recommendations for the street sections based on soil conditions and projected traffic.
- ii. The minimum street section based on subgrade which passes test rolling shall consist of:

	<u>Standard Street</u>	<u>Truck Section</u>
Bituminous Wear Course	1.5"	1.5"
Bituminous Binder	-	2.0"
Bituminous Non-Wear Course	3.0"	3.0"
Aggregate Base	8.0"	12.0"
Select Granular Borrow	12.0"	12.0"
Geotextile Fabric	Yes	Yes

- iii. Subgrade areas which do not pass test roll shall be corrected as approved by the City. Correction options include:
 - a) Aerating and recompacting subgrade soils.
 - b) Subcutting the subgrade and filling with suitable on-site soil, stabilizing aggregate or select granular borrow.
3. Intersections - Streets shall intersect at right angles. In no case shall the angle formed by the intersection of two streets be less than sixty-degrees (60). Intersections having more than four entering street segments are prohibited.
4. Median islands in cul-de-sacs and at street intersections will require verification that they can accommodate bus turning movements and snow removal operations.
5. On-street and off-street parking are necessary within townhome and twinhome developments to accommodate both resident and guest parking at a rate of not less than one guest-parking stall per two units. Other parking regulations are as follows:
 - i. 28-foot street sections – one-sided parking permitted
 - ii. 34-foot street sections – two-sided parking permitted
 - iii. Other streets – to be determined on a case by case basis.
6. Centerline Grades - All centerline grades shall be at least 0.5% and shall not exceed 5% for arterials and 8% for all other streets and alleys. Whenever possible, grades within fifty (50) feet of intersections or railroad crossings shall not exceed 3%.
7. Access - Arterial / Collector Streets.
 - i. There shall be no direct vehicular access from individual lots to arterial or collector streets. Access to arterial streets shall be at intervals of not less than 1/4 mile and through existing and established crossroads. Access along collector streets will be restricted and controlled on the final plat.
 - ii. Access to commercial or industrial developments shall be provided to maximize safe efficient travel within and adjacent to the subdivision.
8. Half Streets - Half streets shall not be approved.
9. Stop signs are needed at all commercial and industrial exits onto local roadways.

10. Private Streets - Private street sections and configurations shall be evaluated on a case-by-case basis and may be permitted.
11. Cul-de-sacs - The use of cul-de-sacs is acceptable where appropriate due to existing topography, vegetation, etc. In no case shall a street ending in a cul-de-sac exceed five hundred (500) feet. Lot lines abutting cul-de-sacs shall be radial except in extreme cases where the City may grant permission for an alternate configuration. All cul-de-sac designs shall have a minimum radii of 45 feet and must accommodate the turning movements for emergency vehicles.
12. Street Arrangements - The arrangement of streets in new developments or plats shall be laid out so as to provide a continuation of existing streets of adjoining areas, whether in the City or in adjoining governmental developments. Streets shall be constructed to the development property line where required.
13. Temporary Cul-de-sacs - Temporary cul-de-sacs will be required where a future public street will connect to a temporary street stub. The maximum length of a street with a temporary cul-de-sac shall be seven hundred and fifty (750) feet. The minimum surface diameter shall be sixty feet (60), without curb and gutter.
14. Four (4) foot concrete aprons are required for all residential, commercial, and industrial driveways. No single driveway shall have a width in excess of twenty-eight (28) feet.
15. Curb Return Radius - The following curb return radius information at intersections shall be used:

	<u>Curb Return Radius (feet) at Intersections</u>			
	<u>Local (28')</u>	<u>Local (34')</u>	<u>Collector (40')</u>	<u>Arterial</u>
Local (28' wide)	20			
Local (34' wide)	20	20		
Collector (40' wide)	25	25	30	(1)
Parkway	30	30	35	(1)
Arterial			(1)	(1)

Note: (1) To be evaluated on a case by case basis

C. Materials

1. Street construction materials shall be in conformance with the Minnesota Department of Transportation, Standard Specifications for Construction, current Edition and all subsequent revisions, except as specifically altered or modified herein.

2. Fill materials shall be subject to the approval of the Engineer. All materials found to be unsuitable for fill shall not be used. This fill material may be either the granular unclassified excavated material from the project or approved granular materials hauled onto the site. All materials intended for use as fill shall be clean and free from rocks, roots, stumps, clay lumps, and other deleterious material.
3. Aggregate Base shall be Class 5, 100% modified (100% crushed limestone) or approved equal.
4. Geotextile Fabric – MnDOT Type V (3733)
5. Bituminous material shall conform to Mn/DOT 3151. All asphalt binder shall meet AASHTO M 320, Specification of Performance Graded Asphalt Binder. For overlays and new construction PG 58-28 is required. Only asphalt binder from a certified source will be allowed.
6. Recycled asphalt pavement (RAP) will be allowed in the base and binder courses only. RAP will not be allowed in the wearing course.
7. Bituminous surface mixture shall be in accordance with Mn/DOT 2360.
 - i. Streets with AADT less than 2300
 - a) Non-wearing Course – Type SP12.5 Mix (2,C) SPNWB230C
 - b) Wearing Course – Type SP 9.5 Mix (2,C) SPWEA240C
 - ii. Streets with AADT more than 2300
 - a) Non-wearing Course – Type SP12.5 Mix (3,C) SPNWB330C
 - b) Wearing Course – Type SP 9.5 Mix (3,C) SPWEA340C
 - iii. Aggregate shall meet the requirements of Mn/DOT 3139 and the gradations for each type of mix.
8. Tack coat is required between bituminous lifts and on the edges of adjacent structures such as curb and gutter and driveways. Bituminous material for tack coat shall be Anionic Emulsified Asphalt SS-1 or RC-250 in accordance with Mn/DOT 2357.
9. Material for concrete curb and gutter shall be in accordance with Mn/DOT 2531 with the following exceptions:

- i. Concrete mix number 3A22 shall be used for concrete placed with a slip form machine.
 - ii. Concrete mix number 3A32 shall be used for concrete placed manually.
- 10. Subsurface draitile shall be PVC Schedule 40 perforated pipe. Draitile is required along the outside edge of all streets, crossing the road between low point structures, and as necessary to allow for sump pump service connections, and as required by the Engineer.
- 11. Permanent pavement markings for application on the final roadway bituminous wearing course shall be:
 - i. Epoxy resin pavement markings, in accordance with MnDOT specification section sections 2582 and 3590.
 - ii. Drop-on glass beads, in accordance with MnDOT specification sections 2582 and 3592.
 - iii. The City reserves the right to request acrylic latex paint in certain locations.
- 12. Permanent pavement markings for application on final parking lot bituminous wearing course shall be:
 - i. Acrylic latex traffic paint in accordance with MnDOT specification sections 2582 and 3591.
 - ii. Drop-on glass beads, in accordance with MnDOT specification sections 2582 and 3592.
- 13. All signing materials shall conform to the requirements of MnDOT specification 3352 and all supplemental specifications thereto.
- 14. All signs shall be constructed in accordance with the “Manual for Uniform Traffic Control Devices” latest edition shall apply.
- 15. Street signs and applicable materials/parts shall be obtained by the City from one of the companies listed below, installed with materials, labor, and equipment charged to the Developer/Owner for their placement:
 - i. Safety Signs – Lakeville, MN
 - ii. Newman Signs – Jamestown, ND

- iii. Gopher Sate – St. Paul, MN (sign hardware)
- iv. Or approved equal

D. Construction Requirements

1. Common excavation and embankment – Mn/DOT 2105.
2. Subgrade - The Contractor shall be required to grade the subgrade surface to within 0.1 foot of the elevation as shown on the Plans or as directed by the City.
3. Aggregate Base – Mn/DOT 2211. The aggregate base shall be compacted to 100% of the Standard Proctor Density and shall be placed to within 0.05 feet of the design grade as shown on the plans.
4. Plant-mixed Bituminous
 - i. Bituminous pavement shall be placed only during daylight hours and over a dry surface. Mixtures may be placed when the air temperature is thirty-three (33) degrees Fahrenheit or more and rising, but shall not be placed when the air temperature is forty-degrees (40) Fahrenheit or less and falling. Mixtures shall not be placed when, in the opinion of the City, the weather or roadway conditions are considered unfavorable. No bituminous pavement shall be placed after November 1, without written permission from the City. No bituminous pavement shall be placed until the City approves the base. The final surface shall not be constructed until at least one construction season after the bituminous base construction is completed.
 - ii. Compaction shall be by the Ordinary Compaction Method for all base and surface courses. A control strip shall be constructed at the beginning of each course. A rolling pattern shall be established for each roller. Compaction shall commence as soon as possible after the mixture has been spread to the desired thickness and shall continue until no appreciable increase in density can be obtained by additional roller coverages. Densities will be determined by means of a portable nuclear testing device or suitable approved alternate. The contractor shall furnish documentation of the growth curve to the Engineer.
 - iii. After compaction, the thickness of each course shall be within +/- ¼ inch of the thickness shown on the plans for that course. Materials used for any excess mixture will be excluded from pay quantities.

- iv. The longitudinal joint in the center of the road will be made last and shall overlap any previously laid bituminous course longitudinal joint by at least six (6) inches. Traverse joints in adjacent strips shall be separated by a minimum of five (5) feet. Connections to an existing asphalt mat shall be allowed only after the existing mat has had vertical joints prepared for final connection. A uniform coat of RS or RC bituminous material shall be sprayed on the existing surface to be matched into.
- v. Base course paving is not permitted until 14 days after the sewer televising has been submitted.

5. Concrete curb and gutter

- i. Reinforcing rods shall be placed in the curb and gutter at all catch basins and where the curb crosses service or mainline utility trenches.
- ii. A spray membrane type of curing agent shall be used on all concrete within one hour after the concrete is finished and “broomed”. In the event of rain or frost, the Contractor shall cover the concrete with plastic or take other necessary precautions. Any concrete damaged by rain, hail, or freezing shall be removed and replaced at the Contractors expense.

6. Concrete valley gutters are required where drainage across an intersection is less than 1.0%. Unless restrictive conditions exist, the minimum valley gutter width shall be 4 (four) feet. See Detail 11-100.

7. The base and pavement structure for alleys shall be constructed to the same standards as streets.

E. Testing Requirements

1. Subgrade Preparation

- i. The Developer shall have soils analysis prepared for the street within the project area. The soils report shall identify all peat, muck, organic, black dirt and other unsuitable material to be removed from beneath the subgrade.
- ii. The Contractor shall furnish a tandem truck, or similar weighted vehicle, loaded with a minimum of 14 tons to check the completed subgrade and/or base for any soft spots that may exist. Soft areas shall be removed

and replaced with satisfactory material before completing subgrade or base preparation. Maximum deflection of 1-inch is permitted. The City engineer must be present for all test rolls.

2. Geotextile Fabric – Certification documentation required.
3. Compaction Tests in accordance with Mn/DOT 2105, Paragraph F-1, Specified Density Method.
4. Aggregate Base Analysis – Gradation.
5. Bituminous Mixture Analysis – Gradation, bituminous extraction, density. Asphalt content shall be determined by the mix design formula method, which shall be submitted to and approved by the City.
6. Concrete Analysis – Slump, air, strength. Mix design may be required.
7. Qualified individuals shall perform all testing required in these guidelines. The Developer shall pay for all tests required in these guidelines. Copies of the test results shall be submitted to the City.

XII. Sidewalks and Trails

A. General

1. Trail design shall conform to the requirements of the most current edition of the “MnDOT Bikeway Facility Design Manual” produced by the Minnesota Department of Transportation.
2. Trail and sidewalk locations should be evaluated in association with the Master Sidewalk and Trail Plan, the City’s Comprehensive Plan, and adjacent pedestrian facility systems.
3. Sidewalks and trails shall not be located less than one foot from the property line, nor be adjacent to the curb except as determined to be necessary. Sidewalks and trails in commercial and industrial areas shall be located to conform to the anticipated pedestrian flow of the development.
4. Sidewalks and trails shall slope a maximum of 2% towards the street and the profile grades shall conform to the street grades.
5. Sidewalks shall be constructed of concrete and have a recommended width of six feet (6’) (where space is limited five feet (5’) will also be acceptable) unless otherwise required by the City. See Detail 12-100.
6. Trail width shall be nine to ten (9’-10’) feet unless otherwise required by the City. In cases where the trail also serves as an access route for a utility main or a stormwater maintenance feature, wider and/or heavier trail sections may be required.
7. Trails shall be constructed of bituminous over an aggregate base. The aggregate base shall exceed the width of the trail by 1 (one) foot on each side. See Detail 12-300.
8. The City may require accent or security lighting. Such lighting shall be in a form and style approved by the City. A lighting plan must be included in the plans.
9. Trails shall be located within easements or dedicated right-of-way.
10. Trail improvements shall provide definition to discourage trespassing onto private property. Such definition may include open fencing, landscaping, and / or berms.

B. Materials

Materials used for trail and sidewalk construction shall meet the same requirements of those used for street construction.

C. Construction Requirements

1. Long steep slopes should be avoided. A maximum grade of 6% is preferred, however in extreme cases the City may allow a maximum grade of 8%. A maximum grade of 2% should be used at intersections with streets or other trail ways to allow adequate time to stop. All trunk sidewalk and trail segments, as determined by the City, shall meet ADA requirements.
2. Avoid sharp or sudden changes in horizontal and vertical alignment. Provide adequate site distance for bicycles at intersections and on vertical changes in alignment. Provide a minimum of ten (10) feet clearance from the ground for vertical obstructions (trees, power poles, signs, etc.).
3. Bicycle trails to be marked and signed as required by the Engineer.

D. Testing Requirements

1. Testing of trail and sidewalk construction materials shall be the same as for street construction.
2. Qualified individuals shall perform all testing required in these guidelines. The Developer shall pay for all tests required in these guidelines. Copies of the test results shall be submitted to the City.

E. Retaining Walls

1. General
 - i. Retaining walls shall be constructed with precast concrete block, either modular block or segmented (large) block, as indicated on the plans or determined by the City.
 - ii. Retaining walls shall be constructed in the locations and configurations as shown on the plans; however, the engineer reserves the right to alter alignments to improve constructability and/or aesthetics.
 - iii. Geosynthetic wall reinforcement (if required) shall be designed as part of the block retaining wall system and shall be certified by the designer of the retaining wall system that it meets the necessary strength and durability criteria for the application.

- iv. All walls shall have cap units placed and glued on the top of the wall.
- v. The Contractor shall submit detailed design drawings and computations for the construction of the block retaining wall. The drawings and computations shall include, but not be limited to footing/foundation drawings, wall details, anchoring requirements, compaction requirements, subdrainage details and other drawings and details that are appropriate for the successful completion of the project.
- vi. Wall design shall be based on NCMA design manual. All drawings submitted by the Contractor shall be certified and signed by a Professional Engineer licensed in Minnesota.
- vii. A subsurface drainage system is required.

Fence with type to be selected by the City shall be constructed at the top of all walls over 4 feet in height.

2. Materials

- i. Concrete Segmental Wall Units
 - a) Segmental Units shall be one of the following:
 - ReCon Block (Rustic Pattern) - Manufactured by ReCon Wall Systems, Inc., 2311 Wayzata Blvd., Minneapolis, MN 55405.
 - Redi Rock (Cobblestone face pattern) - Manufactured by Redi Rock International, 05481 US 31 South, Charletvoix, MI 49720.
 - Other approved equals as listed on Mn/DOT's approved products list.
 - b) Units shall be integral colored or stained to be tan in color. A test panel shall be stained and reviewed by the Engineer and the City for approval. Color variations will be made onsite at the request of the Engineer until a color is accepted for staining of the retaining wall.
 - c) The retaining wall blocks shall be textured block such as Rustic by Recon Block or a Cobblestone face by Redi Rock.
- ii. Modular Block Wall Units
 - a) Modular Block wall units shall be integral colored with tan color. Units shall be one of the following:

- Diamond Pro as manufactured by Anchor Block Company.
 - Classic 8 as manufactured by Rockwood Retaining Walls.
 - Square Foot as manufactured by Versa-Lock Retaining Walls.
 - Standard Unit as manufactured by Keystone Retaining Walls.
- b) The wall units shall comply with ASTM 1372 except that the units shall comply with the Mn/DOT requirements for compressive strength and freeze/thaw durability.
- c) Units shall be integrally colored with tan color. Color sample shall be approved by the City prior to block manufacture and delivery.
- iii. Surface Sealer
- a) Surface sealers shall meet the requirements on file in the Mn/DOT Concrete Engineering Unit. The list may also be viewed on the Mn/DOT website at:
www.mrr.dot.state.mn.us/pavemnet/concrete/products.asp.
- iv. Geosynthetic Wall Reinforcement
- a) Polyester fiber geogrid or geotextile, or polypropylene woven geotextile, as shown on the plan or as recommended by the retaining wall block manufacturer.
- v. Sub-Surface Drains
- a) Perforated PVC drain pipe, Schedule 40.
- vi. Granular Materials
- a) The drainage aggregate shall conform to the requirements of Mn/DOT 3149-H for coarse filter aggregate.
- b) The granular backfill shall be select granular borrow conforming to Mn/DOT Spec 3149 modified as follows:
- Pit-run or crusher-run material that is graded from coarse to fine such that 100% of the material must pass the 2 inch sieve and that the ratio of the proportion passing the #200 sieve divided by the portion passing the 1 inch sieve (#200/1" ratio) may not exceed 10% by mass.

vii. Construction Adhesive

- a) Exterior grade adhesive as recommended by the retaining wall unit manufacturer or where shown on the plans.

3. Construction Requirements

- i. Erect wall units in accordance with the certified design and manufacturer's instructions and recommendations.
- ii. Check each course for level and alignment. Adjust units as necessary to maintain level and alignment prior proceeding with each additional course.
- iii. Wall backfill beyond the drainage aggregate within reinforcement zone shall be granular material compacted to 95% of standard Proctor maximum density.
- iv. See Detail Sheets 12-500 and 12-501 for retaining wall construction details

4. Testing Requirements

- i. Soil density testing shall be done on the retaining wall backfill.

F. Fence

1. General

- i. Fence types typically utilized for Waconia public improvement projects include wood rail, chain link and ornamental steel. Other types of fence may be used subject to approval by the City of Waconia Public Services Department.
- ii. MnDOT Specification 2557 shall apply to fencing except as modified herein.

2. Materials

- i. Wood Rail Fence
 - a) Wood rail fence shall consist of split cedar rails and posts conforming to MnDOT 3413. Fence shall have three rails with a height of 4.0 feet to the top of the top rail. Posts shall be set 2.5 feet deep and spaced not to exceed 10.0 feet. See Detail 12-600.
- ii. Chain Link Fence

- a) Wire for chain link fabric shall be helically wound and woven to a height shown on the plans. Chain link fabric shall meet the requirements of ASTM A392 for the following:
 - 2-inch mesh
 - 9-gauge wire
 - Class 2 zinc coating (2.0 oz./sq.ft. minimum)
- b) Vinyl Coating
 - All fabric, posts, rails and hardware shall be black vinyl coated with a low to medium gloss in compliance with Mn/DOT 3376.2C.
- c) Post, Gates, Top Railing Bracing
 - See Detail 12-601 for descriptions and details.
- iii. Ornamental Steel Fence
 - a) See detail 12-602 for descriptions and details.
 - b) Manufacturer:
 - Hecksel Machine, Watertown, MN
 - Ess Brothers & Sons, Inc., Corcoran, MN
 - Approved equal
 - c) Materials
- iv. Steel material for fence framework (i.e. tubular pickets, rails and posts), when galvanized after forming, shall conform to the requirements of ASTM A1011/A1011M, with a minimum yield strength of 50,000 psi (344 MPa). The exterior shall be hot-dip galvanized with a 0.45 oz/ft² (138 g/m²) minimum zinc weight. The interior surface shall be coated with a minimum of 81% nominal zinc pigmented coating, 0.3 mils (0.0076mm) minimum thickness.
- v. Steel material for fence framework (i.e. tubular pickets, rails and posts), when galvanized prior to forming, shall conform to the requirements of ASTM A924, with a minimum yield strength of 50,000 psi (344 MPa). The

steel shall be hot-dip galvanized to meet the requirements of ASTM A653 with a minimum zinc coating weight of 0.90 oz/ ft² (276 g/m²), Coating Designation G-90.

vi. Galvanized framework shall be subject to six stage pretreatment/wash (with zinc phosphate) followed by an electrostatic spray application of a two coat powder system. The base coat is a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2-4 mils. The topcoat is a “no-mar” TGIC polyester powder coat finish with a minimum thickness of 2-4 mils. The color shall be black. Coated galvanized framework shall be a salt spray resistance of 3,500 hours using Test Method B117 without loss of adhesions.

a) Shop Drawings

- Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
- Include erection drawings, elevations, and details of connections and metal work.
- Indicate welded connections using standard AWS A2.0 welding symbols; indicate net weld lengths.
- Indicate layout of fencings with dimensions, details, and finishes of components, accessories, and post foundations.

b) Concrete for post foundations shall be MnDOT Mix Designation 3B32 or approved equal.

3. Construction Requirements

- i. Fence shall be installed in compliance with Waconia Standard Details and manufacturer's recommendations.
- ii. Corner, brace and gate posts shall be set vertically plum in circular concrete foundations as indicated on the plans. Corner posts shall be installed where the fence deflects 30 degrees or more. Place concrete around posts in a continuous pour. The top of the foundation shall extend above the ground surface and shall be crowned not less than one inch to provide adequate drainage away from the post. Trowel finish around post. Surface mount posts to the top of concrete block retaining wall where indicated.
- iii. All line posts shall be installed vertically plumb and spaced uniformly.

- iv. Install ornamental steel fence panels plumb and level, accurately fitted, free from distortion or defects.
- v. Wood rail and chain link fence shall be erected so the bottom of the fencing will follow the contour of the ground surface.

XIII.Punchlists

A. General

1. Punchlist inspections shall be conducted by the City at the following milestones: just prior to base course paving, just prior to wear course paving, after wear course paving and all restoration is complete, and in the spring of the final year of the warranty period. The Contractor shall provide personnel at all punchlist inspections to open structures.

APPENDIX A

Standard Details

Section 6 – Erosion and Sediment Control

- 6-001 Riprap Ditch Check
- 6-002 Bioroll Ditch Block
- 6-108 Inlet Protection – Road Drain
- 6-200 Erosion Control Blanket Installation
- 6-401 Silt Fence – Preassembled
- 6-402 Silt Fence – Machine Sliced
- 6-403 Silt Fence – Heavy Duty
- 6-404 Floation Silt Curtain
- 6-502 Rock Construction Entrance
- 6-600 Riprap at RCP End

Section 7 – Stormwater Management

- 7-000 RCP Pipe, Class “C” Bedding
- 7-001 RCP Pipe, Class “B” Bedding
- 7-002 Non-Rigid Storm Sewer Trench
- 7-100 Catch Basin, Design G
- 7-102 Storm Sewer Structure, Design F
- 7-105 Storm Sewer Structure, Design 4020
- 7-106 Storm Sewer Structure, Design 4022
- 7-107 Shallow Depth Storm Sewer Structure
- 7-108 Drainage Structure with Sump
- 7-109 Catch Basin R-1 (2’x 3’)
- 7-110 Storm Sewer Structure, Design J
- 7-120 Sump Manhole with Preserver Baffle & Skimmer
- 7-121 Sump Manhole with SAFL Baffle
- 7-122 Rain Guardian Storm Structure
- 7-200 Pond Skimmer Structure
- 7-201 Pond Skimmer Structure with Baffle
- 7-302 Subsurface Edge Drain
- 7-304 Subsurface Drain Cleanout Under Sidewalk
- 7-305 Subsurface Drain Cleanout
- 7-308 Sump Pump Service Line Connection
- 7-502 Mountable Curb Casting
- 7-601 RC Apron Trash Rack
- 7-700 Bioretention Basin
- 7-702 Rain Garden Notes
- 7-703 Iron Enhanced Sand Filter
- 7-800 Porous Pavement

Section 9 – Water Supply

- 9-000 Hydrant Installation
- 9-100 Water Service, Reconstruction
- 9-101 Water Service, New Construction
- 9-200 PVC Watermain Trench
- 9-201 DIP Watermain Trench
- 9-202 PVC Watermain Insulation
- 9-203 Watermain Offset
- 9-205 Pipe Support in Casing
- 9-207 Concrete Thrust Blocks
- 9-303 Tracer Wire Access Box
- 9-305 In-Line Tracer Wire Splice
- 9-306 Tracer Wire Grounding Anode
- 9-307 Tracer Wire at Hydrant
- 9-308 Water Service Casting Assembly
- 9-309 Tracer Wire at Curb Box Inside Casting
- 9-310 Tracer Wire at Water Service, New Construction
- 9-312 Tracer Wire Water Service, Reconstruction
- 9-313 Tracer Wire – Water Plan
- 9-400 Gate Valve Adaptor
- 9-401 Gate Valve Box Alignment Device
- 9-402 Gate Valve Box Installation
- 9-404 Adjustable Valve Extension Stem
- 9-601 Cathodic Protection Pipe Joint Bonding
- 9-602 Cathodic Protection Thermite Welding
- 9-603 Cathodic Protection Galvanic Anode Splice
- 9-604 Cathodic Protection Reference Electrode
- 9-605 Cathodic Protection Test Station

Section 10 – Sanitary Sewer

- 10-001 Sanitary Sewer Manhole
- 10-002 Drop Manhole
- 10-005 Air Release Manhole
- 10-010 Manhole Adjustment Detail
- 10-100 Service Connection to Manhole
- 10-102 Sanitary Sewer Service, New Construction
- 10-107 Sanitary Sewer Service, Reconstruction
- 10-110 Sanitary Sewer Cleanout
- 10-111 Cleanout Under Sidewalk or Driveway
- 10-200 PVC Sanitary Sewer Trench
- 10-202 Forcemain Insulation
- 10-205 Aggregate Pipe Foundation
- 10-300 Tracer Wire Sample Sewer Plan
- 10-301 Tracer Wire Sewer Service Detail
- 10-302 Tracer Wire Access Box, Dual Terminal
- 10-303 Tracer Wire at Manhole

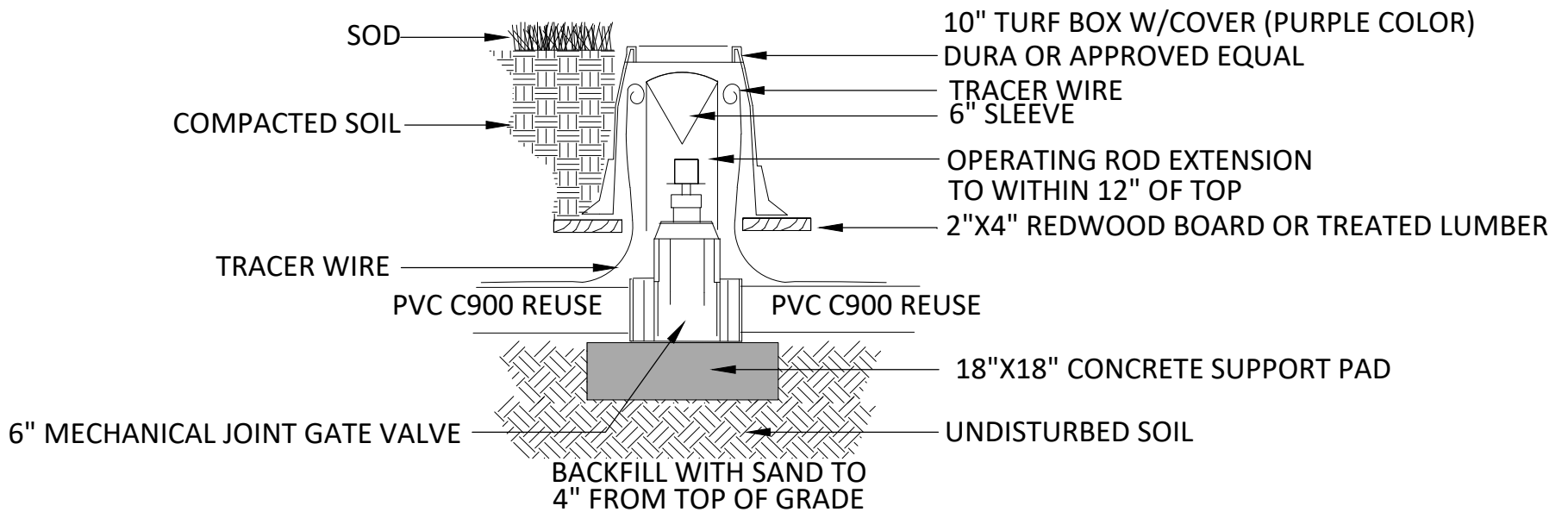
Section 11 – Streets

- 11-000 Typical Street Section, Standard
- 11-001 Typical Street Section, Truck
- 11-002 Concrete Curb and Gutter, Design B618
- 11-004 Mountable Concrete Curb
- 11-005 Subgrade Correction
- 11-007 Catch Basin, B618 Curb Detail
- 11-008 Catch Basin, Mountable Curb Detail
- 11-100 Concrete Valley Gutter
- 11-102 Concrete Driveway Apron
- 11-103 Driveway Pavement Sections
- 11-104 Concrete Driveway Apron with Depressed Sidewalk
- 11-305 Bituminous Street Crack Sealing
- 11-610 Mailbox Installation
- 11-612 Corner Lot Sight Triangle

Section 12 – Sidewalks and Trails

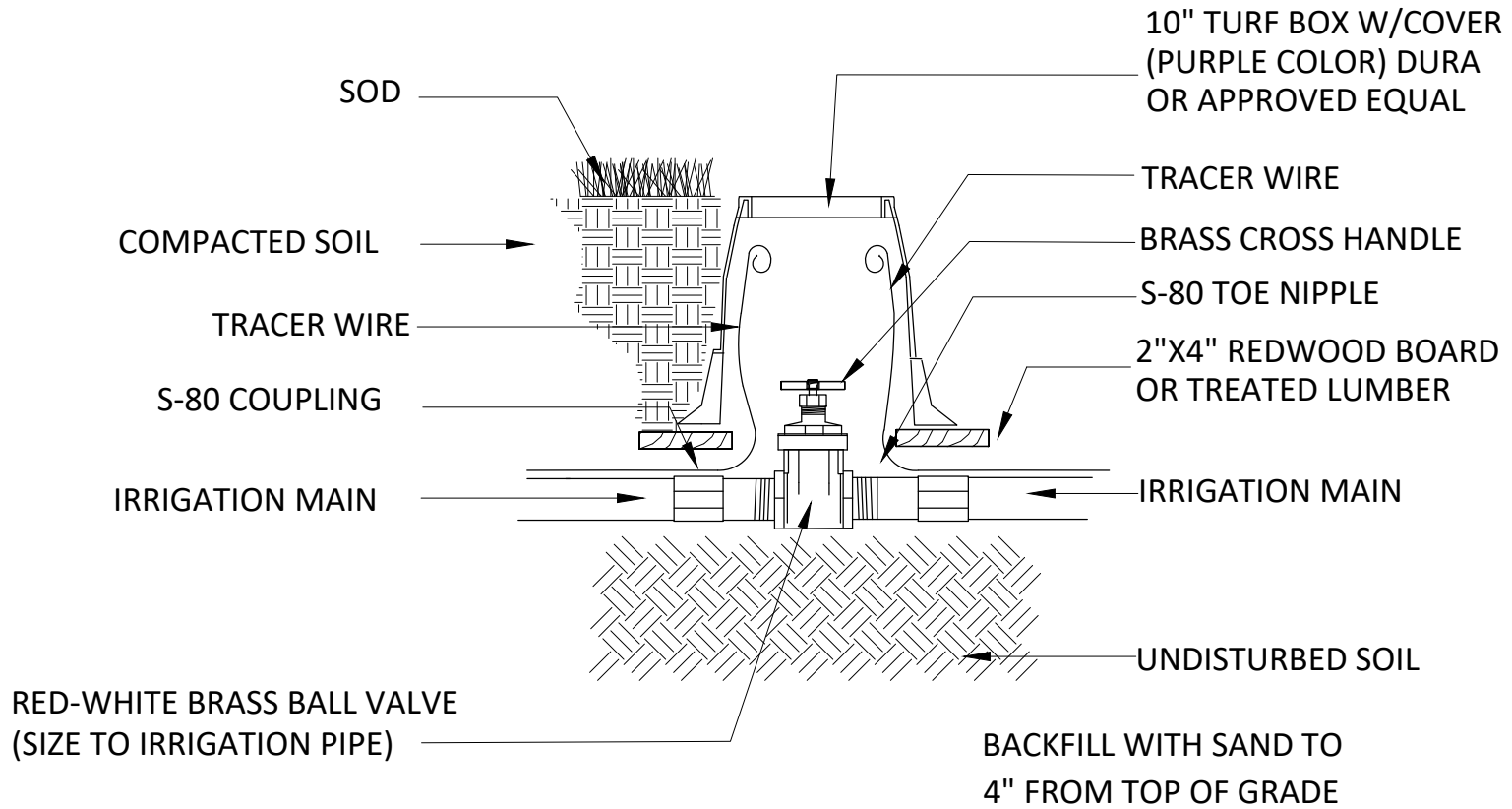
- 12-100 Concrete Sidewalk
- 12-101 Concrete Sidewalk, Thickened Edge
- 12-105 Expansion Joint
- 12-106 Contraction Joint
- 12-200 Concrete Stairway
- 12-300 Bituminous Trail
- 12-400 Pedestrian Crosswalk Striping
- 12-500 Modular Concrete Block Retaining Wall
- 12-501 Segmental Concrete Block Retaining Wall
- 12-600 Wood Rail Fence
- 12-601 Chain Link Fence
- 12-602 Ornamental Steel Fence

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**STORMWATER REUSE
PLASTIC VALVE BOX (FOR TURF AREAS)**
NOT TO SCALE

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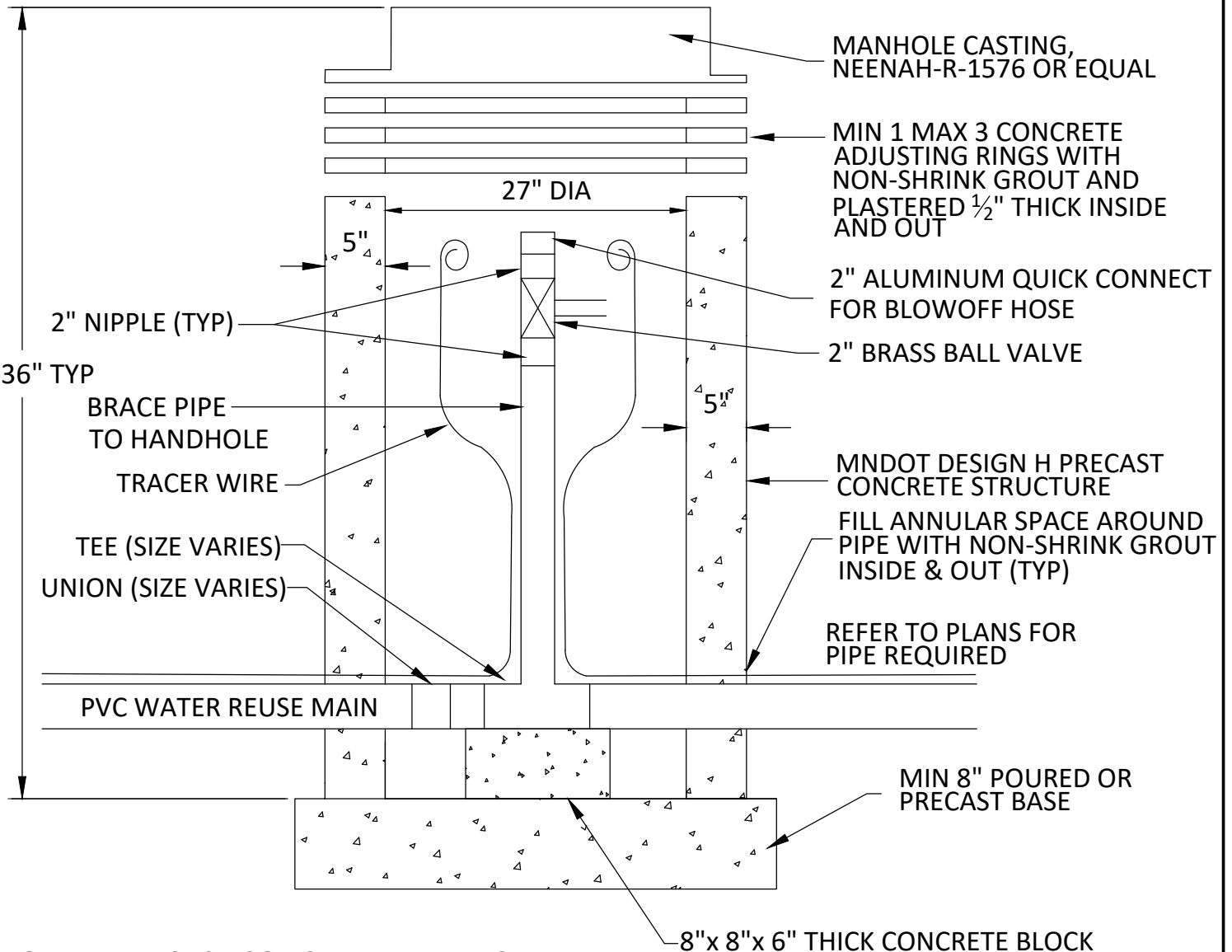
**STORMWATER REUSE
ISOLATION VALVE - 2.5" AND SMALLER**

NOT TO SCALE

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NOTES

1. 2" PIPE SHALL BE THREAD SCH. 80 PVC OR SCH. 40 GALVANIZED STEEL PIPE.
2. BALL VALVES SHALL BE 2" BRASS RED-WHITE VALVE.
3. QUICK CONNECT SHALL BE 2" ALUMINUM PT COUPLING CO. PART 20A, #1000120, OR EQUAL. (MATES WITH CAM ARM COUPLER PART 20D, #1000420).
4. VALVE BOX SHALL BE DURA 12" X 12" X 19" BOX WITH OVERLAPPING SOLID PLASTIC COVER, PURPLE COLOR FOR RECLAIMED WATER OR EQUAL IF LOCATED IN GREEN SPACE. ALL OTHER BOXES SHALL BE PRECAST CONCRETE HANDHOLE.



STORMWATER REUSE BLOWOFF IN PRECAST CONCRETE HANDHOLE

NOT TO SCALE



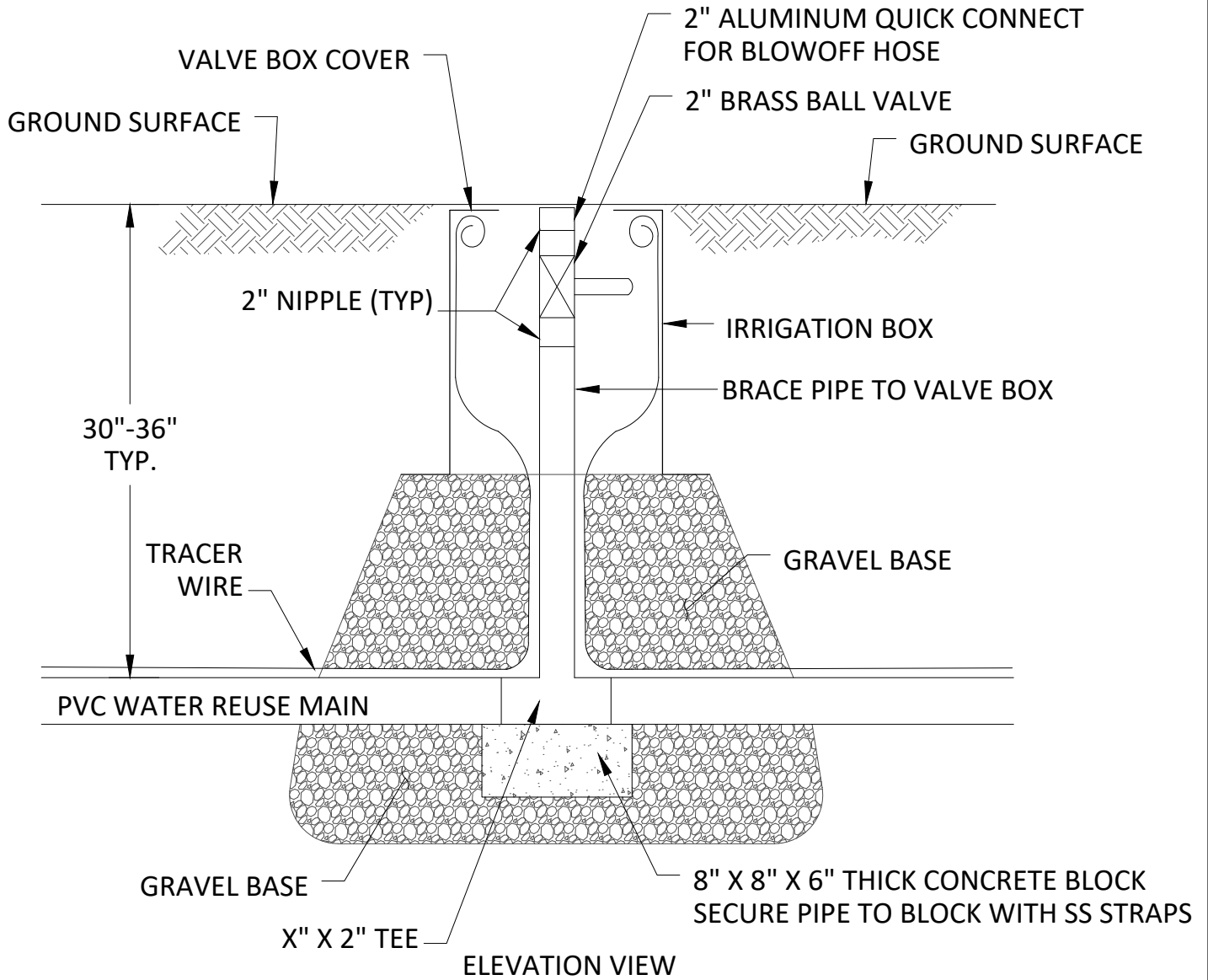
CITY OF WACONIA - STANDARD DETAILS

BLOWOFF IN PRECAST CONCRETE HANDHOLE

REVISION DATE
FEBRUARY 2021

DETAIL NO.

C-103



NOTES:

1. 2" PIPE SHALL BE THREAD SCH. 80 PVC OR SCH. 40 GALVANIZED STEEL PIPE.
2. BALL VALVES SHALL BE 2" BRASS RED-WHITE VALVE.
3. QUICK CONNECT SHALL BE 2" ALUMINUM PT COUPLING CO. PART 20A, #1000120, OR EQUAL. (MATES WITH CAM ARM COUPLER PART 20D, #1000420).
4. VALVE BOX SHALL BE NDS 12" X 12" X 19" BOX WITH OVERLAPPING SOLID PLASTIC COVER, PURPLE COLOR FOR RECLAIMED WATER MANUFACTURED BY DURA OR APPROVED EQUAL.

**STORMWATER REUSE BLOWOFF
IN PLASTIC BOX DETAIL**

NOT TO SCALE

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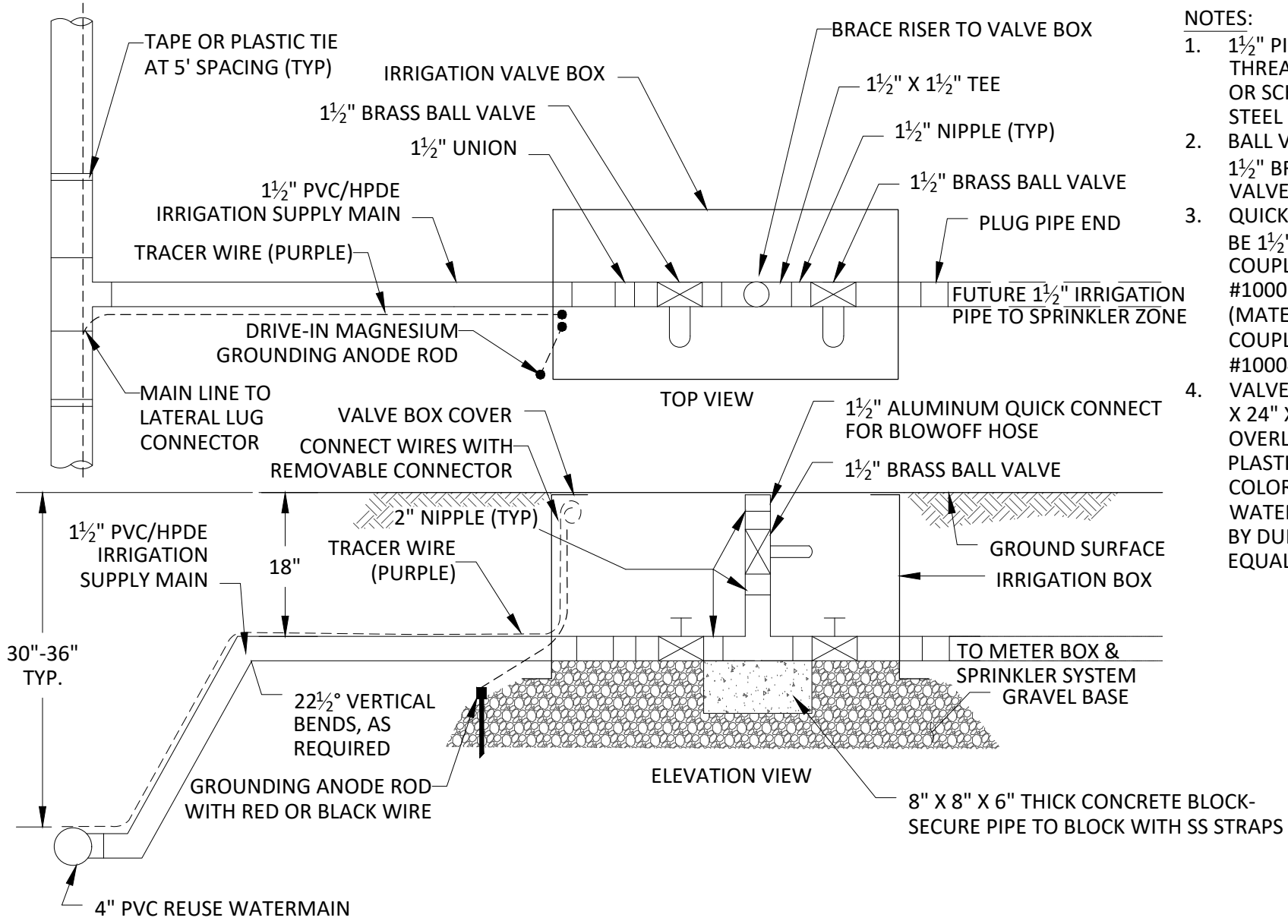
BLOWOFF

REVISION DATE
FEBRUARY 2021

DETAIL NO.

C-104

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- NOTES:**
1. 1 1/2" PIPE SHALL BE THREADED SCH. 80 PVC OR SCH. 40 GALVANIZED STEEL PIPE.
 2. BALL VALVES SHALL BE 1 1/2" BRASS RED-WHITE VALVE.
 3. QUICK CONNECT SHALL BE 1 1/2" ALUMINUM PT COUPLING CO. PART 20A, #1000115, OR EQUAL. (MATES WITH CM ARM COUPLER PART 20D, #1000415).
 4. VALVE BOX SHALL BE 17" X 24" X 18" BOX WITH OVERLAPPING SOLID PLASTIC COVER, PURPLE COLOR FOR RECLAIMED WATER MANUFACTURED BY DURA OR APPROVED EQUAL.

STORMWATER REUSE BLOWOFF AND CONNECTION BOX

NOT TO SCALE

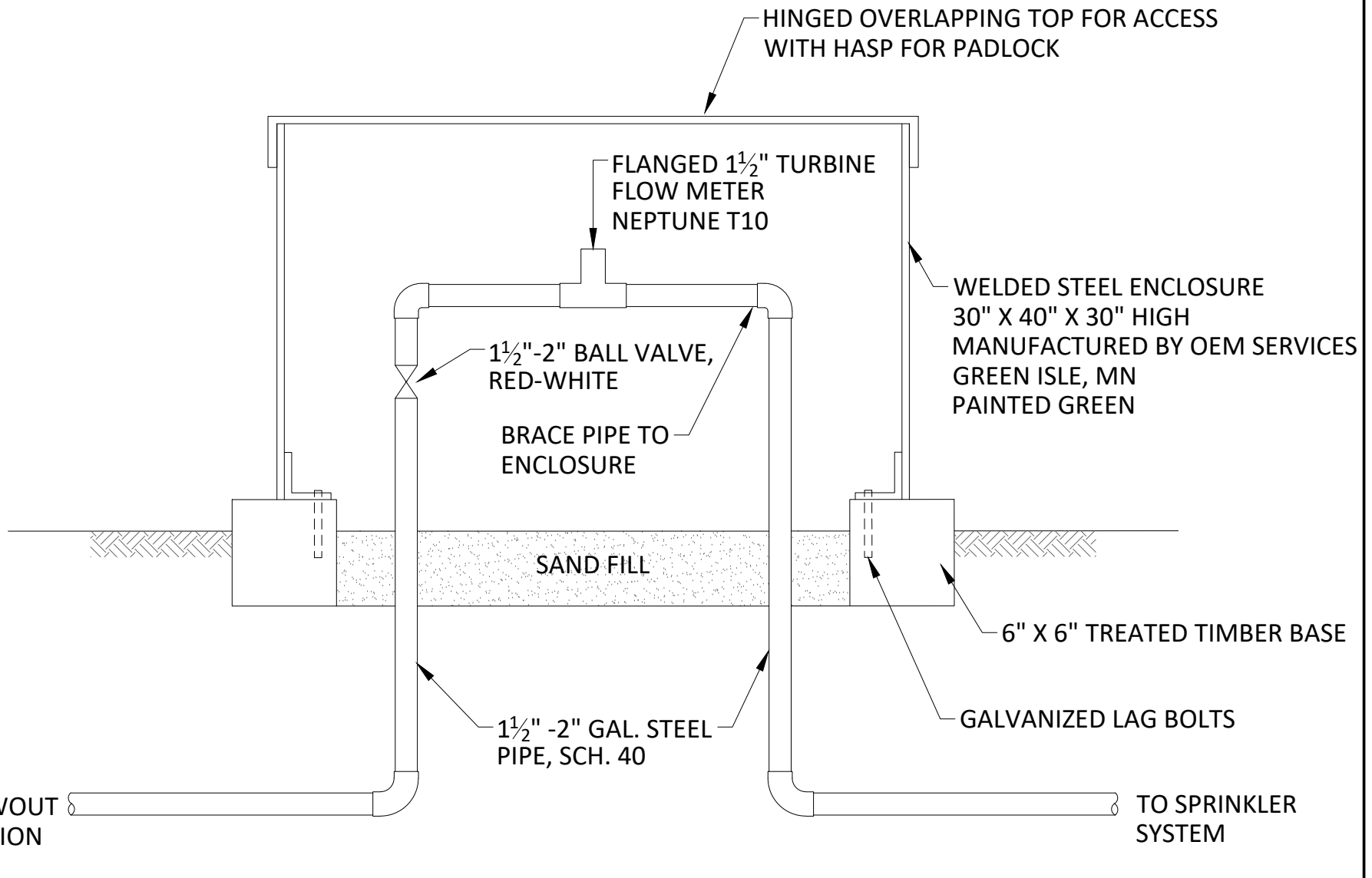


CITY OF WACONIA - STANDARD DETAILS

BLOWOFF & CONNECTION BOX

REVISION DATE	DETAIL NO.
FEBRUARY 2021	C-105

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METER BOX DETAIL

NOT TO SCALE

FROM BLOWOUT
& CONNECTION
BOX

TO SPRINKLER
SYSTEM

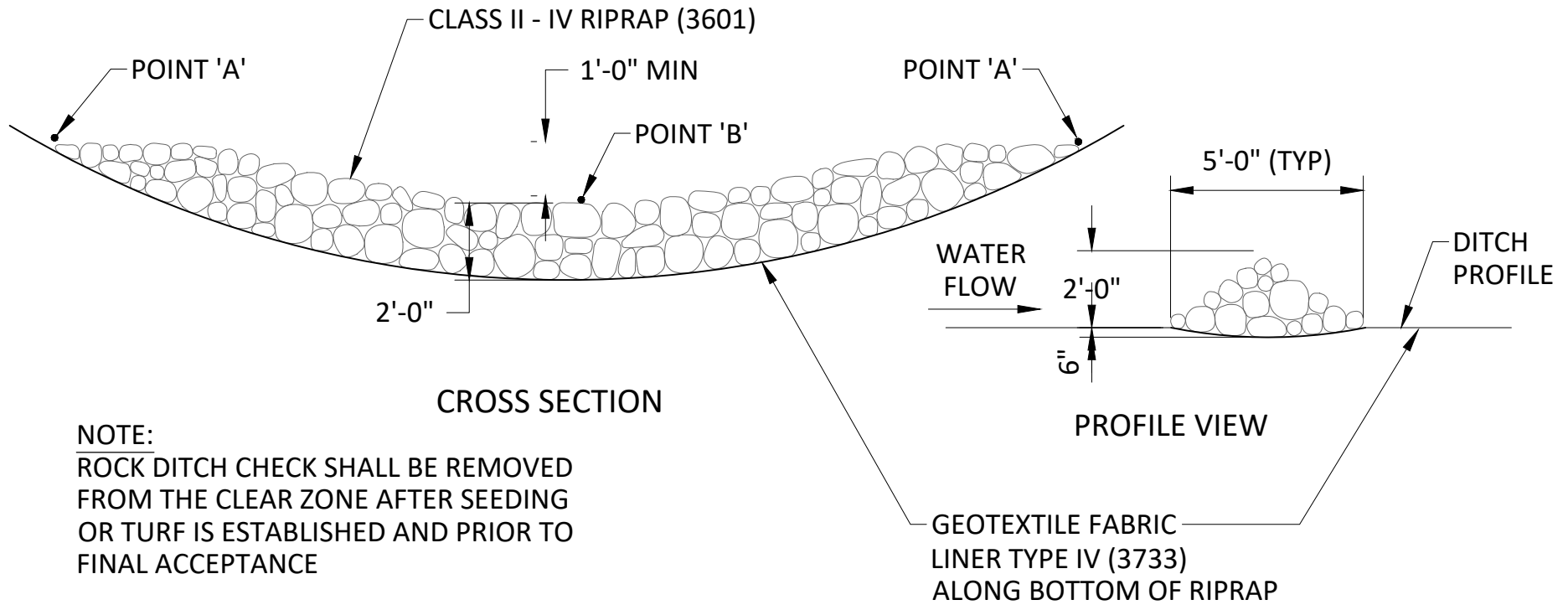


CITY OF WACONIA - STANDARD DETAILS

METER BOX DETAIL

REVISION DATE	DETAIL NO.
FEBRUARY 2021	C-106

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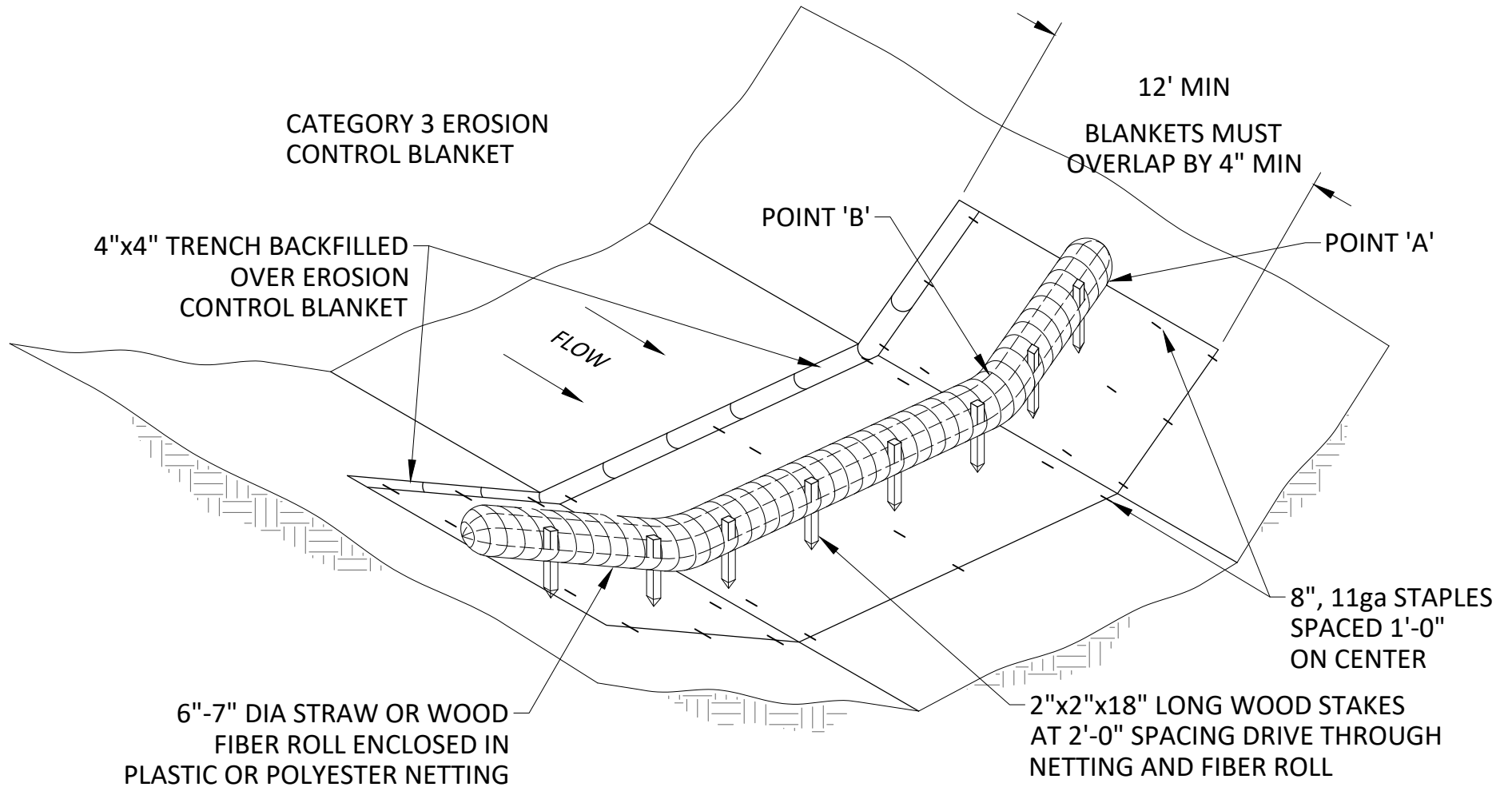


NOTE:
 ROCK DITCH CHECK SHALL BE REMOVED FROM THE CLEAR ZONE AFTER SEEDING OR TURF IS ESTABLISHED AND PRIOR TO FINAL ACCEPTANCE

POINT 'A' MUST BE 1'-0" MINIMUM HIGHER THAN POINT 'B' TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS.

DITCH CHECK - RIPRAP
 NOT TO SCALE

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DITCH CHECK - BIOROLL

NOT TO SCALE

NOTE:
 POINT 'A' MUST BE 1'-0" MIN
 HIGHER THAN POINT 'B' TO
 ENSURE THAT WATER FLOWS
 OVER THE DITCH CHECK AND NOT
 AROUND THE ENDS



CITY OF WACONIA - STANDARD DETAILS

DITCH CHECK BIOROLL

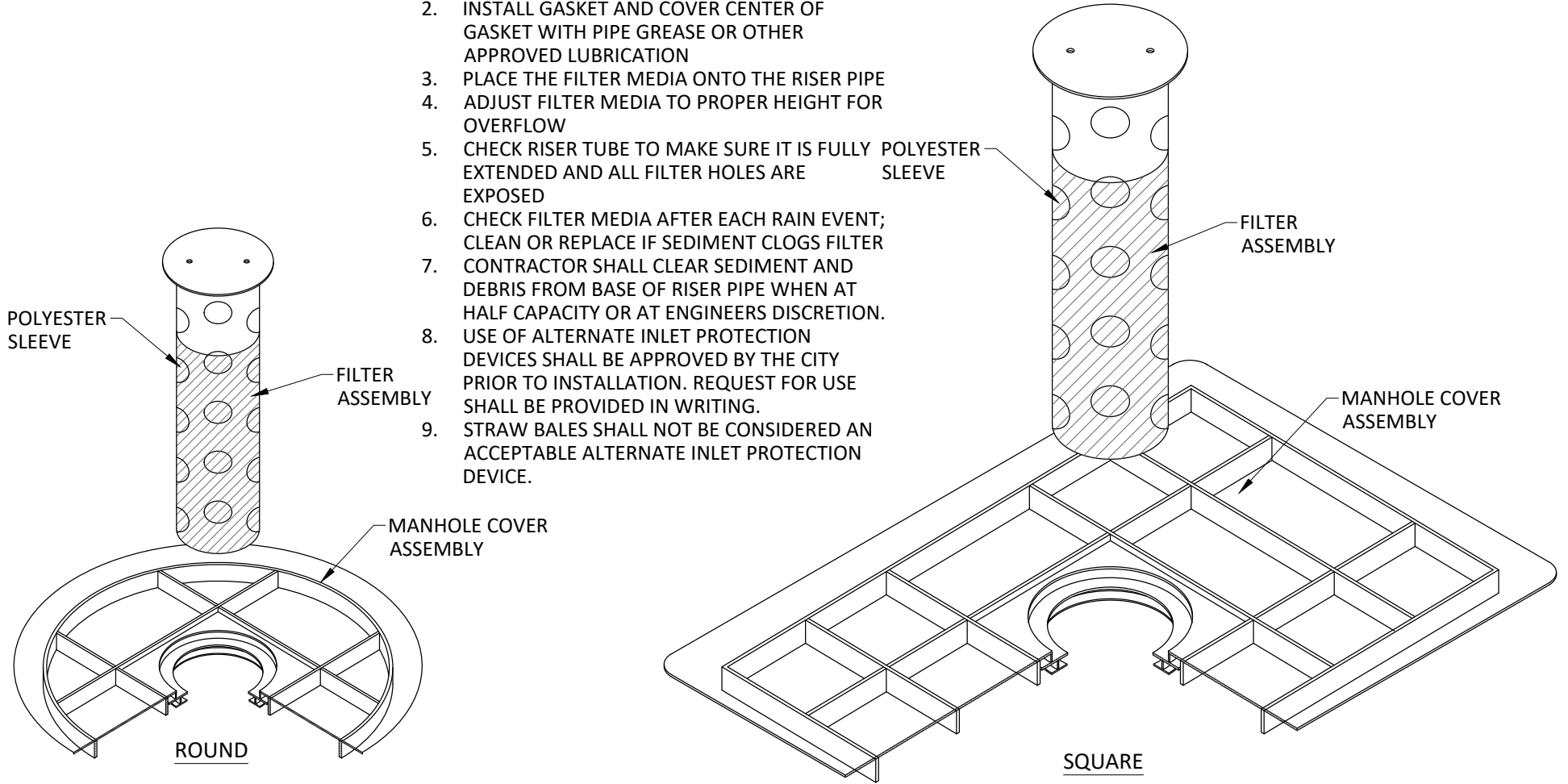
REVISION DATE
FEBRUARY 2021

DETAIL NO.

6-002

NOTES:

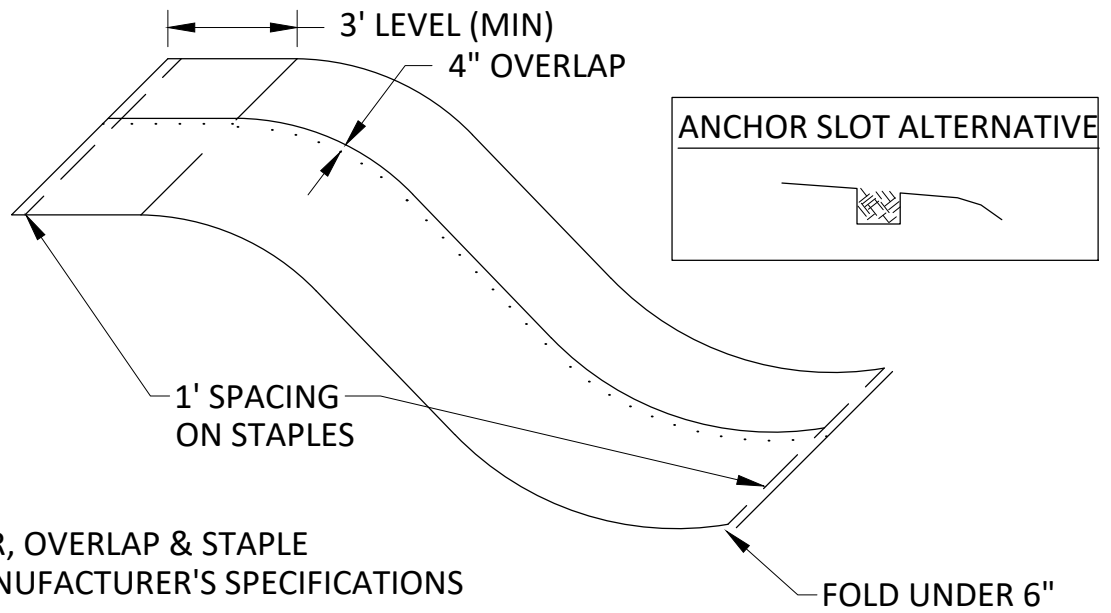
1. PLACE THE ROAD DRAIN-TOP SLAB MODEL DIRECTLY ON THE TOP OF STRUCTURE OR ON ENGINEER APPROVED ADJUSTING RINGS
2. INSTALL GASKET AND COVER CENTER OF GASKET WITH PIPE GREASE OR OTHER APPROVED LUBRICATION
3. PLACE THE FILTER MEDIA ONTO THE RISER PIPE
4. ADJUST FILTER MEDIA TO PROPER HEIGHT FOR OVERFLOW
5. CHECK RISER TUBE TO MAKE SURE IT IS FULLY EXTENDED AND ALL FILTER HOLES ARE EXPOSED
6. CHECK FILTER MEDIA AFTER EACH RAIN EVENT; CLEAN OR REPLACE IF SEDIMENT CLOGS FILTER
7. CONTRACTOR SHALL CLEAR SEDIMENT AND DEBRIS FROM BASE OF RISER PIPE WHEN AT HALF CAPACITY OR AT ENGINEERS DISCRETION.
8. USE OF ALTERNATE INLET PROTECTION DEVICES SHALL BE APPROVED BY THE CITY PRIOR TO INSTALLATION. REQUEST FOR USE SHALL BE PROVIDED IN WRITING.
9. STRAW BALES SHALL NOT BE CONSIDERED AN ACCEPTABLE ALTERNATE INLET PROTECTION DEVICE.



**INLET PROTECTION
ROAD DRAIN**

NOT TO SCALE

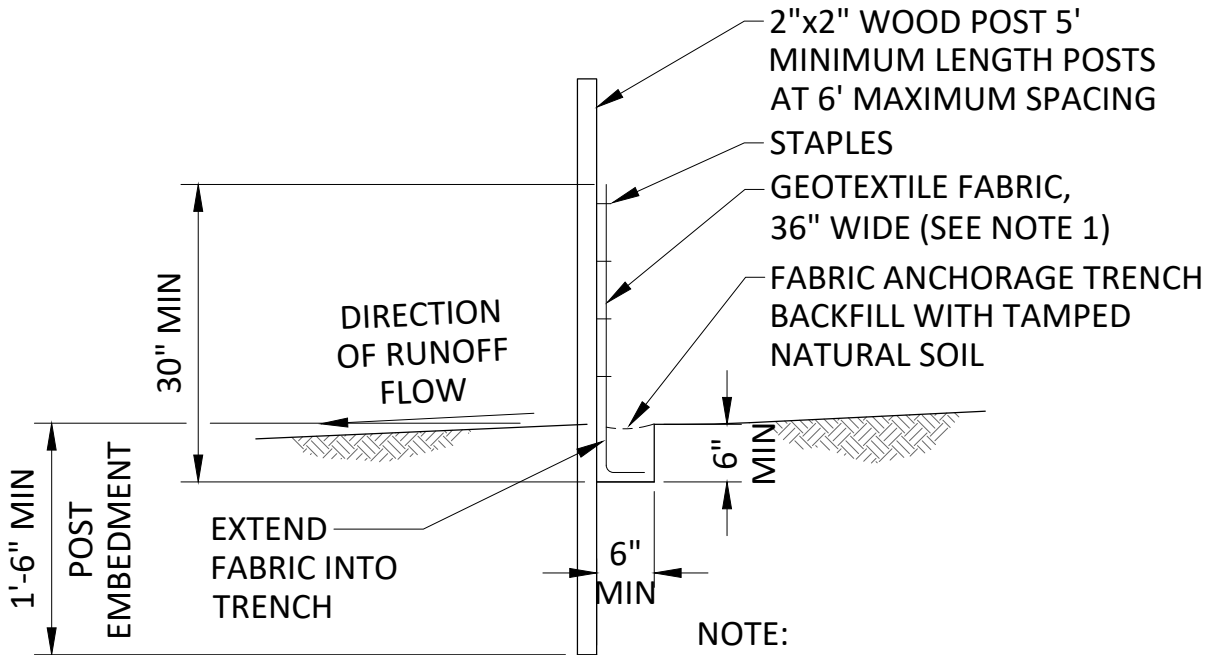
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NOTE:
 ANCHOR, OVERLAP & STAPLE
 PER MANUFACTURER'S SPECIFICATIONS

EROSION CONTROL BLANKET INSTALLATION

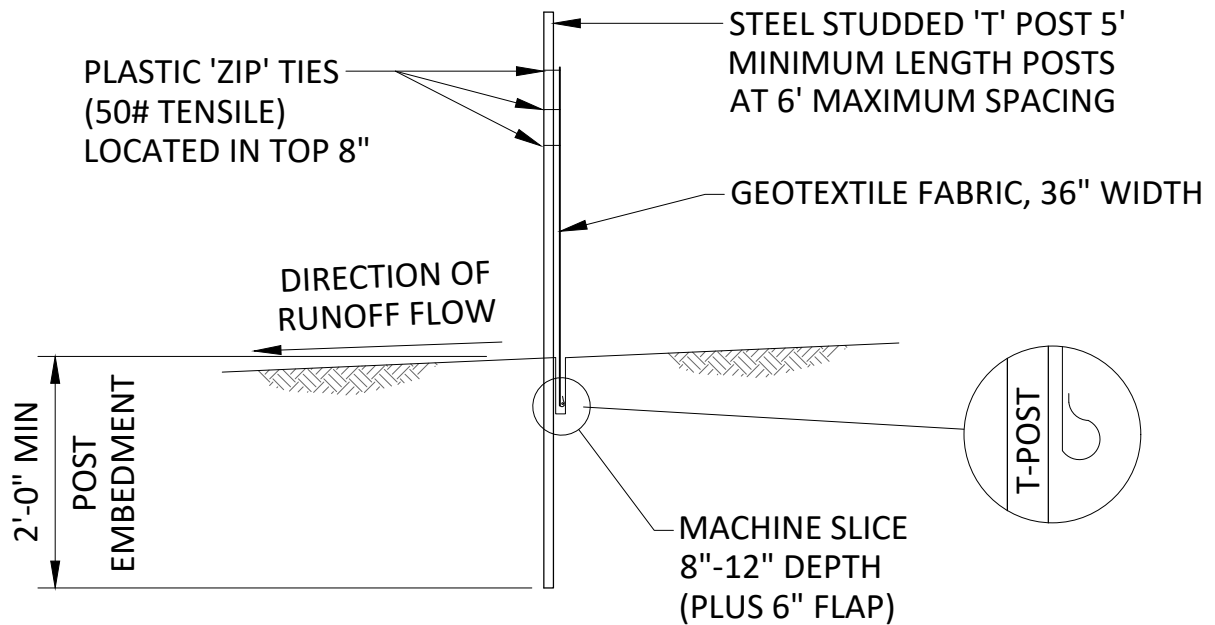
NOT TO SCALE



NOTE:
1. GEOTEXTILE FABRIC SHALL BE PER MnDOT SPEC 3886

SILT FENCE - PREASSEMBLED
NOT TO SCALE

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SILT FENCE - MACHINE SLICED

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

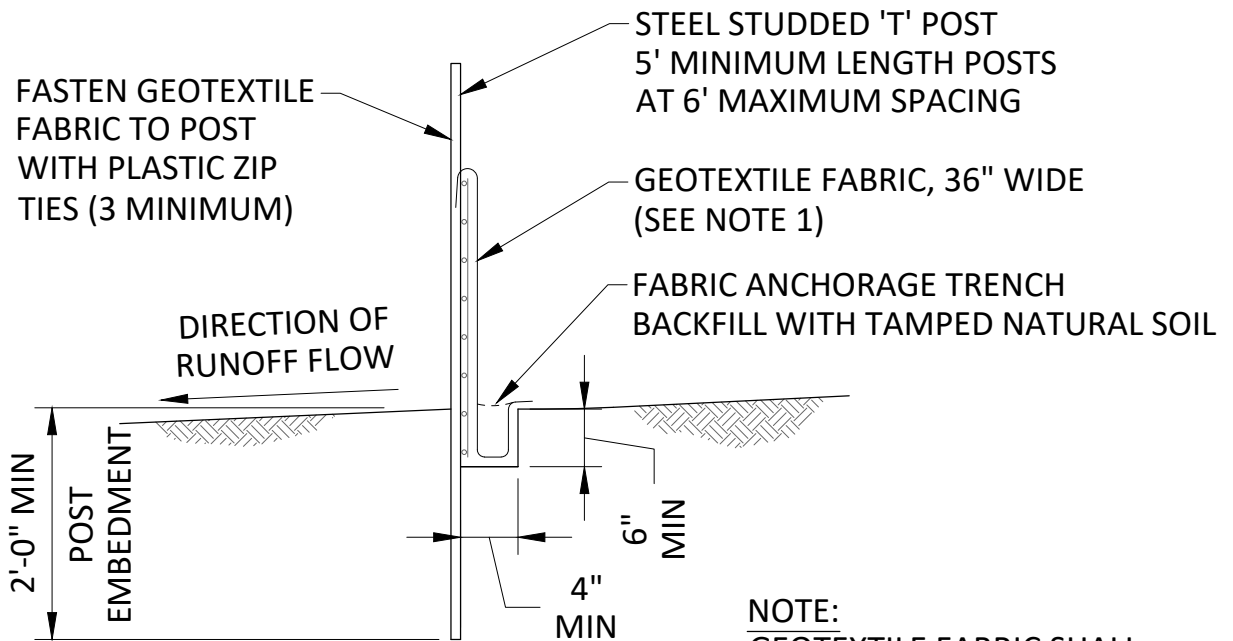
SILT FENCE-MACHINE SLICED

REVISION DATE
FEBRUARY 2021

DETAIL NO.

6-402

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NOTE:
GEOTEXTILE FABRIC SHALL
BE PER MnDOT SPEC 3886

SILT FENCE - HEAVY DUTY
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

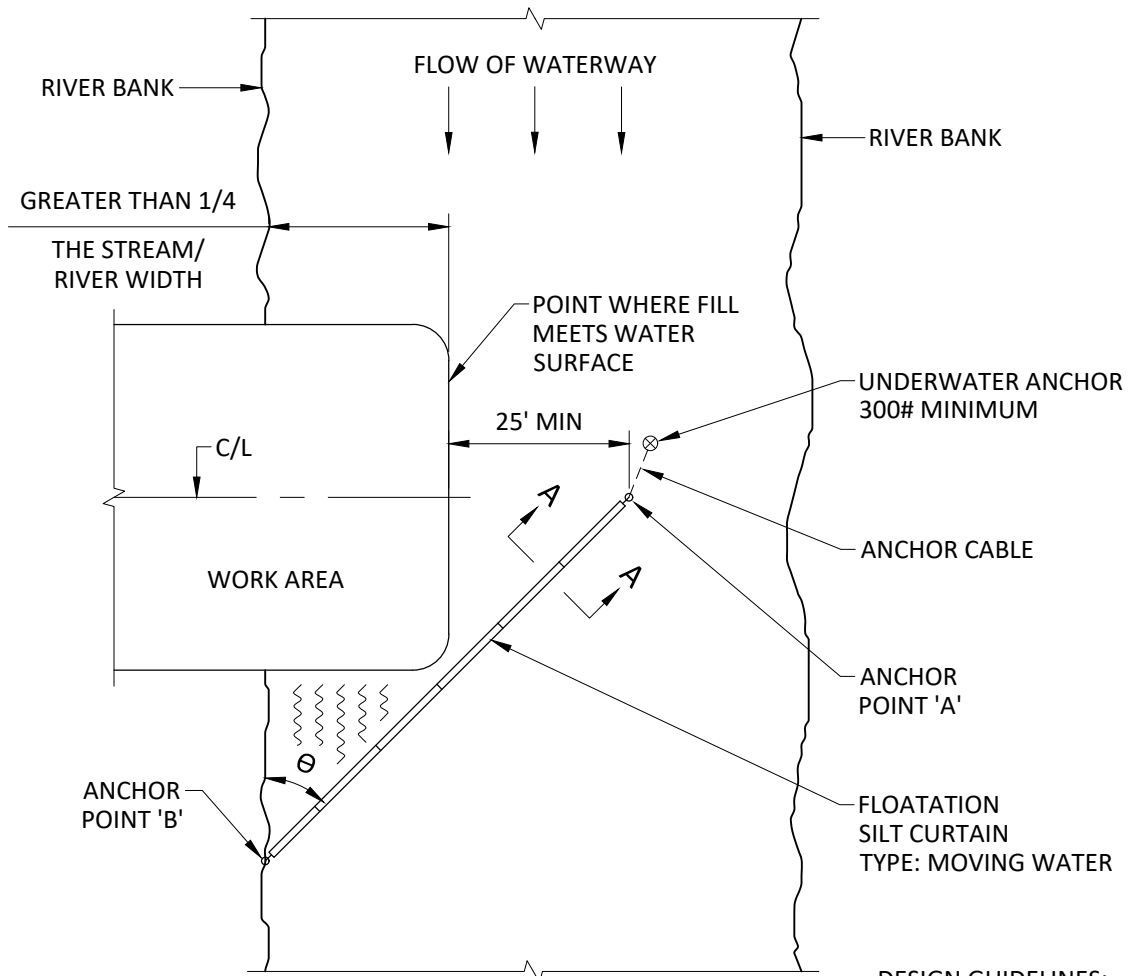
HEAVY DUTY SILT FENCE

REVISION DATE
FEBRUARY 2021

DETAIL NO.

6-403

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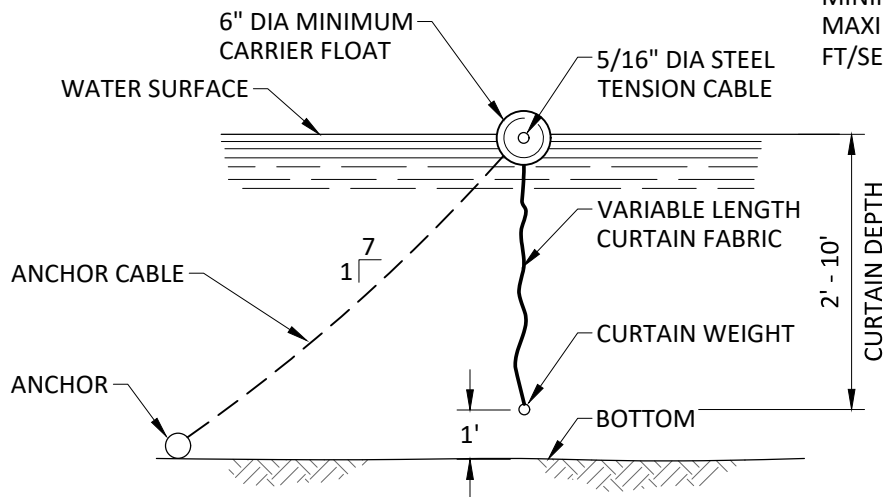


$\angle \theta$	RIVER VELOCITY
45°	SLOW, LESS THAN 3 FT/SEC
35°	MODERATE, 3 - 5 FT/SEC

PLAN VIEW

DESIGN GUIDELINES:
WHEN TEMPORARY FILL
ENCROACHES MORE THAN
1/4 BUT LESS THAN 1/3 THE
WIDTH OF THE STREAM

MAXIMUM WATER DEPTH: 11 FT
MINIMUM WATER DEPTH: 3 FT
MAXIMUM WATER VELOCITY: 5
FT/SEC



SECTION A-A

SILT FENCE - FLOTATION SILT CURTAIN

NOT TO SCALE

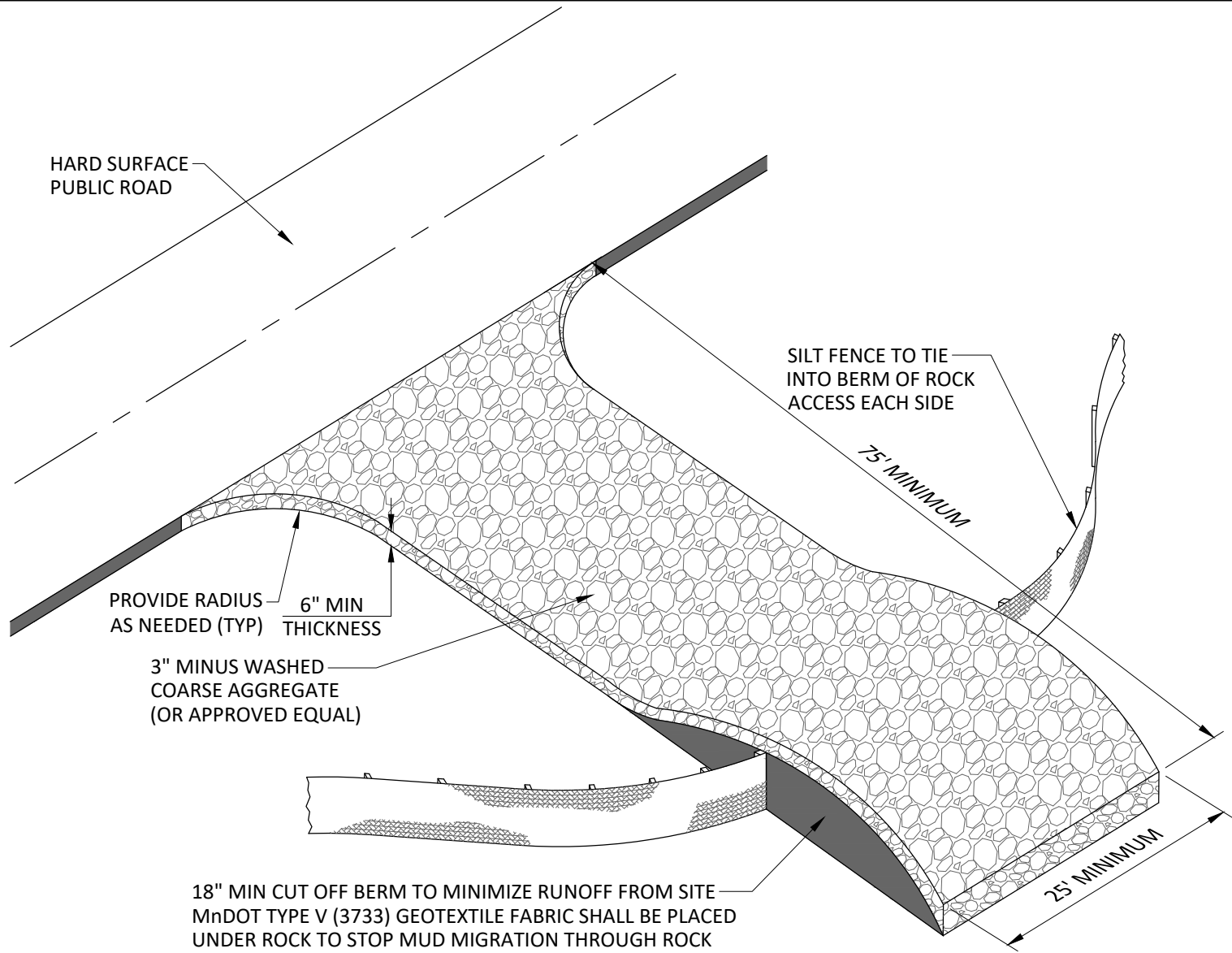


CITY OF WACONIA - STANDARD DETAILS

FLOTATION SILT CURTAIN

REVISION DATE	DETAIL NO.
FEBRUARY 2021	6-404

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PROVIDE RADIUS AS NEEDED (TYP)
 6" MIN THICKNESS
 3" MINUS WASHED COARSE AGGREGATE (OR APPROVED EQUAL)

18" MIN CUT OFF BERM TO MINIMIZE RUNOFF FROM SITE
 MnDOT TYPE V (3733) GEOTEXTILE FABRIC SHALL BE PLACED UNDER ROCK TO STOP MUD MIGRATION THROUGH ROCK

ROCK CONSTRUCTION ENTRANCE

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

ROCK CONSTRUCTION ENTRANCE

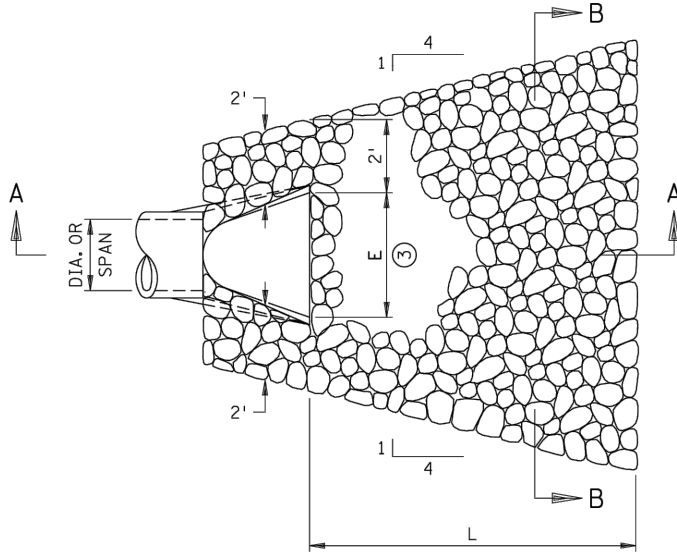
REVISION DATE	DETAIL NO.
FEBRUARY 2021	6-502

TABLE OF QUANTITIES
RIPRAP AT RCP OUTLETS

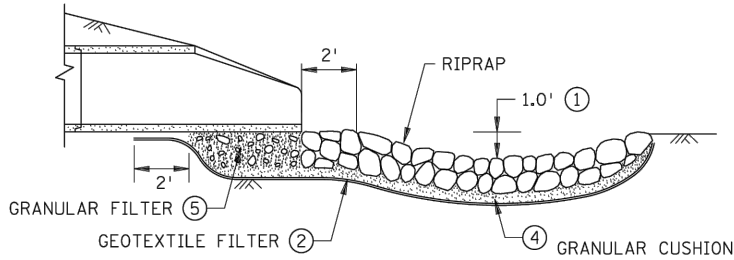
DIA. OF ROUND PIPE (IN.)	L (FT.)	CLASS II d ₅₀ = 6"			CLASS III d ₅₀ = 9"			CLASS IV d ₅₀ = 12"		
		GEO-TEXTILE FILTER (SQ. YD.)	GRANULAR FILTER UNDER APRON (CU. YD.)	12" DEPTH RIPRAP (CU. YD.)	GEO-TEXTILE FILTER (SQ. YD.)	GRANULAR FILTER UNDER APRON (CU. YD.)	18" DEPTH RIPRAP (CU. YD.)	GEO-TEXTILE FILTER (SQ. YD.)	GRANULAR FILTER UNDER APRON (CU. YD.)	24" DEPTH RIPRAP (CU. YD.)
12	8	16.9	0.2	3.0	19.6	0.3	4.4	22.6	0.3	5.9
15	8	18.0	0.2	3.2	20.8	0.3	4.8	23.9	0.4	6.4
18	10	22.4	0.3	4.3	25.6	0.4	6.4	29.0	0.5	8.5
21	10	24.1	0.4	4.7	27.4	0.6	7.1	30.9	0.7	9.4
24	12	29.7	0.5	6.2	33.4	0.8	9.2	37.3	1.0	12.3
27	12	31.4	0.6	6.6	35.2	0.9	9.9	39.2	1.2	13.2
30	14	37.4	0.8	8.2	41.6	1.1	12.3	46.0	1.5	16.4
36	16	45.9	1.1	10.6	50.5	1.6	15.8	55.4	2.1	21.1
42	18	52.8	1.2	12.5	57.8	1.7	18.7	63.0	2.3	24.9
48	20	61.1	1.5	14.8	66.5	2.2	22.2	72.0	2.9	29.6

TABLE OF QUANTITIES
RIPRAP AT RCP-A OUTLETS

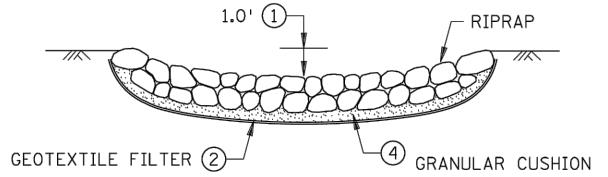
SPAN OF PIPE ARCH (IN.)	L (FT.)	CLASS II d ₅₀ = 6"			CLASS III d ₅₀ = 9"			CLASS IV d ₅₀ = 12"		
		GEO-TEXTILE FILTER (SQ. YD.)	GRANULAR FILTER UNDER APRON (CU. YD.)	12" DEPTH RIPRAP (CU. YD.)	GEO-TEXTILE FILTER (SQ. YD.)	GRANULAR FILTER UNDER APRON (CU. YD.)	18" DEPTH RIPRAP (CU. YD.)	GEO-TEXTILE FILTER (SQ. YD.)	GRANULAR FILTER UNDER APRON (CU. YD.)	24" DEPTH RIPRAP (CU. YD.)
22	10	22.4	0.3	4.1	25.6	0.4	6.1	29.0	0.5	8.1
28	12	29.5	0.5	5.7	33.2	0.7	8.5	37.1	0.9	11.3
36	14	37.3	0.8	7.5	41.5	1.1	11.2	45.8	1.5	14.9
43	16	45.9	1.1	9.5	50.5	1.6	14.3	55.3	2.1	19.0
51	18	52.5	1.2	11.3	57.5	1.7	16.9	62.7	2.3	22.5
58	20	59.9	1.3	13.2	65.2	1.9	19.8	70.7	2.5	26.4



PLAN



SECTION A-A



SECTION B-B

NOTES:

REQUIREMENTS FOR GEOTEXTILE TYPE, RIPRAP SIZE AND THICKNESS WILL BE DESIGNATED IN THE PLANS.

PIPE SIZES LARGER THAN THOSE SHOWN REQUIRE A SPECIAL DESIGN.

- ① FOR PIPES GREATER THAN OR EQUAL TO 30", USE 1.5'.
- ② GEOTEXTILE FILTER, SPEC. 3733, SHALL COVER THE BOTTOM AND SIDES OF THE AREA EXCAVATED FOR THE RIPRAP, GRANULAR FILTER MATERIALS.
- ③ DIMENSION E IS GIVEN ON STANDARD PLATES 3100 AND 3110.
- ④ GRANULAR FILTER, SPEC. 3601, MAY BE USED AS A CUSHION LAYER. PLACE FILTER PER SPEC. 2511. THE CUSHION LAYER IS INCIDENTAL.
- ⑤ GRANULAR FILTER OR RIPRAP, SPEC. 3601, TO EXTEND UNDER ENTIRE OPEN PORTION OF PIPE APRON. DEPTH OF MATERIAL UNDER APRON SHALL MATCH RIPRAP DEPTH. WHEN USING RIPRAP INCREASE RIPRAP QUANTITY ACCORDINGLY AND PLACE A 3" LAYER OF 1.5" CRUSHED ROCK UNDER THE APRON TO AID IN GRADING FOR APRON PLACEMENT. CRUSHED ROCK IS INCIDENTAL.

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CITY OF WACONIA - STANDARD DETAILS

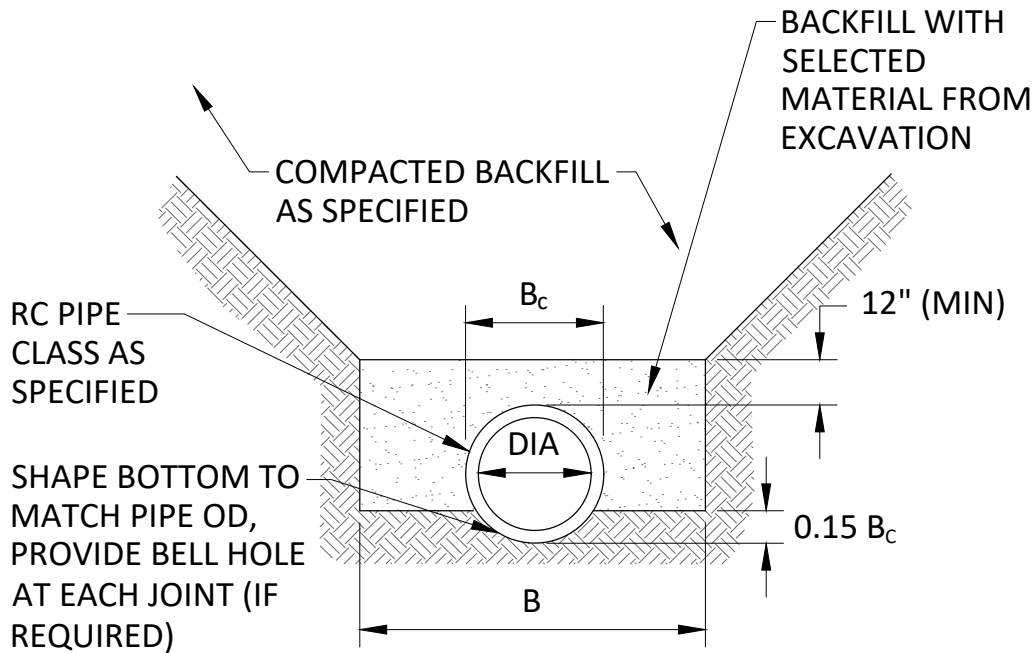
RIPRAP AT RCP END

REVISION DATE
FEBRUARY 2021

DETAIL NO.

6-600

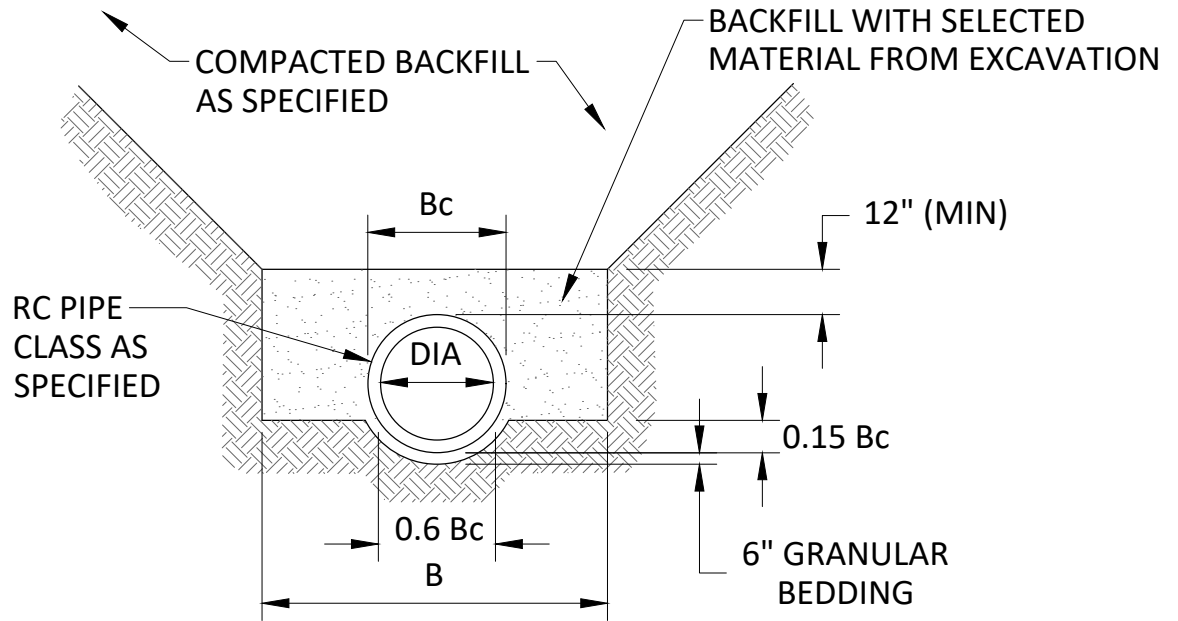
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PIPE DIA	B
36" OR LESS	$B_c + 24"$
42" TO 54"	$1.5 \times B_c$
60" OR OVER	$B_c + 36"$

**RC PIPE
CLASS "C" BEDDING**
NOT TO SCALE

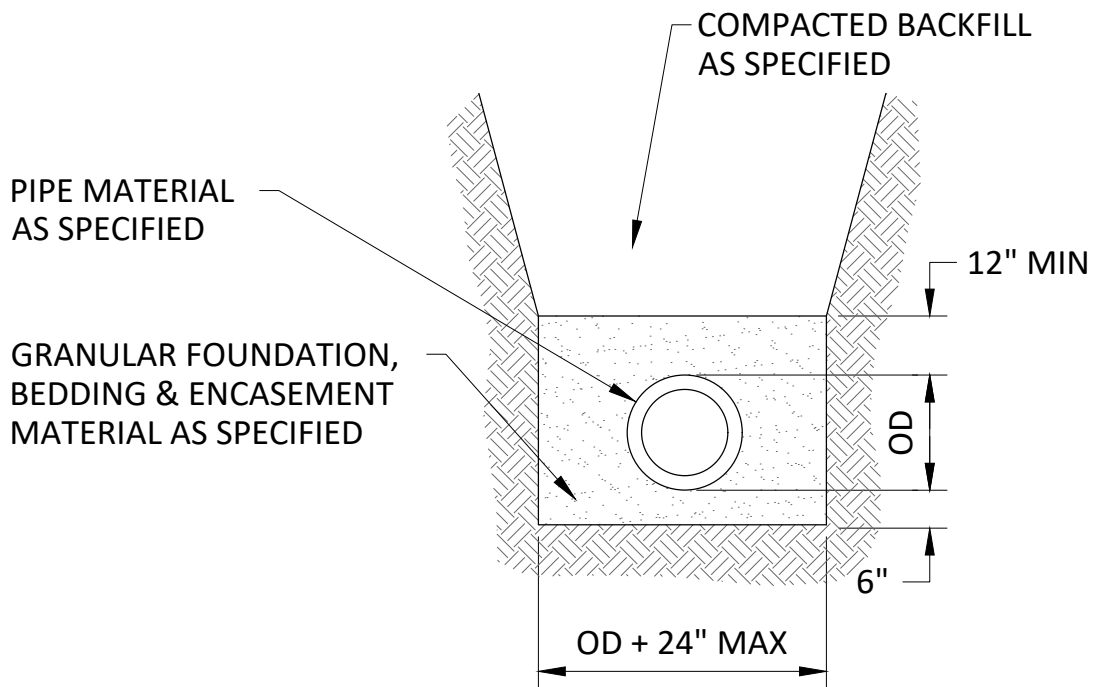
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PIPE DIA	B
36" OR LESS	$B + 24" C$
42" TO 54"	$1.5 X Bc$
60" OR OVER	$B + 36" C$

RC PIPE
CLASS "B" BEDDING
 NOT TO SCALE

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NON-RIGID STORM SEWER TRENCH

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

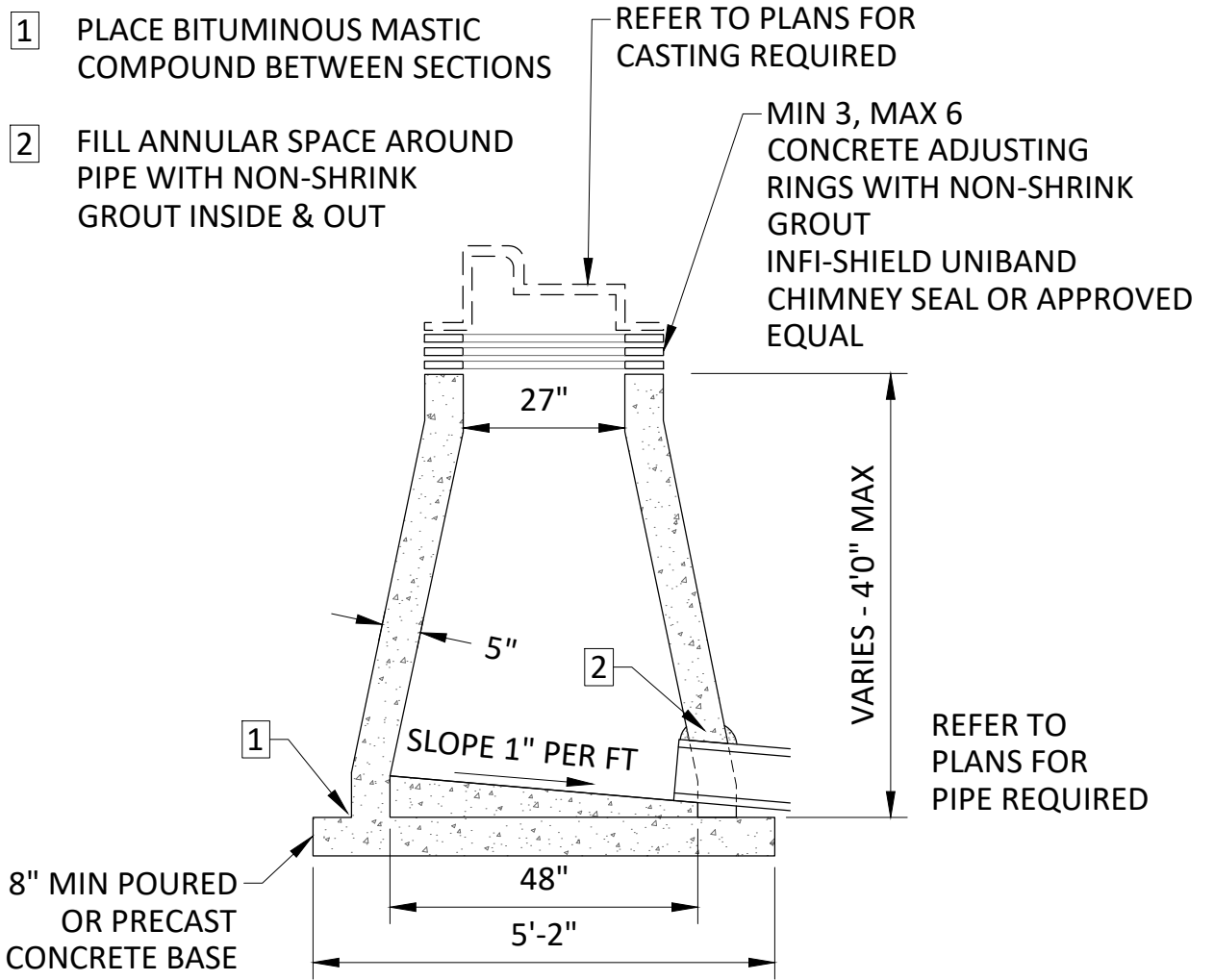
NON-RIGID STORM SEWER TRENCH

REVISION DATE
FEBRUARY 2021

DETAIL NO.

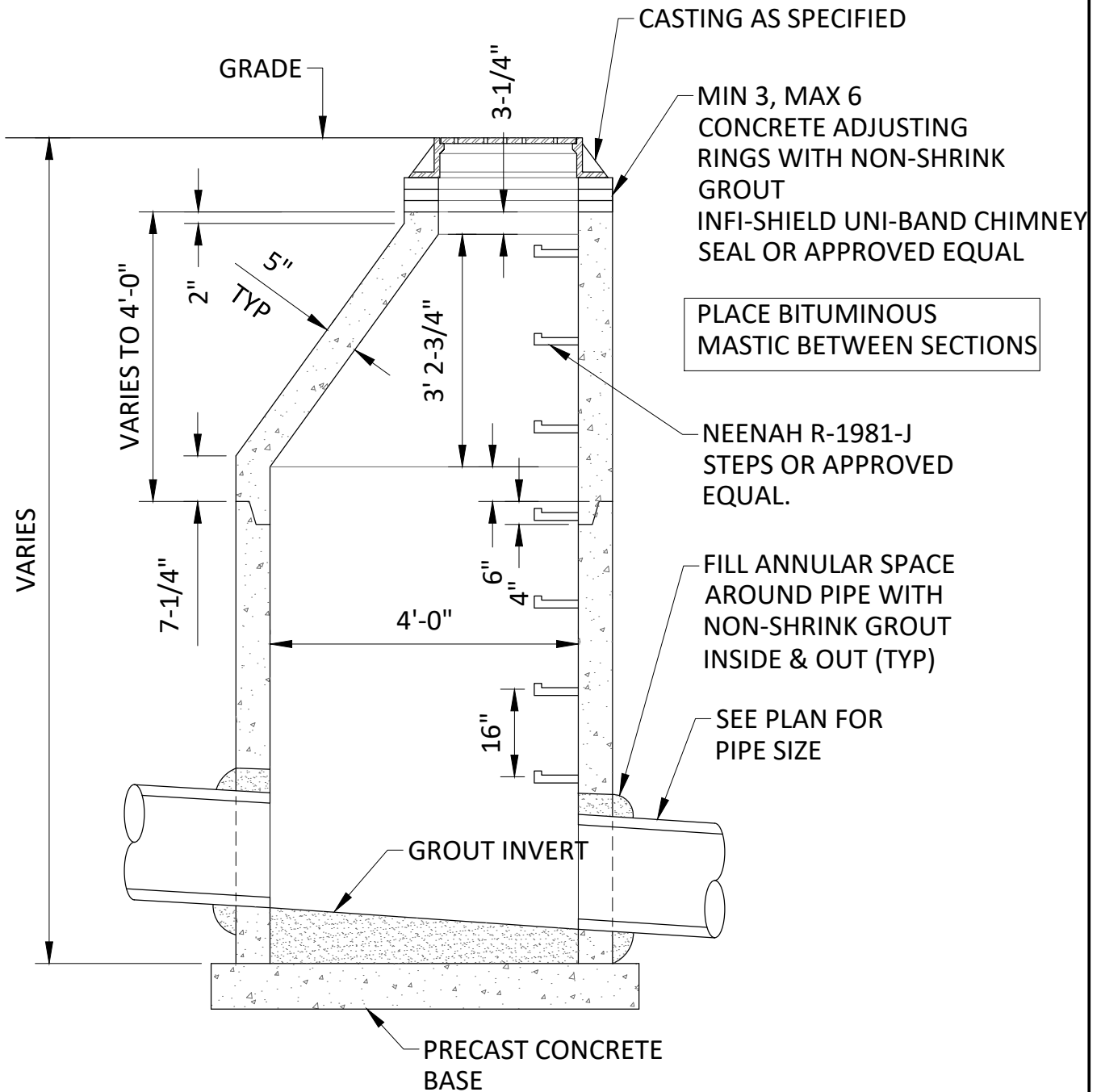
7-002

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CATCH BASIN
DESIGN G
 NOT TO SCALE

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STORM SEWER STRUCTURE
DESIGN F
 NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

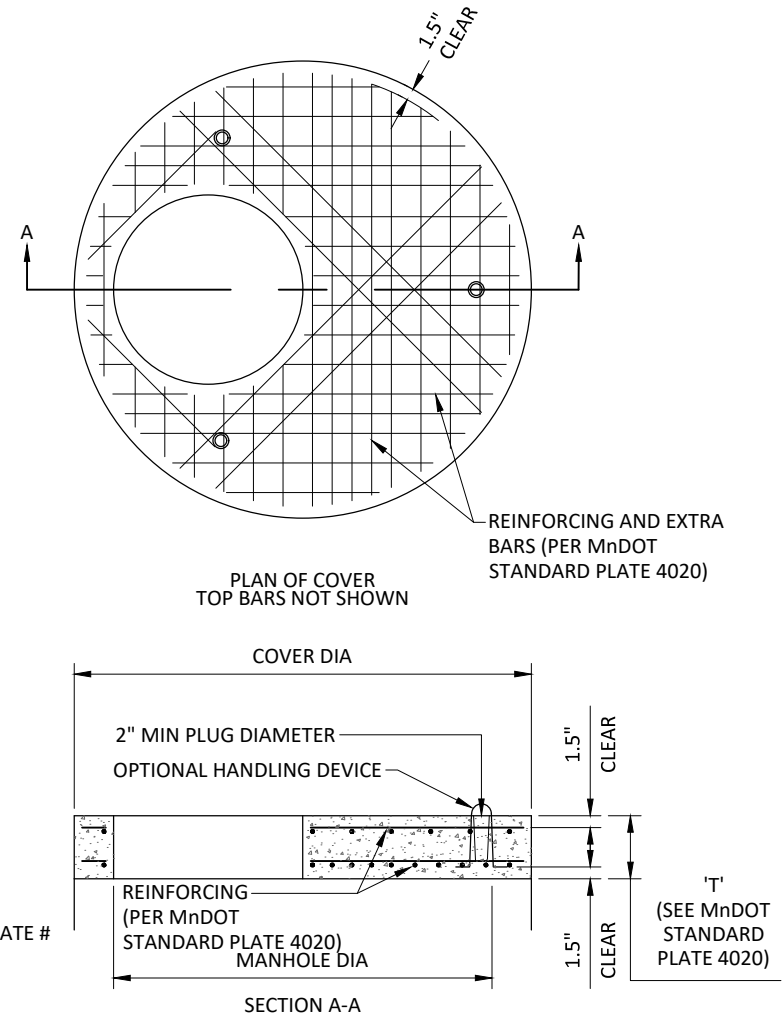
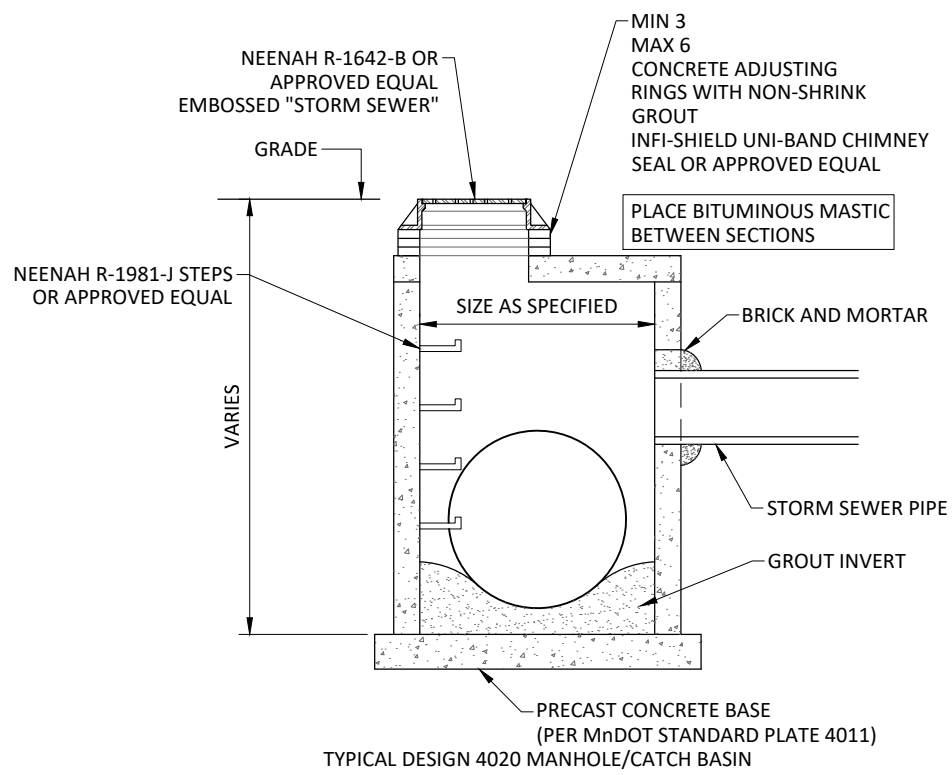
STORM SEWER STRUCTURE-DESIGN F

REVISION DATE
 FEBRUARY 2021
 MARCH 2026

DETAIL NO.

7-102

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- NOTES:**
1. AASHTO HS 25 LOADING MAX FILL HEIGHT 15'
 2. THE # 4020 SHALL BE PERMANENTLY MARKED ON THE TOP COVER
 3. EQUIVALENT STEEL AREAS IN WIRE MESH MAY BE USED
 4. REINFORCEMENT PER SPEC 3301, GRADE 60 A SINGLE HOOP OF 8ga STEEL WIRE

DESIGNATION:
 DESIGN DIAMETER - STANDARD PLATE #
 DESIGN 48-4020

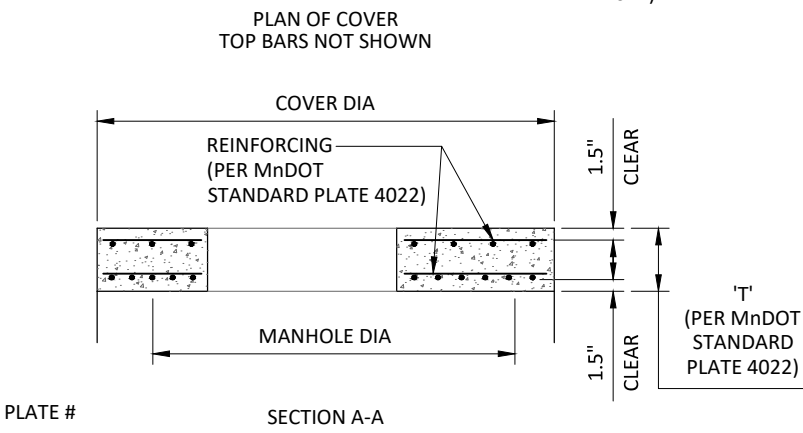
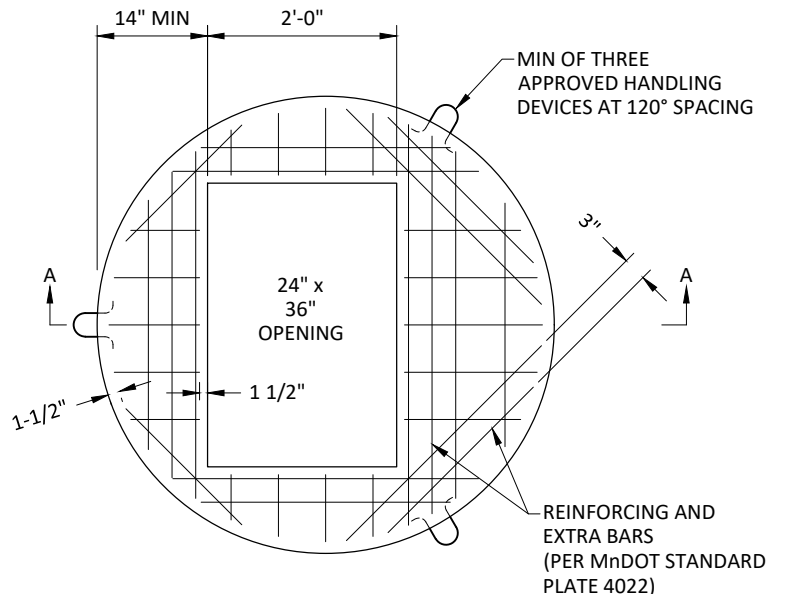
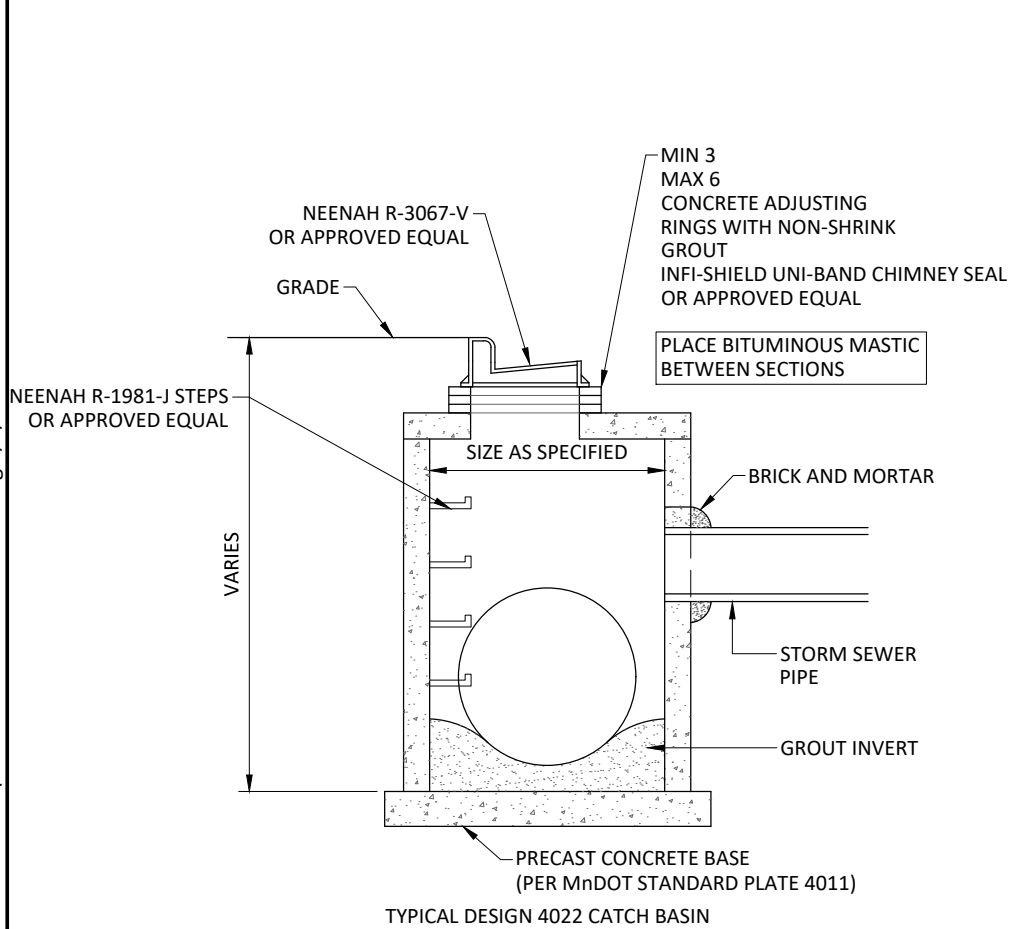
**STORM SEWER STRUCTURE
 DESIGN 4020
 NOT TO SCALE**



CITY OF WACONIA - STANDARD DETAILS
 STORM SEWER STRUCTURE- DESIGN 4020

REVISION DATE FEBRUARY 2021	DETAIL NO. 7-105
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NOTES:

1. AASHTO HS 25 LOADING MAX FILL HEIGHT 15'
2. THE # 4022 SHALL BE PERMANENTLY MARKED ON THE TOP COVER
3. EQUIVALENT STEEL AREAS IN WIRE MESH MAY BE USED
4. REINFORCEMENT PER SPEC 3301, GRADE 60 A SINGLE HOOP OF 8ga STEEL WIRE

DESIGNATION:
 DESIGN DIAMETER - STANDARD PLATE #
 DESIGN 48-4020

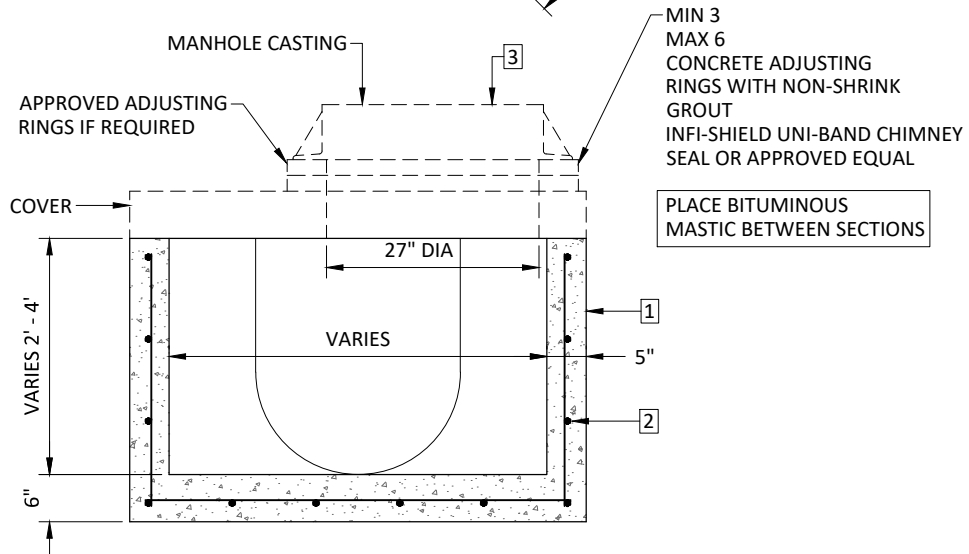
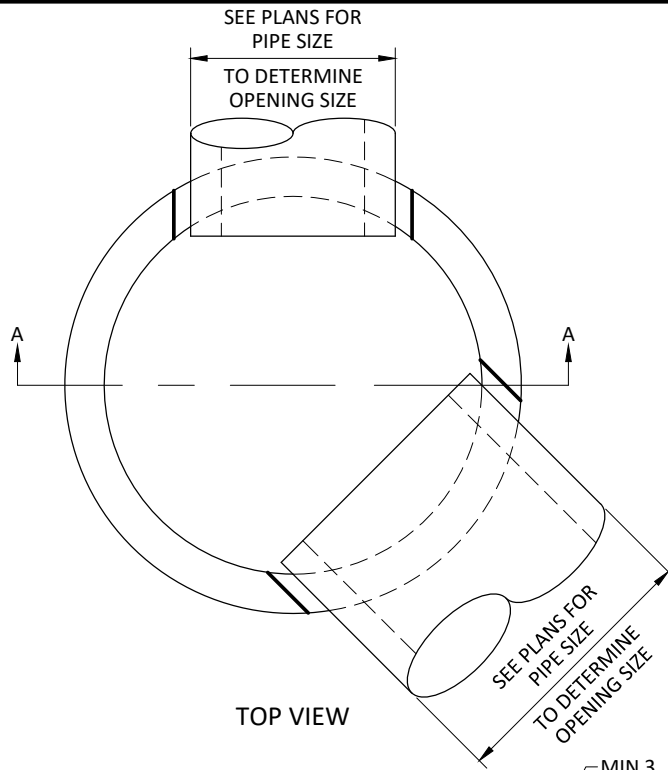
**STORM SEWER STRUCTURE
 DESIGN 4022**

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS
 STORM SEWER STRUCTURE-DESIGN 4022

REVISION DATE	DETAIL NO.
FEBRUARY 2021	7-106



SECTION A-A

NOTES:

- 1 BRICK OR CONCRETE BLOCK MASONRY MAY BE USED, AS APPROVED BY THE ENGINEER
- FOR MATERIALS AND CONSTRUCTION METHODS, SEE STANDARD PLATE NO 4000
- CONE SECTION DETAILS OF 4000 DO NOT APPLY
- 2 REINFORCING: SINGLE LINE STEEL WIRE FABRIC HAVING AN AREA OF NOT LESS THAN 0.12 SQ IN PER FOOT
- 3 COVER AND CASTING AS SPECIFIED

STANDARD OPENINGS	
PIPE DIA (INCHES)	OPENING SIZE (INCHES)
12	20
15	24
18	26
21	30
24	34

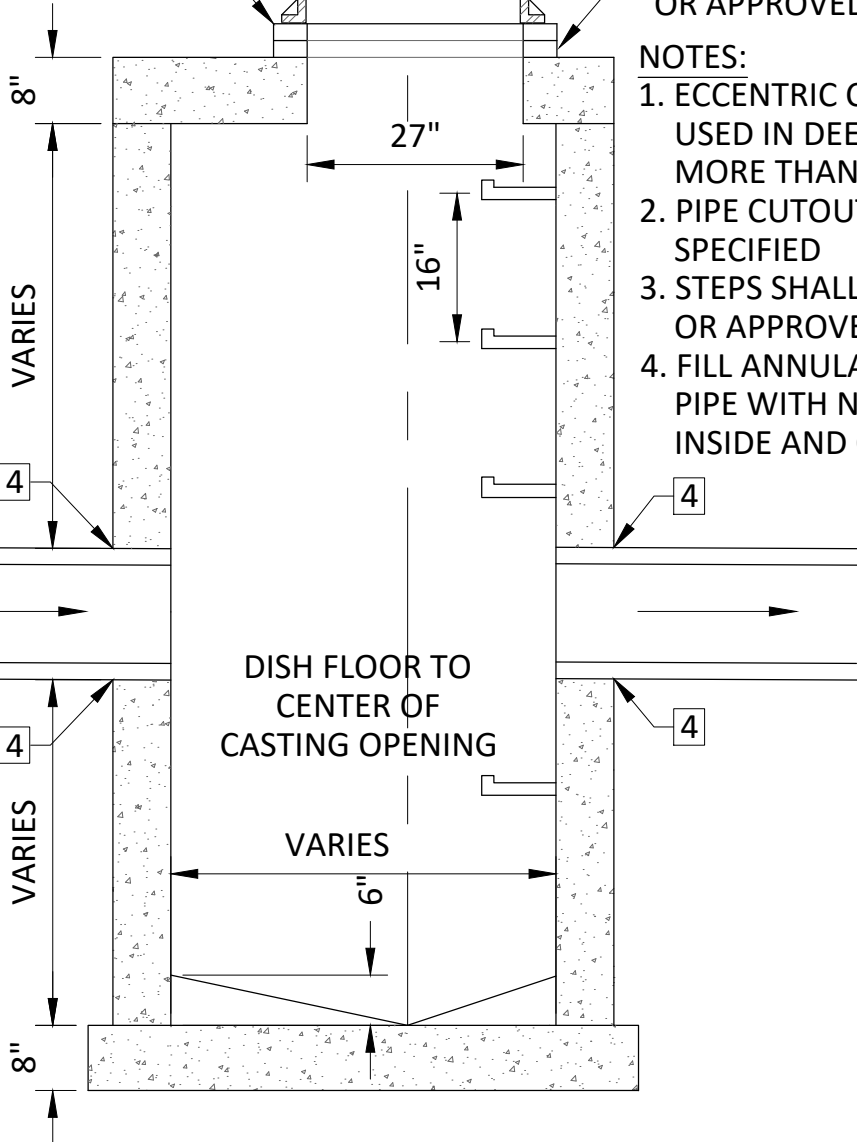
**SHALLOW DEPTH
STORM STRUCTURE**

NOT TO SCALE

CASTING AS SPECIFIED

ADJUSTING RINGS

INFI-SHIELD UNI-BAND CHIMNEY SEAL OR APPROVED EQUAL



- NOTES:
1. ECCENTRIC CONE SECTION MAY BE USED IN DEEP STRUCTURES TO AVOID MORE THAN 4 ADJUSTING RINGS
 2. PIPE CUTOUTS TO BE LOCATED AS SPECIFIED
 3. STEPS SHALL BE NEENAH R-1981-J OR APPROVED EQUAL
 4. FILL ANNULAR SPACE AROUND PIPE WITH NON-SHRINK GROUT INSIDE AND OUT

DISH FLOOR TO CENTER OF CASTING OPENING

SECTIONAL VIEW

DRAINAGE STRUCTURE WITH SUMP

NOT TO SCALE

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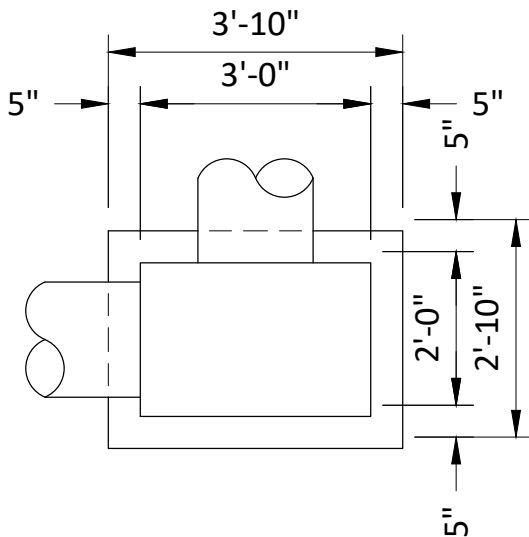


CITY OF WACONIA - STANDARD DETAILS

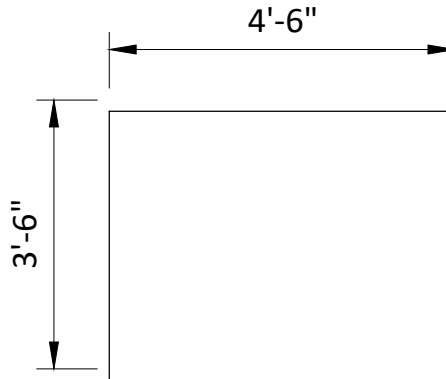
DRAINAGE STRUCTURE WITH SUMP

REVISION DATE	DETAIL NO.
FEBRUARY 2021	
MARCH 2026	

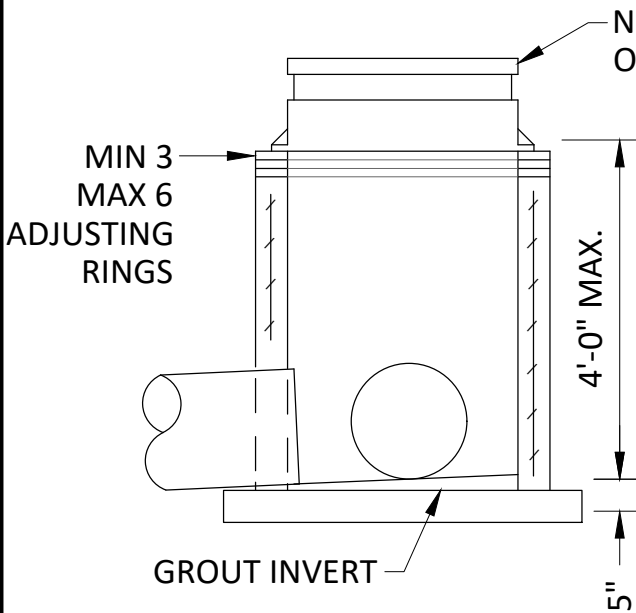
7-108



CATCH BASIN PLAN



BASE SLAB PLAN



SECTION

NEENAH R-3067-V
OR APPROVED EQUAL

NOTES:

1. ALTERNATE CAST-IN PLACE CAN BE USED.
2. MIN. REINFORCING SHALL BE WIRE FABRIC HAVING AN AREA OF NOT LESS THAN 0.12 SQ IN PER FOOT IN BOTH DIRECTIONS.
3. CONCRETE OR HDPE ADJUSTING RINGS MAY BE USED.
4. INSTALL EXTERNAL CHIMNEY SEAL, INFI-SHIELD UNI-BAND OF APPROVED EQUAL

CATCH BASIN STRUCTURE
DESIGN R-1 (2'x3')

NOT TO SCALE

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CITY OF WACONIA - STANDARD DETAILS

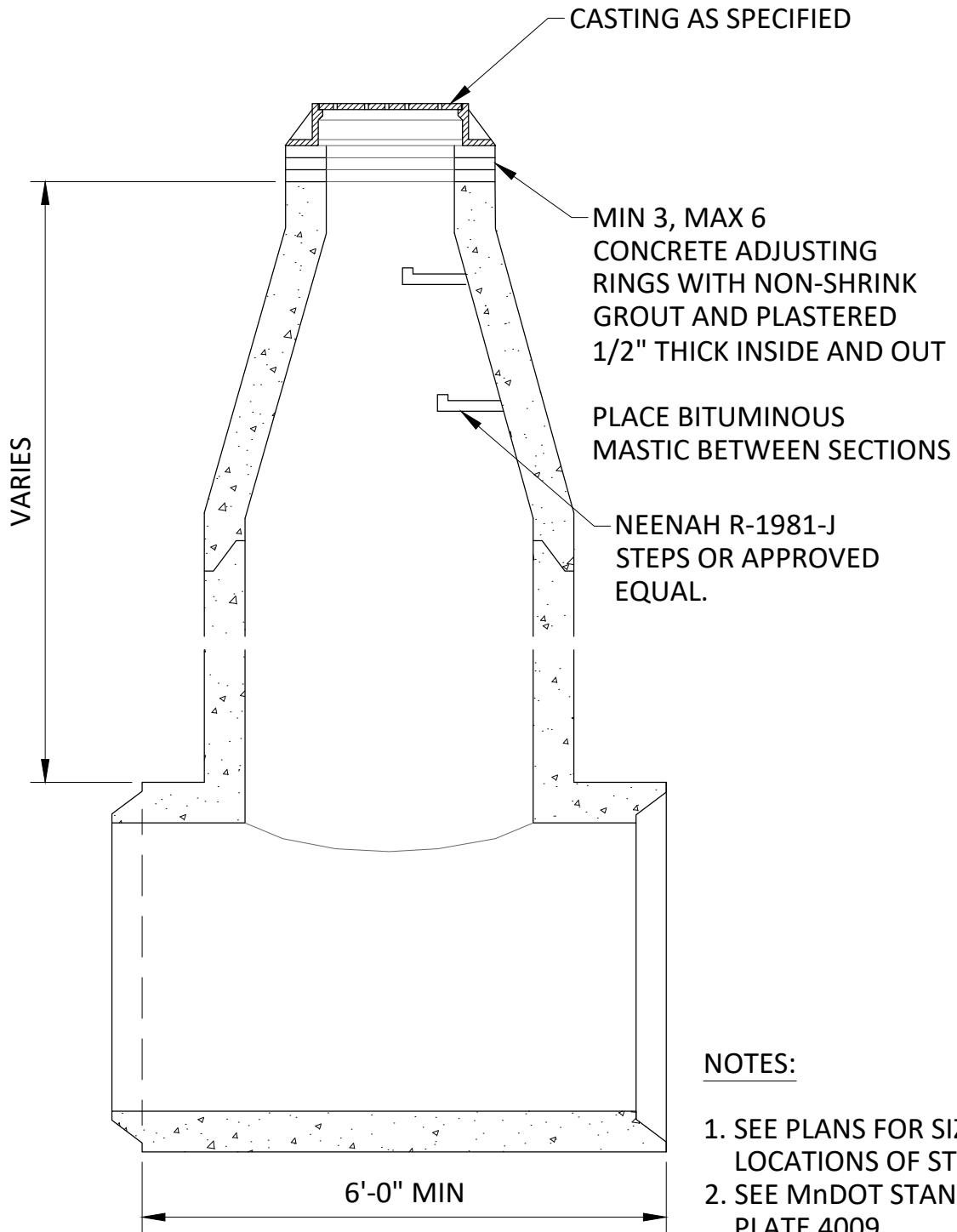
CATCH BASIN R-1 (2' X 3')

REVISION DATE
FEBRUARY 2021

DETAIL NO.

7-109

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NOTES:

1. SEE PLANS FOR SIZE AND LOCATIONS OF STRUCTURE
2. SEE MnDOT STANDARD PLATE 4009

STORM SEWER STRUCTURE
DESIGN J
 NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

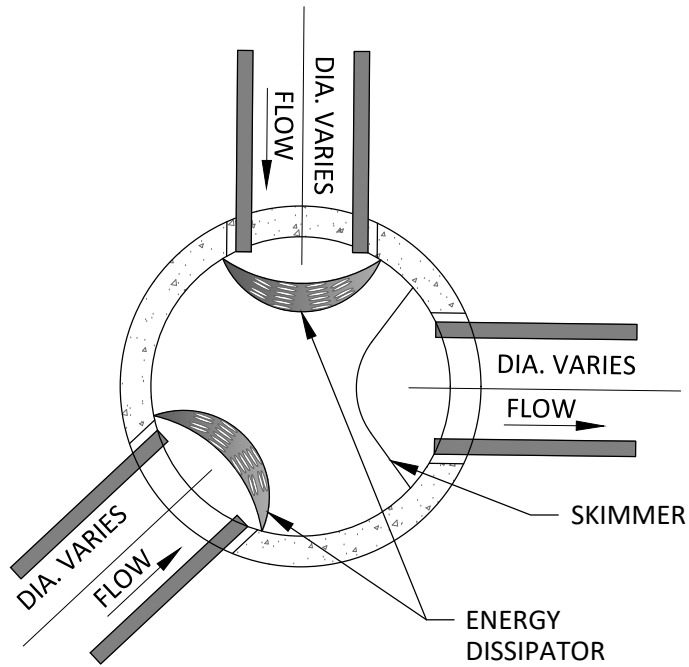
STORM SEWER STRUCTURE DESIGN J

REVISION DATE
FEBRUARY 2021
MARCH 2026

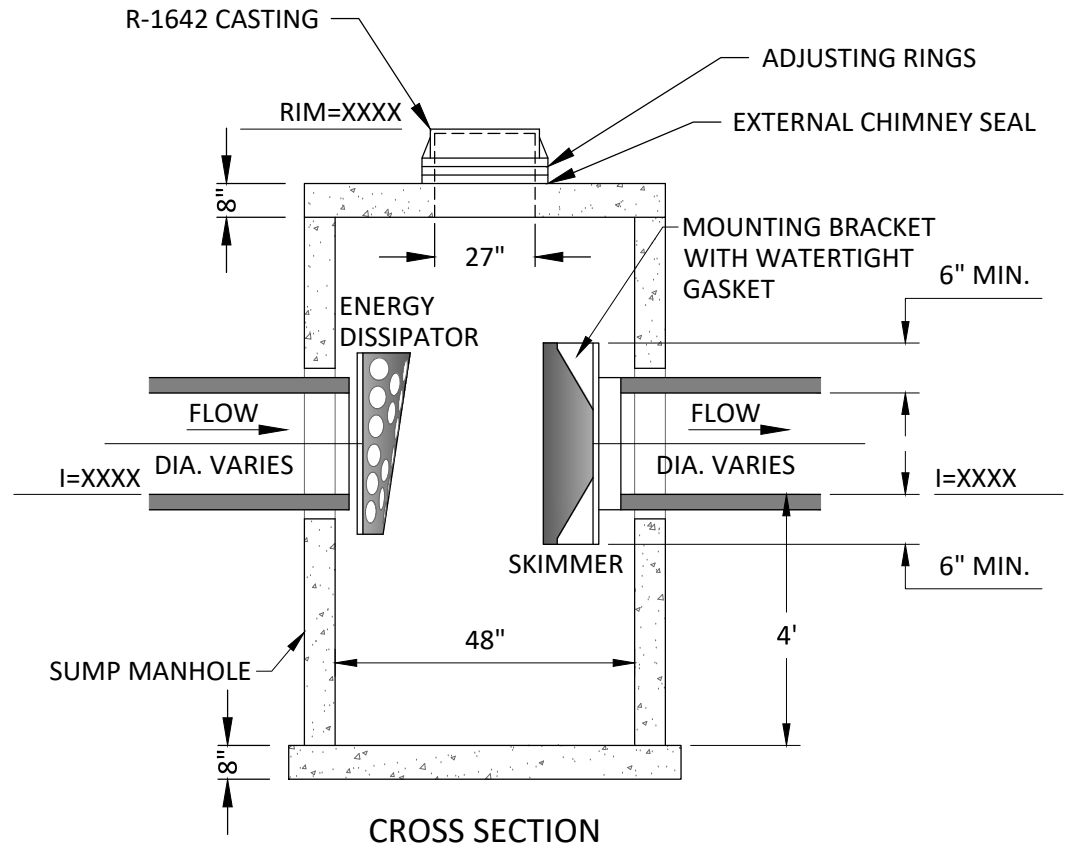
DETAIL NO.

7-110

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PLAN VIEW



CROSS SECTION

SUMP MANHOLE WITH ENERGY DISSIPATOR & SKIMMER

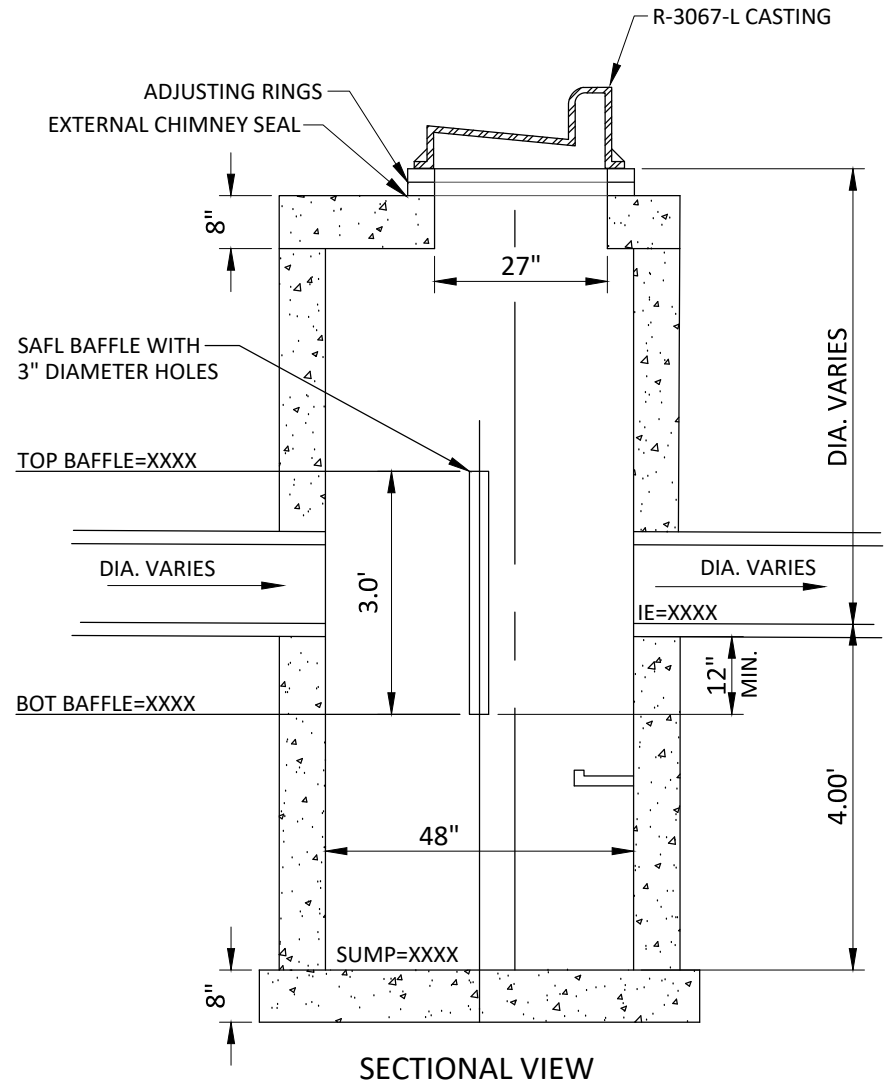
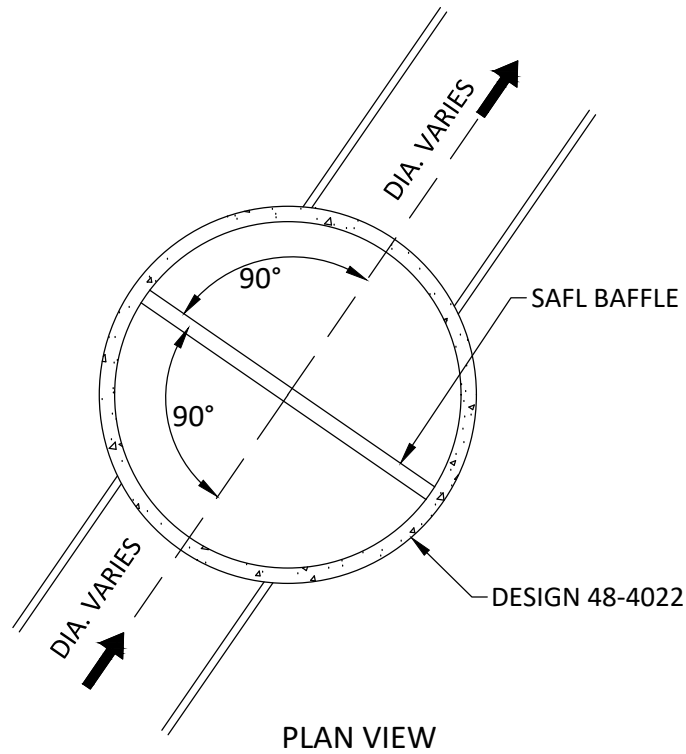
NOT TO SCALE



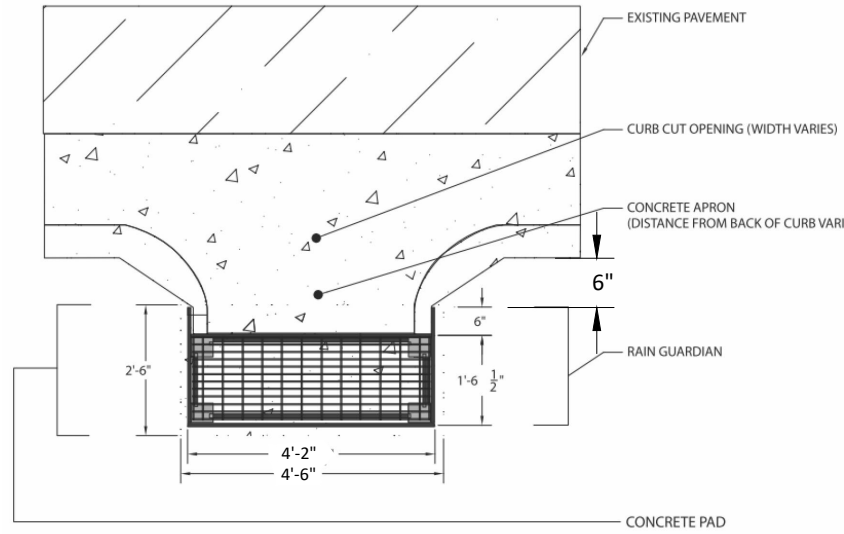
CITY OF WACONIA - STANDARD DETAILS
 SUMP MANHOLE WITH PRESERVER
 BAFFLE & SKIMMER

REVISION DATE	DETAIL NO.
FEBRUARY 2021	7-120

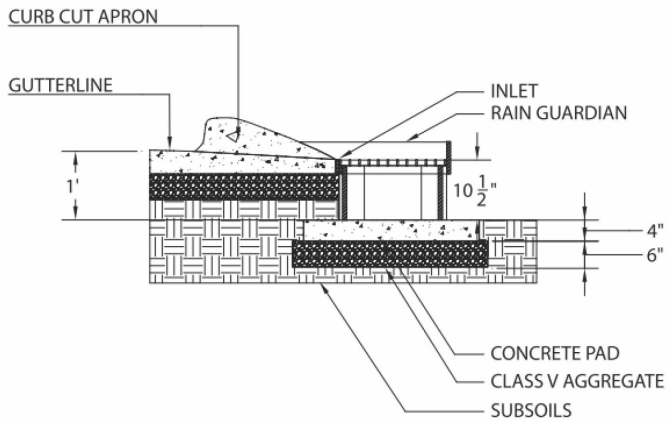
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SUMP MANHOLE WITH SAFL BAFFLE
NOT TO SCALE



PLAN VIEW



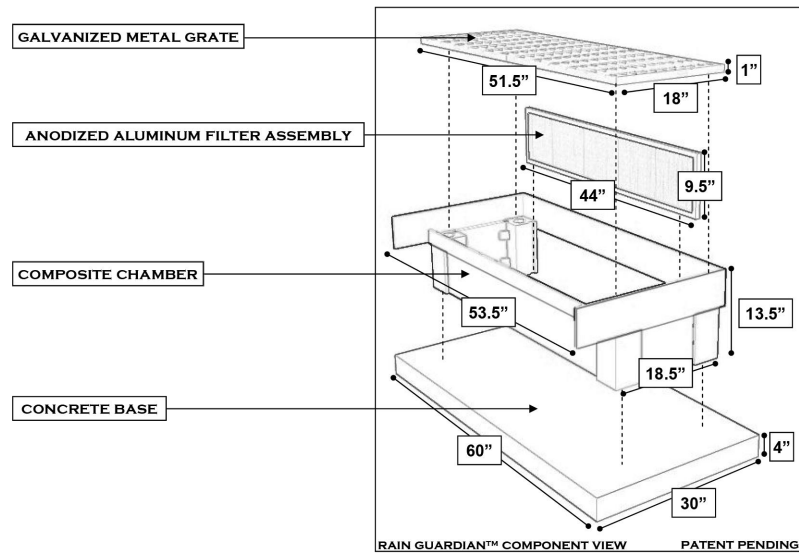
CROSS-SECTION VIEW

NOTES:

1. RAIN GUARDIAN SHALL BE SET 12" FROM BACK OF CURB. CONCRETE BASE SHALL EXTEND A MINIMUM 4" BEYOND FILTER WALL TO SERVE AS A SPLASH DISSIPATOR.
2. APPLY ADHESIVE TO BASE OF RAIN GUARDIAN AND POSITION ON CONCRETE BASE. APPLY ADDITIONAL ADHESIVE AROUND BASE OF INTERIOR TO ESTABLISH WATER-TIGHT SEAL.
3. USING PILOT HOLES IN CORNER POSTS, DRILL 3/16" HOLES INTO CONCRETE WITH 6 1/2" MASONRY BIT AND HAMMER DRILL SECURE WITH 1/4" X 5" MASONRY SCREWS (PROVIDED).
4. WHEN POURING CONCRETE INLET, ENSURE CARRIAGE BOLTS ON RAIN GUARDIAN ARE SURROUNDED BY A MINIMUM 2" CONCRETE ON ALL SIDES. TOP OF GRATE SHALL BE 10.5" ABOVE TOP OF CONCRETE BASE AND 1.5" BELOW BIOFILTRATION BASIN OVERFLOW ELEVATION TO ACCOMMODATE A SLOPED APRON FROM GUTTER TO RAIN GUARDIAN.
5. FILL VOID BETWEEN CURB AND RAIN GUARDIAN. BLEND SIDES OF CURB CUT APRON TO MATCH TOP HEIGHT OF RAIN GUARDIAN DEBRIS WALLS.

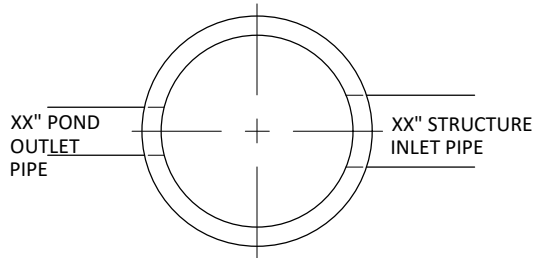
RAIN GUARDIAN

NOT TO SCALE

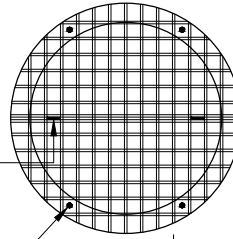


COMPONENT VIEW

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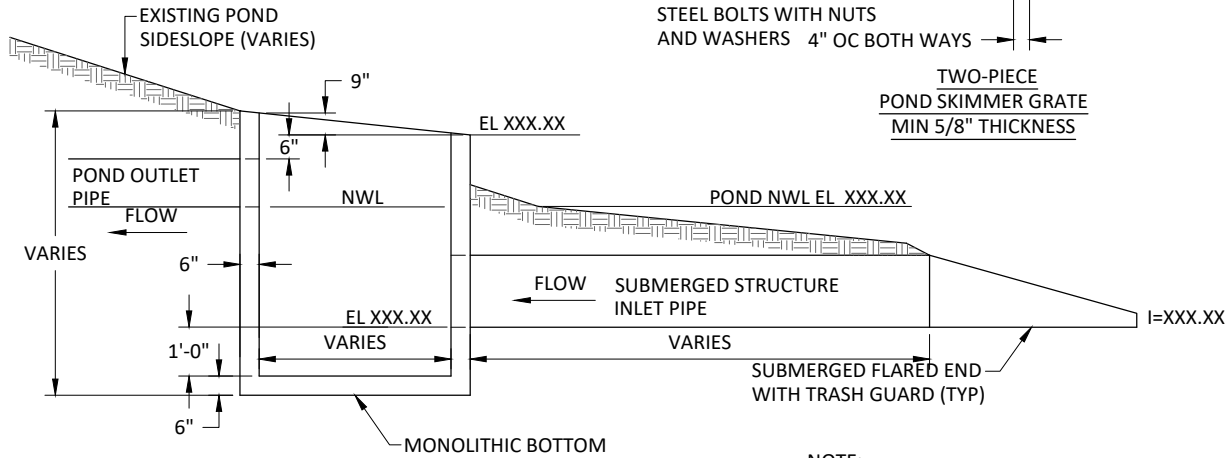
GRATE NOTES:
 1. GRATE TO BE MADE IN TWO (2) PIECES
 2. ALL METAL SHALL BE HOT-DIPPED GALVANIZED



HINGE ASSEMBLY
 MINIMUM OF 2
 HINGES REQUIRED

(4) 1/2" DIA-13 UNC
 HEX HEAD STAINLESS
 STEEL BOLTS WITH NUTS
 AND WASHERS 4" OC BOTH WAYS

TWO-PIECE
 POND SKIMMER GRATE
 MIN 5/8" THICKNESS



NOTE:
 1. ALL PIPE JOINTS SHALL BE TIED.

SECTION VIEW

POND SKIMMER STRUCTURE
 NOT TO SCALE



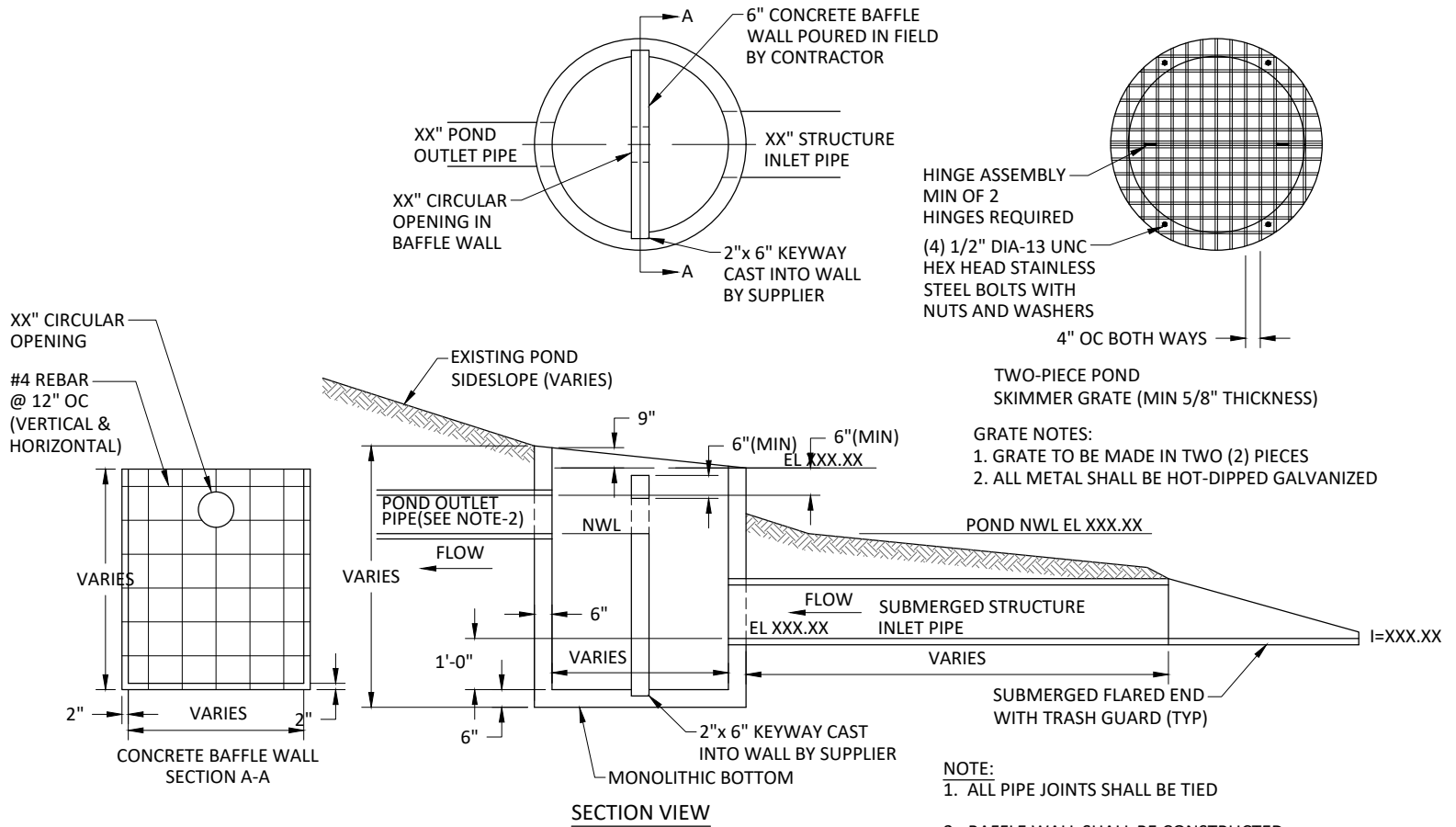
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POND SKIMMER STRUCTURE

REVISION DATE
 FEBRUARY 2021

DETAIL NO.

7-200

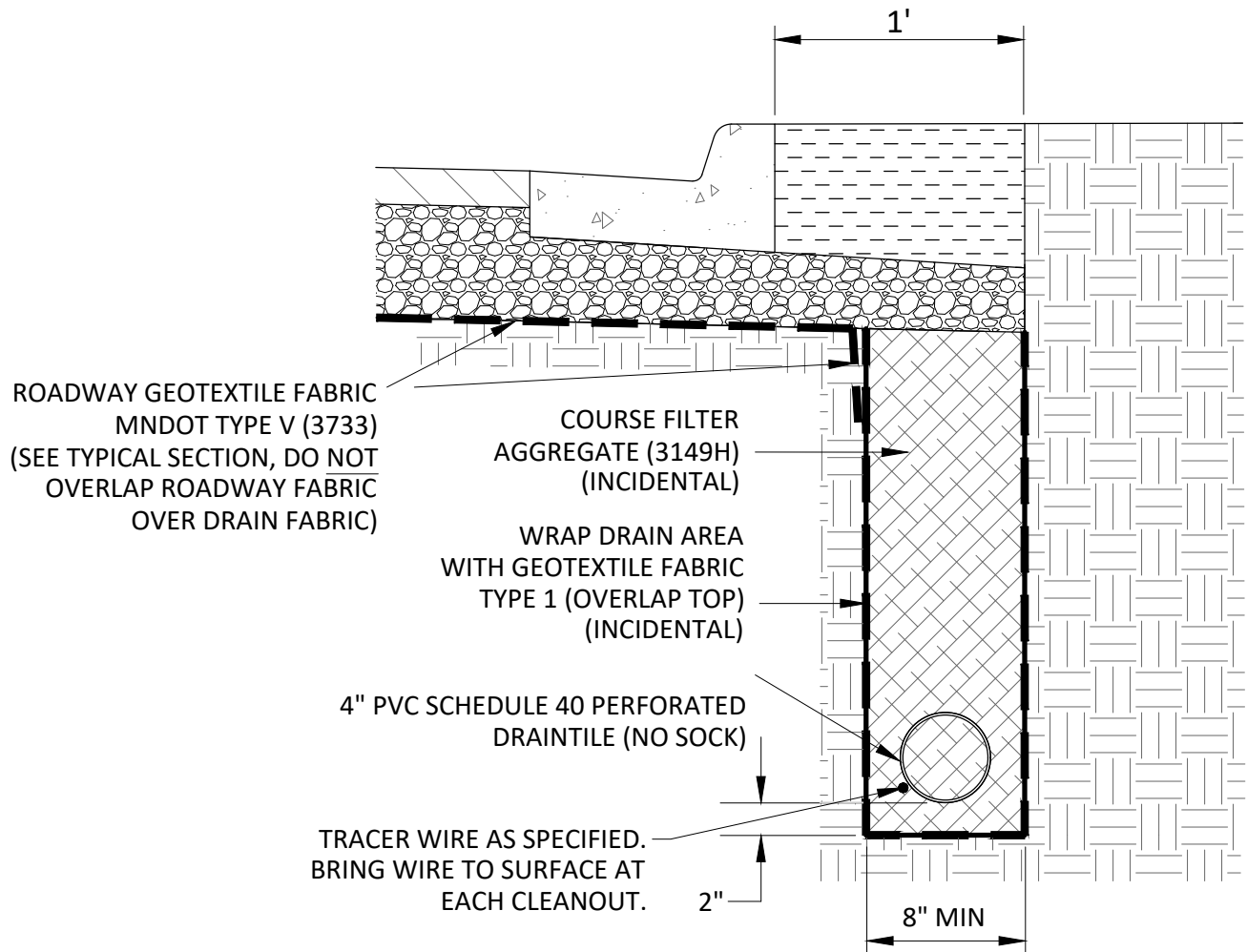


POND SKIMMER STRUCTURE WITH BAFFLE

NOT TO SCALE

- NOTE:**
1. ALL PIPE JOINTS SHALL BE TIED
 2. BAFFLE WALL SHALL BE CONSTRUCTED TO PREVENT LEAKAGE AROUND THE WALL

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SUBSURFACE EDGE DRAIN



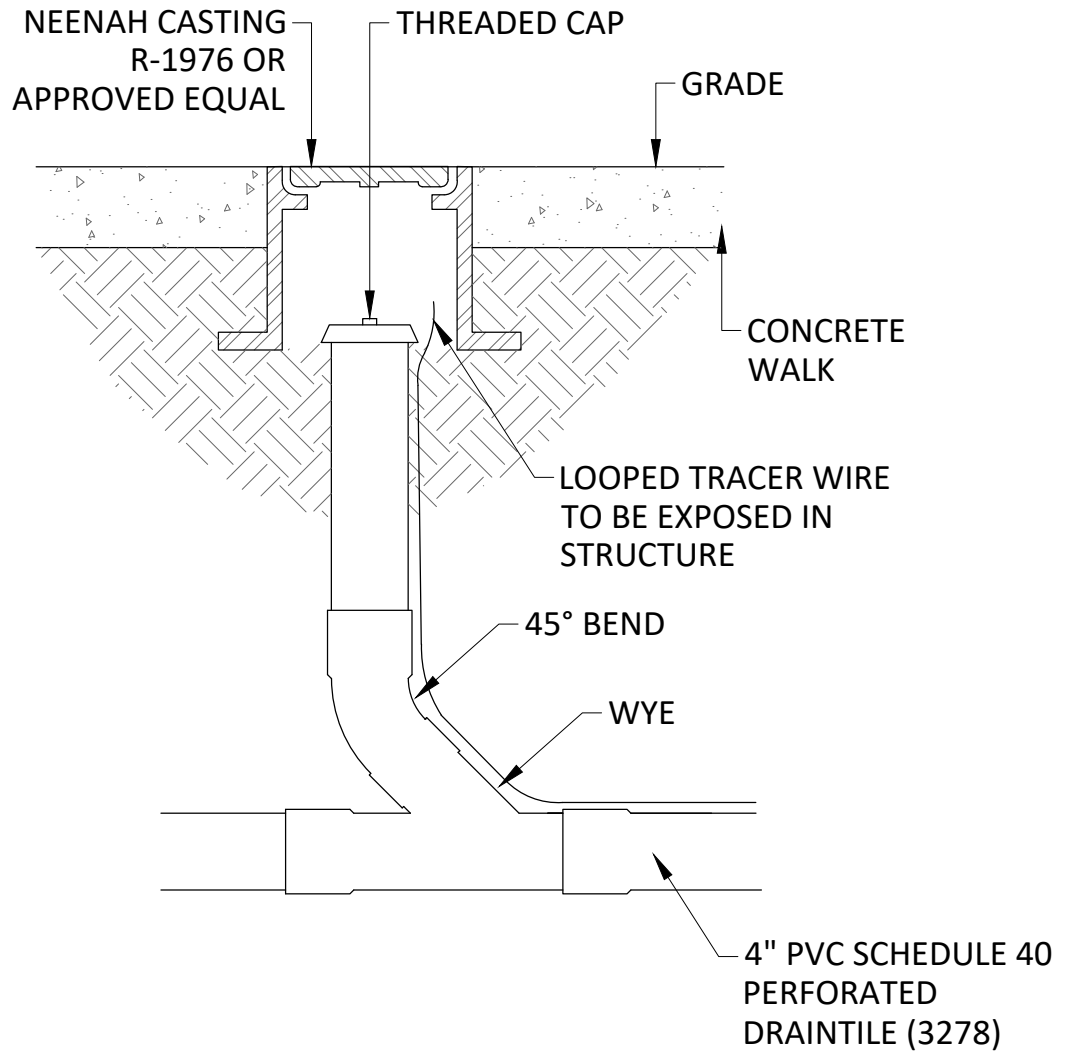
CITY OF WACONIA - STANDARD DETAILS

SUBSURFACE EDGE DRAIN

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MARCH 2026	

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SUBSURFACE DRAIN CLEANOUT UNDER SIDEWALK

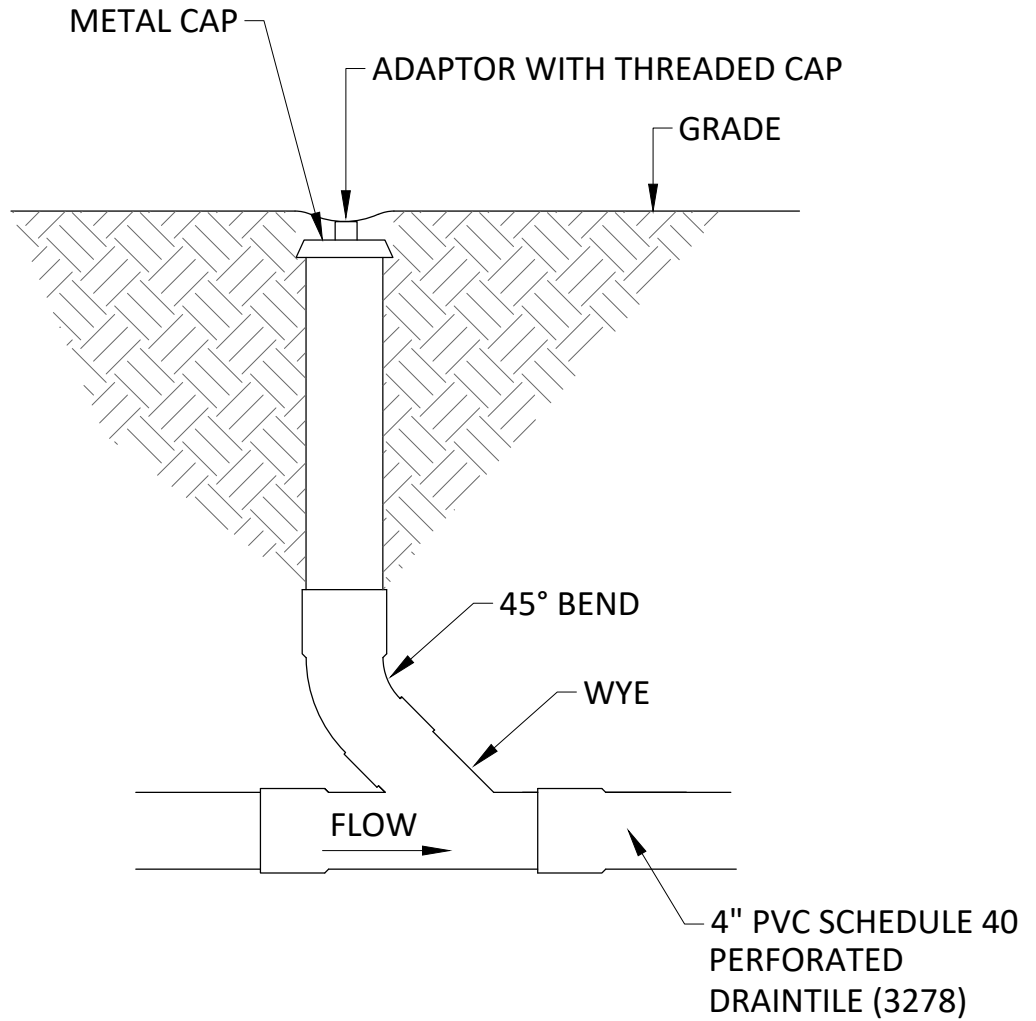
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS
SUBSURFACE DRAIN CLEANOUT UNDER SIDEWALK

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SUBSURFACE DRAIN CLEANOUT

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

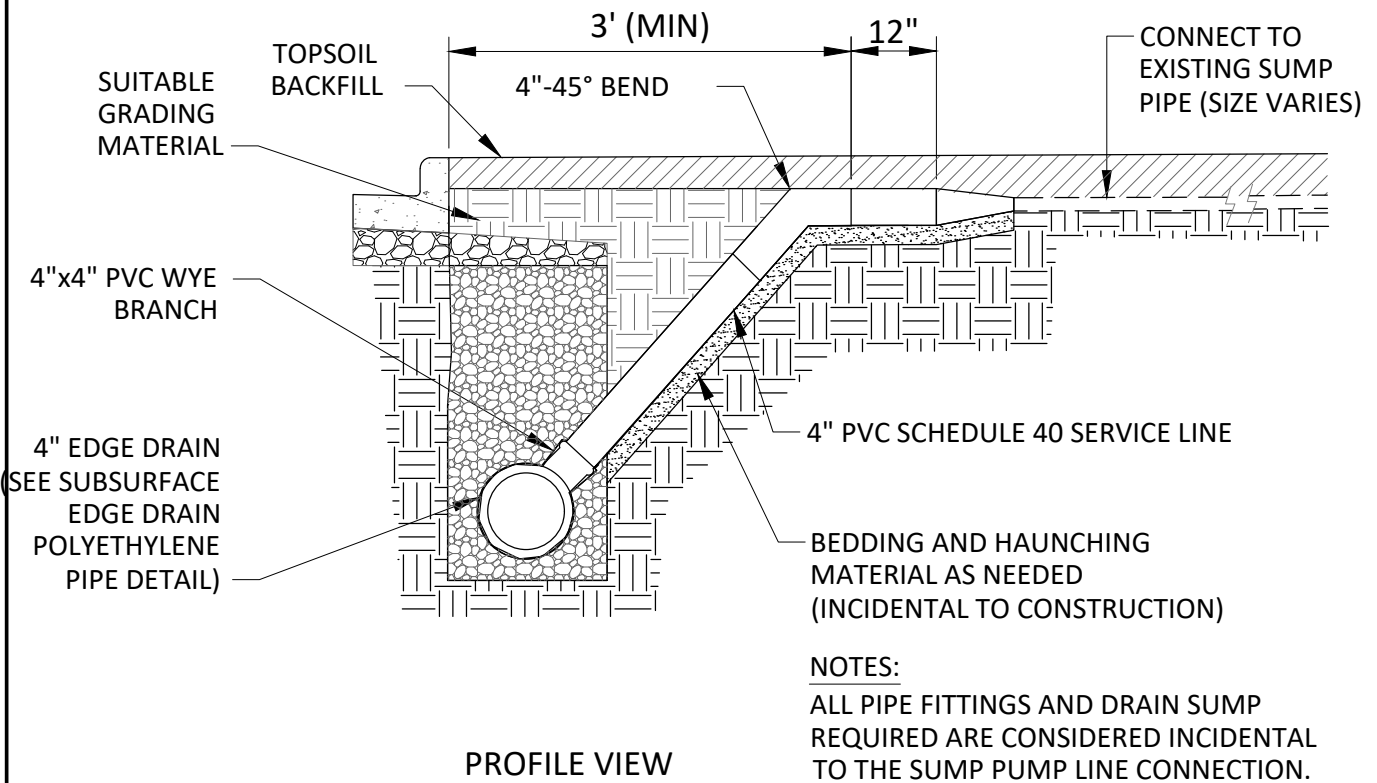
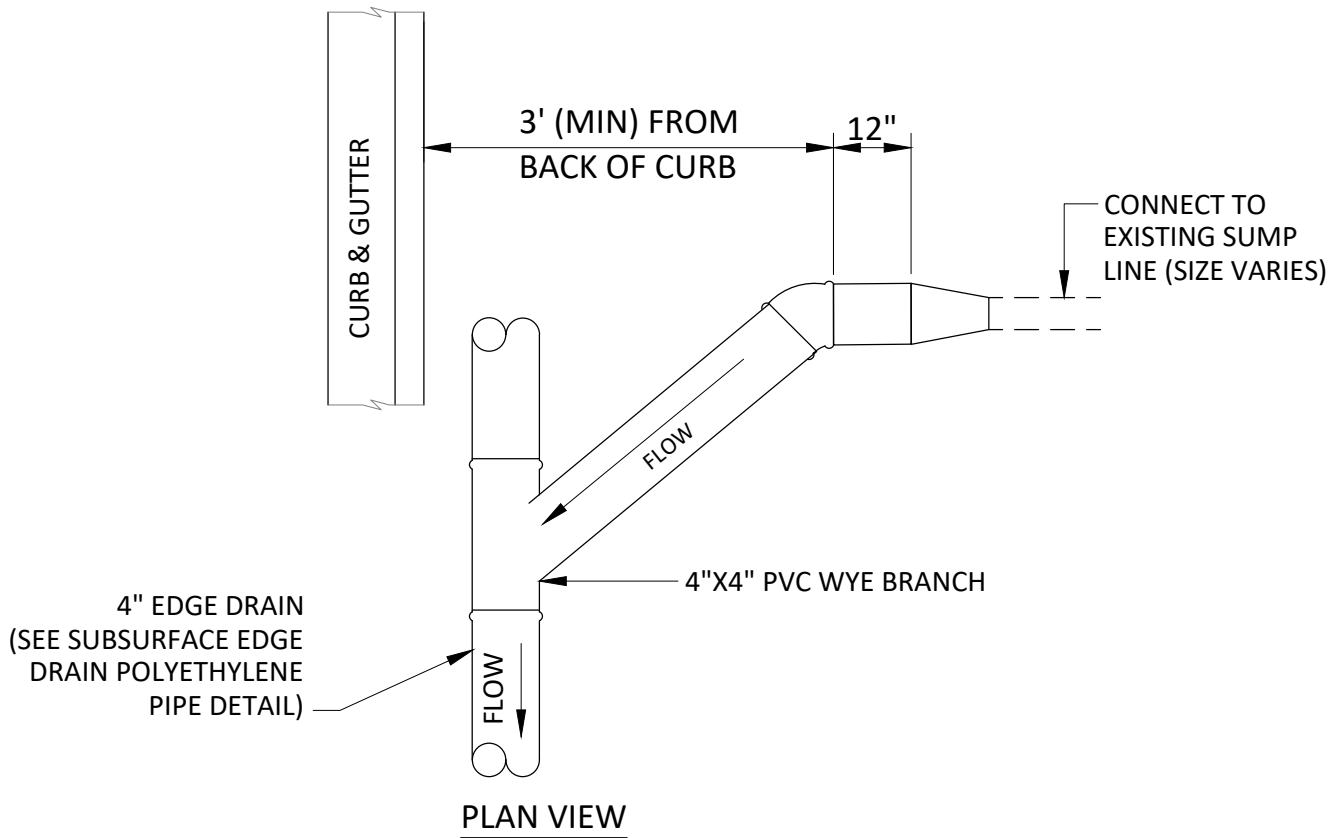
SUBSURFACE DRAIN CLEANOUT

REVISION DATE
FEBRUARY 2021
MARCH 2026

DETAIL NO.

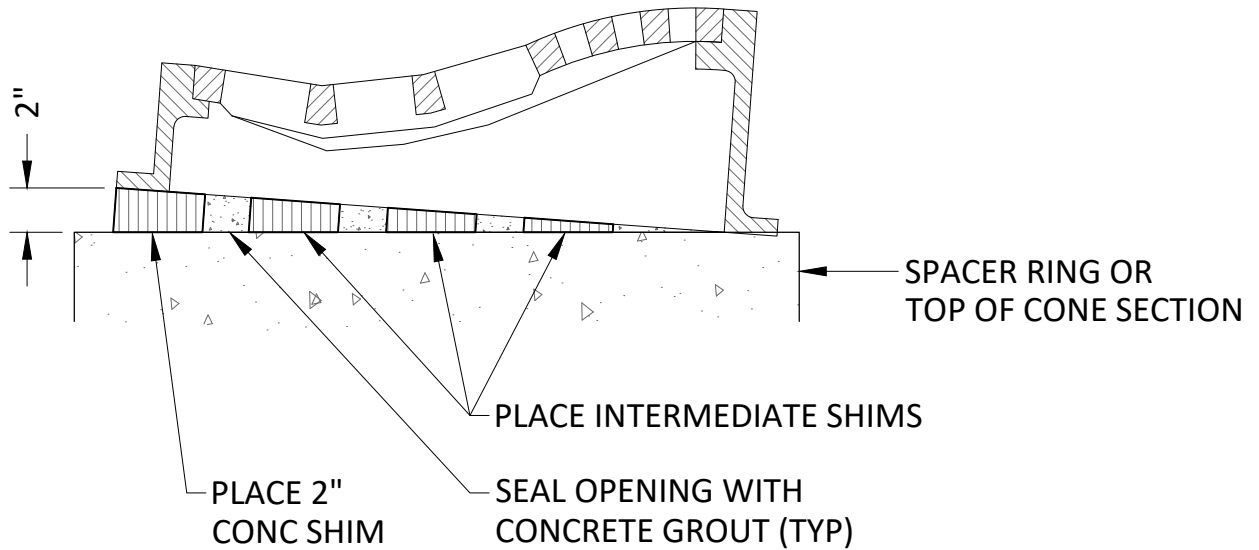
7-305

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SUMP PUMP SERVICE LINE CONNECTION

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NOTE:
CONSTRUCT 5'± TRANSITION CURB
AND GUTTER FROM MOUNTABLE CURB
AND GUTTER SECTION TO MATCH CASTING.

MOUNTABLE CURB CASTING INSTALLATION

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

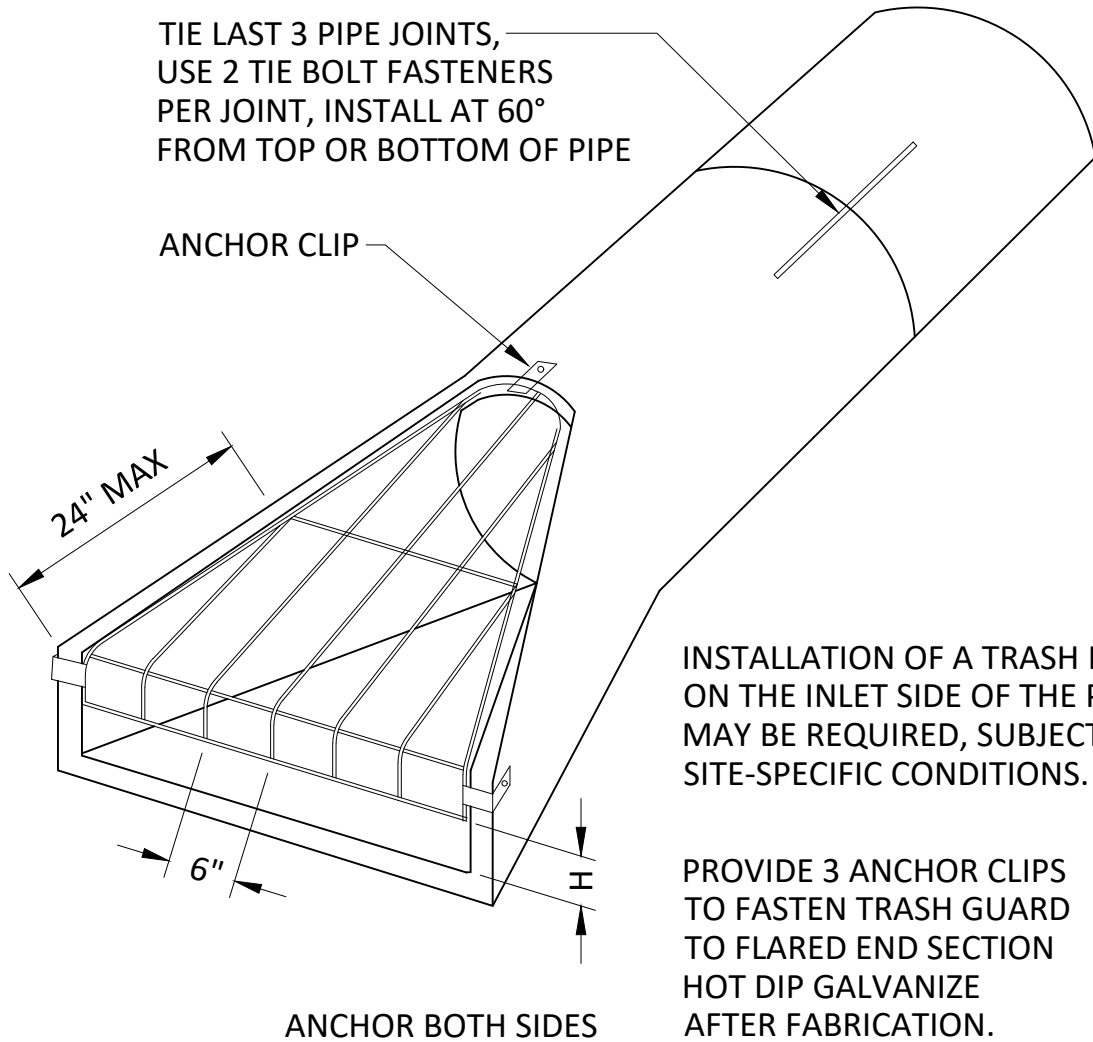
MOUNTABLE CURB CASTING

REVISION DATE
FEBRUARY 2021

DETAIL NO.

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INSTALLATION OF A TRASH RACK ON THE INLET SIDE OF THE PIPE MAY BE REQUIRED, SUBJECT TO SITE-SPECIFIC CONDITIONS.

PROVIDE 3 ANCHOR CLIPS TO FASTEN TRASH GUARD TO FLARED END SECTION
HOT DIP GALVANIZE AFTER FABRICATION.

TRASH GUARD SIZES			
PIPE SIZE	BAR	"H"	BOLTS
12"-18"	3/4"Ø	4"	5/8"
21"-42"	1"Ø	6"	3/4"
42"-72"	1 1/4"Ø	12"	1"

RC APRON TRASH RACK (STEEL BARS)

NOT TO SCALE

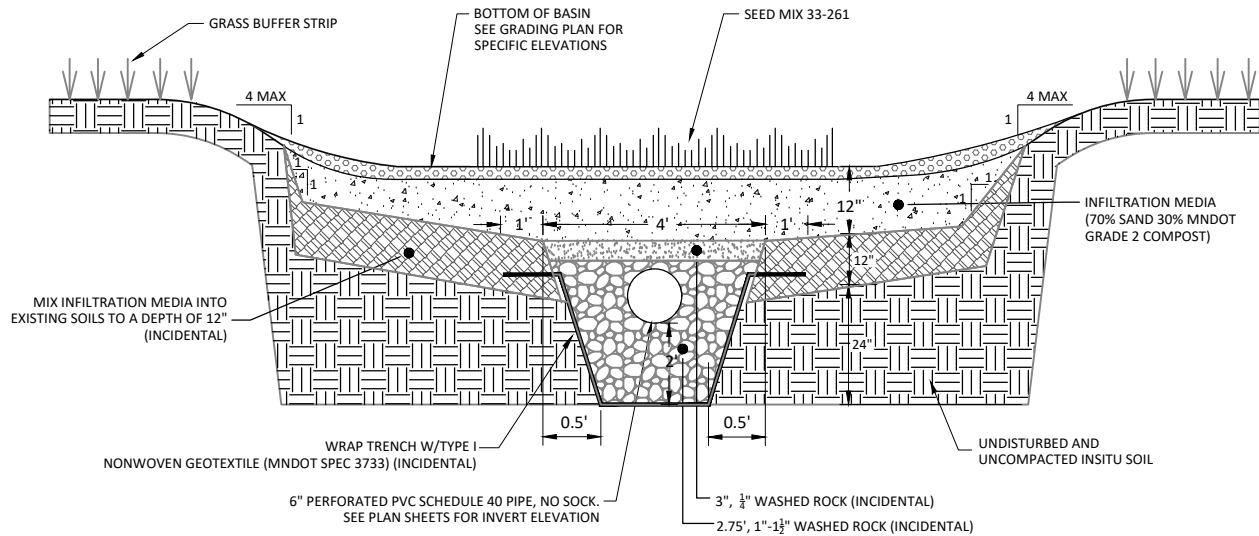


CITY OF WACONIA - STANDARD DETAILS

RC APRON TRASH RACK

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7-601



BIORETENTION BASIN CROSS-SECTION

NOT TO SCALE

CONSTRUCTION SEQUENCING

1. INSTALL ALL TEMPORARY EROSION CONTROL MEASURES PRIOR TO ANY WORK.
2. GRADE BIORETENTION BASIN USING LOW IMPACT EARTH MOVING EQUIPMENT TO PREVENT COMPACTION OF UNDERLYING SOILS. SMALL TRACKED DOZERS AND BOBCATS WITH RUNNER TRACKS ARE RECOMMENDED.
3. EXCAVATE BASIN TO 6" BELOW PROPOSED BOTTOM OF INFILTRATION MEDIA.
4. EXCAVATE 36" WIDE X 30" TRENCH FOR DRAINTILE IN PROPOSED LOCATION .
5. PLACE FILTER FABRIC IN TRENCH TO COVER BOTTOM AND SIDE SLOPES. ALLOW FOR 12" OVERLAP OF FABRIC ON ADJACENT BASIN BOTTOM AND STAKE EDGES DOWN EVERY 2 FT.
6. PLACE 24", 1"-1 1/2" WASHED ROCK IN BOTTOM OF TRENCH.
7. INSTALL 6" PERFORATED HDPE DRAINTILE PIPE PER INVERT ELEVATIONS SHOWN ON PLAN SHEETS.
8. PLACE 9", 1"-1 1/2" WASHED ROCK IN TRENCH TO COVER DRAINTILE.
9. PLACE 3/4" WASHED ROCK TO TOP OF TRENCH.
10. PLACE 6" INFILTRATION MEDIA ON BASIN BOTTOM AND MIX INTO EXISTING SOILS TO DEPTH OF 6" FOR A TOTAL SECTION OF 12" (INCIDENTAL).
11. FILL BASIN TO PROPOSED BOTTOM ELEVATION WITH WELL BLENDED MIXTURE OF 70% SAND AND 30% MNDOT GRADE 2 COMPOST BY VOLUME.

NOTES

1. ONCE MEDIA HAS BEEN MIXED WITH SOIL (STEP 10), NO VEHICLE TRAFFIC SHALL BE ALLOWED ON PREPARED SURFACE. CONTRACTOR SHALL STAGE PLACEMENT OF FINAL LAYER OF MEDIA (STEP 11) WITH SOIL MIXING AS NECESSARY TO COMPLETE CONSTRUCTION OF BASIN.
2. IN THE EVENT SEDIMENT IS INTRODUCED INTO THE BASIN DURING OR IMMEDIATELY FOLLOWING EXCAVATION, THIS MATERIAL MUST BE REMOVED PRIOR TO MEDIA PLACEMENT. IF SEDIMENT IS INTRODUCED AFTER MEDIA PLACEMENT, THIS MATERIAL MUST BE REMOVED, AND ADDITIONAL MEDIA SHALL BE PLACED AS NECESSARY TO RESTORE BASIN TO PROPOSED ELEVATIONS.
3. THE INFILTRATION BASIN SHALL NOT BE EXCAVATED TO FINAL GRADE UNTIL THE CONTRIBUTING DRAINAGE AREA HAS BEEN CONSTRUCTED AND FULLY STABILIZED.
4. SLOPE UNDERDRAIN TOWARDS OUTLET AT A MINIMUM GRADE OF 0.5% TO PROMOTE POSITIVE FLOW. COORDINATE FINAL PIPE SLOPE IN FIELD WITH ENGINEER.
5. CONTRACTOR SHALL COORDINATE FINAL EXTENTS OF BIORETENTION AREAS IN FIELD WITH ENGINEER. ITEMS SHALL BE PAID PER UNIT PRICES ESTABLISHED BY CONTRACT.

RAIN GARDEN PLANT LIST:

THE FOLLOWING RAIN GARDEN MIX SHALL BE APPLIED AT A RATE OF 10 LBS/AC (1 LB/4,400 SF) TO EACH RAIN GARDEN UP TO THE PROPOSED HIGH WATER ELEVATION:

20% WILDFLOWERS THAT INCLUDES:

ALLIUM CERNUUM	NODDING PINK ONION
ASCLEPIAS INCARNATA	SWAMP MILKWEED
ASCLEPIAS TUBEROSA	BUTTERFLY MILKWEED *
ASTER LAEVIS	SMOOTH BLUE ASTER
ASTER NOVAE-ANGLIAE	NEW ENGLAND ASTER
ECHINACEA PURPUREA	PURPLE CONEFLOWER *
EUPATORIUM MACULATUM	JOE PYE WEED *
HELIANTHUS HELIANTHOIDES	FALSE SUNFLOWER
LIATRIS PYCNOSTACHYA	THICK SPIKED BLAZINGSTAR
LIATRIS SPICATA	DENSE BLAZINGSTAR
LOBELIA SIPHILITICA	GREAT BLUE LOBELIA
MONARDA FISTULOSA	WILD BERGAMOT
RATIBIDA PINNATA	YELLOW CONEFLOWER
RUDBECKIA HIRTA	BLACK-EYED SUSAN *
RUDBECKIA SUBTOMENTOSA	SWEET BLACK-EYED SUSAN
VERBENA HASTATA	BLUE VERVAIN
VERNONIA FASCICULATA	COMMON IRONWEED
VERONICASTRUM VIRGINICUM	CULVER'S ROOT
ZIZIA AUREA	GOLDEN ALEXANDER *

80% PRAIRIE GRASS AND SEDGE THAT INCLUDES:

ANDROPOGON GERARDI	BIG BLUESTEM
ANDROPOGON SCOPARIUS	LITTLE BLUESTEM *
CAREX VULPINOIDEA	FOX SEDGE
ELYMUS VIRGINICUS	VIRGINIA WILD RYE
HYSTRIX PATULA	BOTTLE BRUSH GRASS
PANICUM VIRGATUM	SWITCH GRASS
SORGHASTRUM NUTANS	INDIAN GRASS

- * SALT TOLERANT PLANTS - THESE PLANTS ARE TO BE UTILIZED IN RAIN GARDENS TAKING RUNOFF FROM STREET/PARKING AREAS DIRECTLY
- ** CONTRACTOR WILL CHOOSE 5 WILDFLOWERS FROM THIS MIX AS WELL AS 3 GRASSES

RAIN GARDEN NOTES:

1. RAIN GARDEN AREA SHALL BE GRADED TO A DEPTH OF 6"-18"; SEE PLANS FOR ACTUAL GRADING DEPTHS; RAIN GARDEN AREA ADJACENT TO WALL OR WALK SHALL HAVE 10" MIN FREEBOARD
2. CONTRACTOR SHALL TO AVOID COMPACTING SOILS ADJACENT TO PROPOSED RAIN GARDEN AREA; IF COMPACTION HAS OCCURRED CONTRACTOR SHALL RIP AREAS TO A DEPTH OF 18" AND TILL IN 6" OF ORGANIC COMPOST PRIOR TO ANY PLANTINGS
3. CONTRACTOR SHALL MAINTAIN RAIN GARDEN AREA FREE FROM WEEDS AND OTHER INVASIVE PLANT MATERIAL
4. LANDSCAPE ARCHITECT WILL INSPECT CONDITION OF RAIN GARDEN UPON COMPLETION OF INSTALLATION AND GIVE WRITTEN PROVISIONAL ACCEPTANCE; FOLLOWING ANNIVERSARY DATE, LANDSCAPE ARCHITECT WILL INSPECT RAIN GARDEN AREA FOR FINAL ACCEPTANCE; INSPECTION WILL INCLUDE OVERALL CONDITION OF PLANTINGS, INDICATION OF ANY WEEDS AND MONITORING OF ANY SEDIMENTATION; FINAL ACCEPTANCE WILL BE OFFERED TO CONTRACTOR AFTER ANY COMMENTS ARE ADDRESSED UPON THIS INSPECTION
5. AFTER FIRST GROWING SEASON, CONTRACTOR SHALL REMOVE ALL DEAD PLANT DEBRIS FROM PREVIOUS GROWING SEASON AND PRUNE SHRUB MATERIAL AS NECESSARY FOR OVERALL APPEARANCE OF RAIN GARDEN
6. CONTRACTOR SHALL MONITOR AND CONTROL SEDIMENTATION IN SPREADER STRIP, PRETREATMENT AREAS (TURF) AND IN RAIN GARDEN FOR ONE FULL YEAR; TURF ON PRETREATMENT AREAS SHALL BE MOWED WITH LOW GROUND PRESSURE EQUIPMENT (TO AVOID SOIL COMPACTION) TO 3-4" HEIGHT
7. CONTRACTOR SHALL MONITOR MOISTURE IN ALL RAIN GARDEN AREAS FOR ONE FULL YEAR; CONTRACTOR SHALL SUPPLEMENT WATER IF THERE IS INSUFFICIENT RAINFALL PER WEEK (ONE INCH PER WEEK)
8. MULCH IS TO BE 4"-5" OF MNDOT TYPE 6 SHREDDED HARDWOOD BARK MULCH IN RAIN GARDEN; CONTRACTOR SHALL MAINTAIN 4" CLEARING AROUND BASE OF SHRUBS AND 3" CLEARING AROUND PERENNIALS, FREE FROM MULCH; CONTRACTOR SHALL MAINTAIN INITIAL DEPTH OF MULCH FOR ONE FULL YEAR IN RAIN GARDEN AREAS TO REDUCE WEED INFESTATION
9. RAIN GARDEN AREAS ARE TO RECEIVE 4' DEPTH OF PLANTING SOIL; PLANTING SOIL IS TO CONSIST OF 20% ORGANIC MATERIAL, 50% SANDY SOIL AND 30% TOPSOIL; CLAY CAN BE PRESENT TO A MAXIMUM OF 10% OF OVERALL MIX; ALL AMENDED NATIVE SOILS SHALL MEET SOIL MIXTURE SPECIFICATIONS; CONTRACTOR SHALL INSURE PERCOLATION RATE OF AMENDED SOIL GREATER THAN ONE INCH PER HOUR
10. SEE SPECIFICATION BOOKLET FOR ADDITIONAL INFORMATION

RAIN GARDEN NOTES

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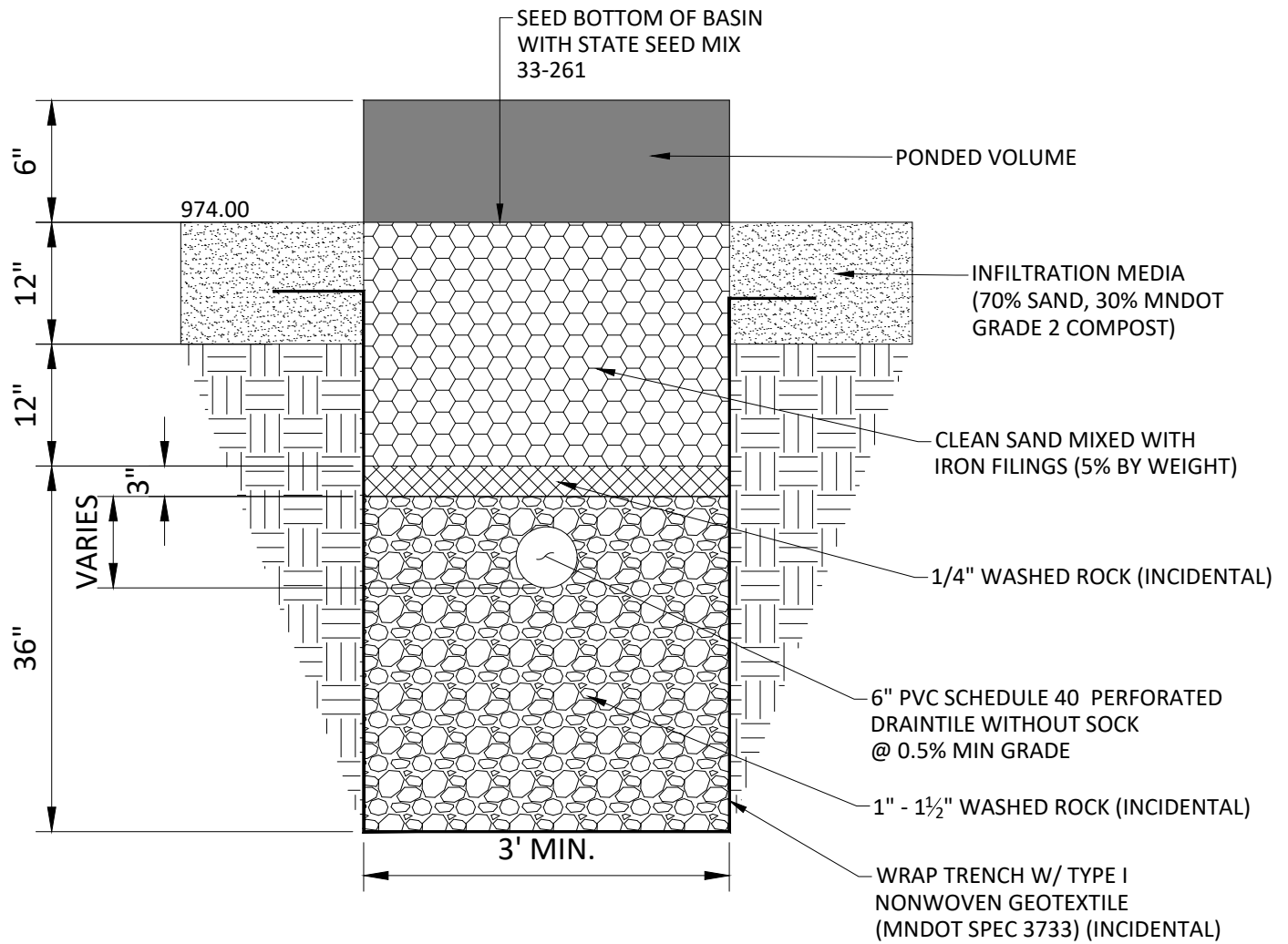


CITY OF WACONIA - STANDARD DETAILS

RAIN GARDEN NOTES

REVISION DATE	DETAIL NO.
FEBRUARY 2021	7-702

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NOTE:

1. SAND IRON NEEDS TO BE PRE-MIXED PRIOR TO INSTALLATION. CAN OCCUR OFF SITE. COORDINATE WITH ENGINEER PRIOR TO MIXING.
2. IRON FILINGS MUST BE CLEANED AND WASHED. PROVIDE SUPPLIER INFORMATION TO CCWMO. NO OIL OR GREASE ALLOWED.

**IRON ENHANCED SAND FILTER
TYPICAL SECTION**

NOT TO SCALE

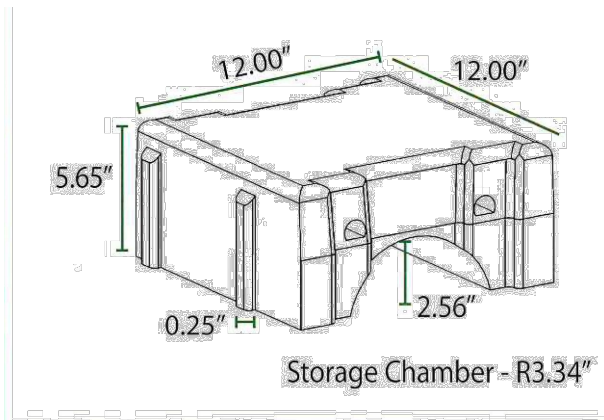
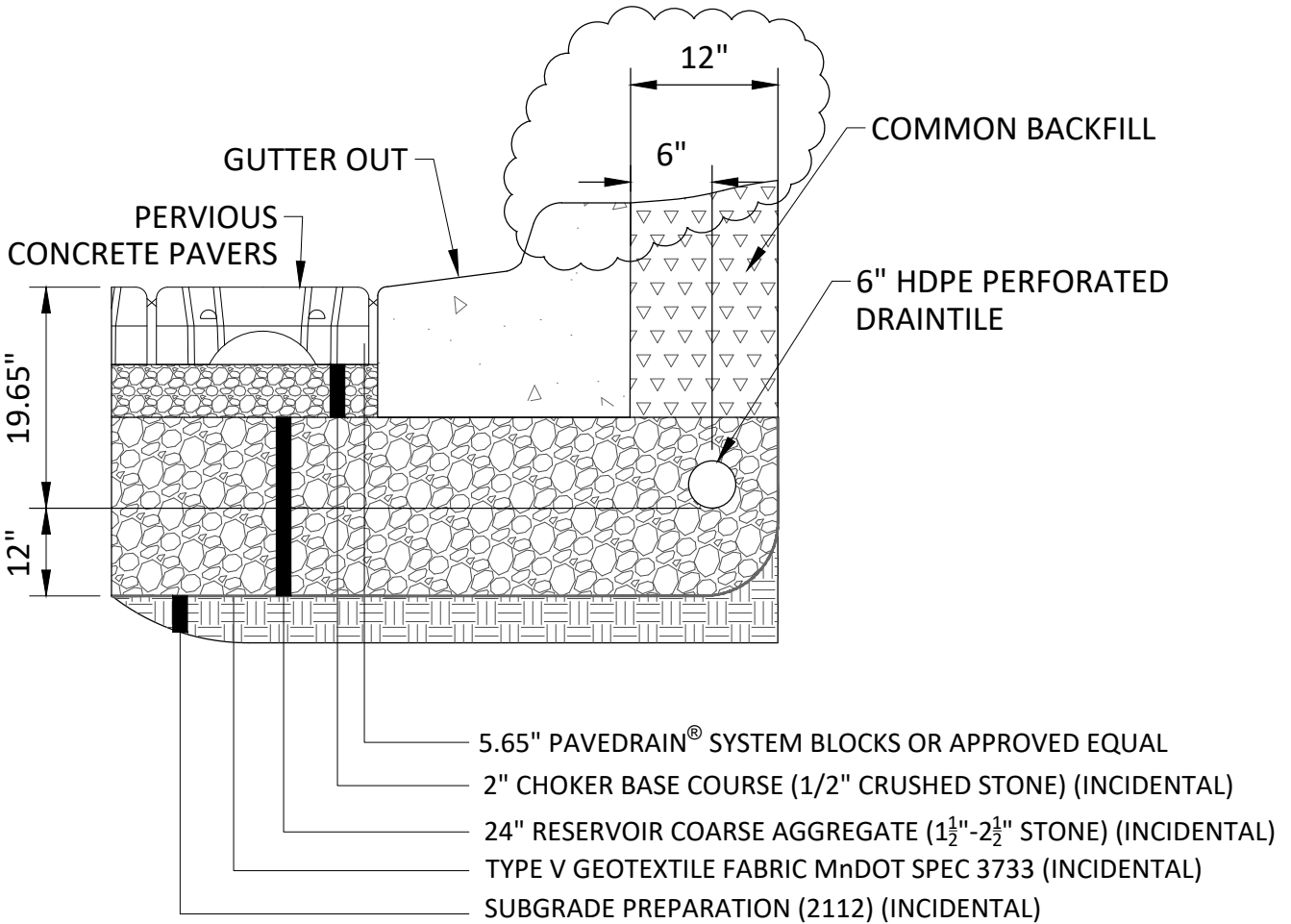


CITY OF WACONIA - STANDARD DETAILS

IRON ENHANCED SAND FILTER

REVISION DATE	DETAIL NO.
FEBRUARY 2021	7-703
MARCH 2026	

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PAVEDRAIN® SYSTEM DIMENSIONS

POROUS PAVEMENT TYPICAL SECTION

NOT TO SCALE

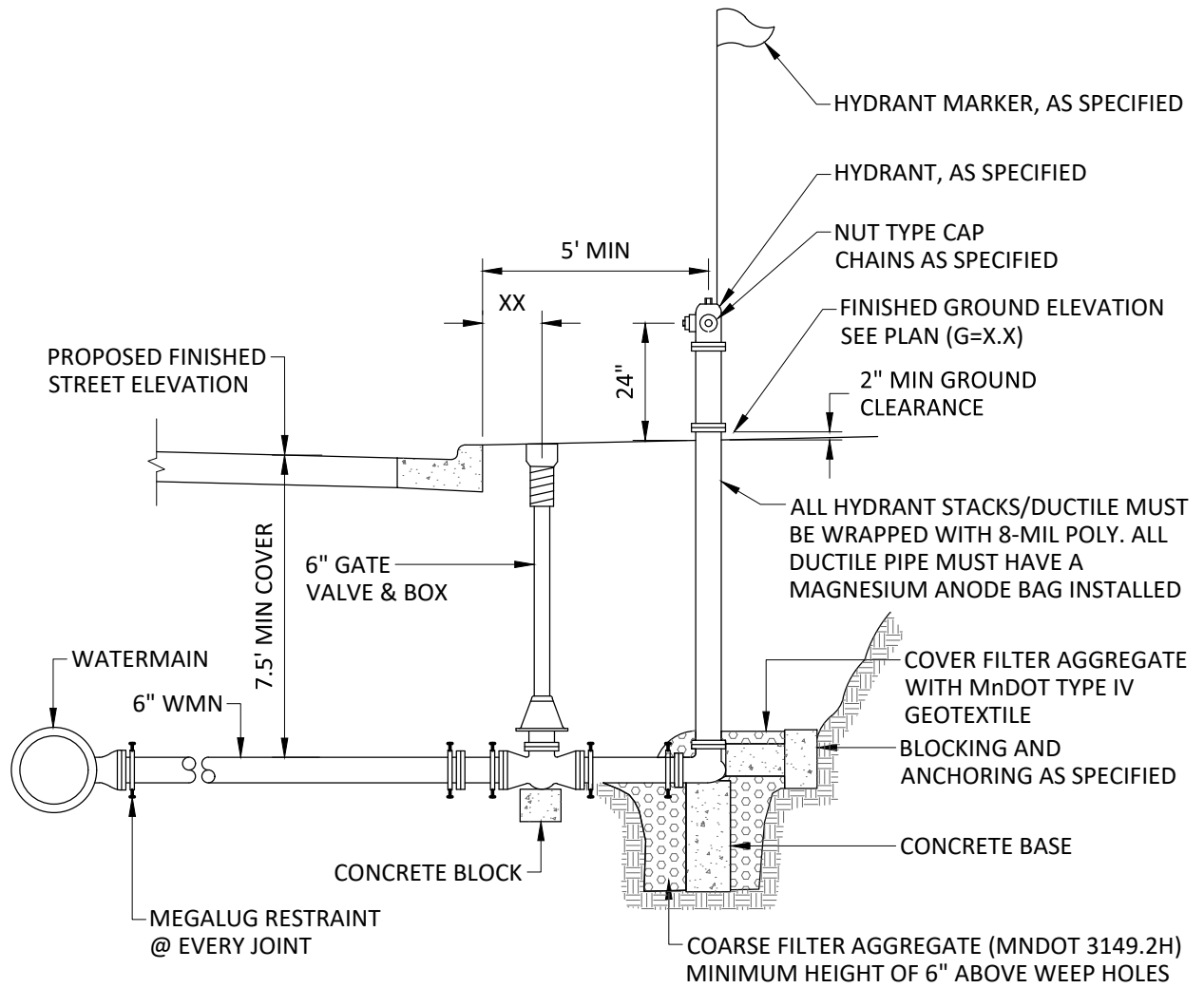


CITY OF WACONIA - STANDARD DETAILS

POROUS PAVEMENT

REVISION DATE	DETAIL NO.
FEBRUARY 2021	7-800

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HYDRANTS LOCATED WHERE THE GROUNDWATER TABLE IS ABOVE THE DRAIN OUTLET SHALL HAVE THE OUTLET DRAIN PLUGGED AND SHALL BE EQUIPPED WITH A TAG STATING "PUMP AFTER USE"

HYDRANT INSTALLATION, MEGALUGS
NOT TO SCALE

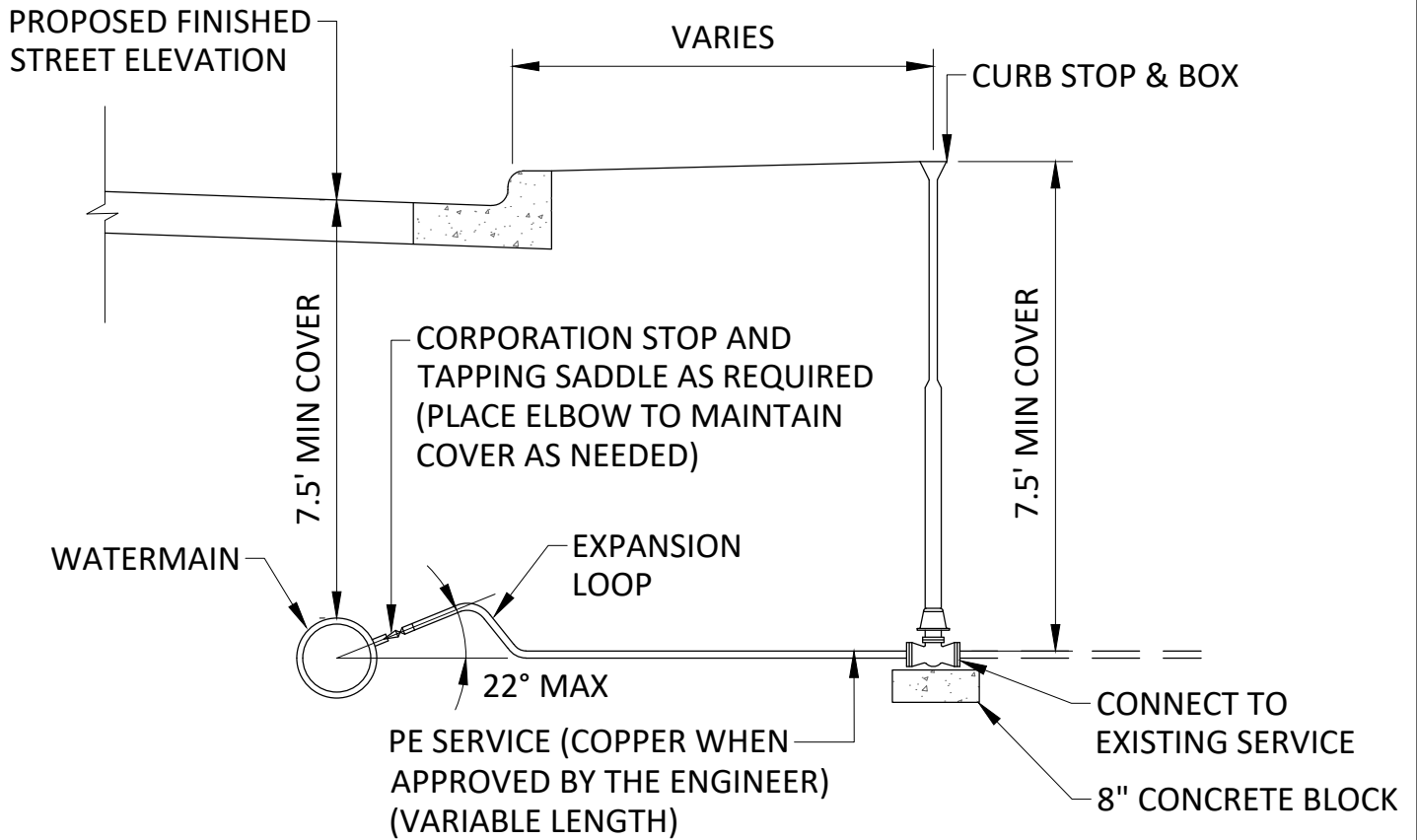


CITY OF WACONIA - STANDARD DETAILS

HYDRANT INSTALLATION-MEGALUGS

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-000
MARCH 2026	

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**WATER SERVICE INSTALLATION
RECONSTRUCTION**
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

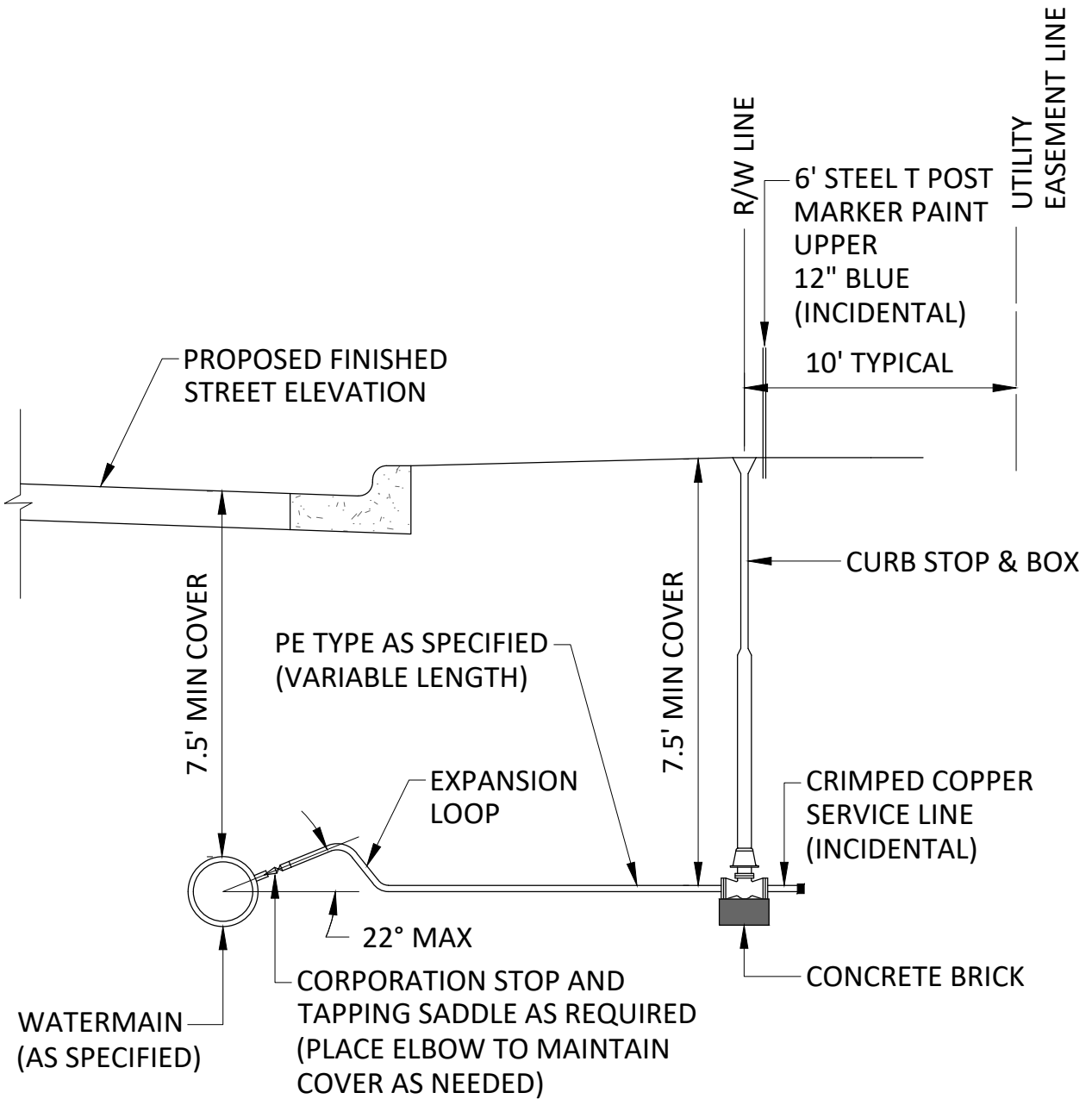
WATER SERVICE RECONSTRUCTION

REVISION DATE
FEBRUARY 2021
MARCH 2026

DETAIL NO.

9-100

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WATER SERVICE INSTALLATION NEW CONSTRUCTION

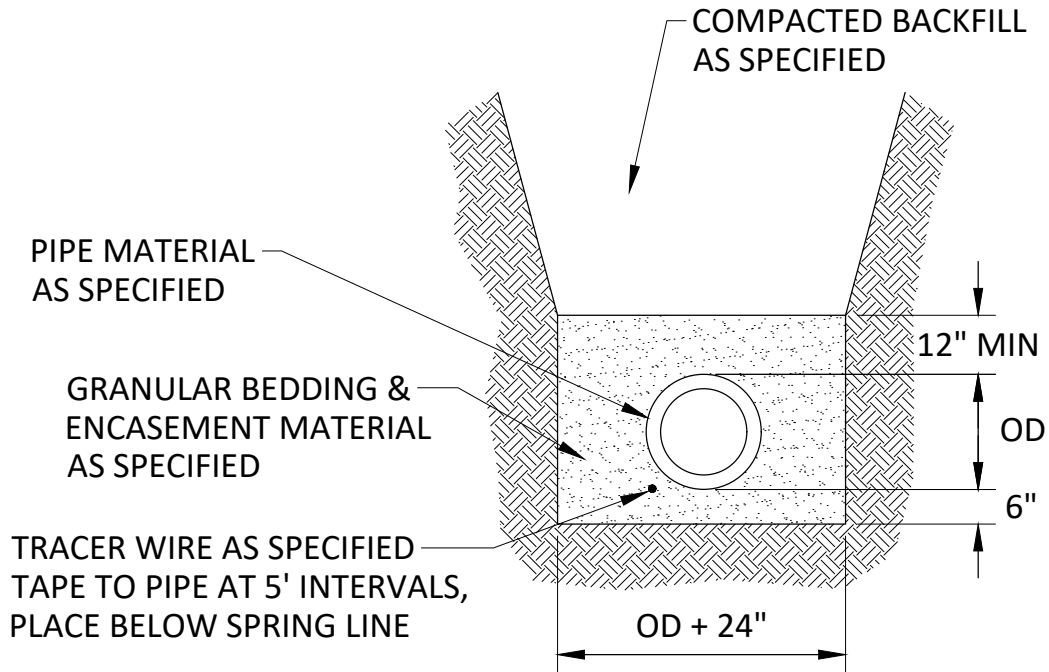
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS
WATER SERVICE NEW CONSTRUCTION

REVISION DATE	DETAIL NO.
FEBRUARY 2021	
SEPTEMBER 2024	9-101

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PVC WATERMAIN TRENCH
NOT TO SCALE

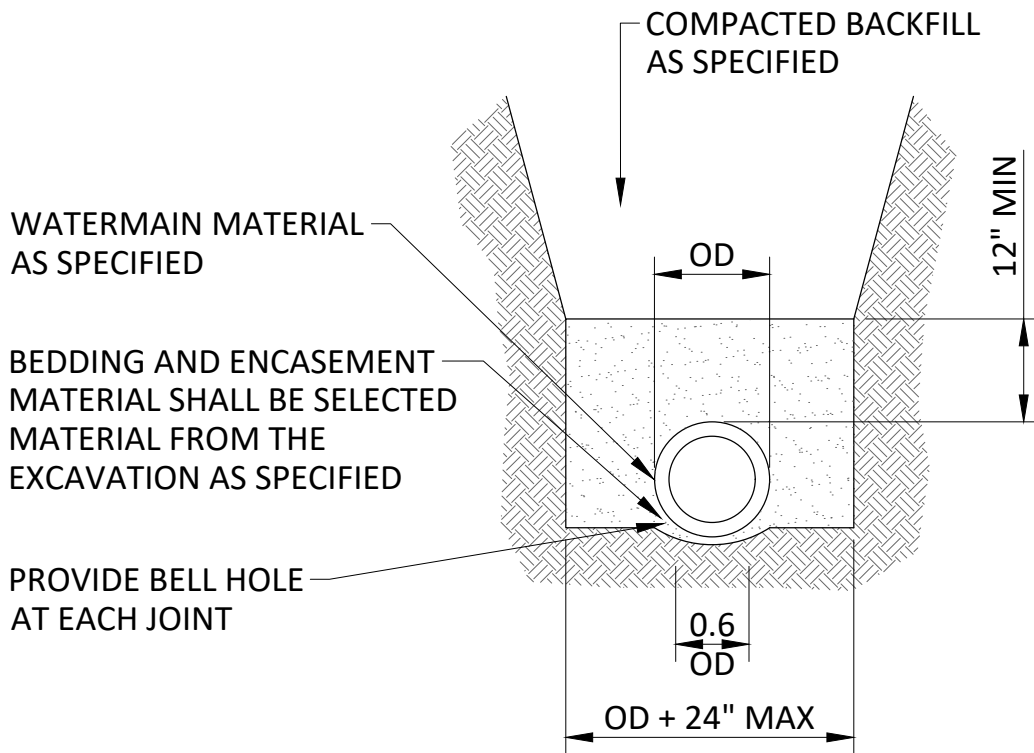


CITY OF WACONIA - STANDARD DETAILS

PVC WATERMAIN TRENCH

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-200

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WATERMAIN MATERIAL AS SPECIFIED

BEDDING AND ENCASEMENT MATERIAL SHALL BE SELECTED MATERIAL FROM THE EXCAVATION AS SPECIFIED

PROVIDE BELL HOLE AT EACH JOINT

COMPACTED BACKFILL AS SPECIFIED

12" MIN

OD

0.6 OD

OD + 24" MAX

DIP WATERMAIN TRENCH
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

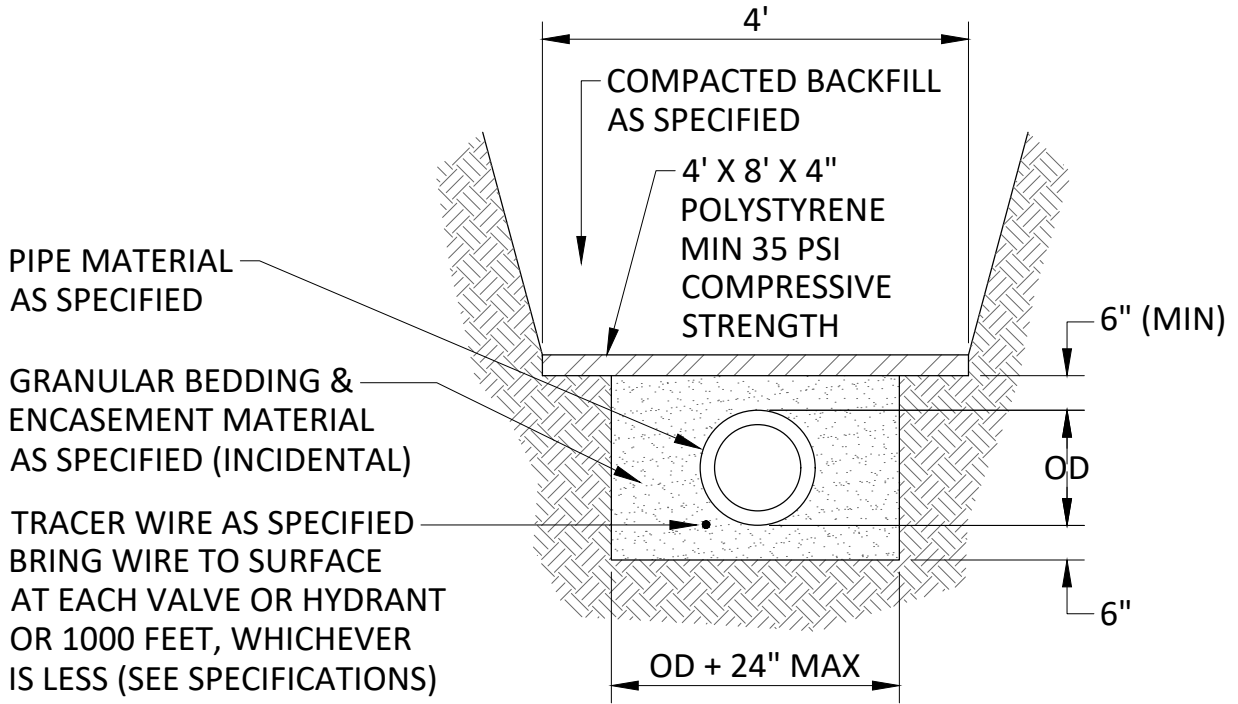
DIP WATERMAIN TRENCH

REVISION DATE
FEBRUARY 2021

DETAIL NO.

9-201

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WATERMAIN INSULATION
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

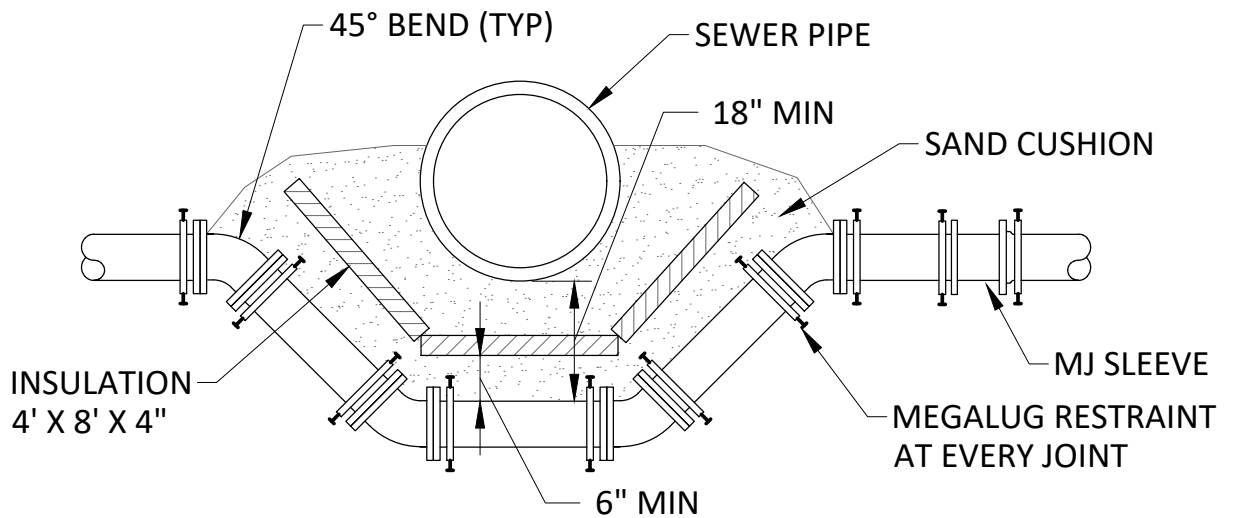
PVC WATERMAIN INSULATION

REVISION DATE
FEBRUARY 2021
MARCH 2026

DETAIL NO.

9-202

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NOTES:

1. PROVIDE MEGALUG RESTRAINT AT JOINT ON BENDS AND AS SHOWN THIS DETAIL
2. COAT ALL ANCHORAGE AS PER SPECS
3. PROVIDE SAND CUSHION BETWEEN TOP OF WATERMAIN AND BOTTOM OF SEWER PIPE, MIN DIMENSIONS AS SHOWN THIS DETAIL (INCIDENTAL)
4. INSULATION TO BE 4" THICK POLYSTYRENE

WATERMAIN OFFSET

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

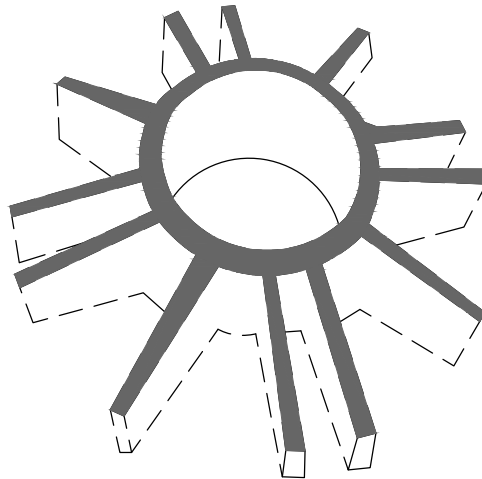
WATERMAIN OFFSET

REVISION DATE
FEBRUARY 2021
MARCH 2026

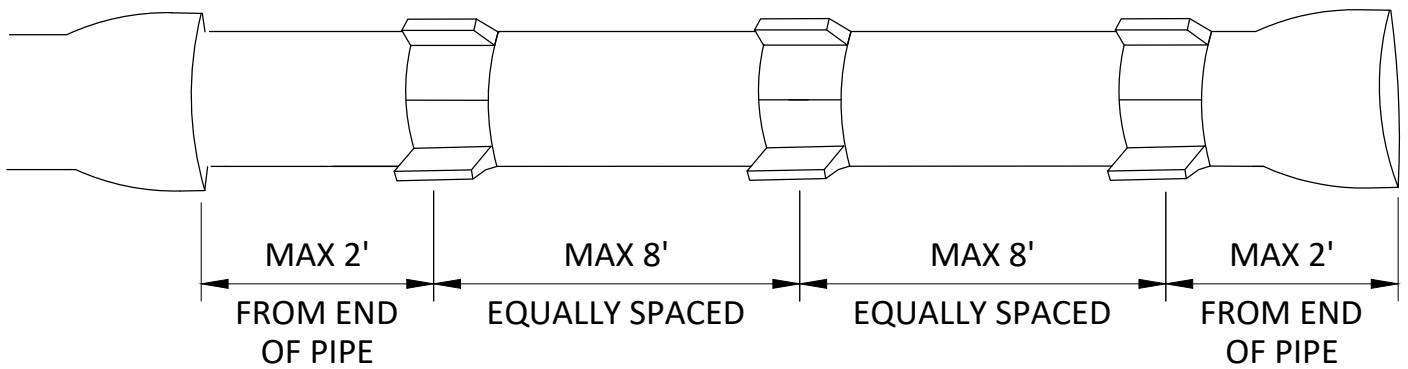
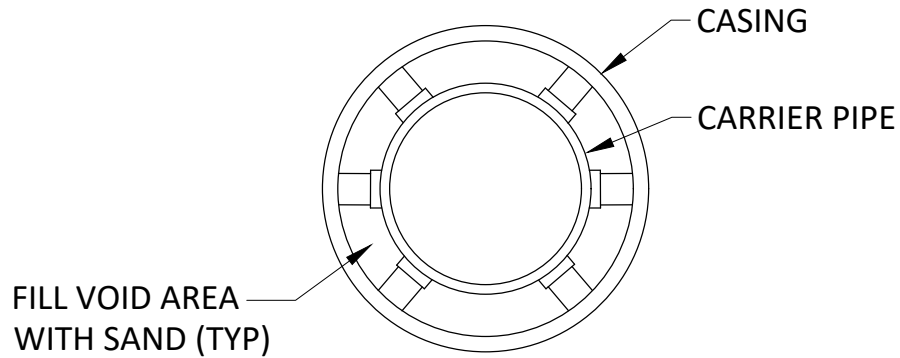
DETAIL NO.

9-203

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PHOENIX PLASTIC CASING SPACER
OR APPROVED EQUAL



PIPE SUPPORT IN CASING

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

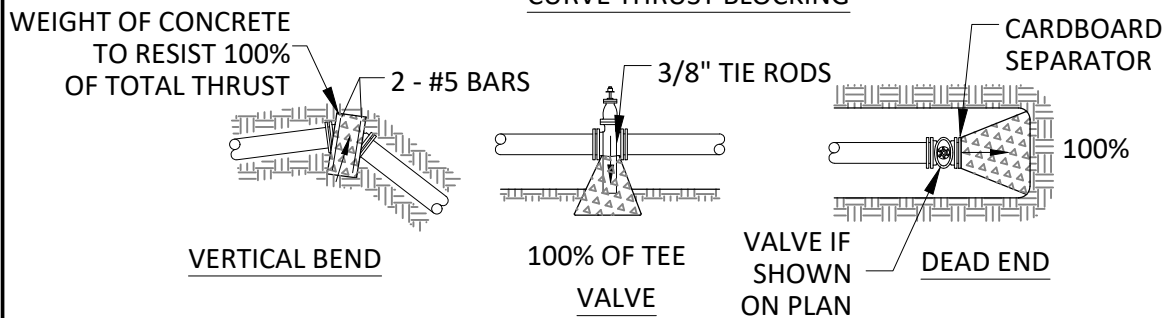
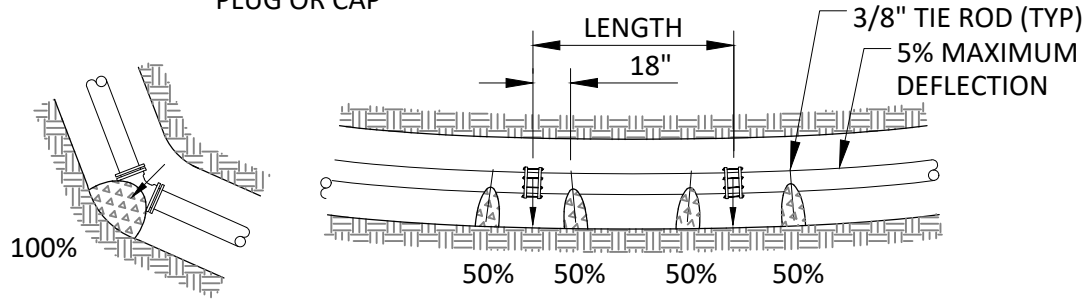
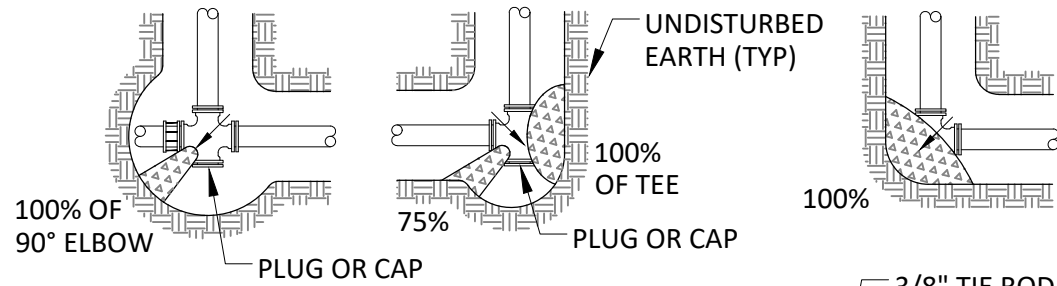
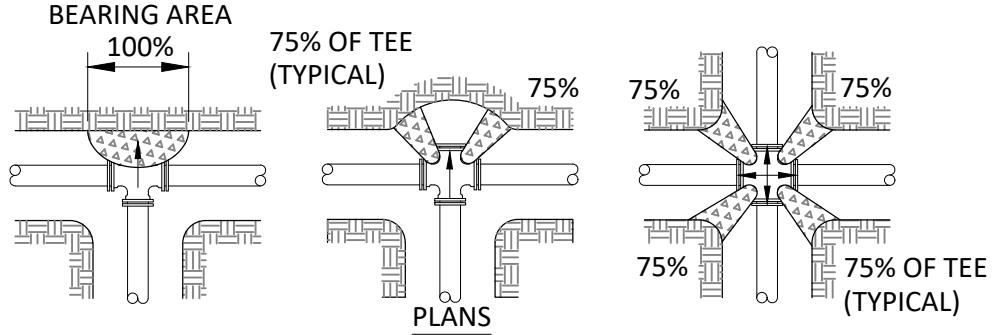
PIPE SUPPORT IN CASING

REVISION DATE
FEBRUARY 2021

DETAIL NO.

9-205

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ARROWS (→) INDICATE THRUST DIRECTION

NOTES:

- FIGURE (100%) AT THRUST BLOCK INDICATES PER CENT OF TOTAL THRUST TO BE APPLIED FOR BEARING AREA.
- CONCRETE FOR THRUST BLOCKS TO BE 2000 PSI.
- RESTRAINING RODS ARE REQUIRED AT ALL TEES AND AT BENDS DEFLECTING 22 1/2° OR MORE.
- WRAP THE PIPE WITH POLYETHYLENE WRAPPING PRIOR TO POURING THE THRUST BLOCK.
- SEE SOILS REPORT FOR BEARING STRENGTH OF SOIL. IN ABSENCE OF A SOILS REPORT, AN AVERAGE SOIL (SPADABLE MEDIUM CLAY) CAN BE ASSUMED TO HAVE A BEARING STRENGTH OF 2000 PSI.
- THRUST BLOCKS ARE NOT REQUIRED ON PVC WITH SOLVENT WELDED JOINTS.

100% BEARING AREA (SQ FT)				
PIPE SIZE	DEAD END OR TEE	90° ELBOW	45° ELBOW	22 1/2° ELBOW
4	2.4	3.4	1.9	0.9
6	4.9	6.9	3.8	1.9
8	8.4	11.8	6.4	3.4
10	13.7	19.3	10.5	5.4
12	19.4	27.3	14.9	7.7
14	26.3	37.0	20.1	10.3
16	34.0	47.9	26.2	13.3
18	43.9	61.8	33.7	17.2
20	54.3	76.4	41.7	21.2
24	77.9	109.8	59.8	30.5

NOTE:
BEARING AREAS ARE BASED ON 250 LB MAXIMUM PRESSURE AND SOIL BEARING STRENGTH OF 2000 LB/SQ FT.

SIDE THRUST PER 100 LB/SQ IN PRESSURE PER DEGREE OF DEFLECTION			
PIPE SIZE	SIDE THRUST-LB	PIPE SIZE	SIDE THRUST-LB
4	35	14	377
6	72	16	486
8	122	18	665
10	197	20	790
12	278	24	1150

MULTIPLY THRUST BY DEGREE OF DEFLECTION TO OBTAIN TOTAL THRUST

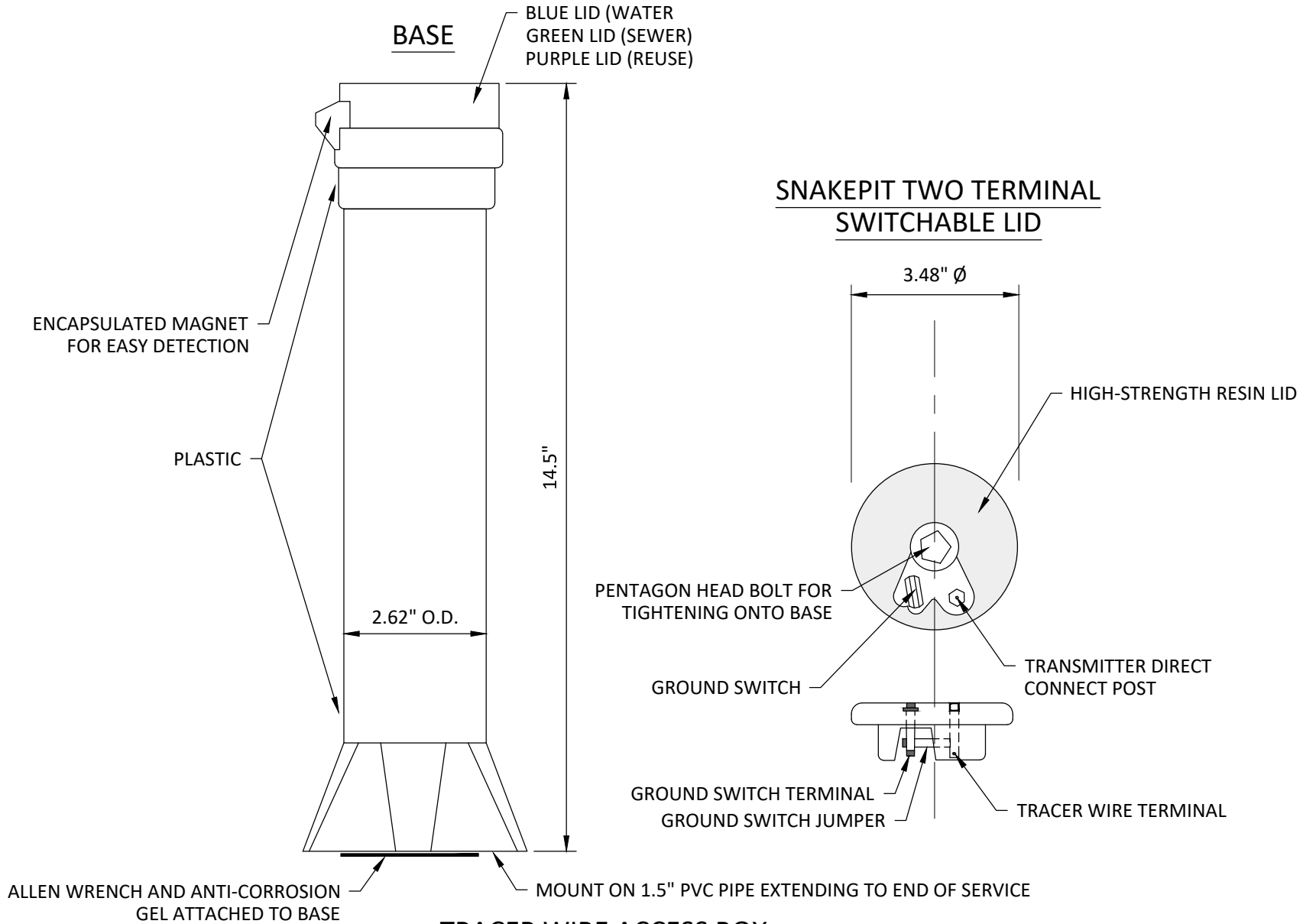


CITY OF WACONIA - STANDARD DETAILS

CONCRETE THRUST BLOCKS

REVISION DATE FEBRUARY 2021	DETAIL NO. 9-207
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**TRACER WIRE ACCESS BOX
 DUAL TERMINAL SEWER**



CITY OF WACONIA - STANDARD DETAILS

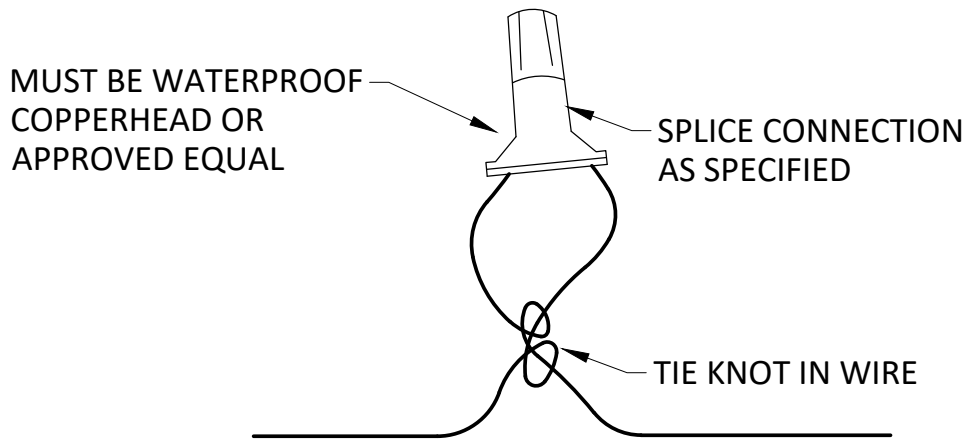
TRACER WIRE ACCESS BOX-DUAL TERMINAL SEWER

REVISION DATE
 FEBRUARY 2021

DETAIL NO.

9-303

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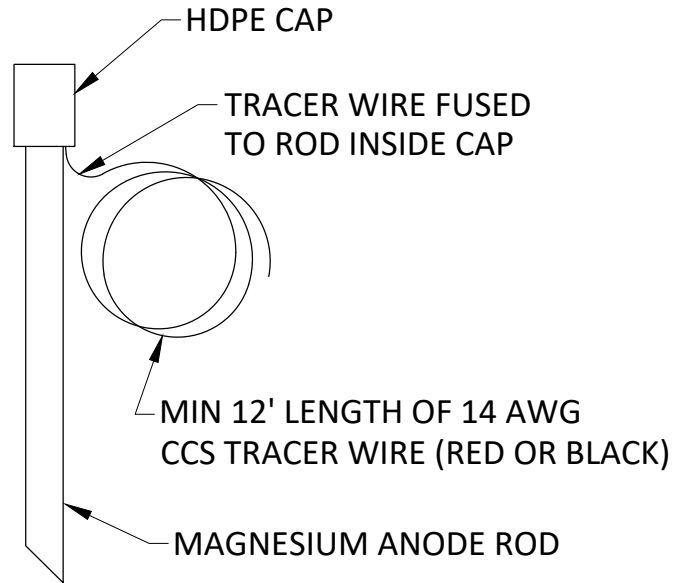


WHERE IN-LINE SPLICES ARE REQUIRED ALONG PIPES, THE TRACER WIRE SHALL BE KNOTTED PRIOR TO INSERTION INTO THE SPLICE CONNECTION.

IN-LINE TRACER WIRE SPLICE

NOT TO SCALE

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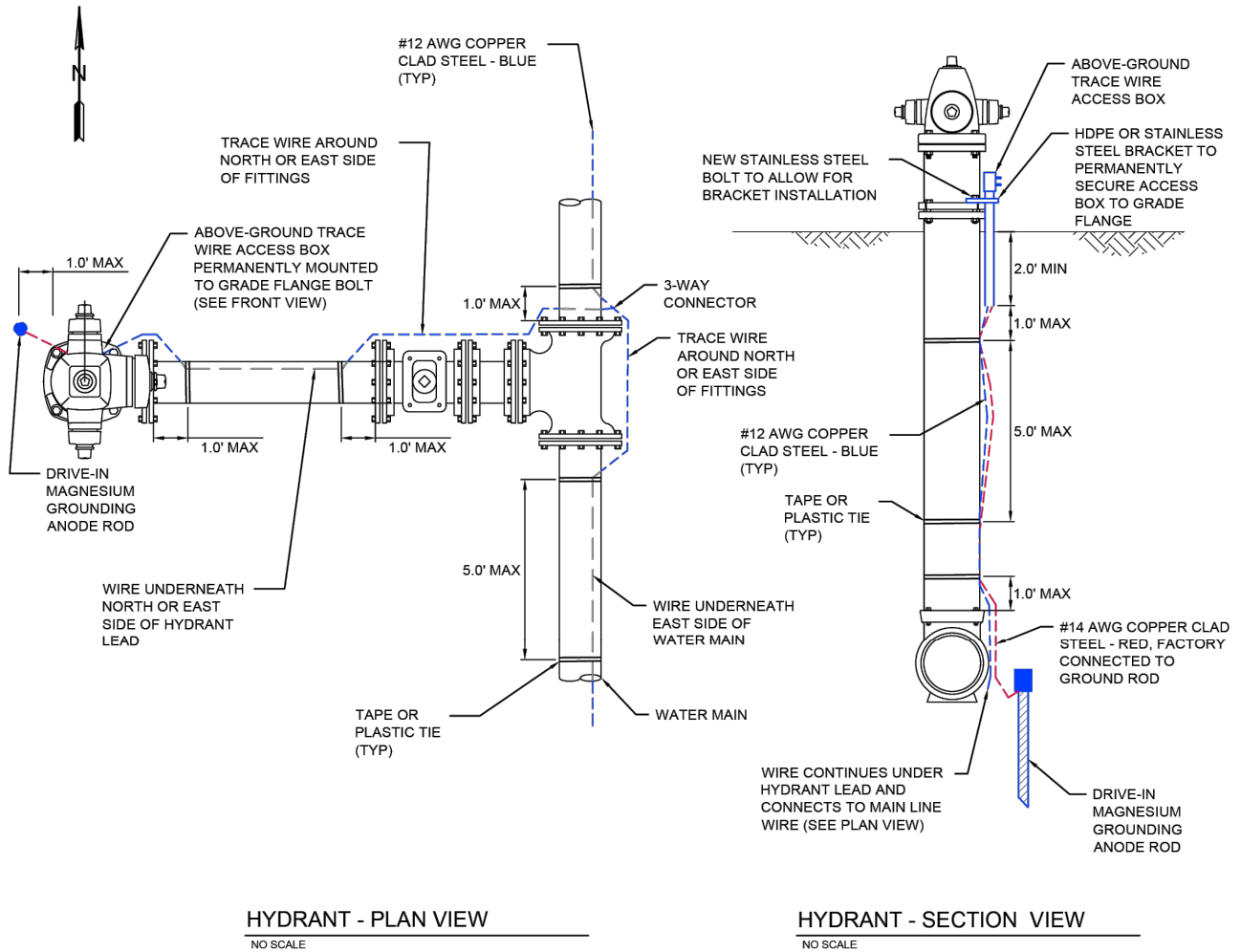
NOTE: MAGNESIUM ROD DIMENSIONS SHALL BE APPROX 18" LONG BY 1.3" DIA, AND APPROX 1 LB IN WEIGHT.

INSTALL AT ALL CURB STOPS.

GROUNDING ANODE

NOT TO SCALE

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MINNESOTA RURAL WATER ASSOCIATION
STANDARD DETAIL

TRACE WIRE
HYDRANT DETAIL

May 28, 2014

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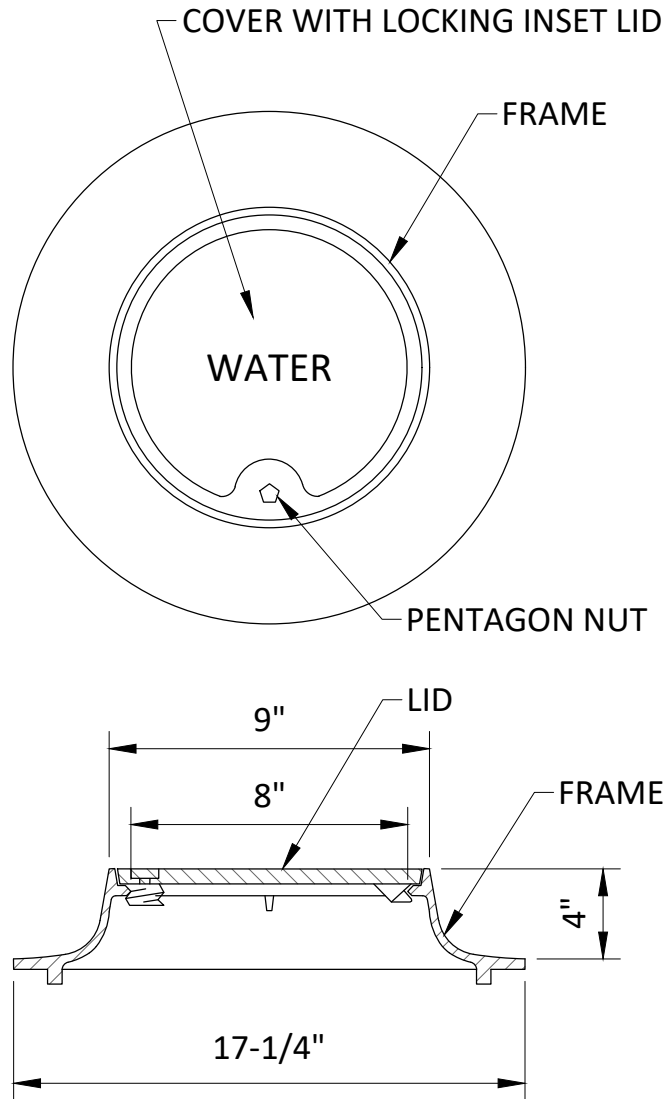
CITY OF WACONIA - STANDARD DETAILS

TRACER WIRE AT HYDRANT

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-307

9-307

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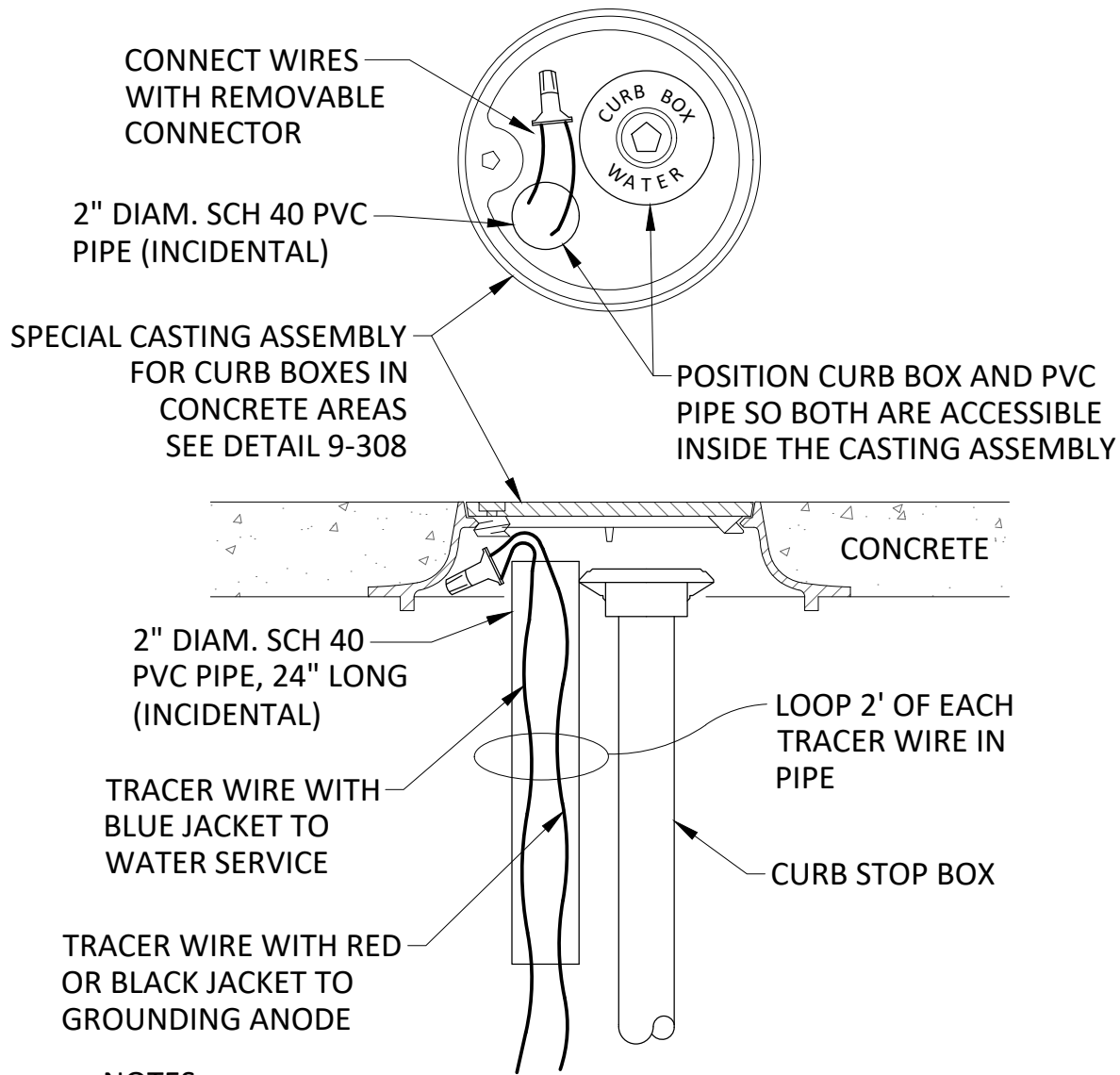
NOTES:

1. FURNISH AND INSTALL ON CURB STOPS THAT ARE WITHIN CONCRETE OR BITUMINOUS SURFACING
2. CASTING ASSEMBLY TO BE FORD METER BOX MODEL A1 OR APPROVED EQUAL

CASTING ASSEMBLY

NOT TO SCALE

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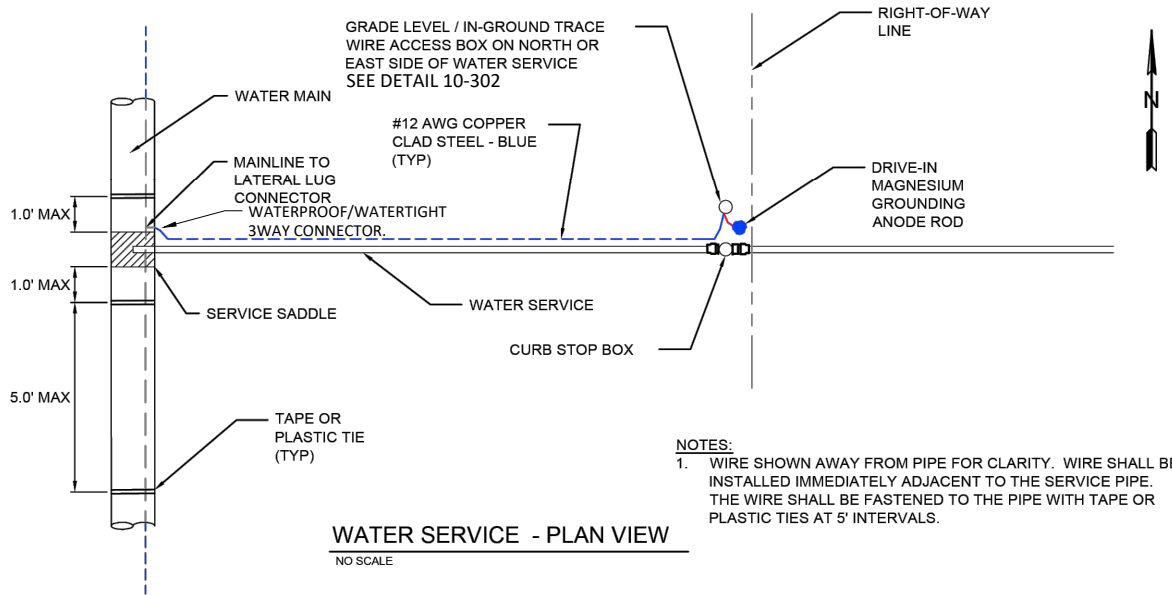
NOTES:

1. SPECIAL CASTING ASSEMBLIES ARE REQUIRED ON CURB STOP BOXES THAT ARE WITHIN CONCRETE OR BITUMINOUS SURFACING.
2. TRACER WIRE ACCESS BOXES ARE NOT REQUIRED WHERE A SPECIAL CASTING ASSEMBLY IS INSTALLED.

TRACER WIRE AT CURB BOX, INSIDE CASTING ASSEMBLY SPECIAL

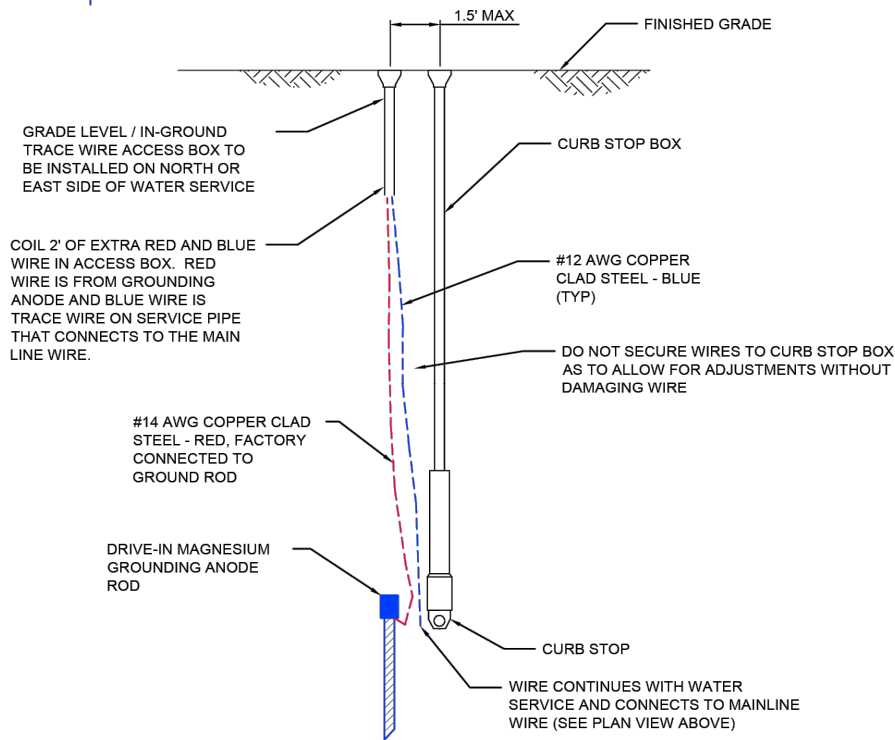
NOT TO SCALE

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NOTES:
 1. WIRE SHOWN AWAY FROM PIPE FOR CLARITY. WIRE SHALL BE INSTALLED IMMEDIATELY ADJACENT TO THE SERVICE PIPE. THE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 5' INTERVALS.

WATER SERVICE - PLAN VIEW
 NO SCALE



WATER SERVICE - SECTION VIEW
 NO SCALE

(USED FOR NEW CONSTRUCTION)



MINNESOTA RURAL WATER ASSOCIATION
 STANDARD DETAIL

TRACE WIRE
 WATER SERVICE DETAIL

May 28, 2014

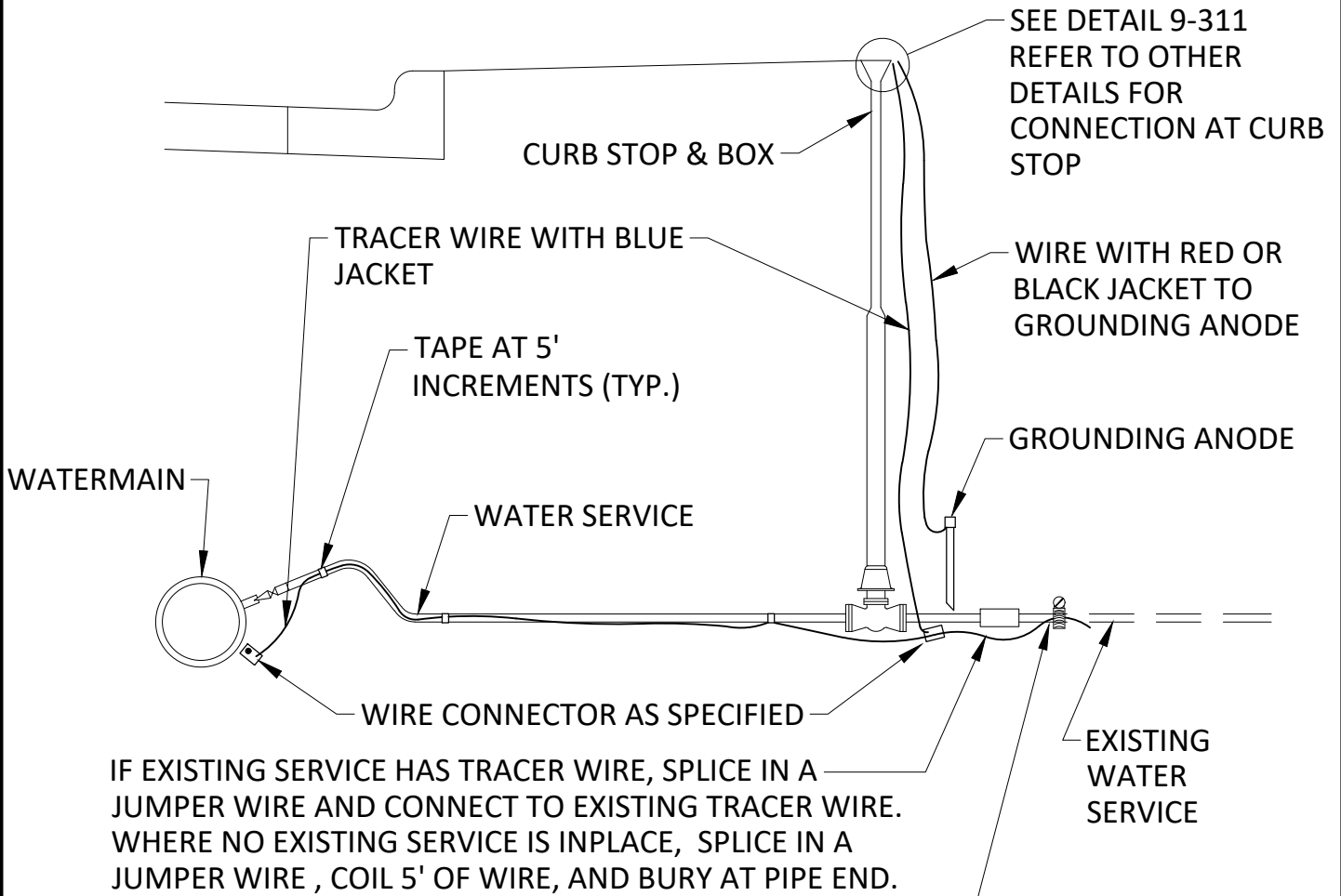
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CITY OF WACONIA - STANDARD DETAILS
 TRACER WIRE AT WATER SERVICE -
 NEW CONSTRUCTION

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-310
MARCH 2026	

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IF EXISTING SERVICE HAS TRACER WIRE, SPLICE IN A JUMPER WIRE AND CONNECT TO EXISTING TRACER WIRE. WHERE NO EXISTING SERVICE IS INPLACE, SPLICE IN A JUMPER WIRE , COIL 5' OF WIRE, AND BURY AT PIPE END.

STRIP AND CONNECT TRACER WIRE TO EXISTING COPPER SERVICE WITH STAINLESS STEEL HOSE CLAMP

TRACER WIRE AT WATER SERVICE RECONSTRUCTION

NOT TO SCALE

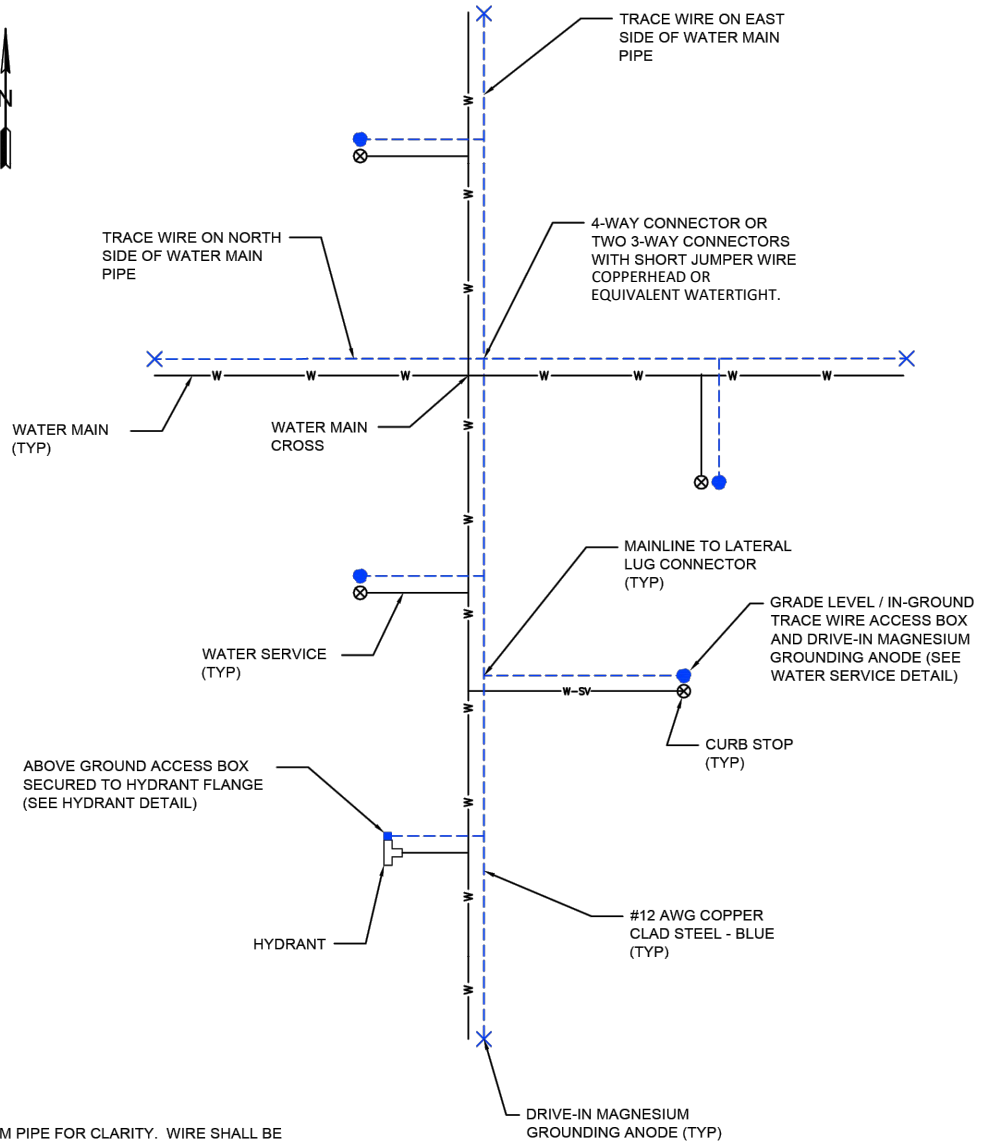


CITY OF WACONIA - STANDARD DETAILS

TRACER WIRE AT WATER SERVICE
RECONSTRUCTION

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-312

9-312



NOTES:

1. WIRE SHOWN AWAY FROM PIPE FOR CLARITY. WIRE SHALL BE INSTALLED ON THE BOTTOM SIDE OF THE PIPE BELOW THE SPRING LINE. THE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 5' INTERVALS.

TRACE WIRE PLAN (WATER)

NO SCALE



MINNESOTA RURAL WATER ASSOCIATION
STANDARD DETAIL

TRACE WIRE
SAMPLE WATER PLAN

May 28, 2014

L:\Library\Municipal\Professional Associations\Rural Water Details\Trace Wire Details 5.28.14.dwg



CITY OF WACONIA - STANDARD DETAILS

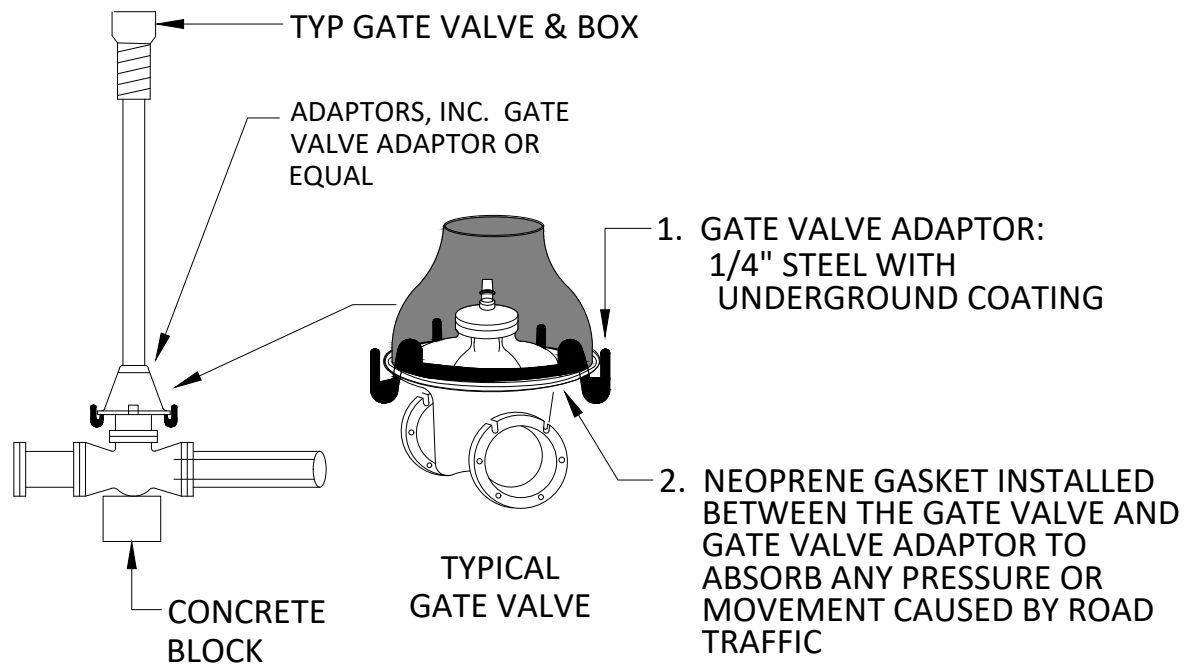
TRACER WIRE-WATER PLAN

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-313
MARCH 2026	

DETAIL NO.

9-313

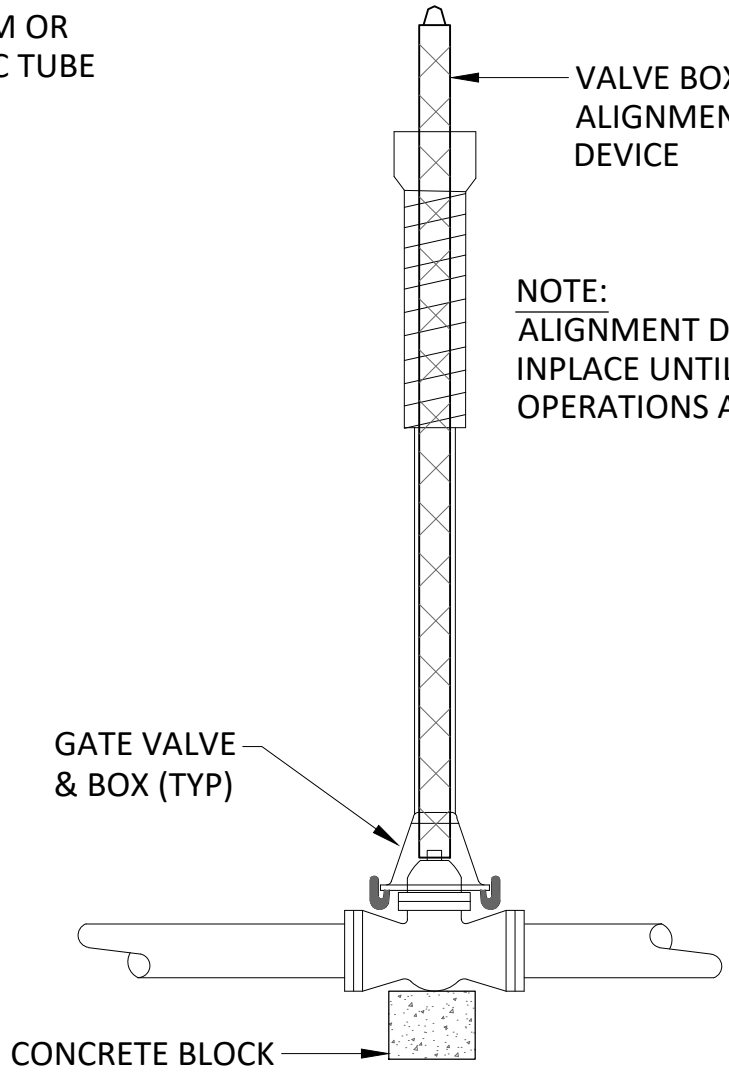
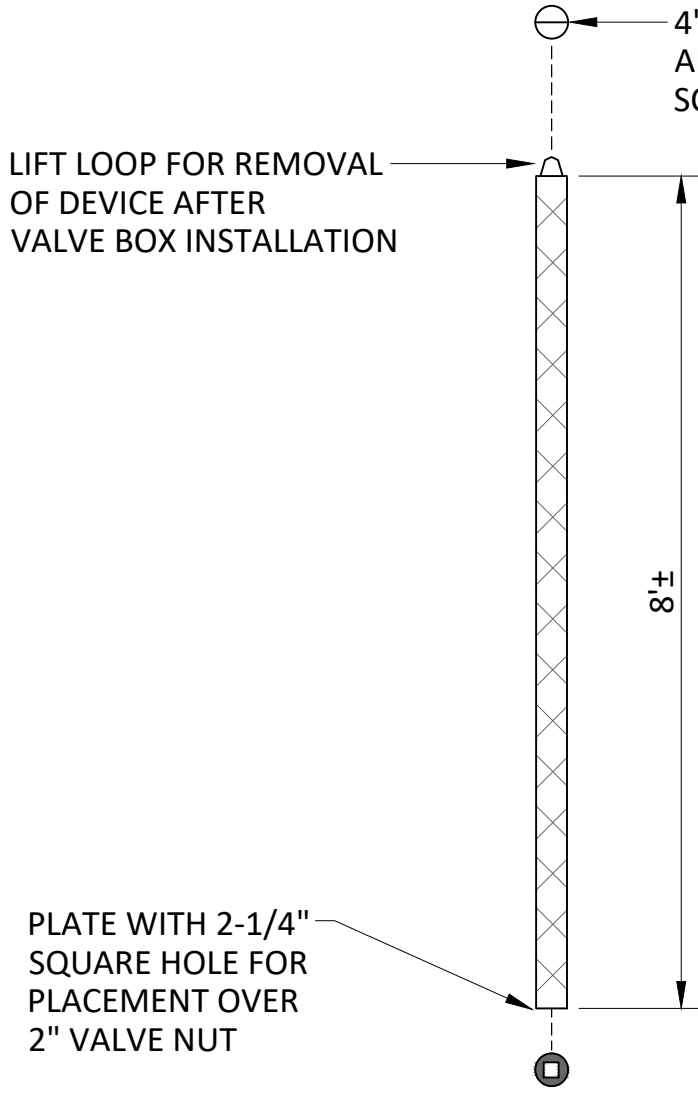
H:\WACA\C14120525\CAD\C3D\2020 Revised Detail Manual\120525-GATE VALVE ADAPTOR.dwg 2/8/2021 12:02 PM



GATE VALVE ADAPTOR

NOT TO SCALE

H:\WACA\C14120525\CAD\C3D\2020 Revised Detail Manual\120525-GV BOX ALIGN DEVICE.dwg 2/8/2021 12:03 PM



NOTE:
ALIGNMENT DEVICE TO BE LEFT IN PLACE UNTIL BACKFILL OPERATIONS ARE COMPLETE

GATE VALVE BOX ALIGNMENT DEVICE

NOT TO SCALE

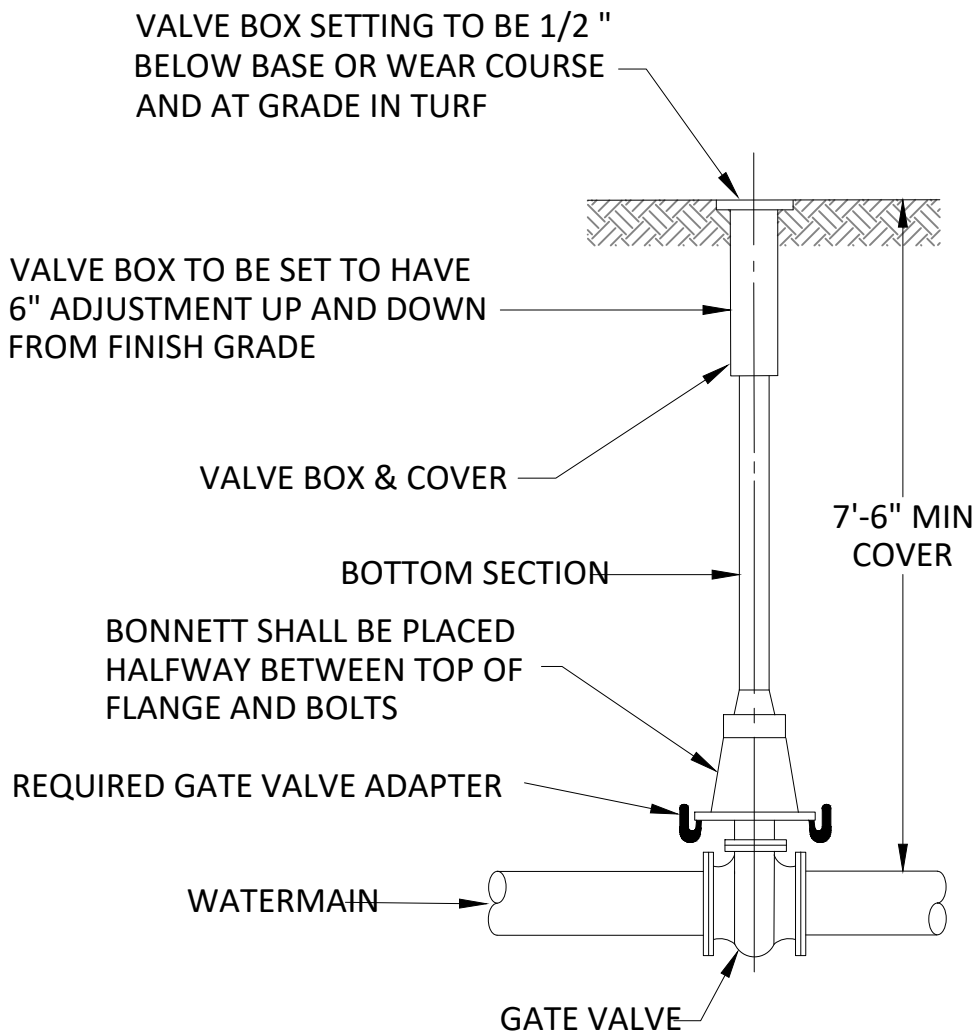


CITY OF WACONIA - STANDARD DETAILS
GATE VALVE BOX ALIGNMENT DEVICE

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-401

NOTES:

1. VALVE BOX SHALL BE CENTERED ON OPERATING NUTS, STRAIGHT, FREE FROM DEBRIS, AND ALL SECTIONS UNBROKEN.
2. VALVES IN EASEMENTS SHALL HAVE CHANNEL POST WITNESS MARKERS WITH REFLECTIVE "GV" SIGN.
3. DEEP VALVES SHALL HAVE NUT EXTENSIONS INSTALLED TO ELEVATION TO ACCOMMODATE STANDARD 10' KEY; AND ONLY ONE SECTION.
4. COMPACTION WITH MECHANICAL TAMPER AROUND VALVE BOX SHALL BE PLACED AND COMPACTED WITH 2' LIFTS TO ACHIEVE 95% COMPACTION.
5. GATE VALVES LOCATED WITHIN THE CONCRETE SIDEWALK SHALL INCLUDE A METAL SEPARATOR BETWEEN THE VALVE BOX AND THE CONCRETE.



GATE VALVE BOX INSTALLATION

NOT TO SCALE

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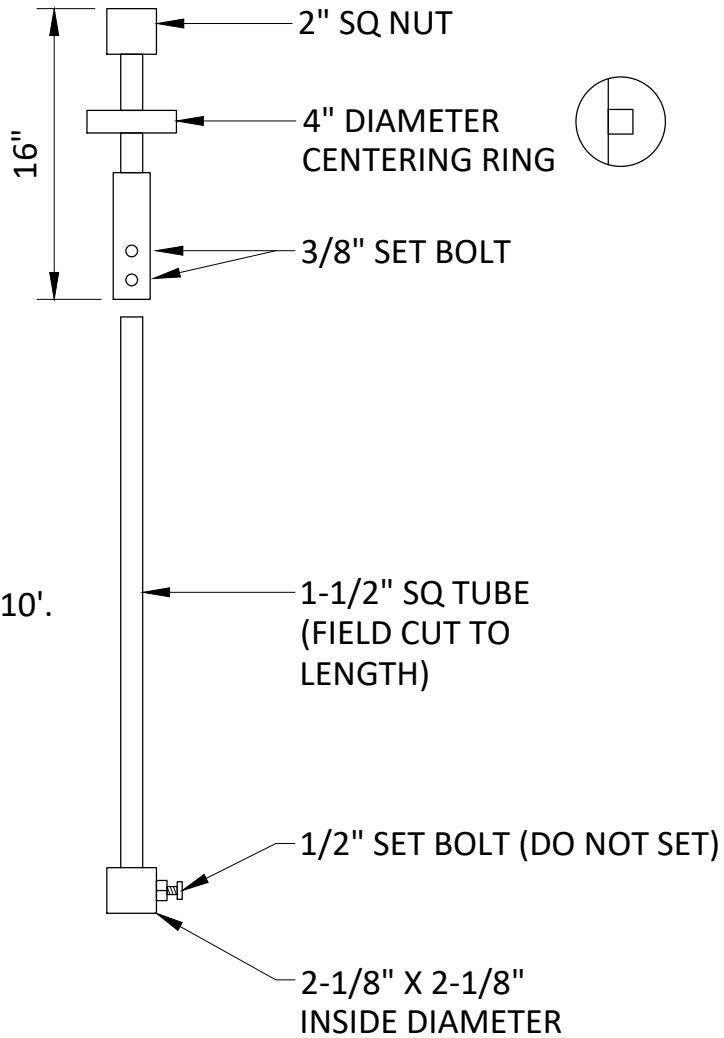
CITY OF WACONIA - STANDARD DETAILS

GATE VALVE BOX INSTALLATION

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-402
MARCH 2026	

H:\WACA\C14120525\CAD\C3D\2020 Revised Detail Manual\120525-ADJUSTABLE VALVE EXTENSION STEM.dwg 3/17/2026 12:33 PM

NOTE:
REQUIRED FOR ALL
MAINS DEEPER THAN 10'.



ADJUSTABLE VALVE EXTENSION STEM

NOT TO SCALE



**BOLTON
& MENK**



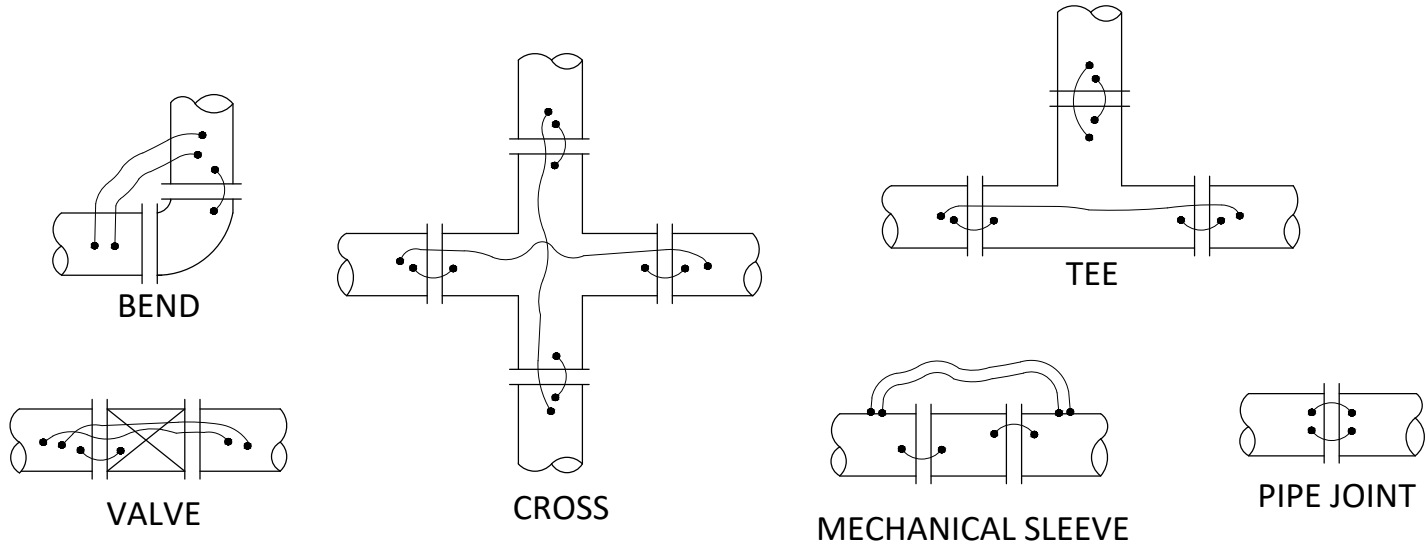
CITY OF WACONIA - STANDARD DETAILS

ADJUSTABLE VALVE EXTENSION STEM

REVISION DATE
FEBRUARY 2021
MARCH 2026

DETAIL NO.

9-404



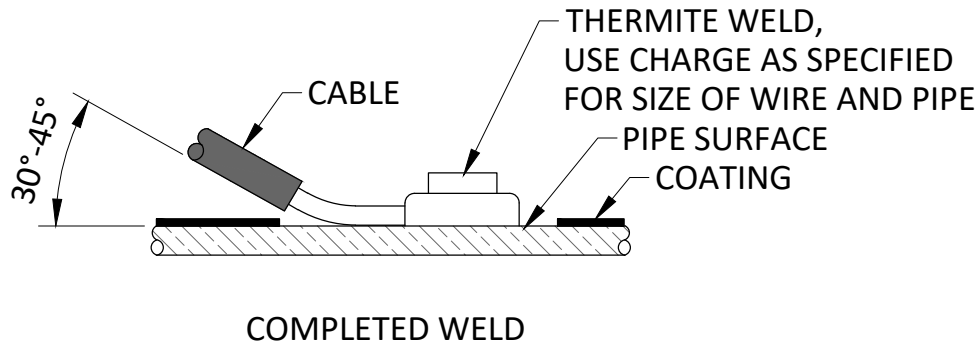
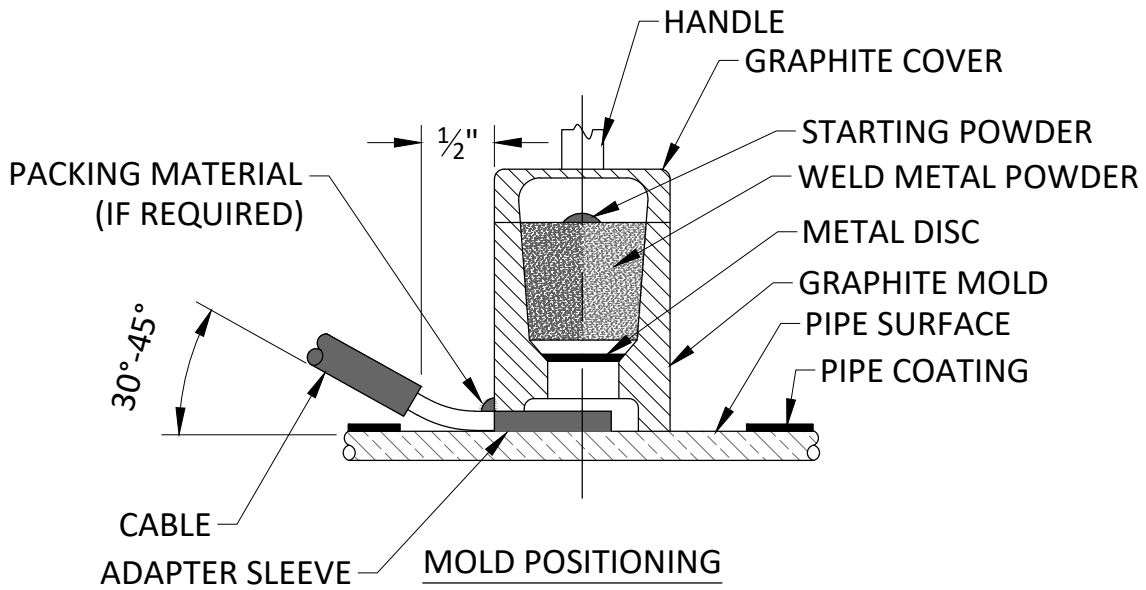
NOTES:

1. COATING REQUIRED FOR ALL WELD LOCATIONS
2. WIRE SIZE SHALL BE #4 AWG COPPER WIRE
3. USE A MINIMUM OF TWO BONDS PER PIPE JOINT-SEE THERMITE WELDING DETAIL

CATHODIC PROTECTION PIPE JOINT BONDING DETAIL

NOT TO SCALE

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NOTES:

1. CLEAN SURFACE OF PIPE OR BONDING PLATE TO BRIGHT METAL.
2. STRIP INSULATION FROM END OF COPPER WIRE.
3. INSTALL ADAPTER SLEEVE ON WIRE.
4. HOLD THERMITE MOLD FIRMLY AGAINST PIPE OR BONDING PLATE, INSERT WIRE, IGNITE WELD METAL.
5. REMOVE SLAG FROM THERMITE WELD.
6. STRIKE WELD FIRMLY WITH HAMMER TO VERIFY CONNECTION.
7. COAT WELD AREA AND ALL EXPOSED COPPER.
8. FOR MORTAR COATED PIPE, COVER PIPE WELD WITH A MORTAR COATING.

CATHODIC PROTECTION THERMITE WELDING DETAIL

NOT TO SCALE



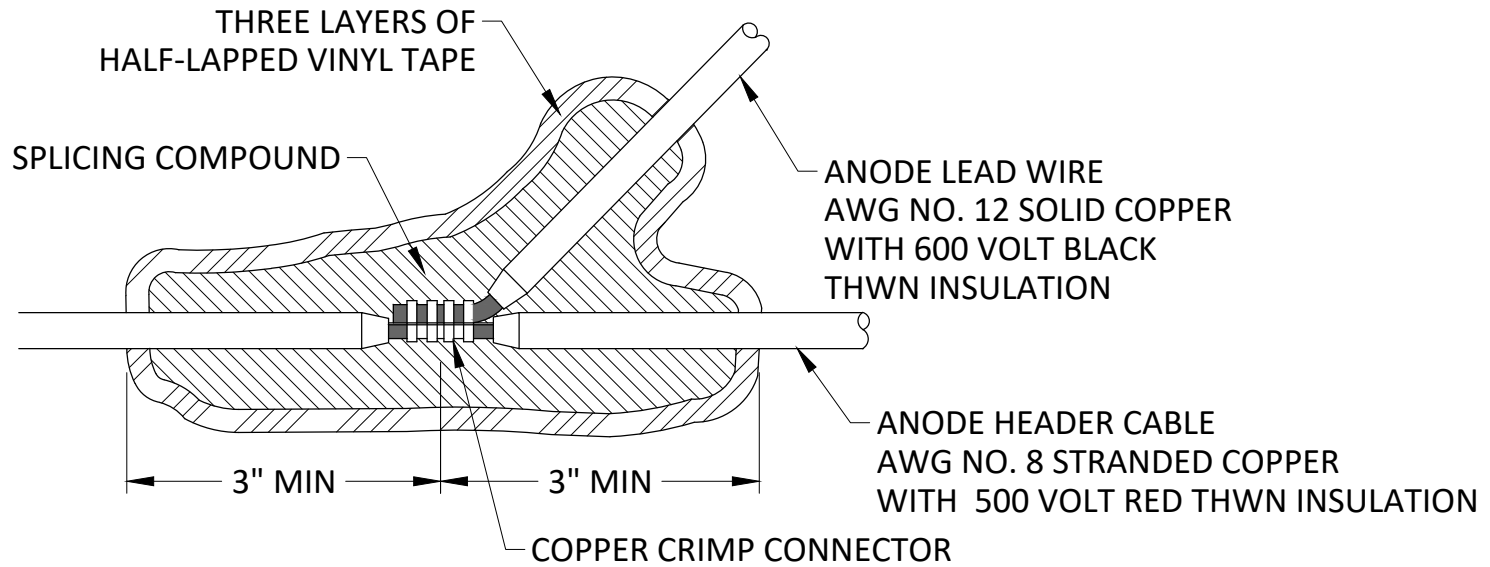
CITY OF WACONIA - STANDARD DETAILS
CATHODIC PROTECTION THERMITE WELDING

REVISION DATE
FEBRUARY 2021

DETAIL NO.

9-602

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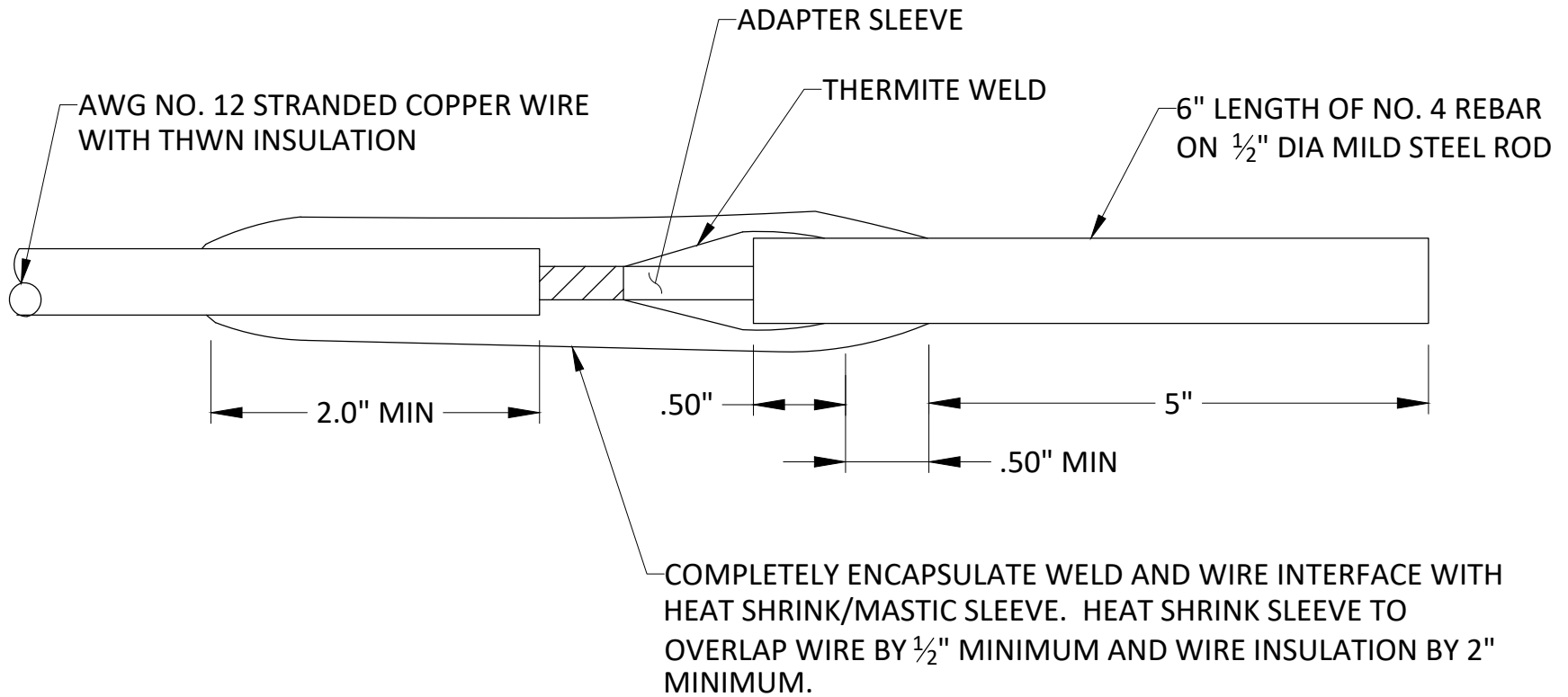
NOTES:

1. TAPER AND ROUGHEN WIRE INSULATION IN SPLICING COMPOUND.
2. COAT ENTIRE SPLICE WITH ELECTRICAL COATING COMPOUND.

CATHODIC PROTECTION GALVANIC ANODE SPLICE

NOT TO SCALE

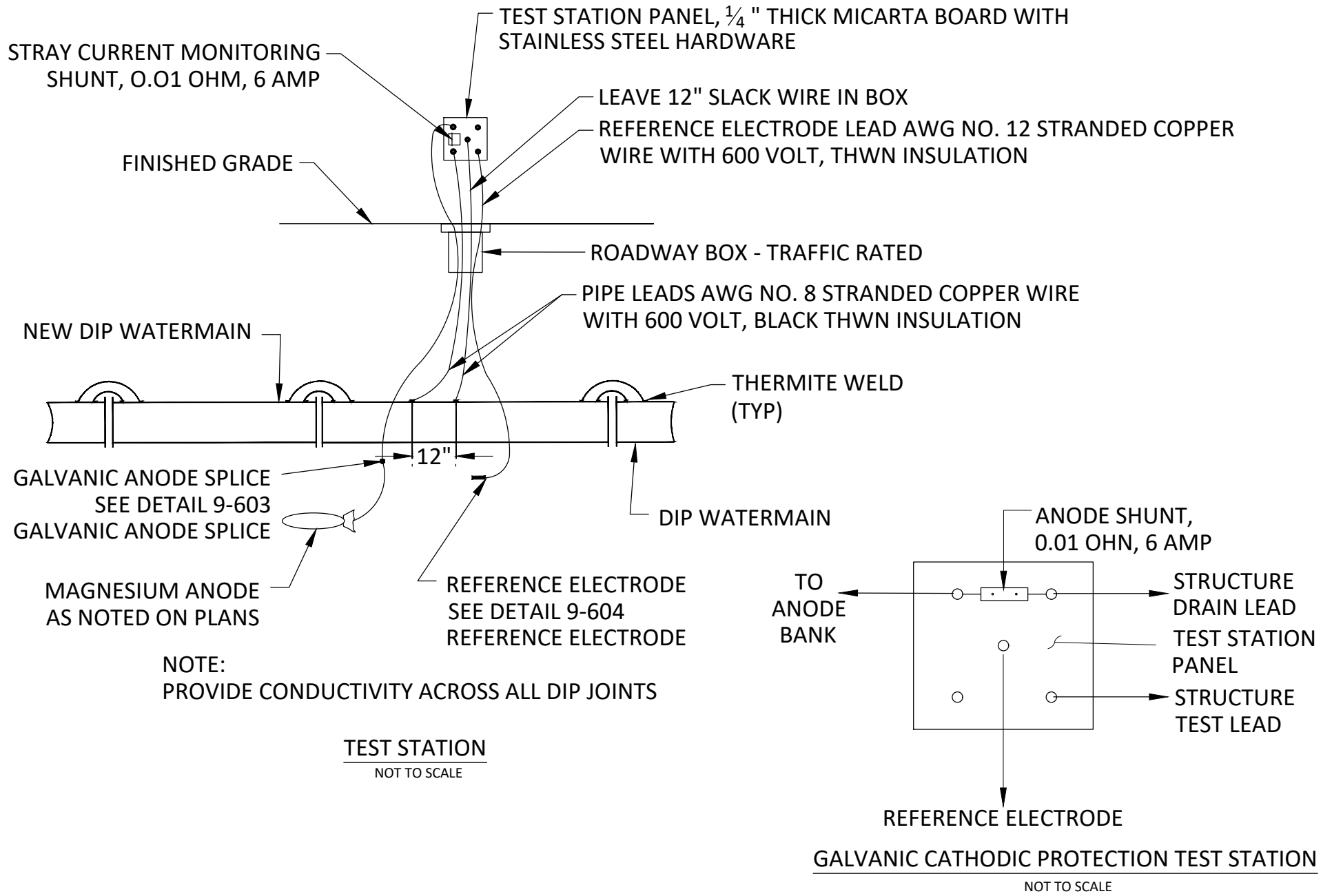
H:\WACA\C14120525\CAD\C3D\2020 Revised Detail Manual\120525-REF ELECTRODE.dwg 2/8/2021 12:05 PM



CATHODIC PROTECTION REFERENCE ELECTRODE

NOT TO SCALE

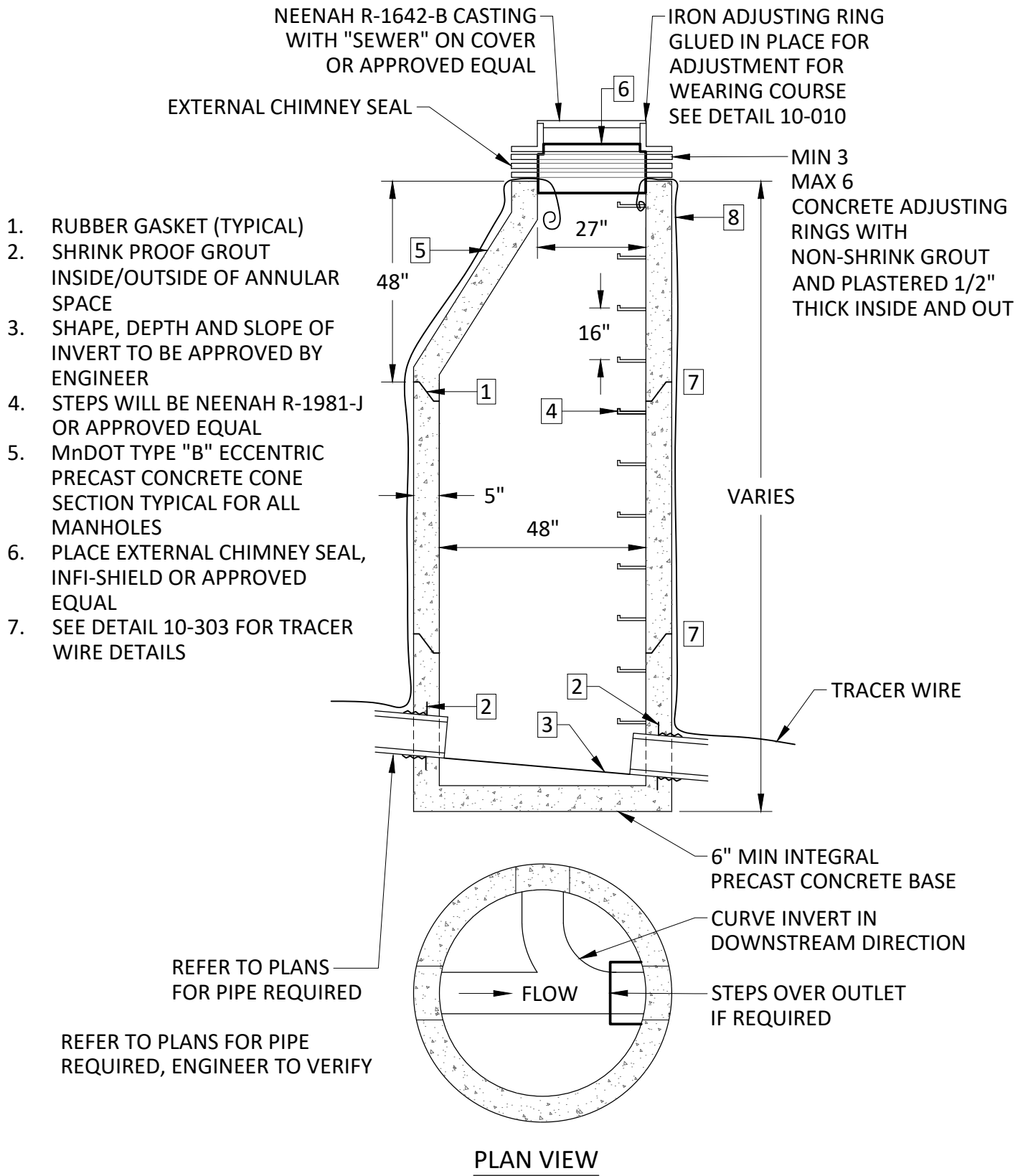
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CITY OF WACONIA - STANDARD DETAILS
CATHODIC PROTECTION TEST STATION

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-605

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SANITARY SEWER MANHOLE

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

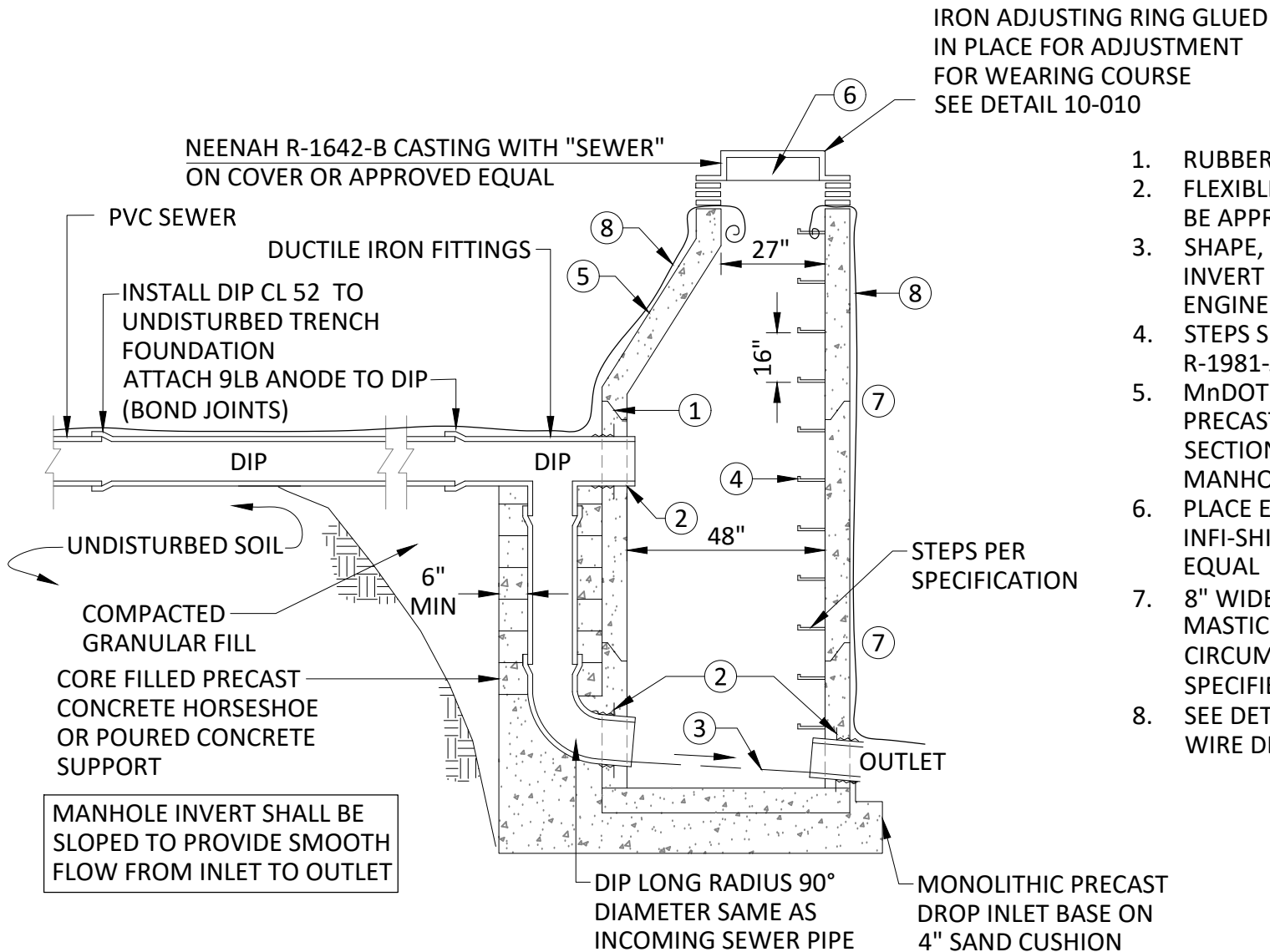
SANITARY SEWER MANHOLE

REVISION DATE
FEBRUARY 2021
MARCH 2026

DETAIL NO.

10-001

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1. RUBBER GASKET (TYPICAL)
2. FLEXIBLE WATERTIGHT SEAL TO BE APPROVED BY ENGINEER
3. SHAPE, DEPTH AND SLOPE OF INVERT TO BE APPROVED BY ENGINEER
4. STEPS SHALL BE NEENAH R-1981-J OR APPROVED EQUAL
5. MnDOT TYPE "B" ECCENTRIC PRECAST CONCRETE CONE SECTION TYPICAL FOR ALL MANHOLES
6. PLACE EXTERIOR CHIMNEY SEAL, INFI-SHIELD OR APPROVED EQUAL
7. 8" WIDE, 1/4" THICK BITUMINOUS MASTIC WRAP FULL CIRCUMFERENCE (WHEN SPECIFIED)
8. SEE DETAIL 10-303 FOR TRACER WIRE DETAILS

SANITARY MANHOLE WITH OUTSIDE DROP & TRACER WIRE

NOT TO SCALE

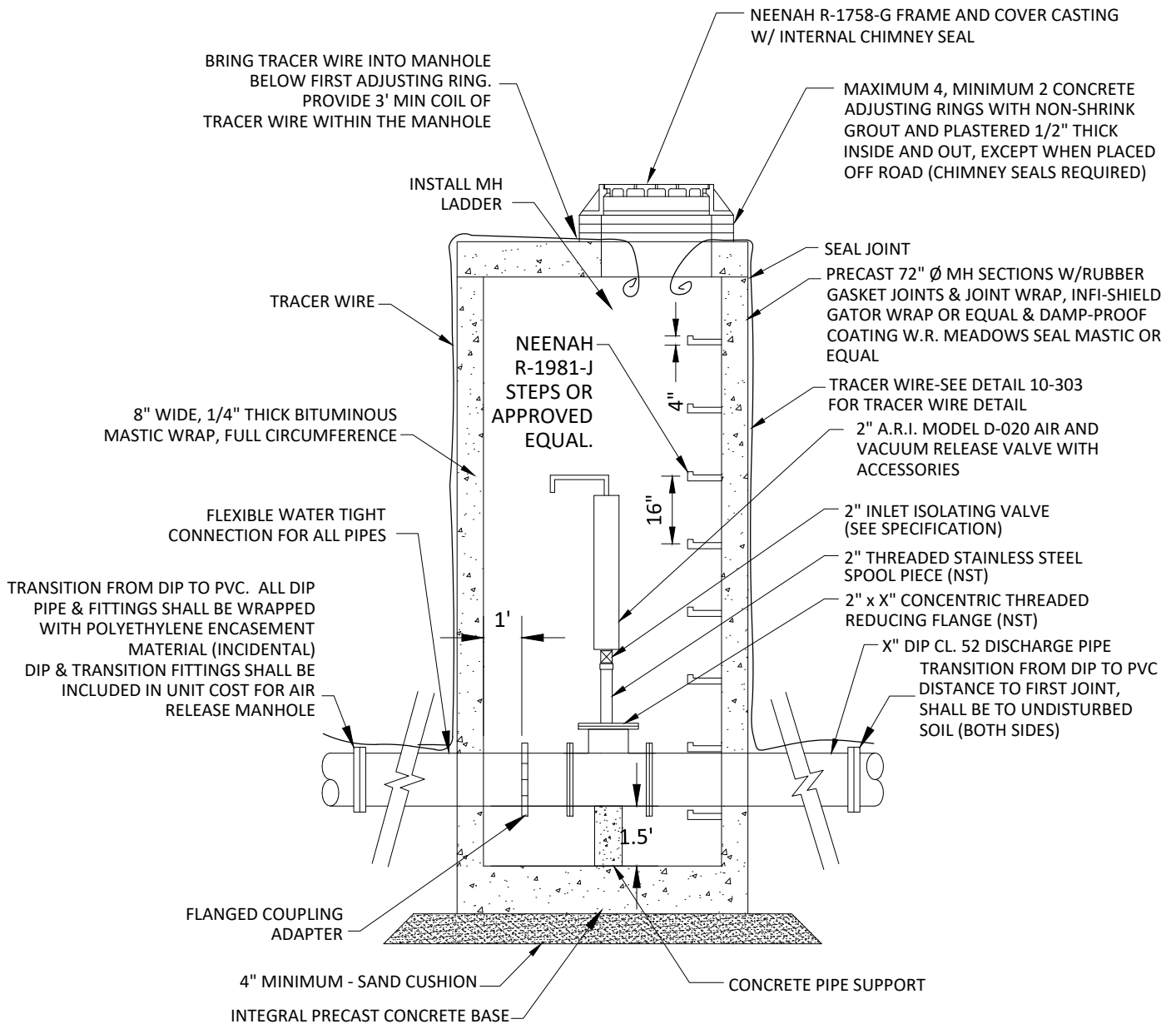


CITY OF WACONIA - STANDARD DETAILS

DROP MANHOLE

REVISION DATE	DETAIL NO.
FEBRUARY 2021	10-002

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AIR RELEASE MANHOLE

NOT TO SCALE



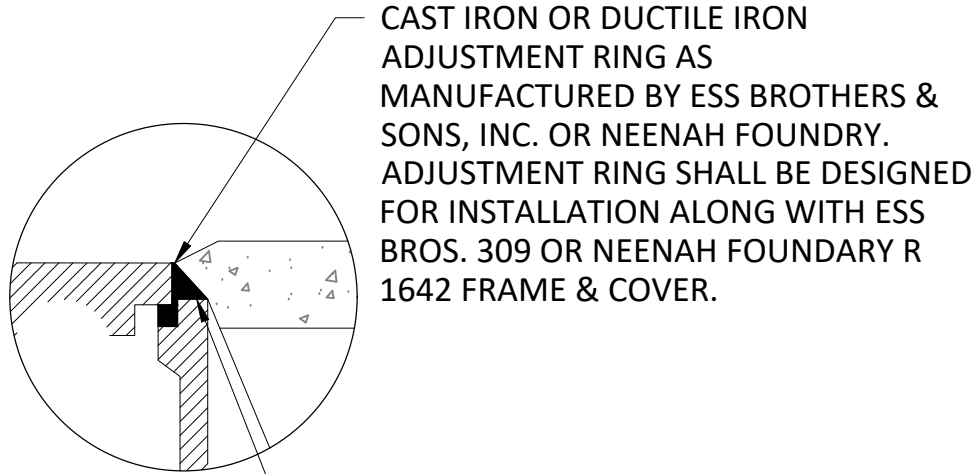
CITY OF WACONIA - STANDARD DETAILS

AIR RELEASE MANHOLE

REVISION DATE
FEBRUARY 2021
MARCH 2026

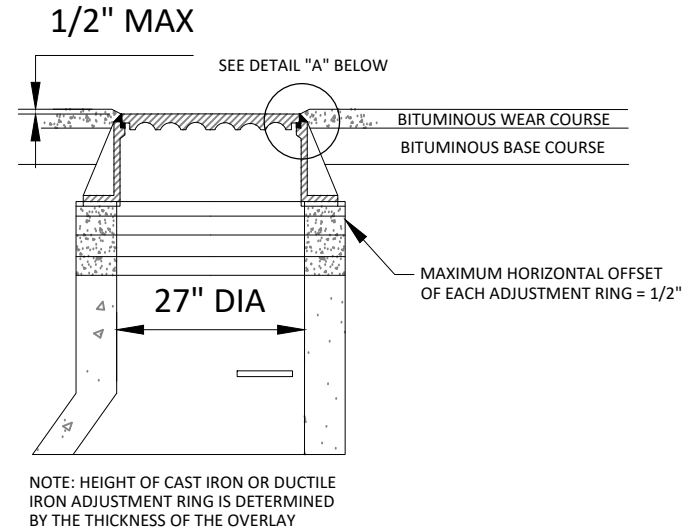
DETAIL NO.

10-005

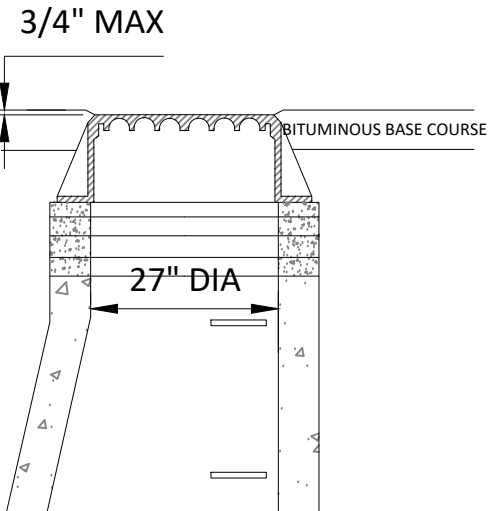


DETAIL "A" — EBS SUPER GLUE ADHESIVE OR APPROVED EQUIVALENT (1/4" BEAD, 360 DEG)

MANHOLE CASTING ADJUSTMENT DETAIL
NOT TO SCALE



BITUMINOUS WEAR COURSE



BITUMINOUS BASE COURSE

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NOTE:
WYES, BENDS AND PIPE SIZES
AS REQUIRED BY PLANS AND SPECS

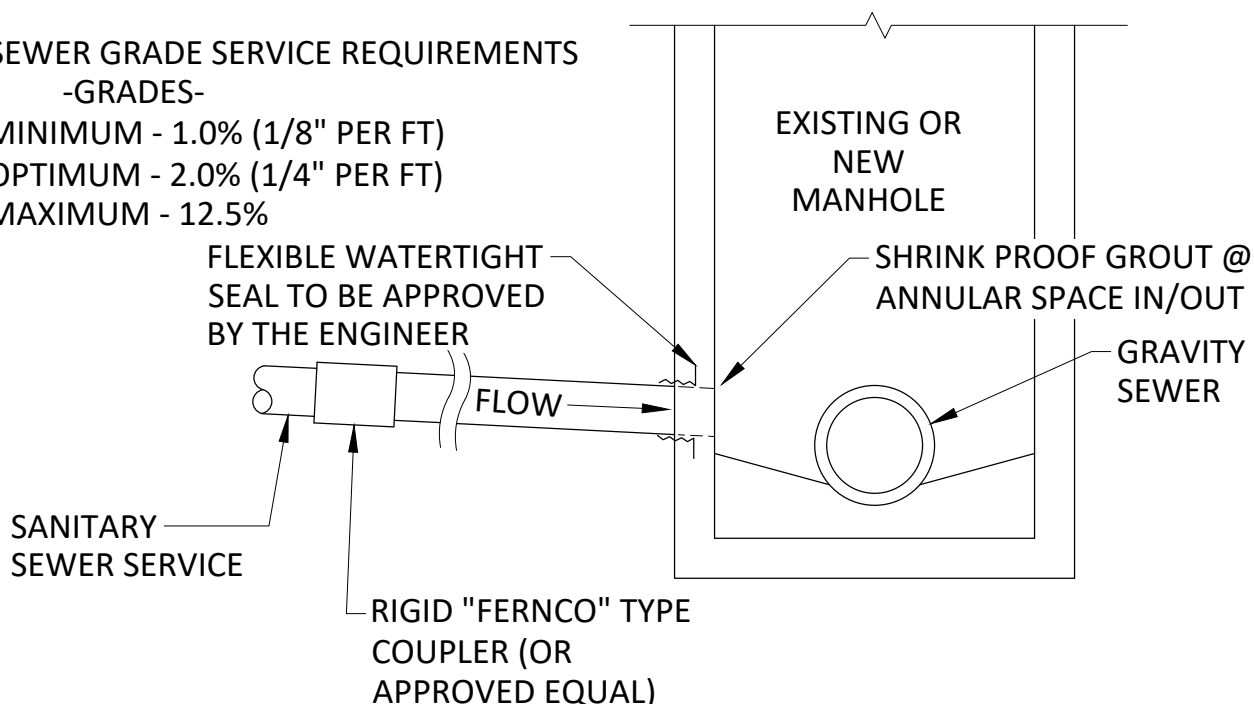
SEWER GRADE SERVICE REQUIREMENTS

-GRADES-

MINIMUM - 1.0% (1/8" PER FT)

OPTIMUM - 2.0% (1/4" PER FT)

MAXIMUM - 12.5%



NOTE:
WHERE NO EXISTING SEWER IS IN PLACE,
INSTALL PVC CAP AND MARK LOCATION WITH
4"X4"X6' TIMBER & 3/8" X 4' STEEL "GREEN" T POST.
BURY 6" BELOW FINISHED GRADE.

**SANITARY SEWER SERVICE
CONNECTION TO MANHOLE**

NOT TO SCALE

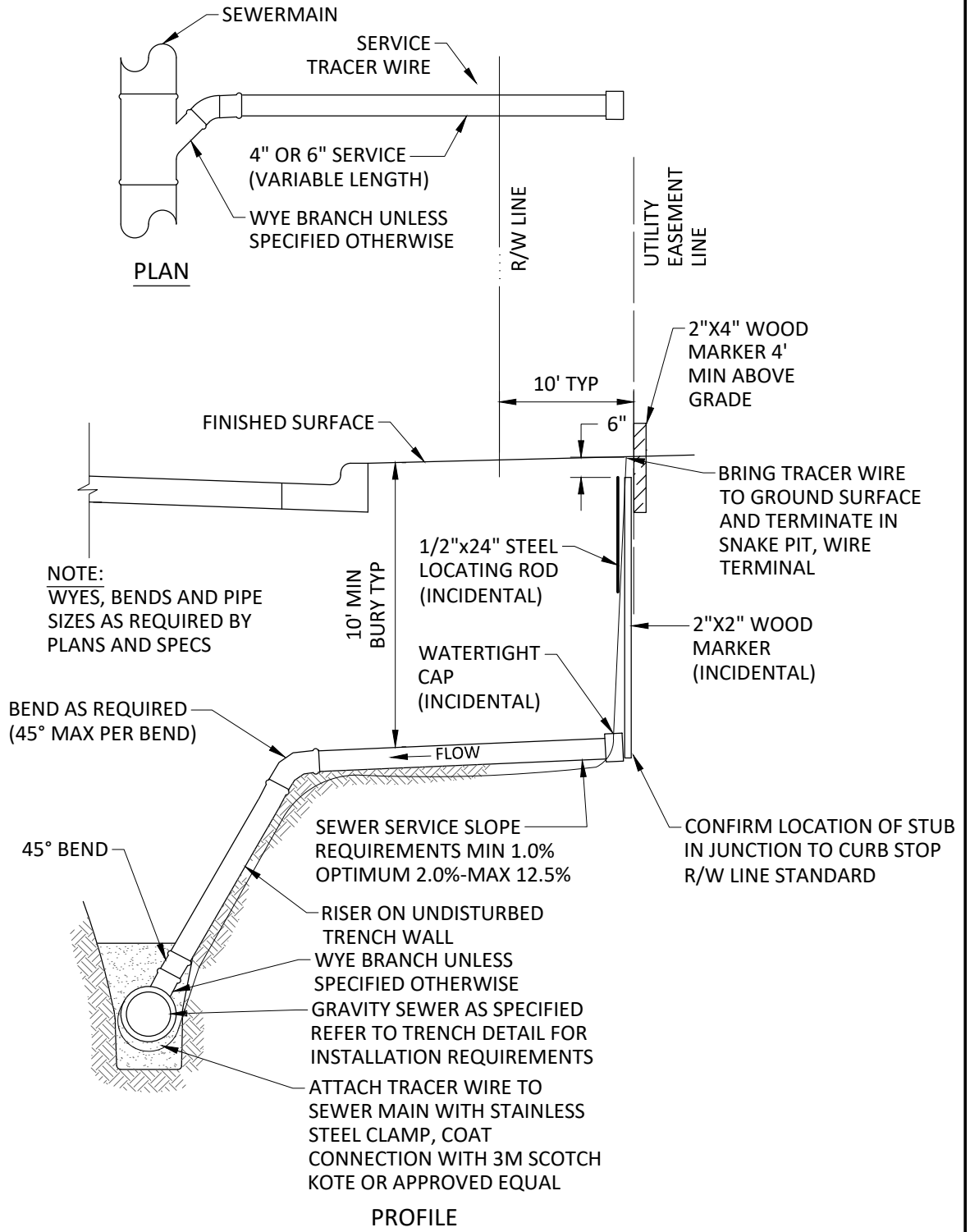


CITY OF WACONIA - STANDARD DETAILS

SERVICE CONNECTION TO MANHOLE

REVISION DATE	DETAIL NO.
FEBRUARY 2021	10-100
MARCH 2026	

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- NOTE:**
1. WYES, BENDS AND PIPE SIZES SHALL BE 6" PVC SDR26.
 2. WHERE NO EXISTING SEWER IS INPLACE, INSTALL PVC CAP AND MARK LOCATION WITH 4"X4"X6' TIMBER & 3/8" X 4' STEEL ROD BURY 6" BELOW FINISHED GRADE

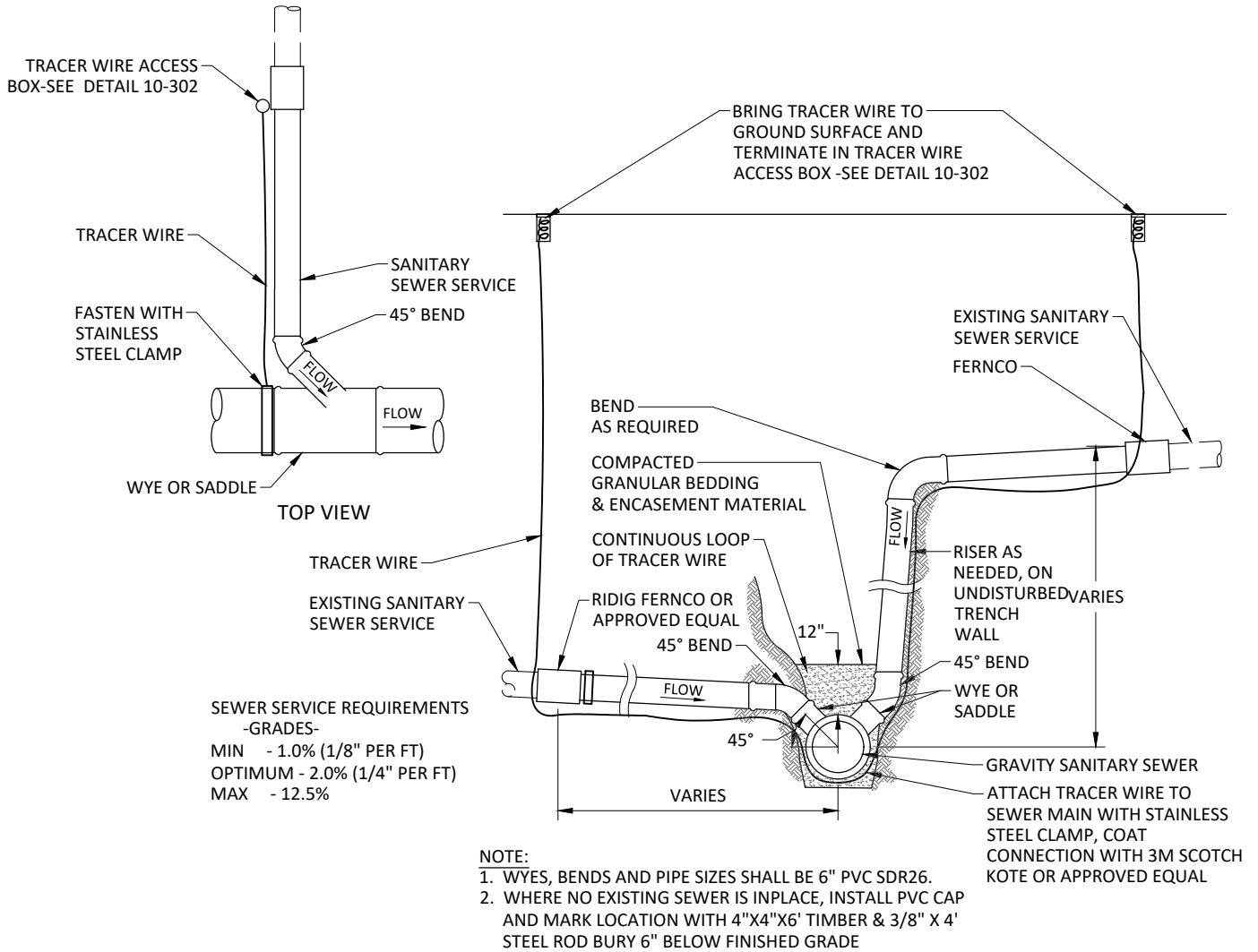
**SANITARY SEWER SERVICE
NEW CONSTRUCTION**
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS
SANITARY SEWER SERVICE -
NEW CONSTRUCTION

REVISION DATE	DETAIL NO.
FEBRUARY 2021	10-102
MARCH 2026	

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**SANITARY SEWER SERVICE
 AND SERVICE RISER, RECONSTRUCTION,
 WITH TRACER WIRE ACCESS BOX**

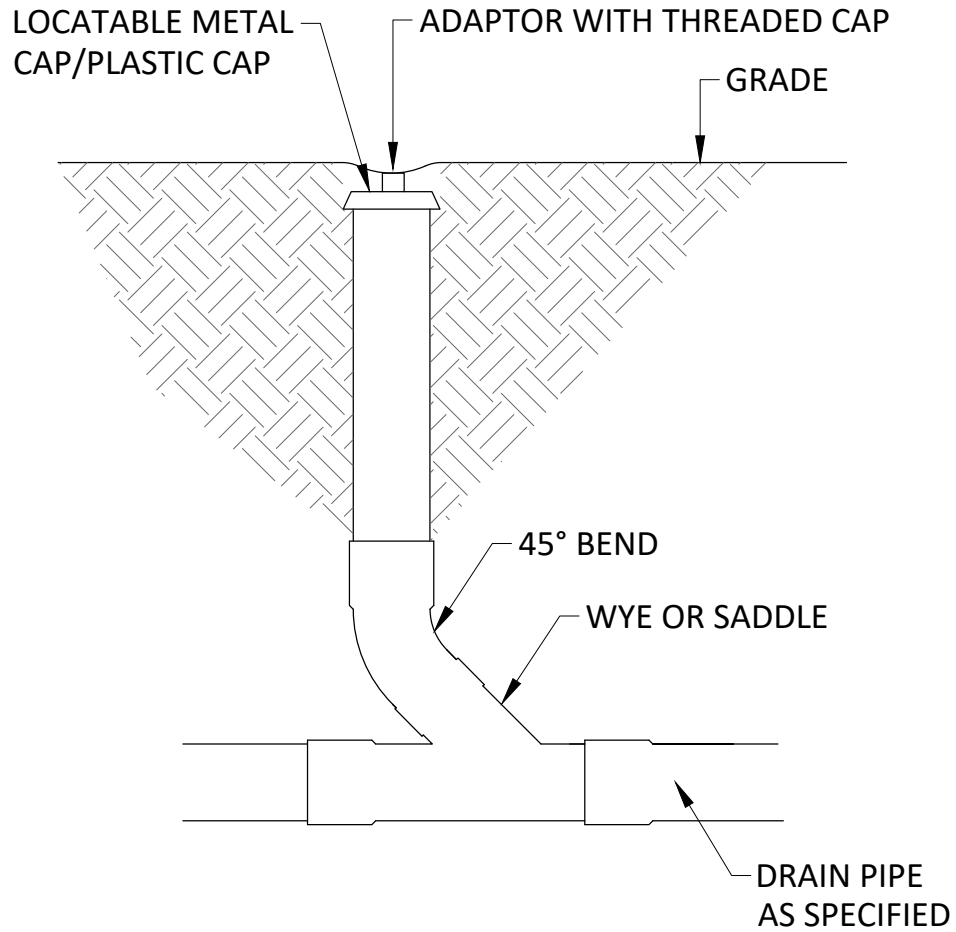
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS
 SANITARY SEWER SERVICE SERVICE RISER
 RECONSTRUCTION TRACER WIRE

REVISION DATE	DETAIL NO.
FEBRUARY 2021	10-107
MARCH 2026	

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SANITARY SEWER CLEANOUT

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

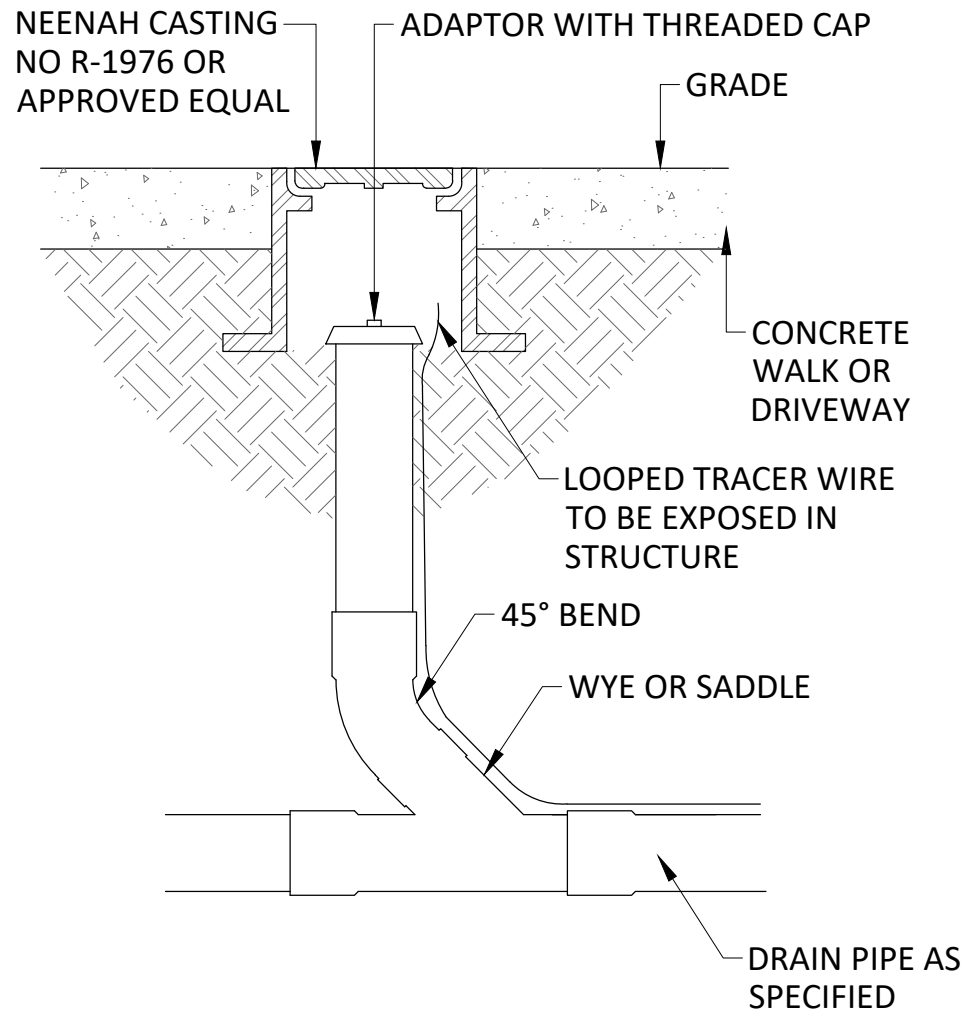
SANITARY SEWER CLEANOUT

REVISION DATE
FEBRUARY 2021
MARCH 2026

DETAIL NO.

10-110

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SUBSURFACE SANITARY SEWER CLEANOUT UNDER SIDEWALK/DRIVEWAY

NOT TO SCALE

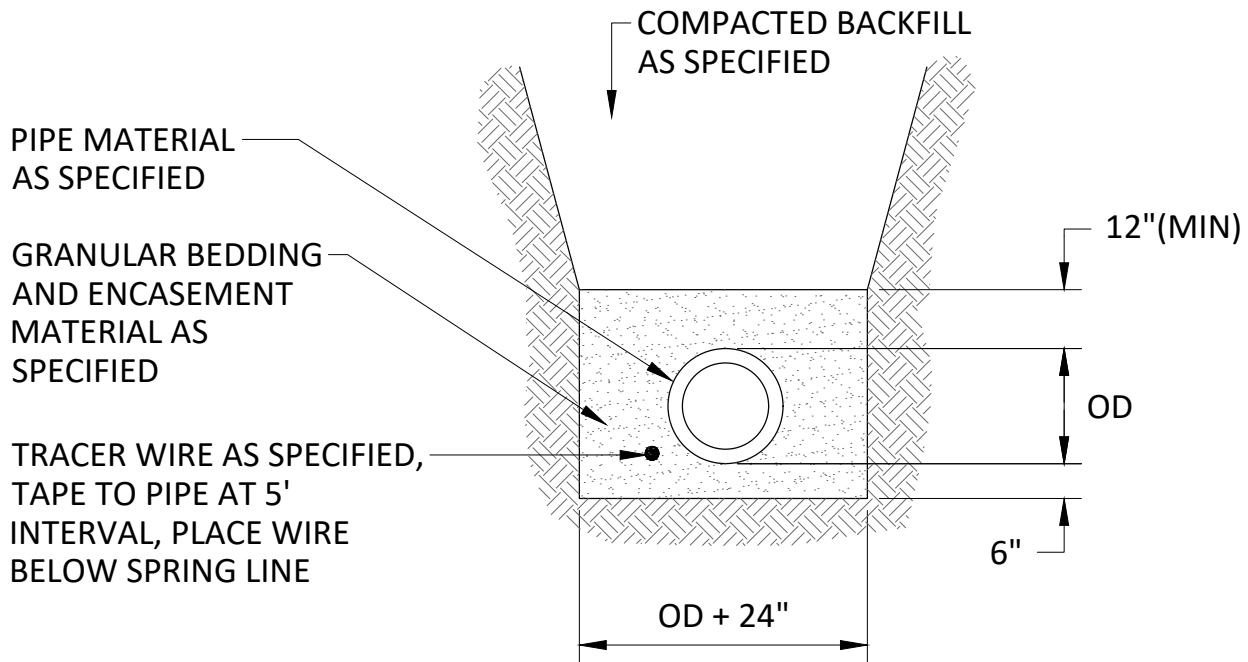


CITY OF WACONIA - STANDARD DETAILS
CLEANOUT UNDER SIDEWALK OR DRIVEWAY

REVISION DATE
FEBRUARY 2021
MARCH 2026

DETAIL NO.
10-111

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NON-RIGID SANITARY SEWER TRENCH

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

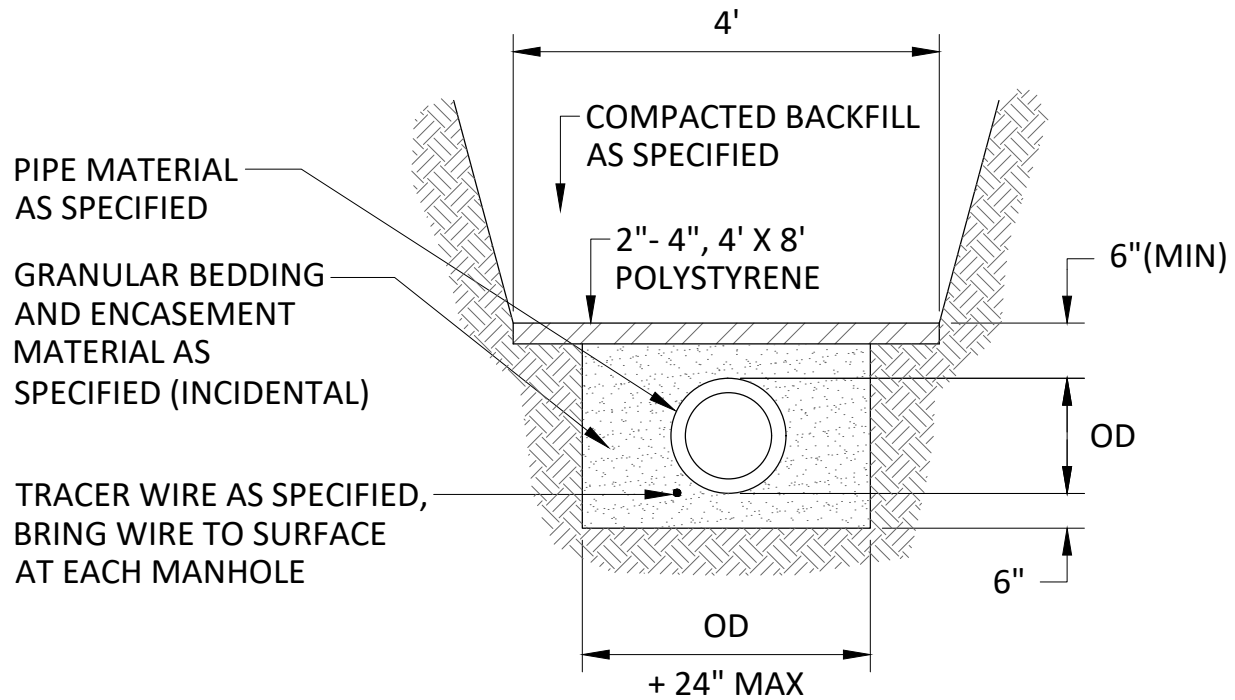
PVC SANITARY SEWER TRENCH

REVISION DATE
FEBRUARY 2021

DETAIL NO.

10-200

H:\WACA\C14120525\CAD\C3D\2020 Revised Detail Manual\120525-PVC FORCEMAIN INSULATION.dwg 3/17/2026 9:14 AM



PIPE MATERIAL
AS SPECIFIED

GRANULAR BEDDING
AND ENCASEMENT
MATERIAL AS
SPECIFIED (INCIDENTAL)

TRACER WIRE AS SPECIFIED,
BRING WIRE TO SURFACE
AT EACH MANHOLE

4'
COMPACTED BACKFILL
AS SPECIFIED

2" - 4", 4' X 8'
POLYSTYRENE

6" (MIN)

OD

6"

OD

+ 24" MAX

**FORCEMAIN
INSULATION**
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

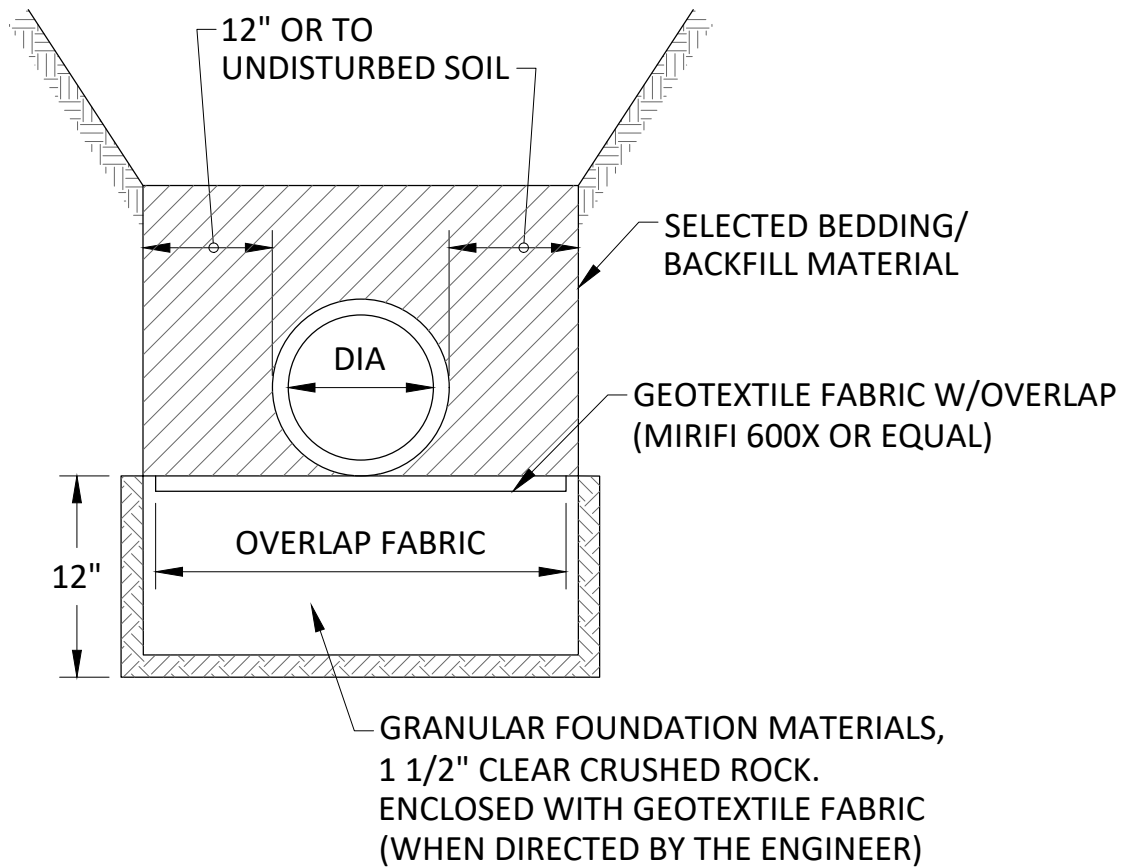
PVC FORCEMAIN INSULATION

REVISION DATE
FEBRUARY 2021
MARCH 2026

DETAIL NO.

10-202

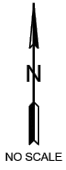
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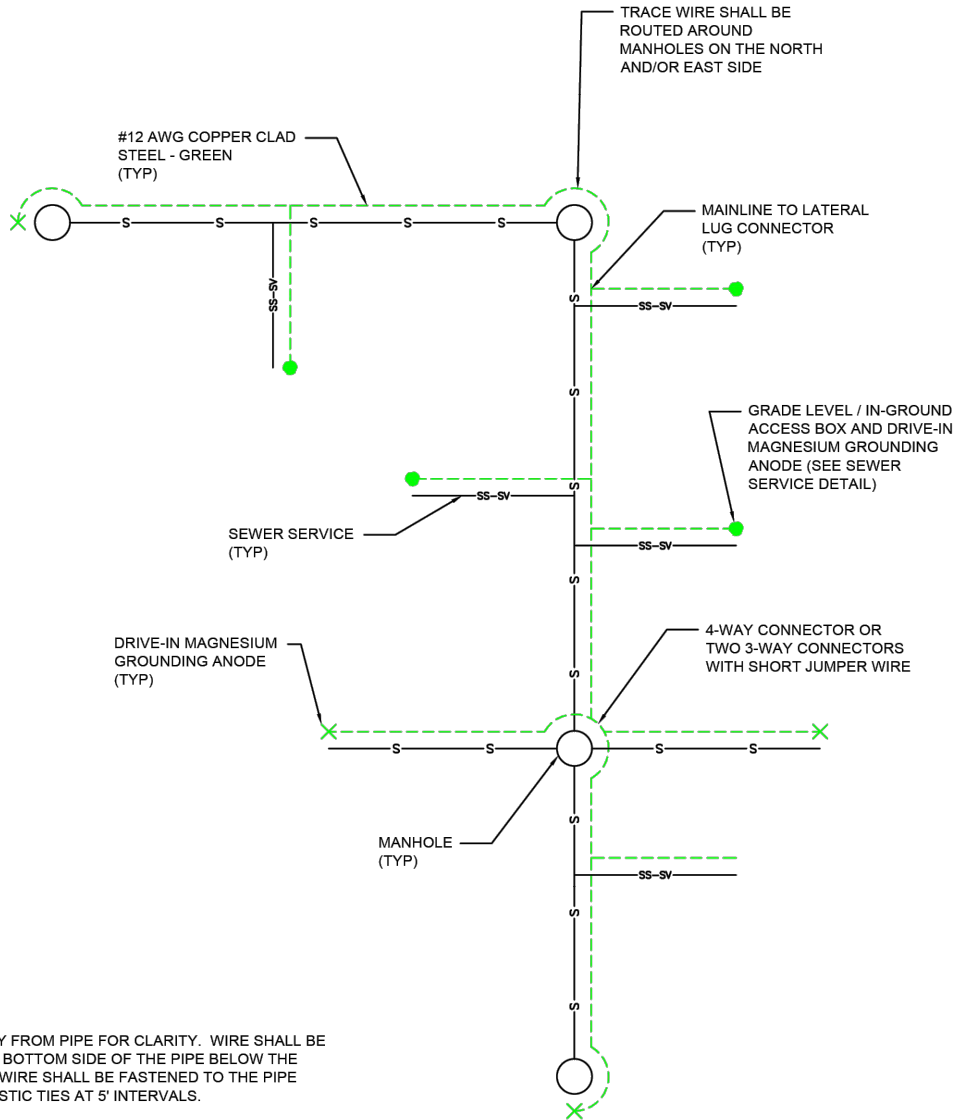
AGGREGATE PIPE FOUNDATION

NOT TO SCALE

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NO SCALE



NOTES:
 1. WIRE SHOWN AWAY FROM PIPE FOR CLARITY. WIRE SHALL BE INSTALLED ON THE BOTTOM SIDE OF THE PIPE BELOW THE SPRING LINE. THE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 5' INTERVALS.

TRACE WIRE PLAN (SEWER)
 NO SCALE



MINNESOTA RURAL WATER ASSOCIATION
 STANDARD DETAIL

TRACE WIRE
 SAMPLE SEWER PLAN

May 28, 2014

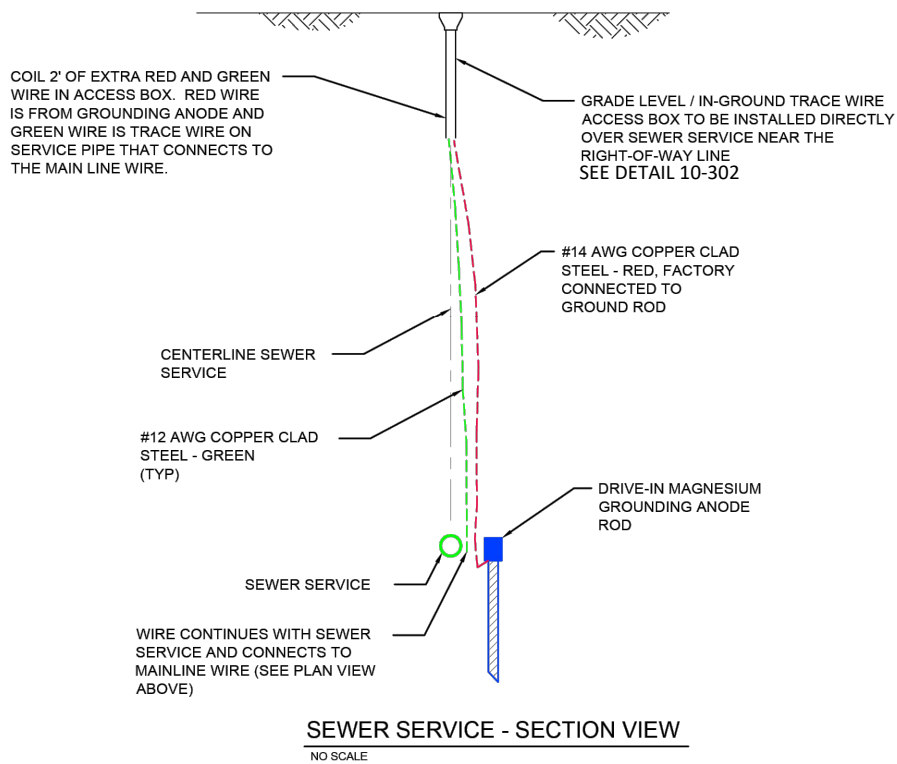
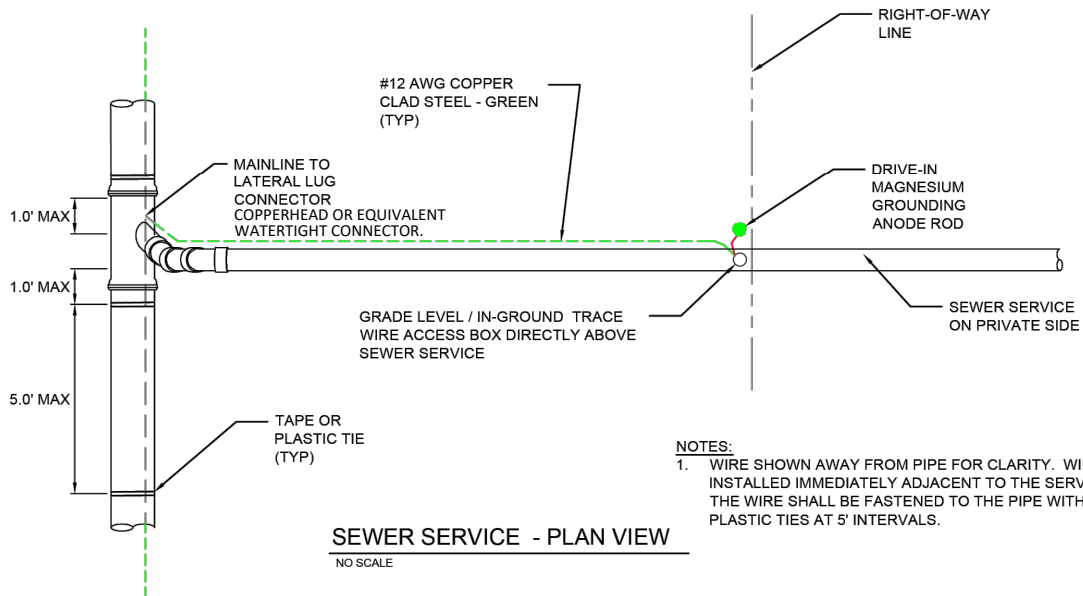
L:\Library\Municipal\Professional Associations\Rural Water Details\Trace Wire Details 5.28.14.dwg



CITY OF WACONIA - STANDARD DETAILS
 SANITARY SEWER TRACER WIRE PLAN

REVISION DATE	DETAIL NO.
FEBRUARY 2021	10-300

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MINNESOTA RURAL WATER ASSOCIATION
STANDARD DETAIL

TRACE WIRE
SEWER SERVICE DETAIL

May 28, 2014

L:\Library\Municipal\Professional Associations\Rural Water Details\Trace Wire Details 5.28.14.dwg



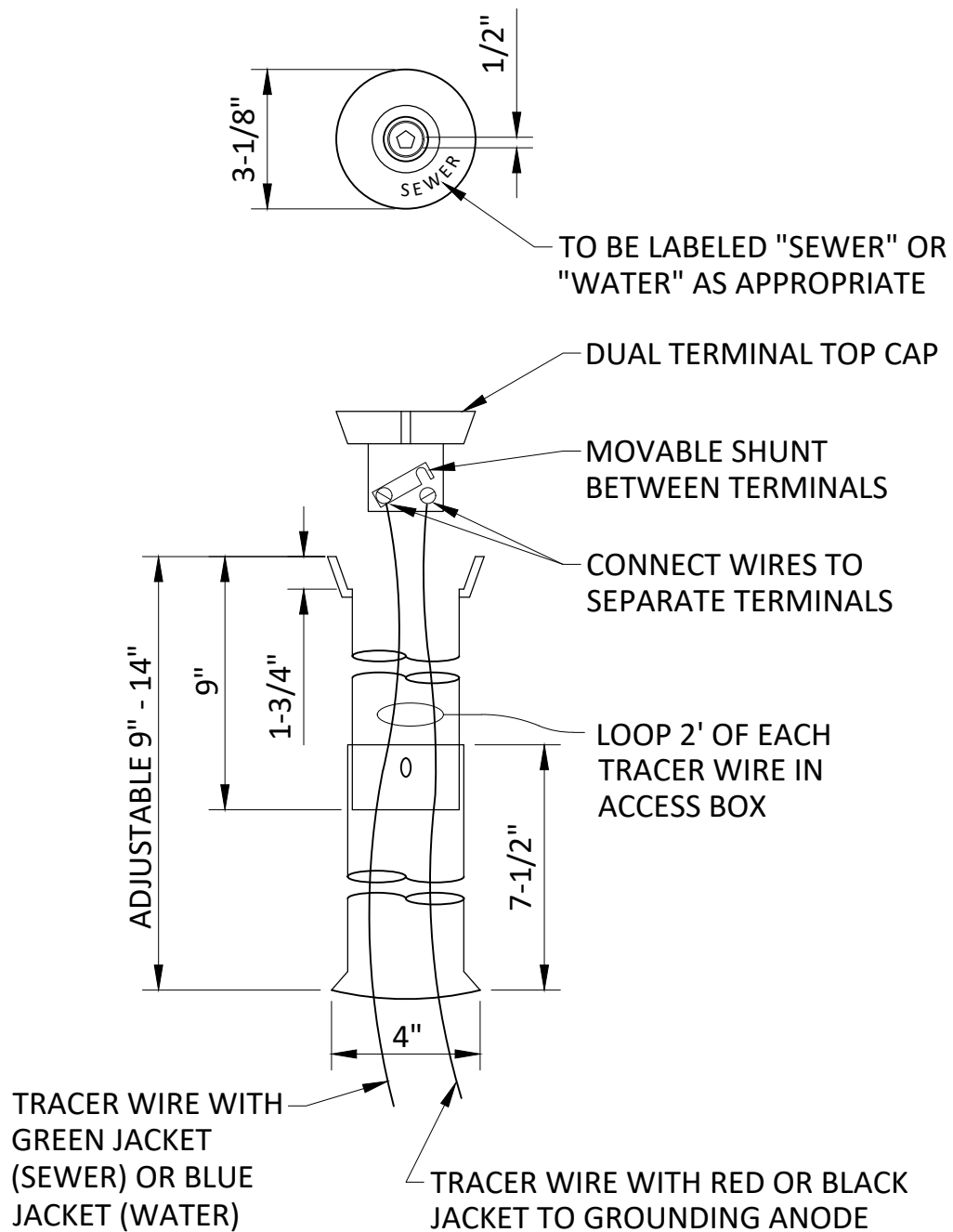
CITY OF WACONIA - STANDARD DETAILS

TRACER WIRE SEWER SERVICE DETAIL

REVISION DATE	DETAIL NO.
FEBRUARY 2021	
MARCH 2026	

10-301

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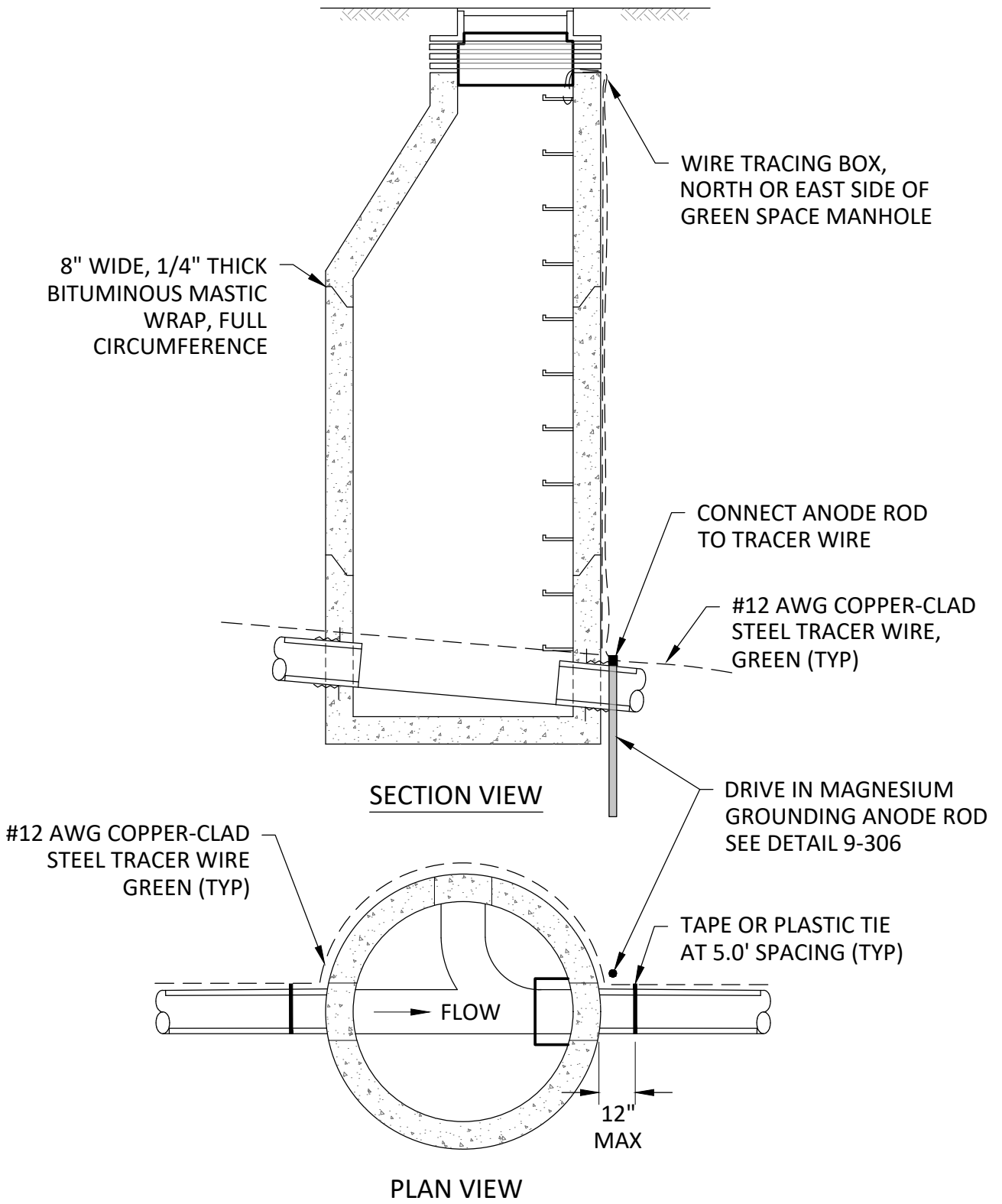
ADJUSTABLE TRACER WIRE ACCESS BOX
DUAL TERMINAL
SEWER OR WATER
 NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS
 TRACER WIRE ACCESS BOX-DUAL TERMINAL SEWER

REVISION DATE	DETAIL NO.
FEBRUARY 2021	10-302

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TRACER WIRE SEWER MANHOLE

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

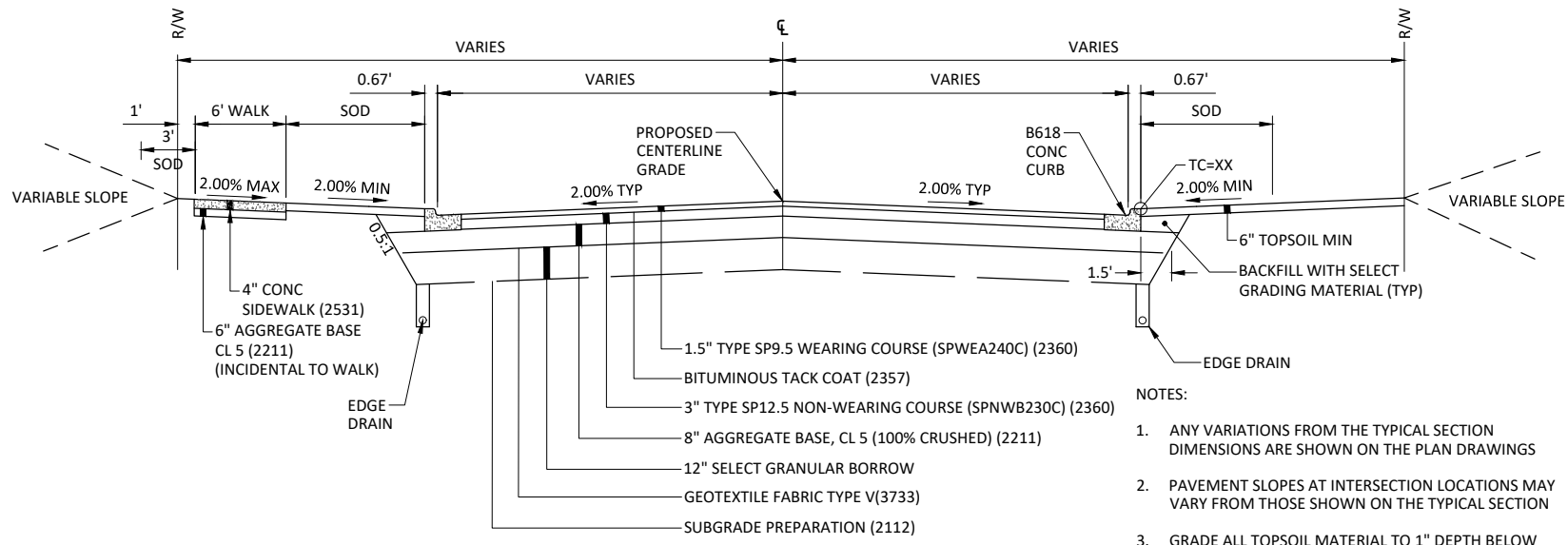
TRACER WIRE SEWER MANHOLE

REVISION DATE
FEBRUARY 2021

DETAIL NO.

10-303

TYPICAL SECTION

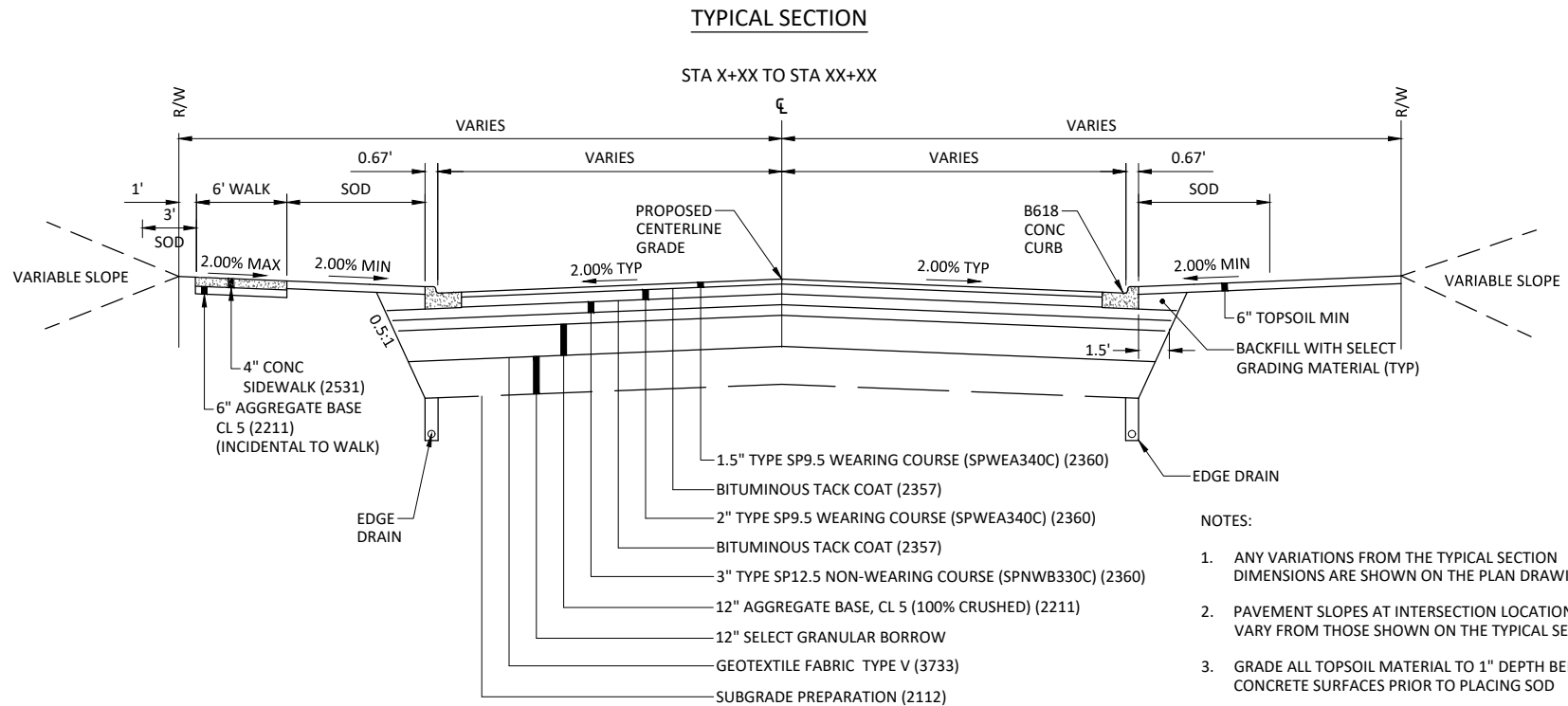


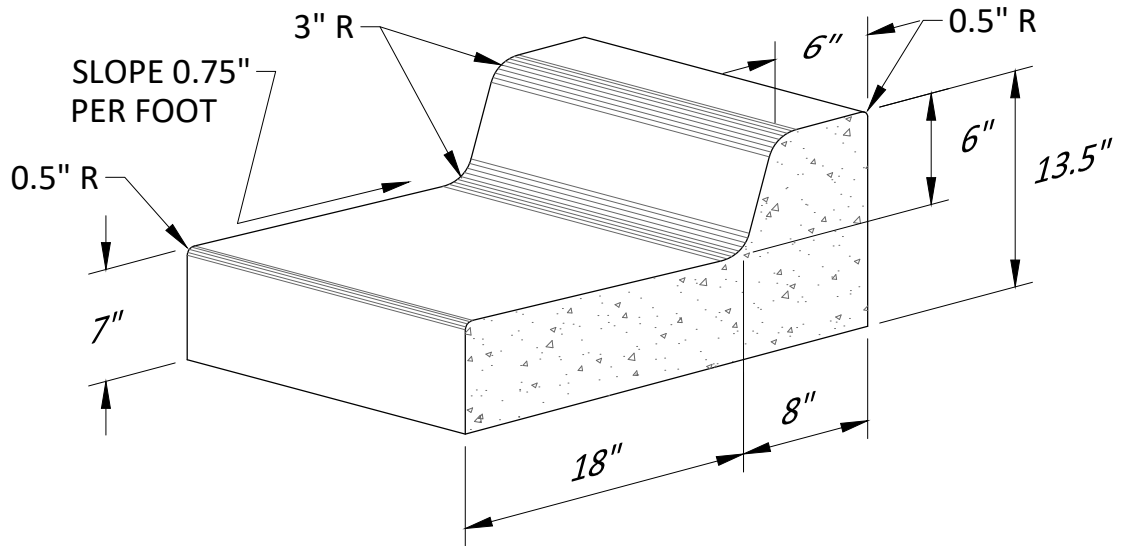
- NOTES:
1. ANY VARIATIONS FROM THE TYPICAL SECTION DIMENSIONS ARE SHOWN ON THE PLAN DRAWINGS
 2. PAVEMENT SLOPES AT INTERSECTION LOCATIONS MAY VARY FROM THOSE SHOWN ON THE TYPICAL SECTION
 3. GRADE ALL TOPSOIL MATERIAL TO 1" DEPTH BELOW CONCRETE SURFACES PRIOR TO PLACING SOD
 4. ELEVATIONS SHOWN ARE RELATIVE TO C/L AND DO NOT RELATE TO ACTUAL CONSTRUCTION GRADES
 5. RECYCLED MATERIAL IS AN ACCEPTABLE SUBSTITUTE IN THE AGGREGATE BASE AND THE BITUMINOUS NON-WEARING COURSE.



CITY OF WACONIA - STANDARD DETAILS
TYPICAL STREET SECTION-RESIDENTIAL

REVISION DATE	DETAIL NO.
MARCH 2021	11-000
MARCH 2026	



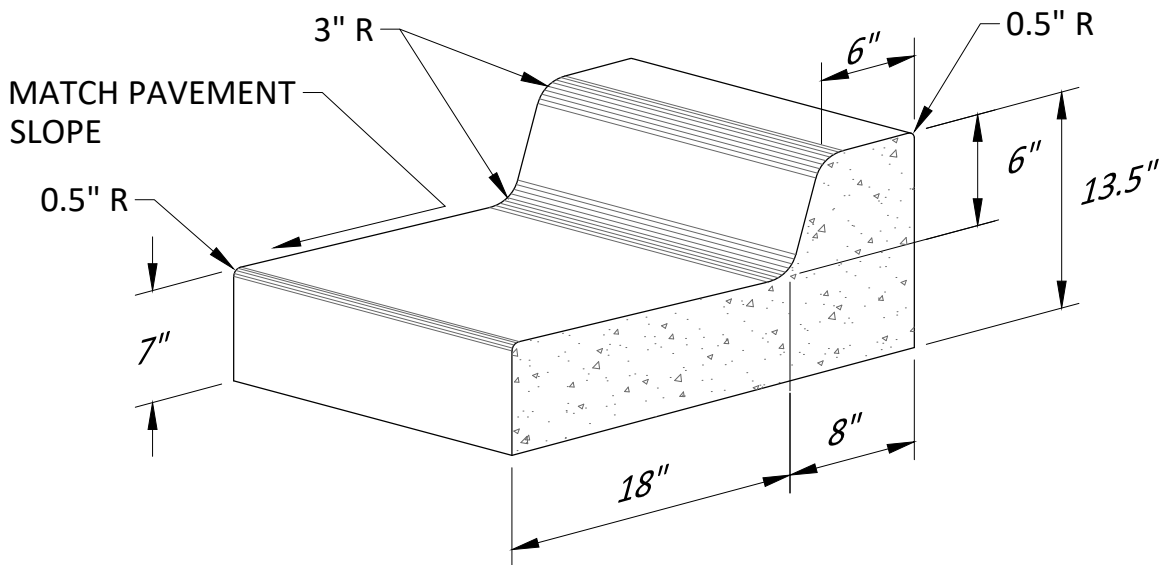


CONCRETE CURB & GUTTER DESIGN B618

NOT TO SCALE

NOTE:

"S" STAMP REQUIRED, INLINE FOR SEWER SERVICE. "W" STAMP, INLINE FOR CURB STOP.



CONCRETE CURB & GUTTER DESIGN B618, GUTTER OUT

NOT TO SCALE

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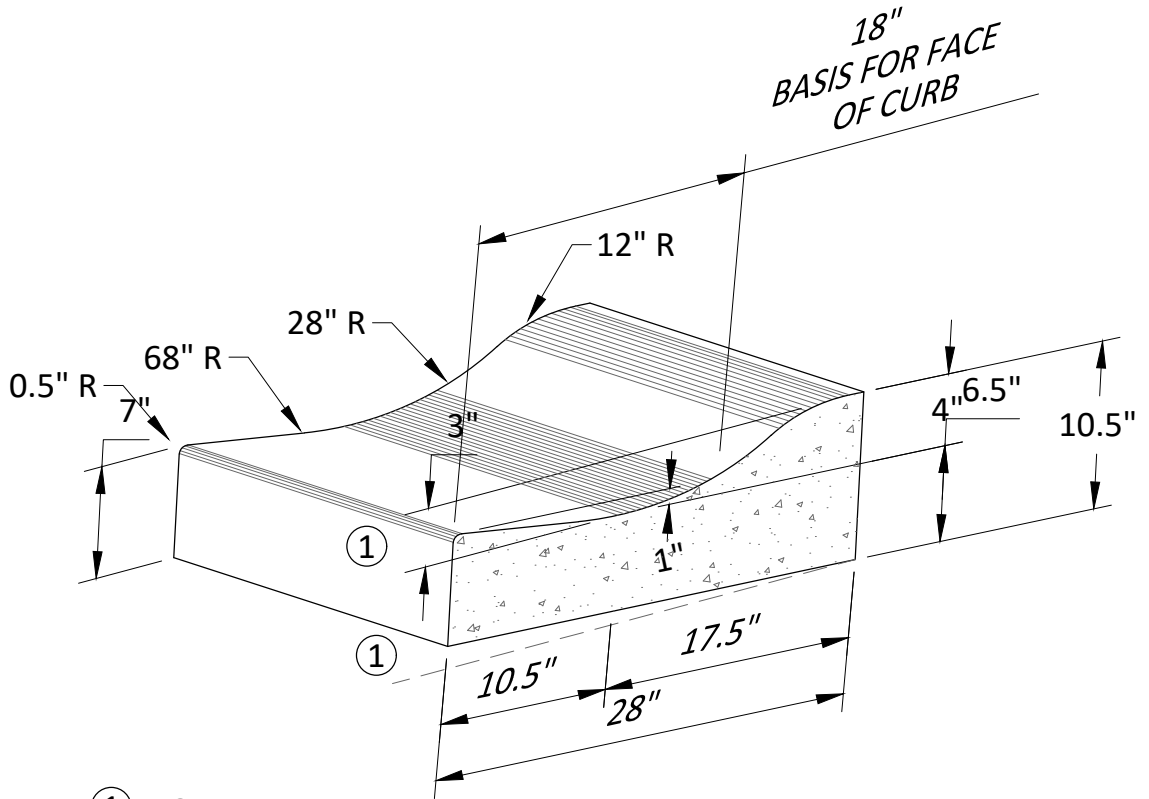
CITY OF WACONIA - STANDARD DETAILS

CONCRETE CURB & GUTTER-DESIGN B618

REVISION DATE	DETAIL NO.
FEBRUARY 2021	
MARCH 2026	

11-002

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① NOTE:
CURB SHALL BE PLACED IN A TILTED POSITION AS SUCH TO PROVIDE A 3" DEPTH FROM THE TOP OF CURB TO THE FLOWLINE WHEN MEASURED ON A LEVEL PLANE.

NOTE:
"S" STAMP REQUIRED, INLINE FOR SEWER SERVICE. "W" STAMP, INLINE FOR CURB STOP.

MOUNTABLE CONCRETE CURB & GUTTER

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

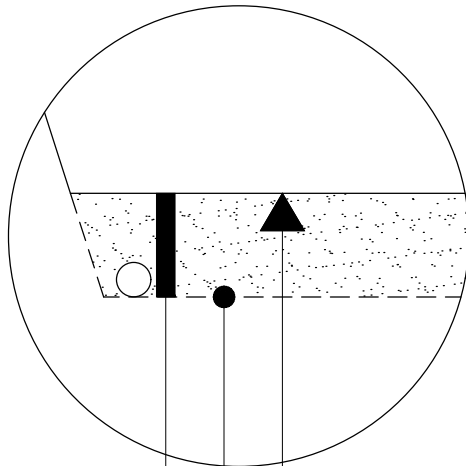
MOUNTABLE CURB & GUTTER

REVISION DATE
FEBRUARY 2021
MARCH 2026

DETAIL NO.

11-004

H:\WACA\C14120525\CAD\C3D\2020 Revised Detail Manual\120525-SUBGRADE CORRECTION.dwg 2/8/2021 12:20 PM



BOTTOM OF AGGREGATE BASE CL 5

GEOTEXTILE FABRIC, MNDOT TYPE V

VARIABLE DEPTH STABILIZING AGGREGATE
COMPACTED INTO SUBGRADE

SUBGRADE CORRECTION

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

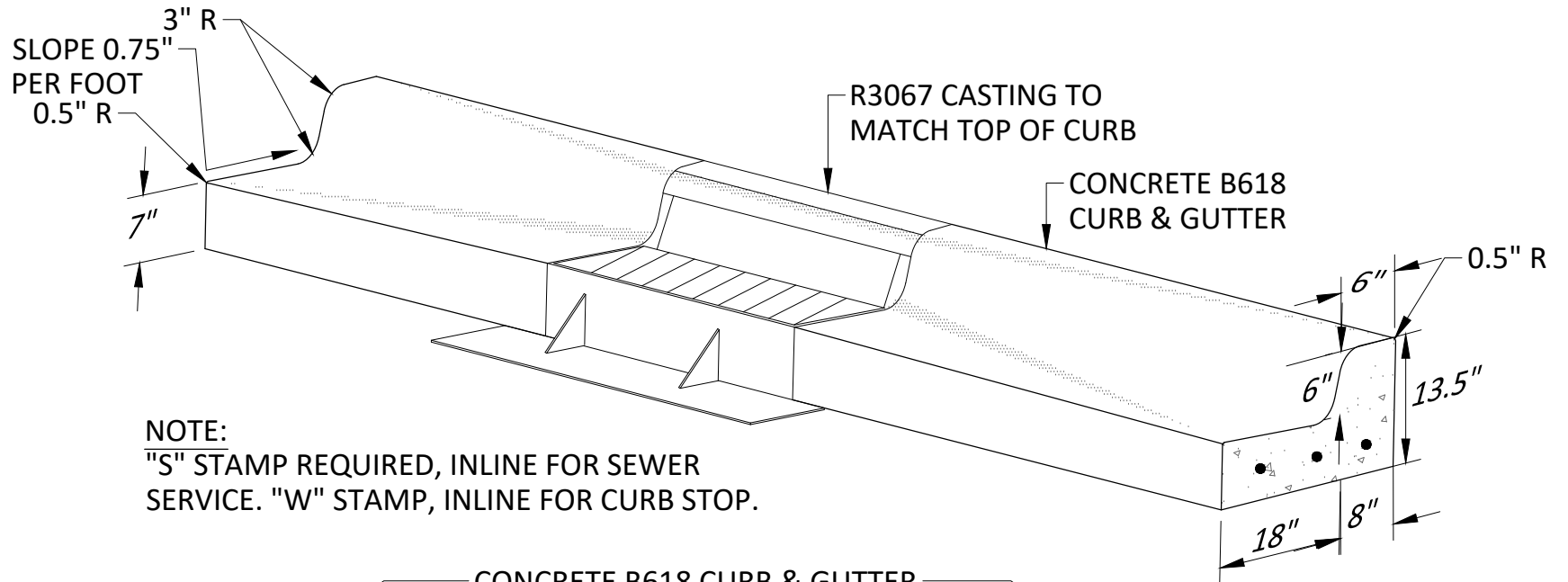
SUBGRADE CORRECTION

REVISION DATE
FEBRUARY 2021

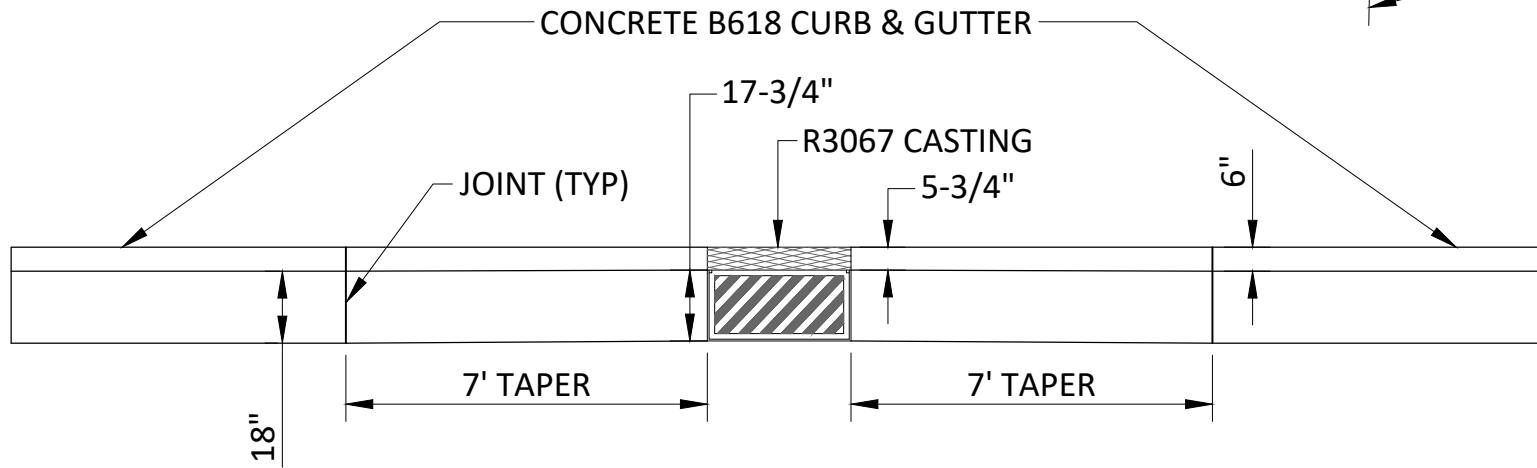
DETAIL NO.

11-005

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NOTE:
 "S" STAMP REQUIRED, INLINE FOR SEWER SERVICE. "W" STAMP, INLINE FOR CURB STOP.



**CATCHBASIN - CURB DETAIL FOR R-3067
 IN "B" STYLE CURB**

NOT TO SCALE

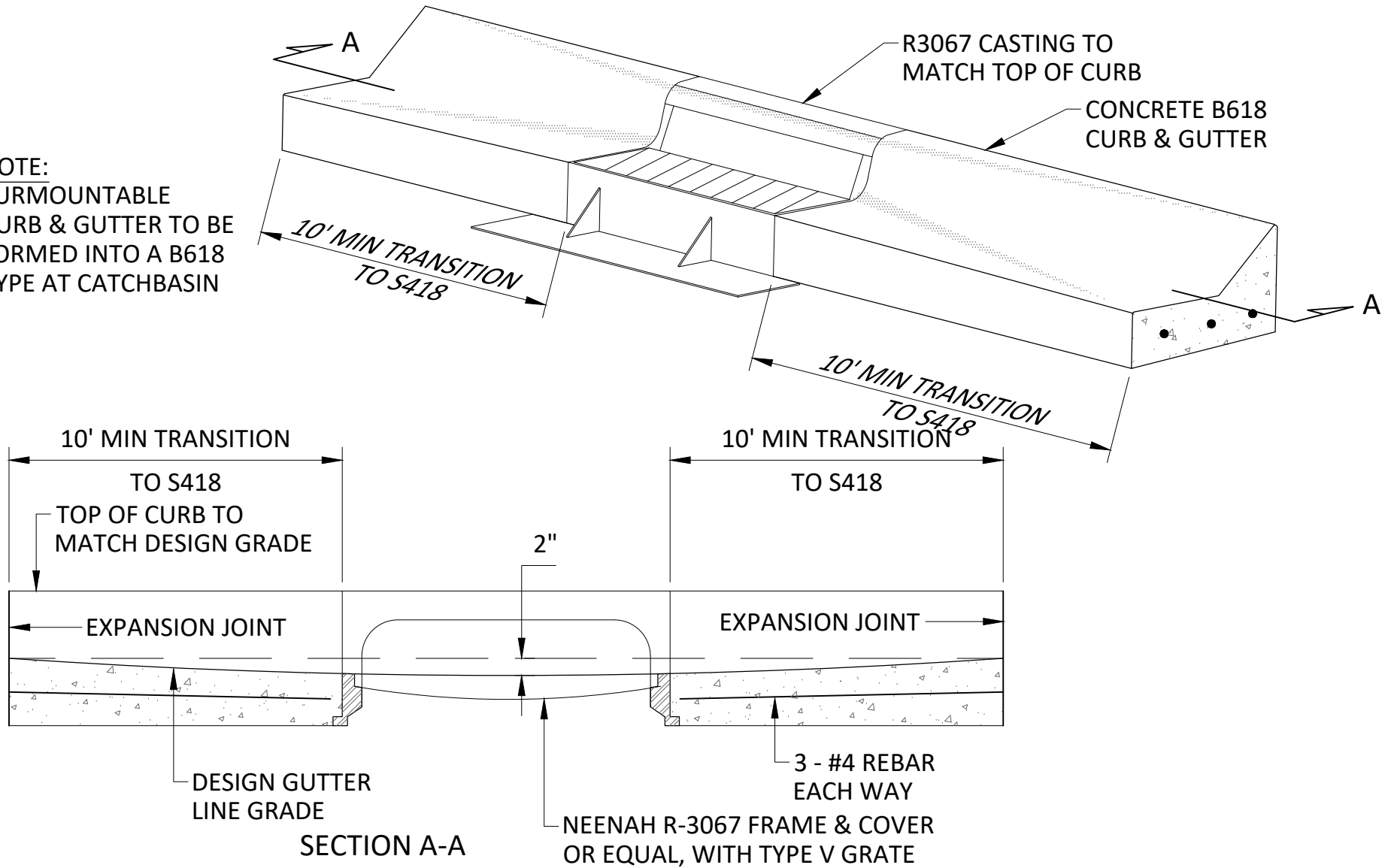


CITY OF WACONIA - STANDARD DETAILS
 CATCH BASIN B618 CURB FOR R3067
 CASTINGS

REVISION DATE	DETAIL NO.
FEBRUARY 2021	11-007
MARCH 2026	

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NOTE:
 SURMOUNTABLE
 CURB & GUTTER TO BE
 FORMED INTO A B618
 TYPE AT CATCHBASIN



**CATCHBASIN - CURB DETAIL FOR R-3067
 IN MOUNTABLE CURB**

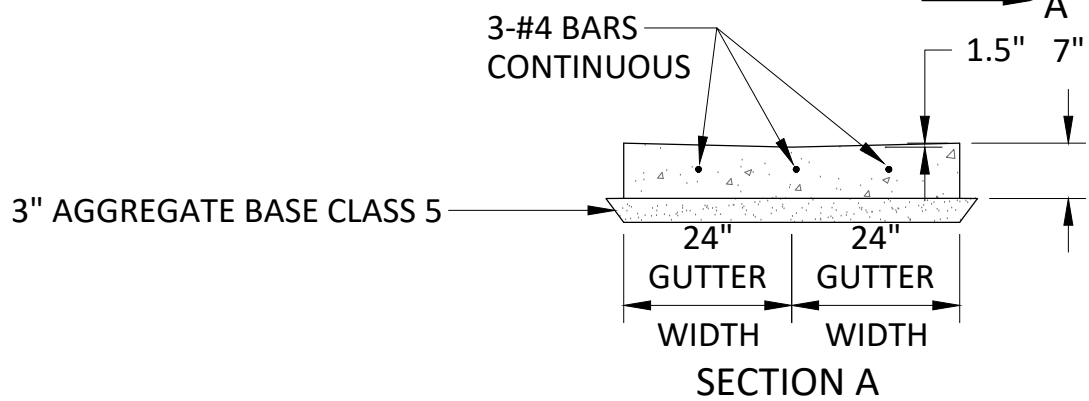
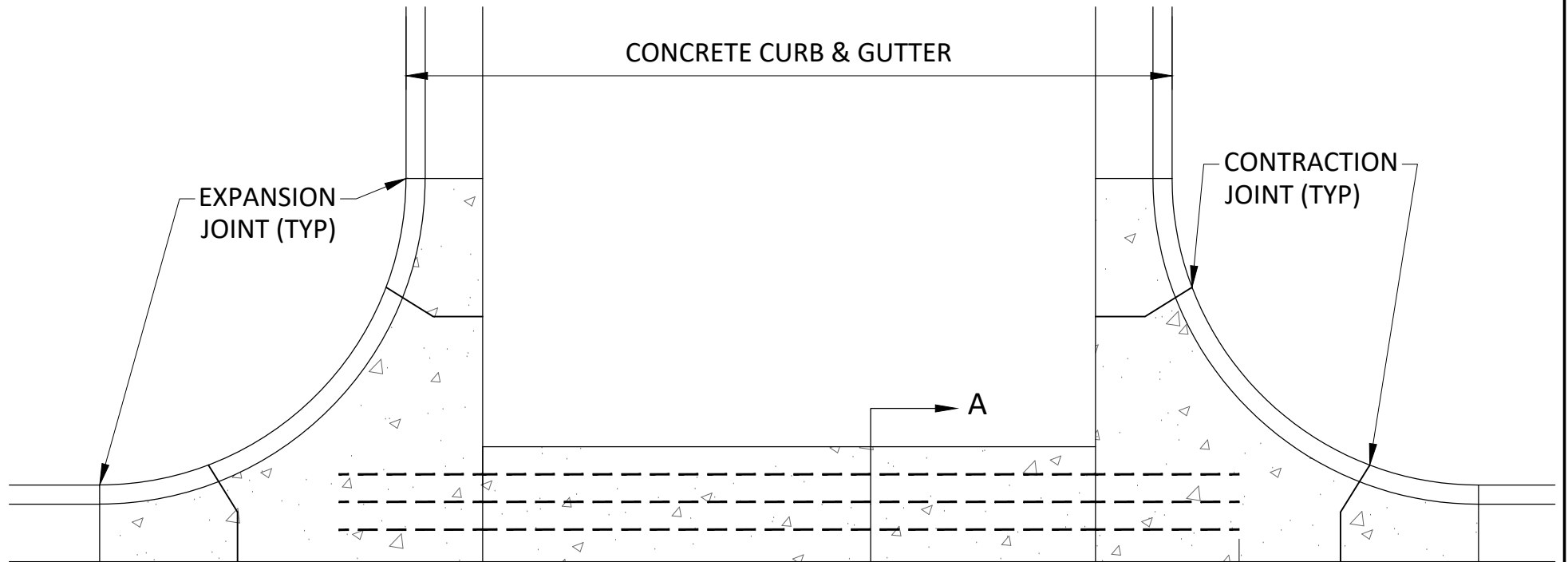
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS
 CATCH BASIN SURMOUNTABLE CURB
 DETAIL FOR R-3067 CASTINGS

REVISION DATE	DETAIL NO.
FEBRUARY 2021	11-008

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- NOTE:
1. NO CONTRACTION JOINTS IN VALLEY GUTTER
 2. THE CONCRETE VALLEY GUTTER SHALL BE CONSTRUCTED ON 6" AGGREGATE BASE, CLASS 5

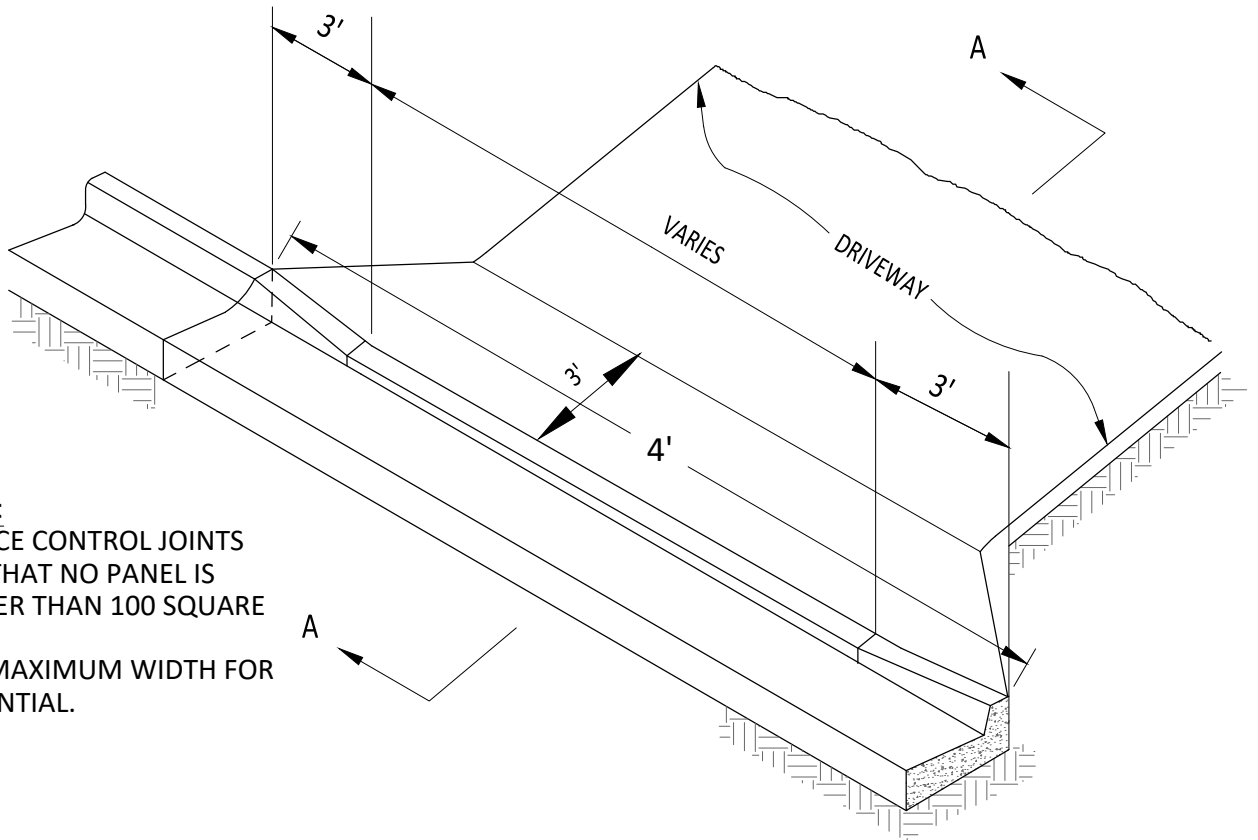
CONCRETE VALLEY GUTTER
NOT TO SCALE



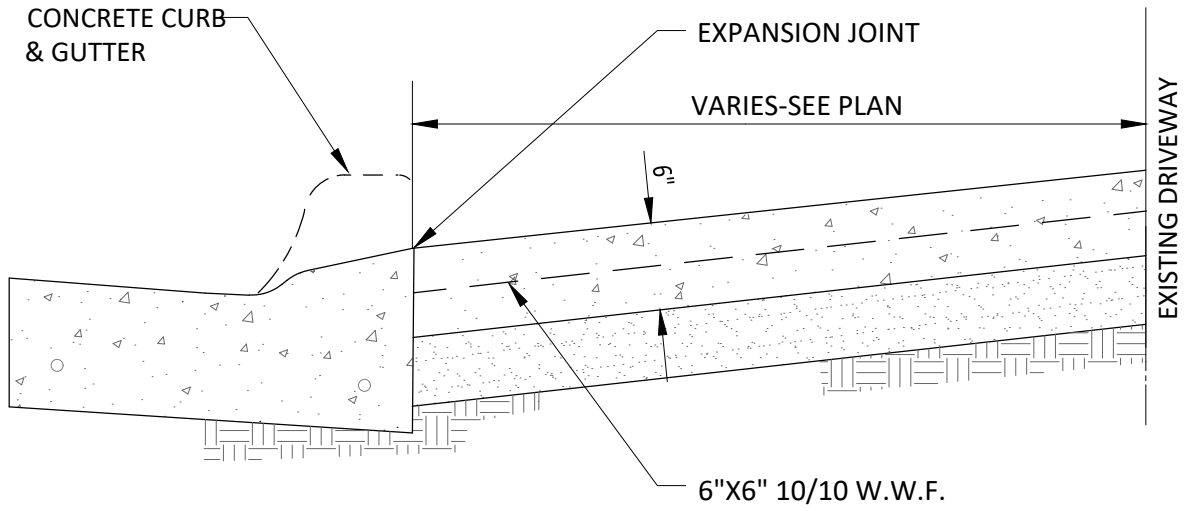
CITY OF WACONIA - STANDARD DETAILS
CONCRETE VALLEY GUTTER

REVISION DATE	DETAIL NO.
FEBRUARY 2021	11-100

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- NOTES:
1. SPACE CONTROL JOINTS SUCH THAT NO PANEL IS GREATER THAN 100 SQUARE FEET.
 2. 24' MAXIMUM WIDTH FOR RESIDENTIAL.



SECTION A-A

CONCRETE DRIVEWAY APRON

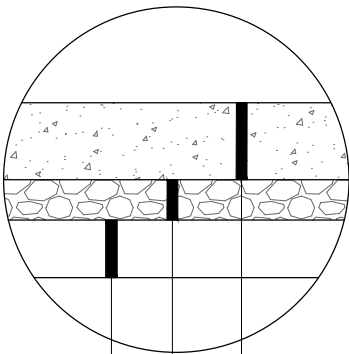
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS
CONCRETE DRIVEWAY APRON

REVISION DATE	DETAIL NO.
FEBRUARY 2021	11-102
MARCH 2026	

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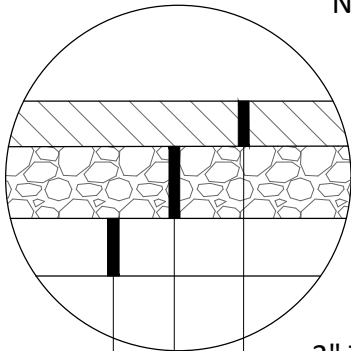
6" CONCRETE DRIVEWAY PAVEMENT (2531)
W/ 6"X6" 10/10 W.W.F.

6" AGGREGATE BASE, CL 5 (100% CRUSHED)
(2211) (INCIDENTAL)

SUBGRADE PREPARATION (2112) (INCIDENTAL)

CONCRETE DRIVEWAY PAVEMENT

NOT TO SCALE



3" TYPE SP9.5 WEARING COURSE
(SPWEA240B) (2360)

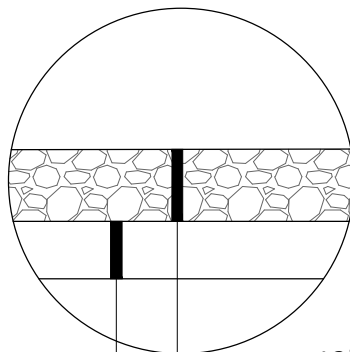
6" AGGREGATE BASE CL 5 (100% CRUSHED)
(2211) (INCIDENTAL)

SUBGRADE PREPARATION (2112) (INCIDENTAL)

BITUMINOUS DRIVEWAY PAVEMENT

(RESIDENTIAL BIT DRIVEWAY)

NOT TO SCALE



12" AGGREGATE SURFACING CL 5
(100% CRUSHED) (2211)

SUBGRADE PREPARATION (2112) (INCIDENTAL)

AGGREGATE DRIVEWAY

NOT TO SCALE



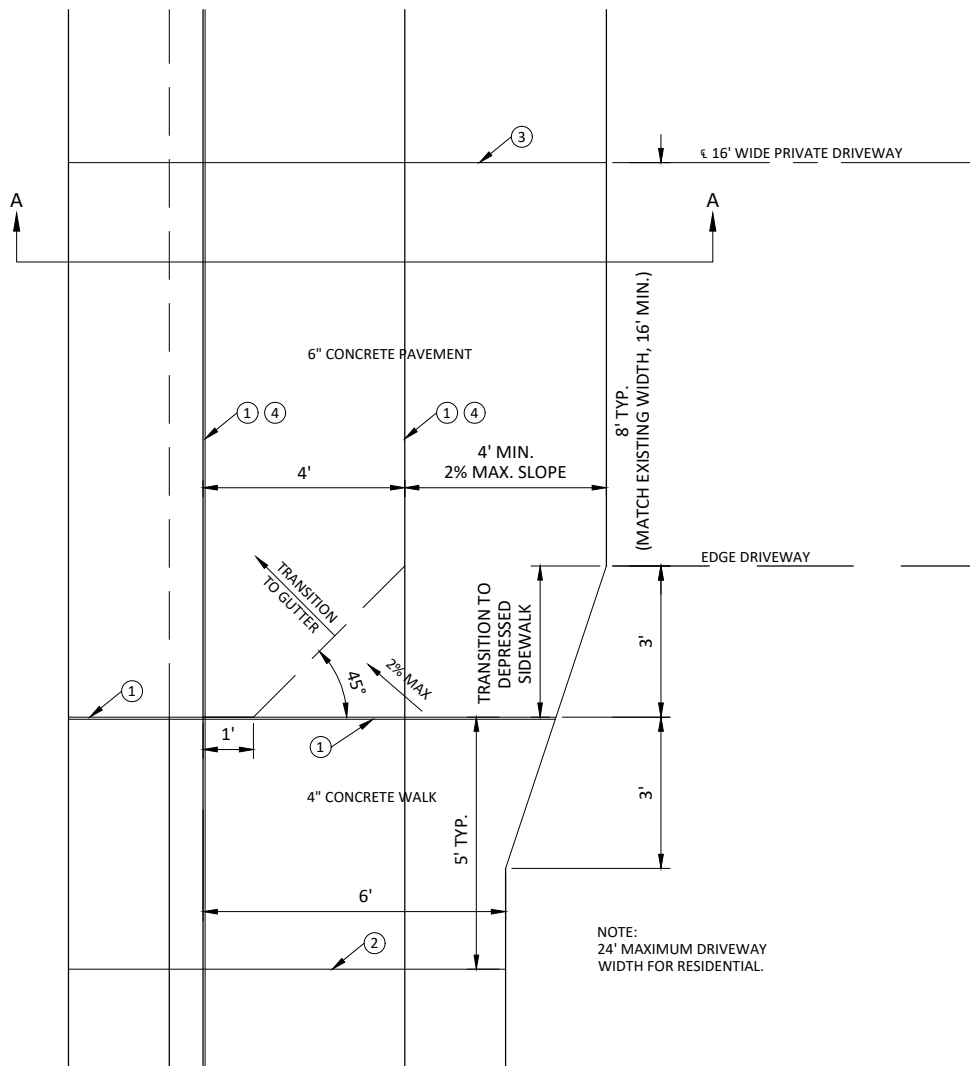
CITY OF WACONIA - STANDARD DETAILS

DRIVEWAY PAVEMENT SECTIONS

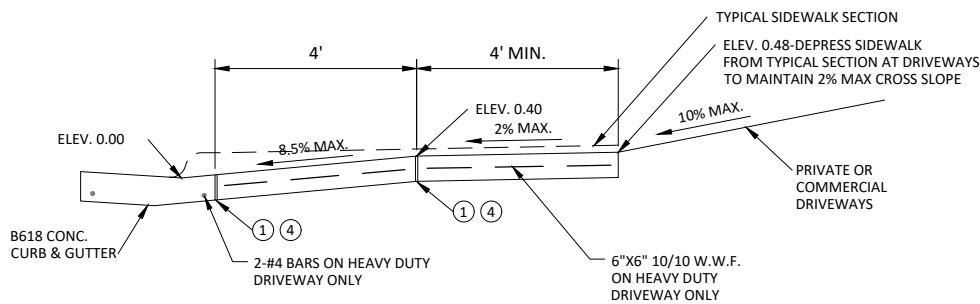
REVISION DATE
FEBRUARY 2021

DETAIL NO.

11-103



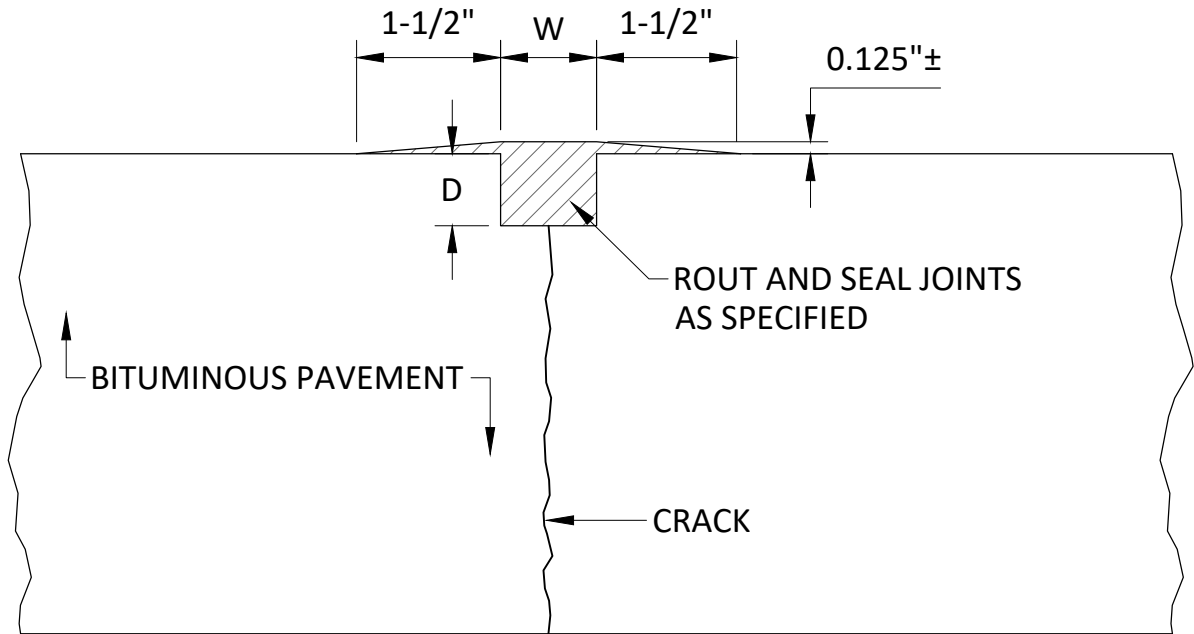
DRIVEWAY PLAN-6' SIDEWALK



**TYPICAL DRIVEWAY SECTION-6' SIDEWALK
(SECTION A-A)**

- ① 1/2" EXPANSION JOINT
- ② CONTRACTION JOINT
- ③ CONTRACTION JOINT-FORMED OR SAWED
- ④ EXPANSION JOINT NOT REQUIRED IF ADJACENT SECTIONS ARE POURED MONOLITHICALLY

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<u>W</u>	<u>D</u>
1"	0.75"
2"	1.25"

BITUMINOUS CRACK SEALING

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

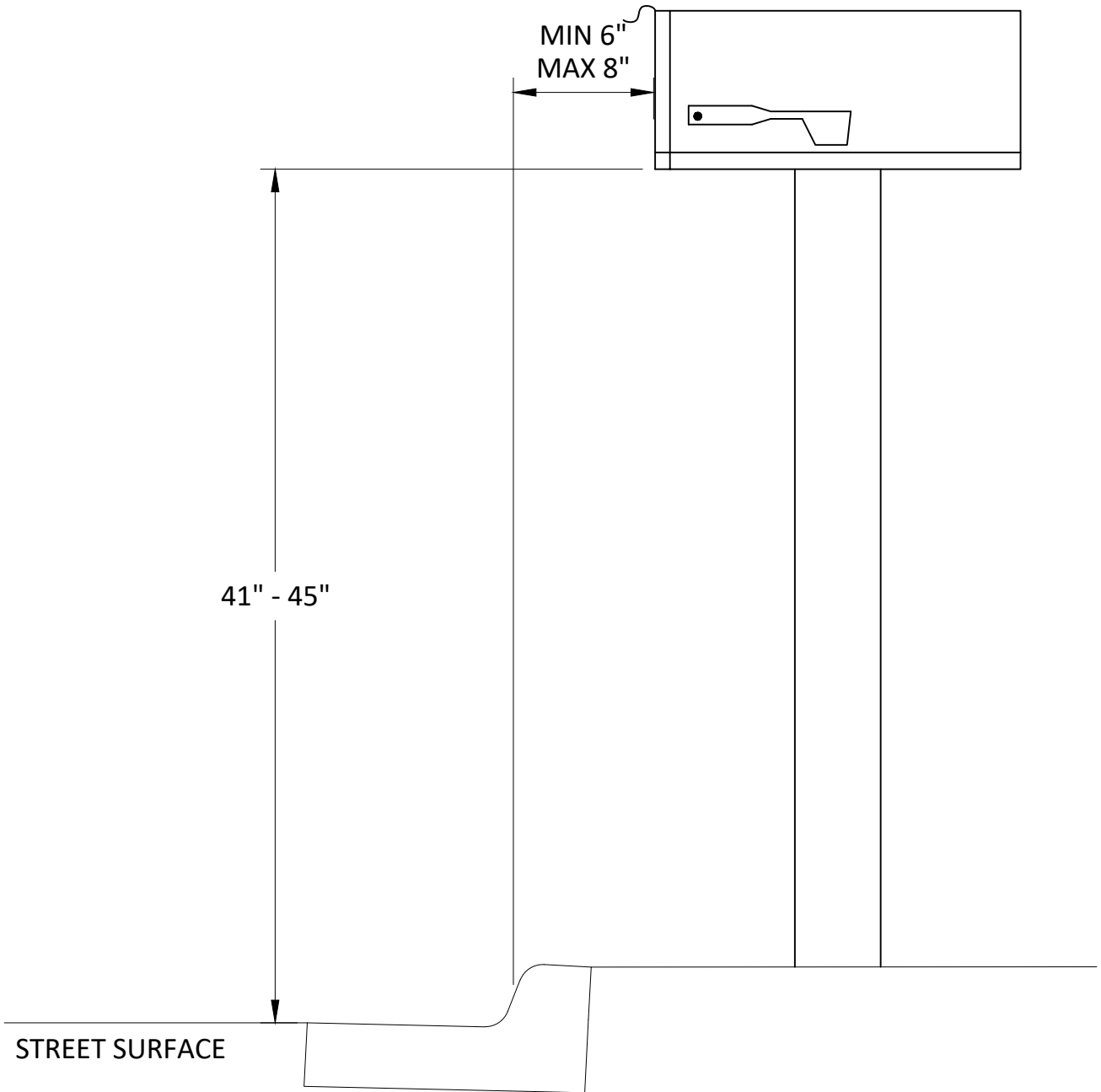
BITUMINOUS CRACK SEAL

REVISION DATE
FEBRUARY 2021

DETAIL NO.

11-305

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MAILBOX INSTALLATION
NOT TO SCALE

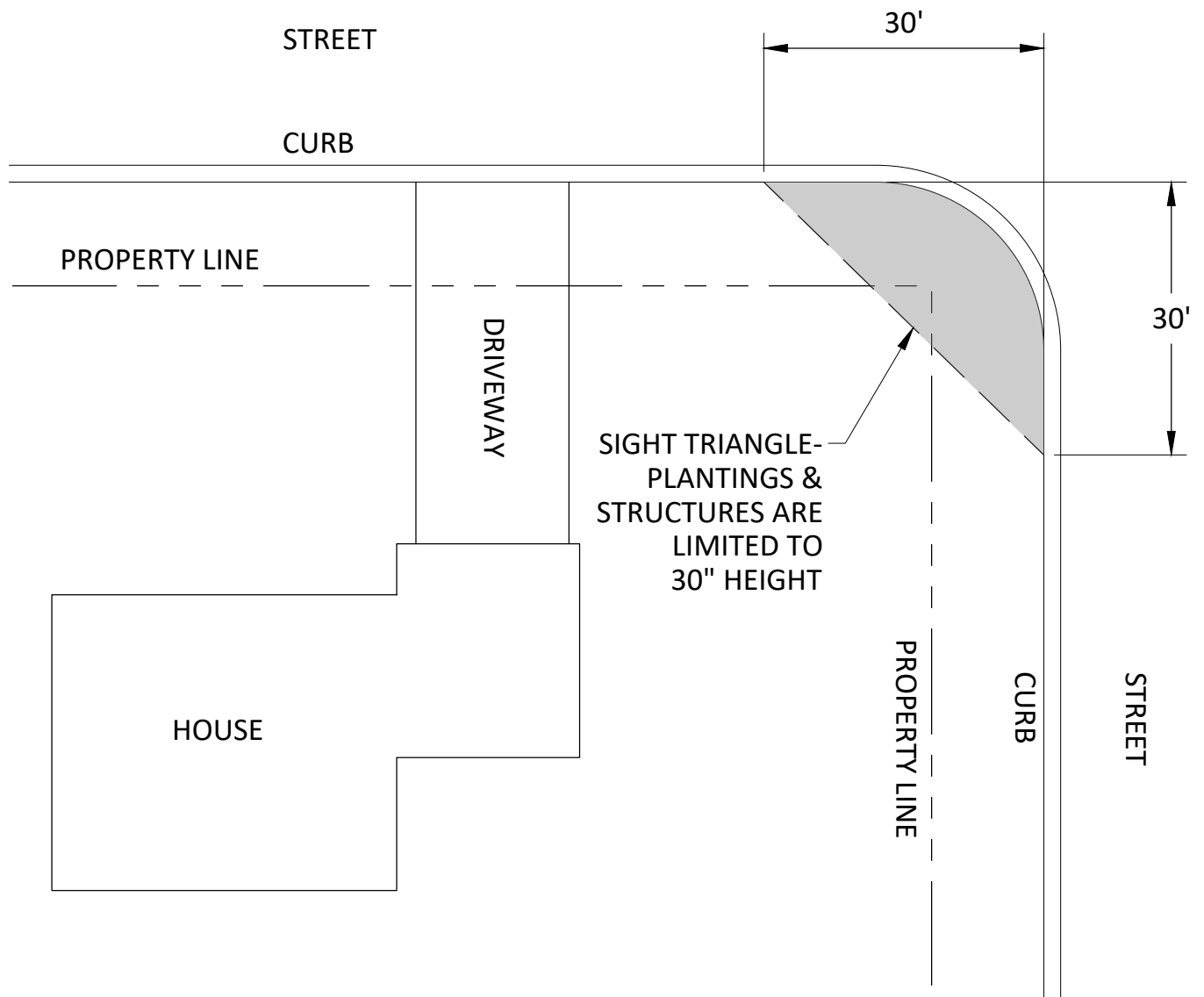


CITY OF WACONIA - STANDARD DETAILS

MAILBOX INSTALLATION

REVISION DATE	DETAIL NO.
FEBRUARY 2021	11-610

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CORNER LOT SIGHT TRIANGLE

NOT TO SCALE



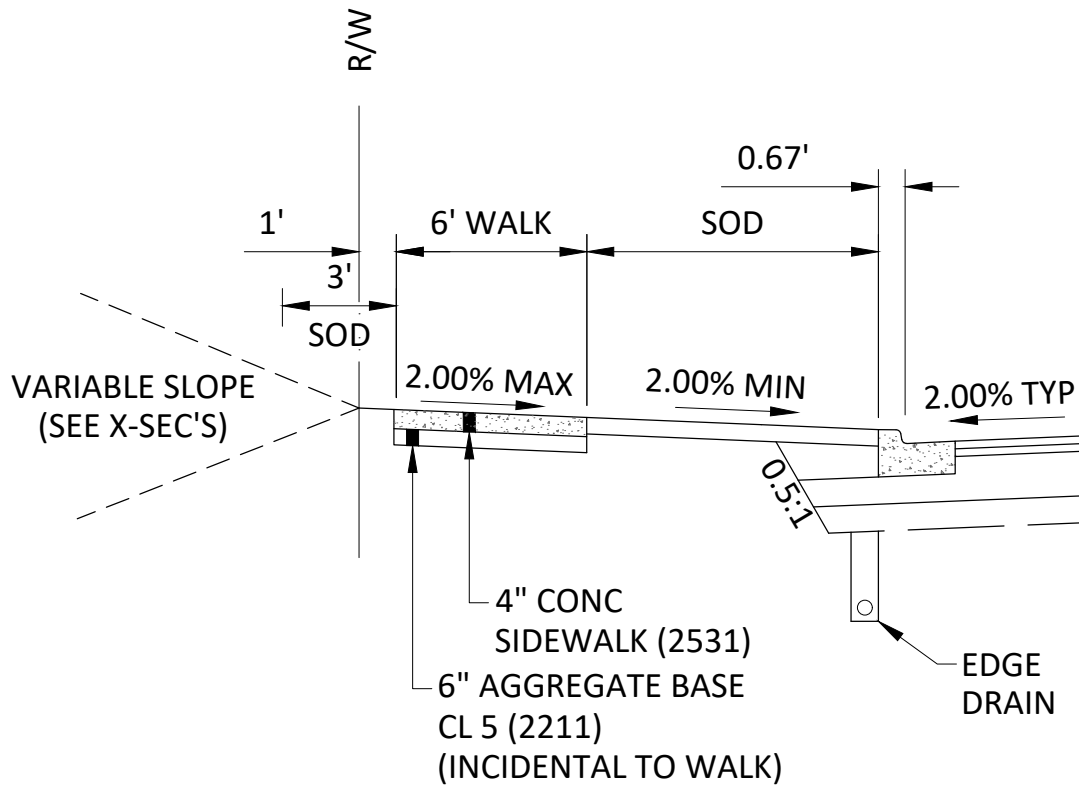
CITY OF WACONIA - STANDARD DETAILS

CORNER LOT SITE TRIANGLE

REVISION DATE	DETAIL NO.
FEBRUARY 2021	11-612

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TYPICAL SECTION-SIDEWALK

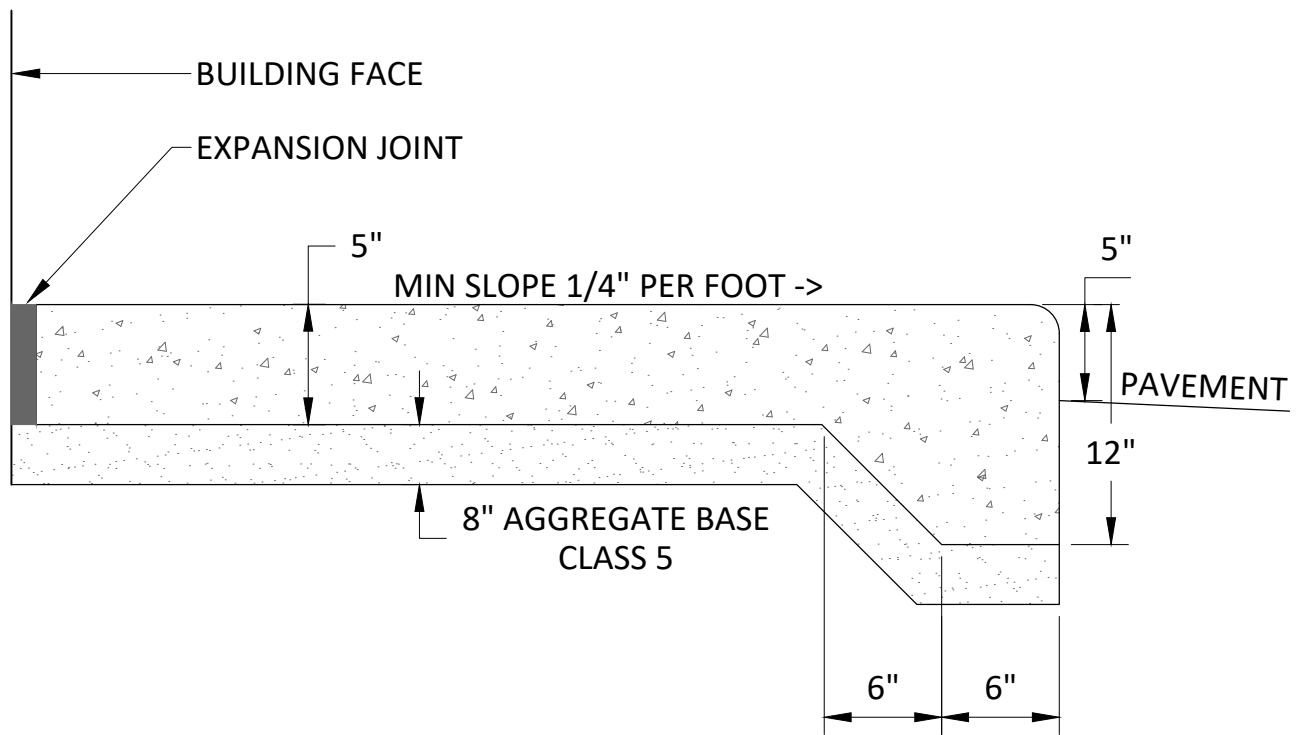


CITY OF WACONIA - STANDARD DETAILS

TYPICAL SIDEWALK SECTION

REVISION DATE	DETAIL NO.
FEBRUARY 2021	12-100

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CONCRETE SIDEWALK THICKENED EDGE

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

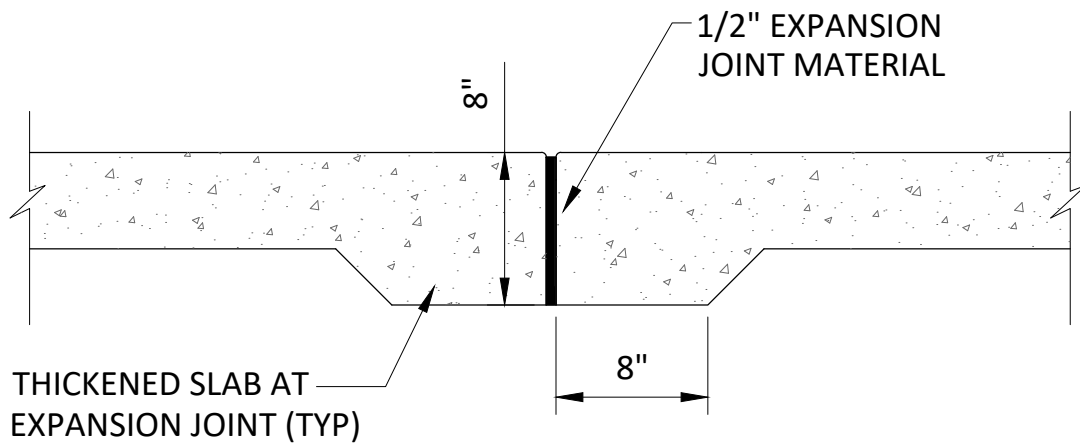
CONCRETE SIDEWALK THICKENED EDGE

REVISION DATE
FEBRUARY 2021

DETAIL NO.

12-101

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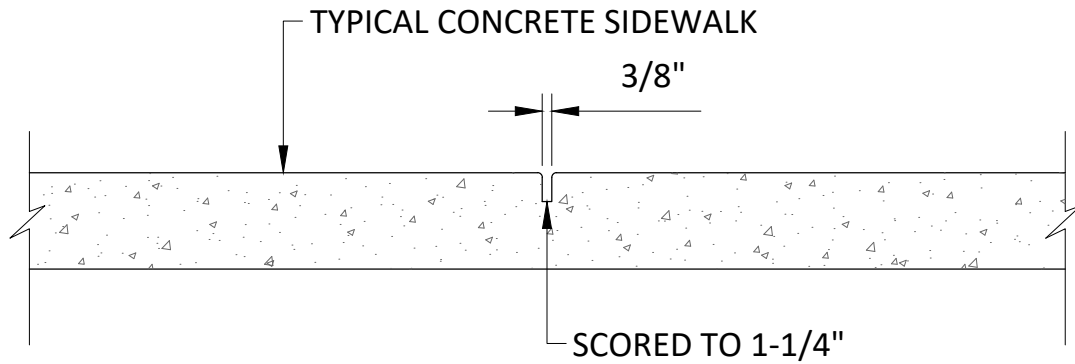
EXPANSION JOINT
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS
CONCRETE EXPANSION JOINT

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FEBRUARY 2021	12-105

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CONTRACTION JOINT

NOT TO SCALE

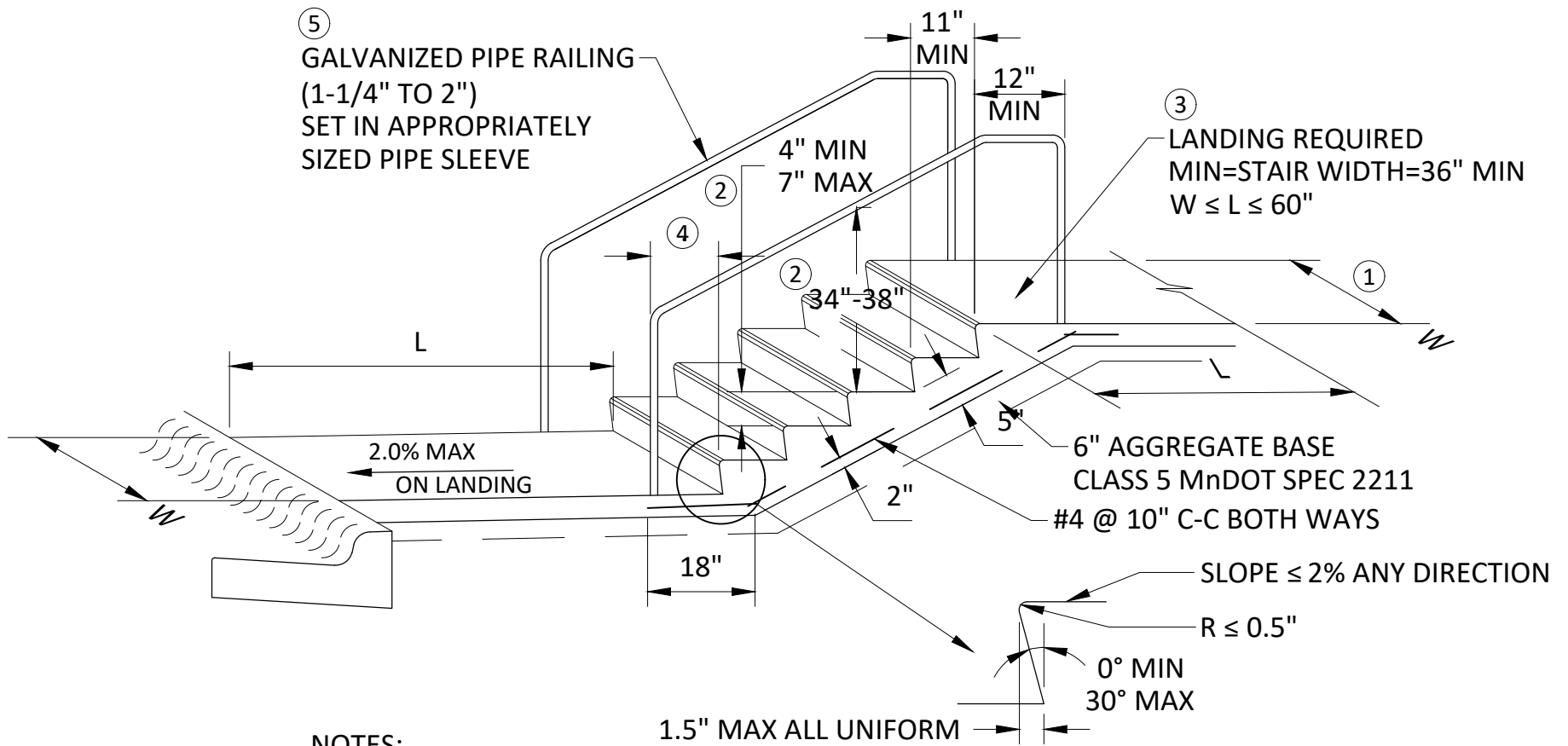


CITY OF WACONIA - STANDARD DETAILS

CONCRETE CONTRACTION JOINT

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NOTES:

1. MIN WIDTH IS CLEAR BETWEEN HANDRAILS; CHECK WITH CITY BUILDING OFFICIAL FOR OCCUPANT LOADS ≥ 50 PERSONS
2. TREADS AND RISERS MUST BE UNIFORM WITH NO MORE THAN 3/8" DIFFERENCE FROM SMALLEST TO LARGEST TREAD OR RISER
3. SEE BUILDING CODE IF DOORS OPEN ON TO STAIR LANDING
4. MINIMUM ONE STAIR TREAD WIDTH
5. RAILINGS SHALL CONFORM TO AMERICANS WITH DISABILITIES ACT

CONCRETE STAIRWAY

NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

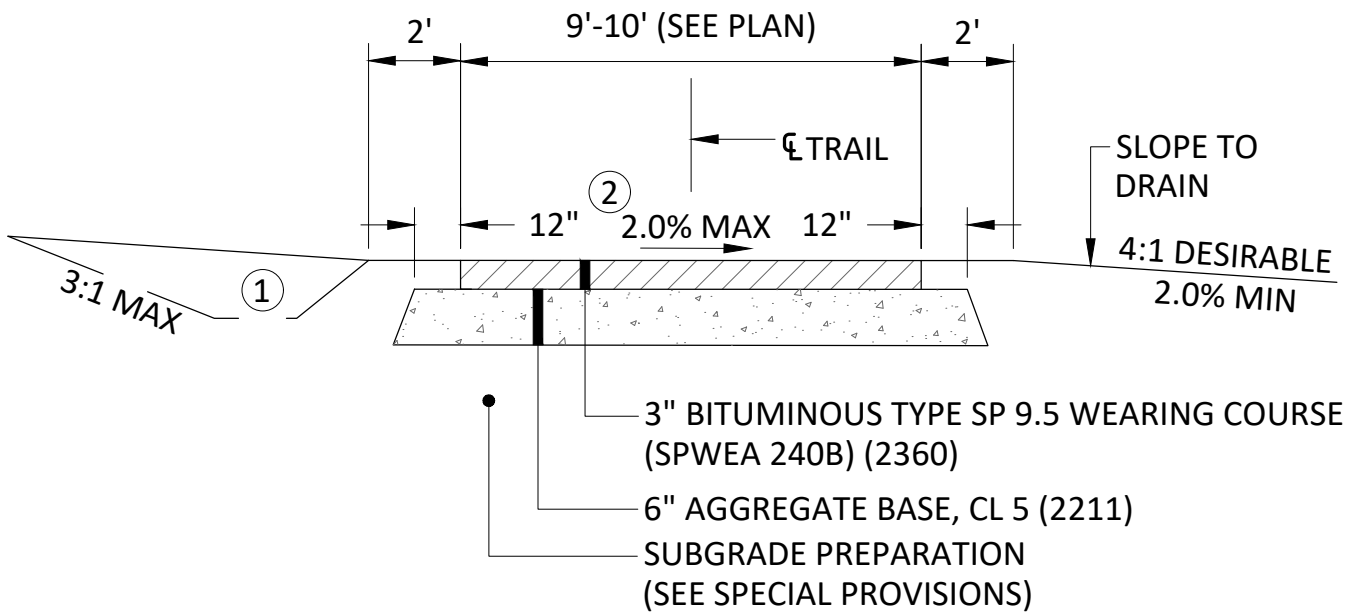
CONCRETE STAIRWAY

REVISION DATE
FEBRUARY 2021

DETAIL NO.

12-200

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- ① DITCH IF REQUIRED FOR DRAINAGE
- ② SLOPE TOWARDS INSIDE OF CURVE

BITUMINOUS TRAIL
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS

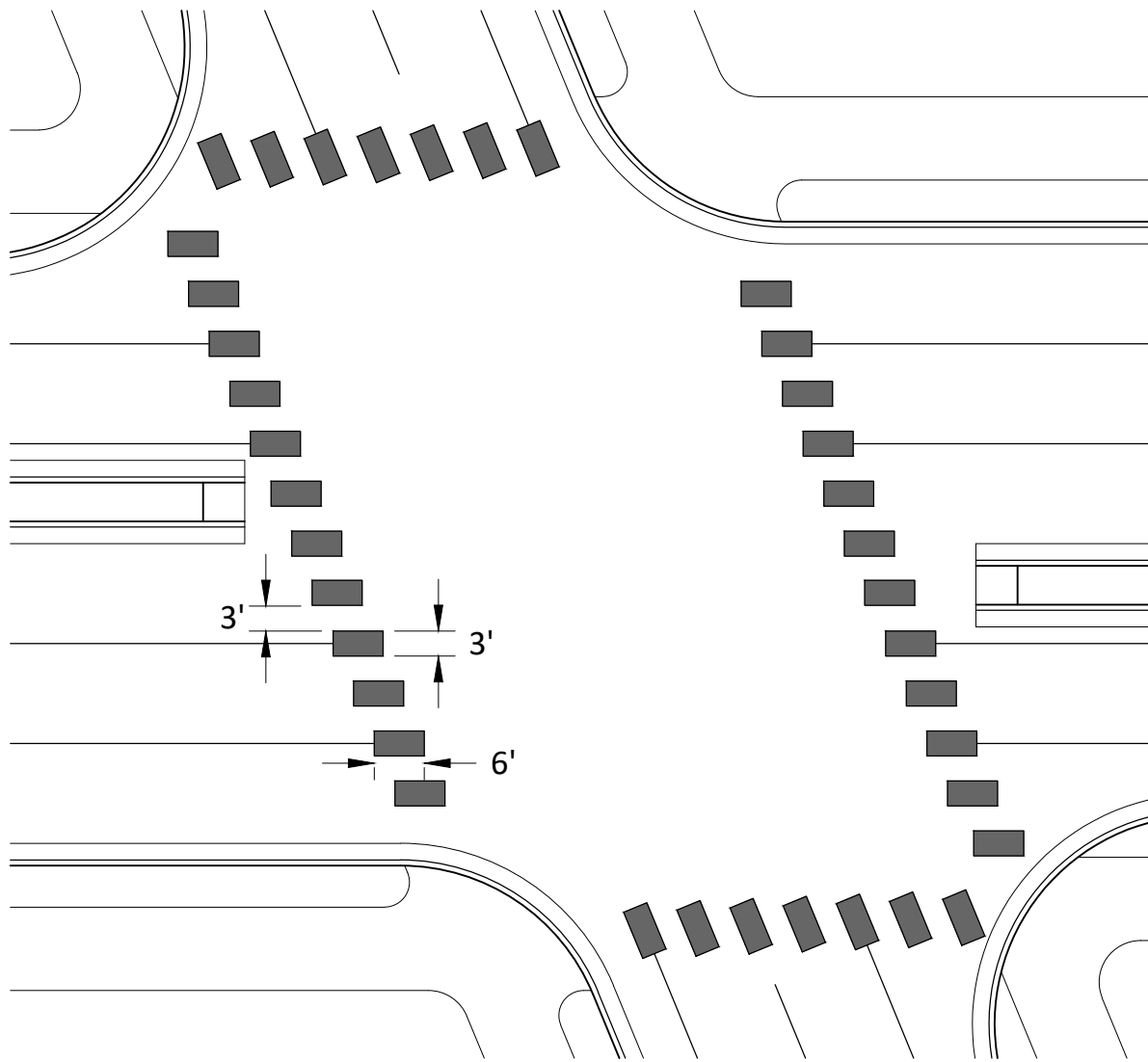
BITUMINOUS TRAIL

REVISION DATE
FEBRUARY 2021

DETAIL NO.

12-300

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NOTE:

1. PAINTED AREAS TO BE CENTERED ON CENTERLINE AND LANE LINES.
2. A MINIMUM OF 18" CLEAR DISTANCE SHALL BE LEFT ADJACENT TO THE CURB. IF THE LAST PAINTED AREA FALLS INTO THIS DISTANCE, IT MUST BE OMITTED.
3. FOR DIVIDED ROADWAYS, ADJUSTMENTS IN SPACING OF THE BLOCKS SHOULD BE MADE IN THE MEDIAN SO THAT THE BLOCKS ARE MAINTAINED IN THEIR PROPER LOCATION ACROSS THE TRAVELED PORTION OF THE ROADWAY.
4. AT SKEWED CROSSWALKS, THE BLOCKS ARE TO REMAIN PARALLEL TO THE LANE LINES AS SHOWN.

PEDESTRIAN CROSSWALK STRIPING



CITY OF WACONIA - STANDARD DETAILS

PEDESTRIAN CROSSWALK STRIPING

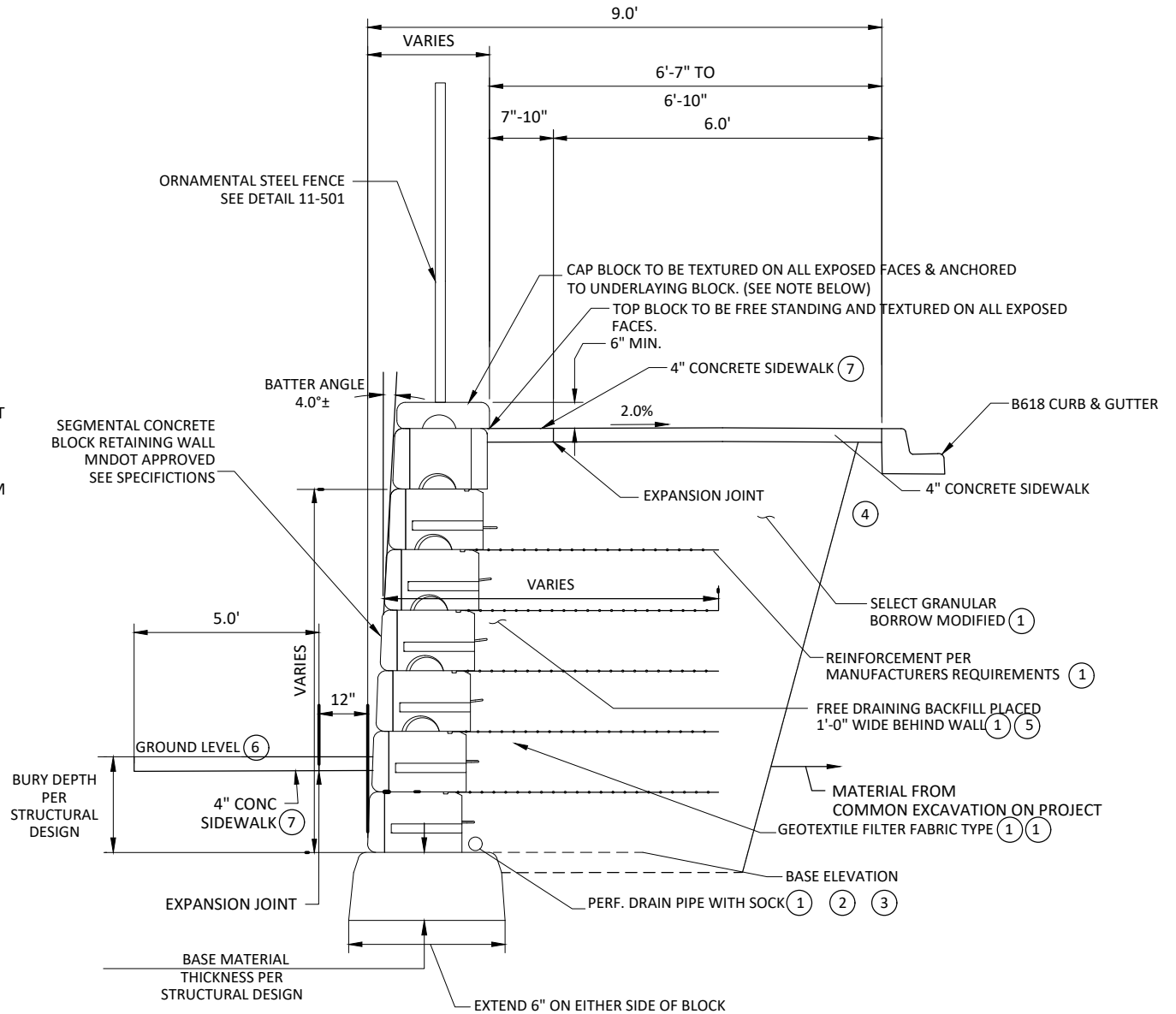
REVISION DATE
FEBRUARY 2021

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12-400

NOTES:

- ① TO BE INCIDENTAL
- ② 4" DIA PERFORATED PVC SCHEDULE 40 MNDOT SPEC 3245, WRAP W/TYPE 1 GEOTEXTILE MNDOT SPEC 3733. INSTALLATION PER MNDOT SPEC 2502. ALL DRAINAGE PIPE SHALL BE PER MNDOT SPEC 3245 & PLACED PER SPEC 2502.
- ③ 4" NON-PERFORATED TP PIPE TO EXTEND FROM DRAINAGE SYSTEM TO DRAINTILE OR STORM BASIN. MINIMUM SLOPE IS 1%.
- ④ ASSUMED/MINIMUM EXCAVATION LIMIT SHOWN. CONTRACTOR SHALL INCREASE AND/OR SHORE AS NECESSARY TO MEET OSHA OR ANY OTHER APPLICABLE SAFETY OR WALL SYSTEM DESIGN REQUIREMENTS. PROTECT EXISTING IN PLACE UTILITIES.
- ⑤ COARSE FILTER AGGREGATE MNDOT SPEC 3149.2H TO BE INCIDENTAL.
- ⑥ FILL SLOPES AND DIMENSIONS IN FRONT AND BACK OF WALL WILL VARY AS REQUIRED TO MATCH EXISTING CONDITIONS AT ENDS OF WALL.
- ⑦ SEE STREET PLAN FOR SIDEWALK LOCATION ABOVE OR BELOW WALL.
- ⑧ CONTRACTOR TO SUBMIT RETAINING WALL PLAN SIGNED BY MINNESOTA REGISTERED PROFESSIONAL ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.



SEGMENTAL CONCRETE BLOCK RETAINING WALL

NOT TO SCALE

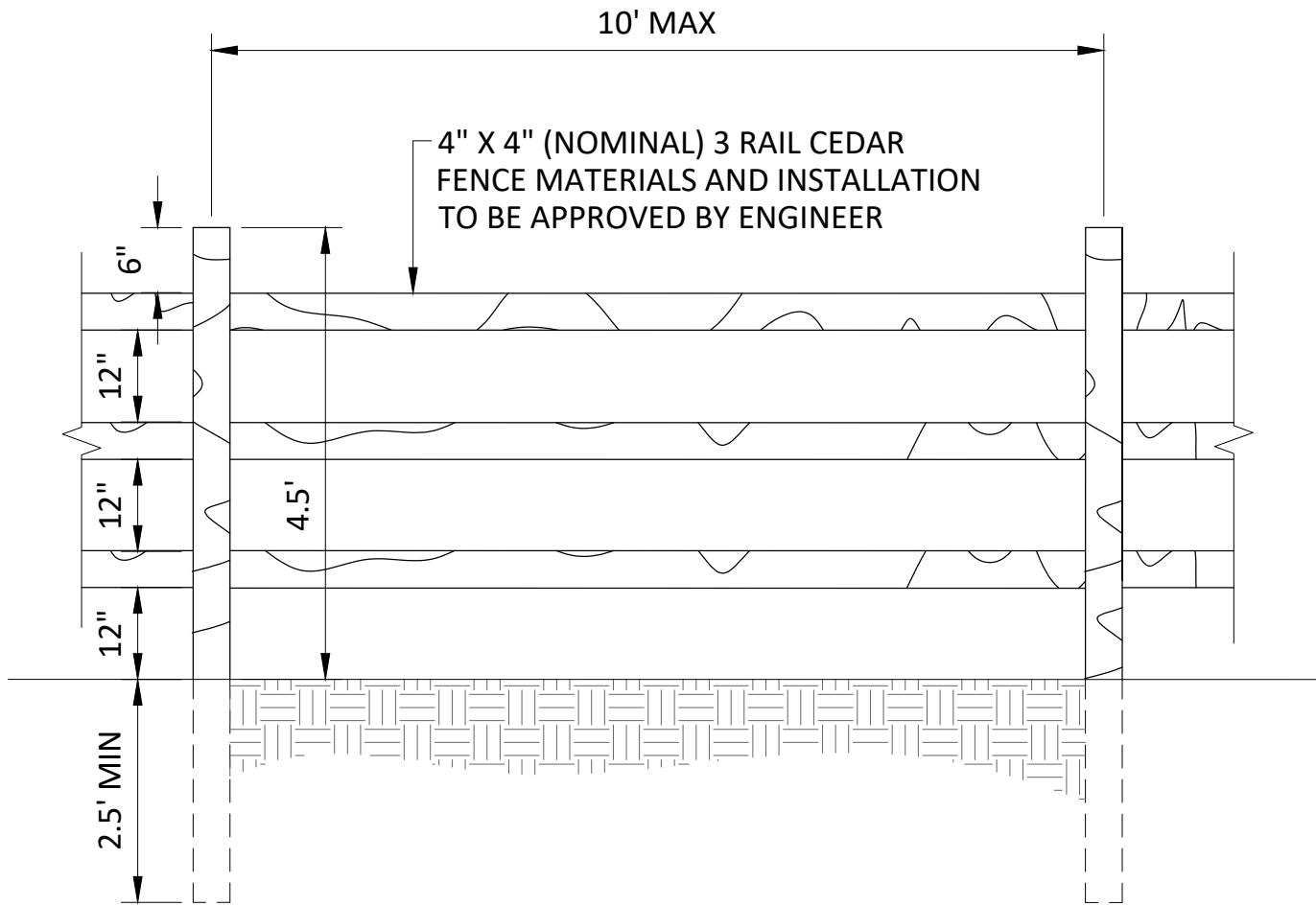


CITY OF WACONIA - STANDARD DETAILS

SEGMENTAL CONCRETE BLOCK RETAINING WALL

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WOOD RAIL FENCE

NOT TO SCALE



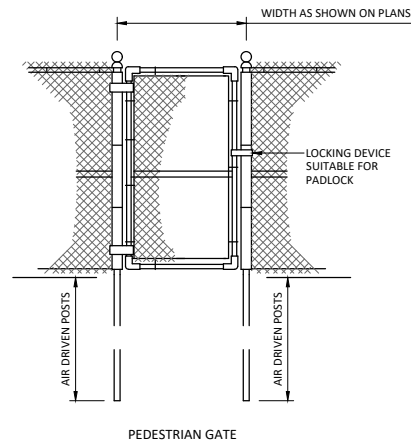
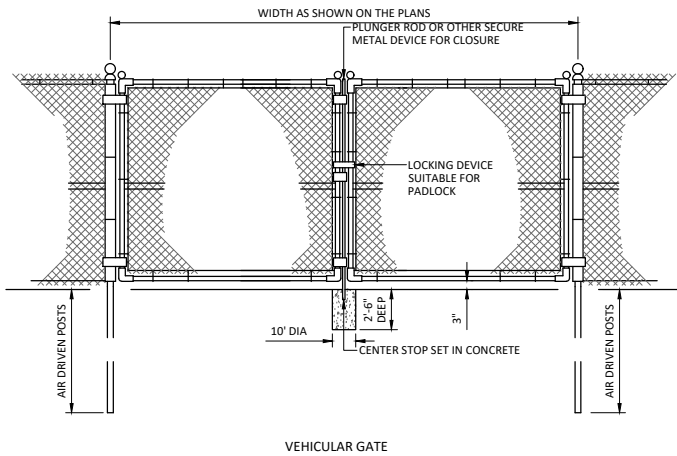
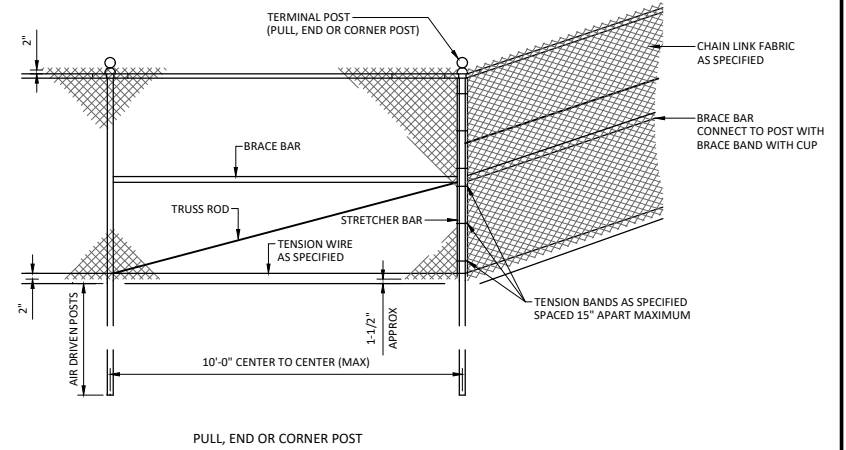
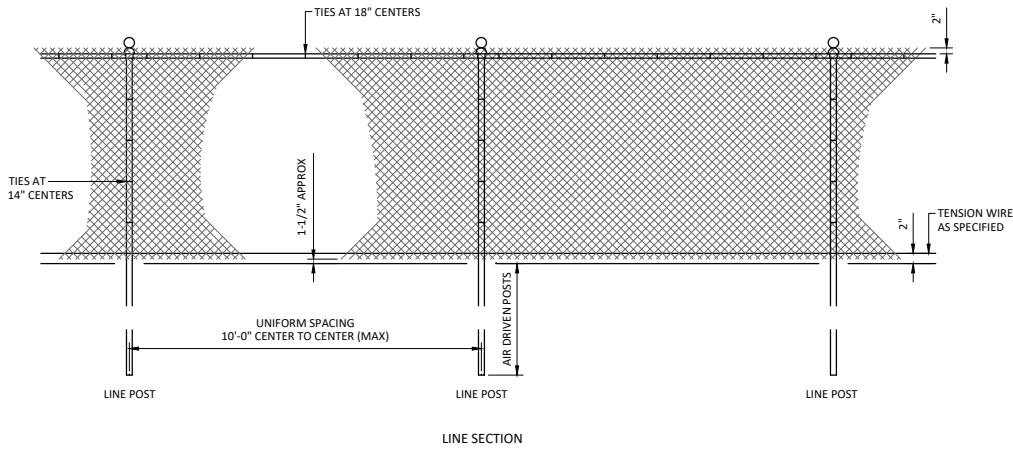
CITY OF WACONIA - STANDARD DETAILS

WOOD RAIL FENCE

REVISION DATE
FEBRUARY 2021

DETAIL NO.

12-600



CHAIN LINK FENCE
NOT TO SCALE

CITY OF WACONIA - STANDARD DETAILS

REVISION DATE
FEBRUARY 2021
DETAIL NO.
12-601-A

CHAIN LINK FENCE



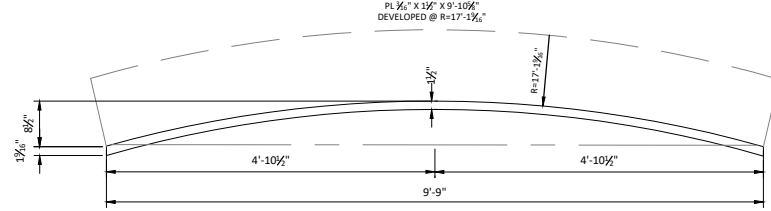
CHAIN LINK FENCE FRAMEWORK SPECIFICATIONS					
FRAMING MEMBERS	TYPE 1 (SCHED 40) ROUND PIPE	POST DEPTH BELOW GRADE (IN)	CONCRETE FOOTING		
			DIA (IN)	DEPTH (IN)	
TERMINAL POSTS (END, CORNER AND PULL POSTS)					
FABRIC HEIGHT 6 FEET OR LESS	OUTSIDE DIAMETER (IN)	2.375	36	10	42
	WALL THICKNESS (IN)	0.154			
	WEIGHT (LB/FT)	3.650			
FABRIC HEIGHT OVER 6 FEET TO 8 FEET	OUTSIDE DIAMETER (IN)	2.875	42	12	48
	WALL THICKNESS (IN)	0.203			
	WEIGHT (LB/FT)	5.790			
FABRIC HEIGHT OVER 8 FEET TO 10 FEET	OUTSIDE DIAMETER (IN)	2.875	48	12	54
	WALL THICKNESS (IN)	0.203			
	WEIGHT (LB/FT)	5.790			
LINE POSTS					
FABRIC HEIGHT 6 FEET OR LESS	OUTSIDE DIAMETER (IN)	1.900	48	NO CONCRETE FOUNDATION - AIR DRIVE	
	WALL THICKNESS (IN)	0.145			
	WEIGHT (LB/FT)	2.720			
FABRIC HEIGHT OVER 6 FEET TO 8 FEET	OUTSIDE DIAMETER (IN)	2.375	48	NO CONCRETE FOUNDATION - AIR DRIVE	
	WALL THICKNESS (IN)	0.154			
	WEIGHT (LB/FT)	3.650			
FABRIC HEIGHT OVER 8 FEET TO 10 FEET	OUTSIDE DIAMETER (IN)	2.375	60	NO CONCRETE FOUNDATION - AIR DRIVE	
	WALL THICKNESS (IN)	0.154			
	WEIGHT (LB/FT)	3.650			
GATE SUPPORT POSTS (6' OR LESS GATE LEAF WIDTH)					
FABRIC HEIGHT 6 FEET OR LESS	OUTSIDE DIAMETER (IN)	2.375	36	10	42
	WALL THICKNESS (IN)	0.154			
	WEIGHT (LB/FT)	3.650			
FABRIC HEIGHT OVER 6 FEET TO 8 FEET	OUTSIDE DIAMETER (IN)	2.875	42	12	48
	WALL THICKNESS (IN)	0.203			
	WEIGHT (LB/FT)	5.790			
FABRIC HEIGHT OVER 8 FEET TO 10 FEET	OUTSIDE DIAMETER (IN)	2.875	48	12	54
	WALL THICKNESS (IN)	0.203			
	WEIGHT (LB/FT)	5.790			
GATE SUPPORT POSTS (OVER 6' TO 12' GATE LEAF WIDTH)					
FABRIC HEIGHT 6 FEET OR LESS	OUTSIDE DIAMETER (IN)	2.875	42	12	48
	WALL THICKNESS (IN)	0.203			
	WEIGHT (LB/FT)	5.790			
FABRIC HEIGHT OVER 6 FEET TO 8 FEET	OUTSIDE DIAMETER (IN)	3.500	42	12	48
	WALL THICKNESS (IN)	0.216			
	WEIGHT (LB/FT)	7.580			
FABRIC HEIGHT OVER 8 FEET TO 10 FEET	OUTSIDE DIAMETER (IN)	4.000	48	12	54
	WALL THICKNESS (IN)	0.226			
	WEIGHT (LB/FT)	9.120			
GATE FRAMES					
6' OR LESS GATE LEAF WIDTH	OUTSIDE DIAMETER (IN)	1.660	N/A	N/A	N/A
	WALL THICKNESS (IN)	0.140			
	WEIGHT (LB/FT)	2.270			
OVER 6' TO 12' GATE LEAF WIDTH	OUTSIDE DIAMETER (IN)	1.900	N/A	N/A	N/A
	WALL THICKNESS (IN)	0.145			
	WEIGHT (LB/FT)	2.720			
TOP RAIL AND BRACES					
ALL	OUTSIDE DIAMETER (IN)	1.660	36	10	42
	WALL THICKNESS (IN)	0.140			
	WEIGHT (LB/FT)	2.270			
NOTE TO DESIGNER: FOR FENCING WITH WINDSCREENS, PRIVACY SLATS OR SIGNS THAT WILL IMPACT WIND LOADING, OR FOR FENCES OVER 10 FEET IN HEIGHT, CONSULT FENCE FABRICATOR OR STRUCTURAL ENGINEER FOR POST AND FOUNDATION DESIGN.					



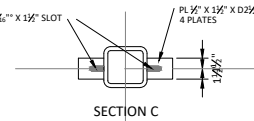
CITY OF WACONIA - STANDARD DETAILS

CHAIN LINK FENCE

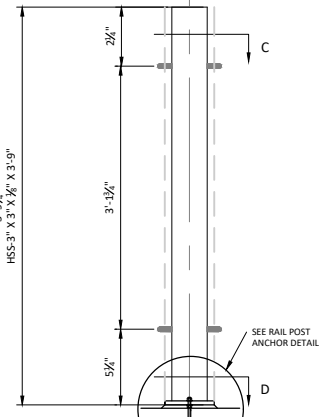
REVISION DATE	DETAIL NO.
FEBRUARY 2021	12-601-B



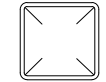
CURVED PLATE FOR FENCE
NOT TO SCALE



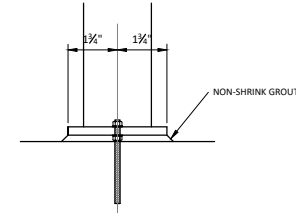
SECTION C



HSS 3" X 3" X 3/8" X 3'-9"

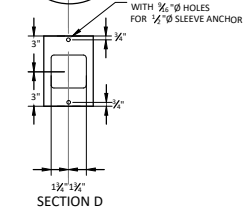


POST CAP
NOT TO SCALE

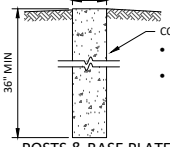


- DRILL HOLES IN CONCRETE BASE
- CLEAN HOLES WITH COMPRESSED AIR
- ANCHOR CENTER OF POST WITH 1/2" Ø X 10" STAINLESS STEEL THREADED ROD, WASHER AND NUT.
- EROD RODS INTO PLACE.
- ROD SHALL NOT EXTEND ABOVE NUT BY MORE THAN 1/2 INCH.

RAIL POST ANCHOR
NOT TO SCALE



SECTION D



POSTS & BASE PLATE
NOT TO SCALE

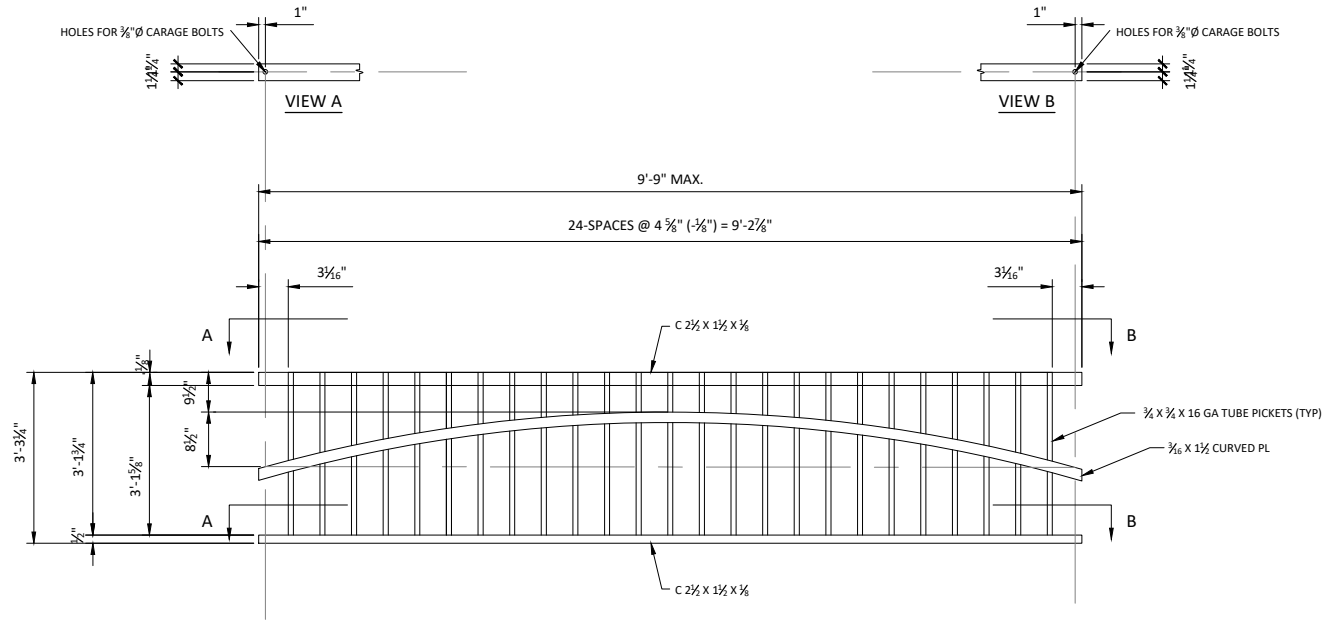
- CONCRETE BASE FOR POSTS
- PLACE 12" Ø FORM IN RETAINING WALL BACKFILL.
- FILL FORM WITH 4000 PSI CONCRETE TO REQUIRED TOP ELEVATION.



CITY OF WACONIA - STANDARD DETAILS

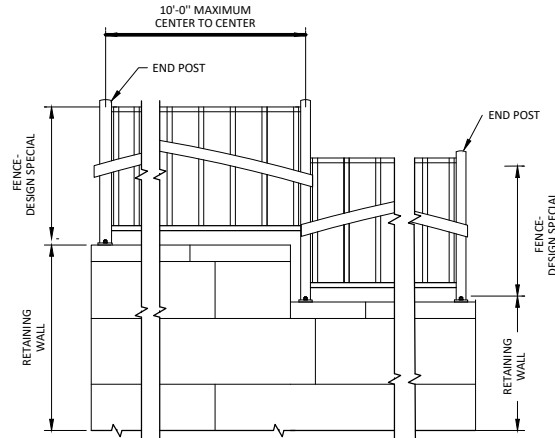
ORNAMENTAL STEEL FENCE

REVISION DATE	DETAIL NO.
FEBRUARY 2021	12-602-A



FENCE-DESIGN SPECIAL 1
NOT TO SCALE

- NOTES:
 1. DIMENSIONS SHOWN ARE TYPICAL. FIELD MEASURE POST LOCATIONS PRIOR TO FABRICATION & INSTALLATION.
 2. ORNAMENTAL FENCE DESIGN SPECIAL 1 SHALL BE BLACK POWDER COATED.



FENCE-DESIGN SPECIAL 1
NOT TO SCALE

APPENDIX B
Lift Station Standardization Policy

Manual of Lift Station Standards

City of Waconia

Adopted: November 2011

Last Amended: May 2026



Real People. Real Solutions.

Submitted by:

Bolton & Menk, Inc.
2638 Shadow Lane, Suite 200
Chaska, MN 55318

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APPENDIX A

- **Sheet No. 1 – Duplex Pump Lift Station**
- **Sheet No. 2 – Lift Station Details**
- **Sheet No. 3 – Maintenance Manhole & Air Release Manhole Details**
- **Sheet No. 4 – Electrical Details**

I. General

This Sanitary Sewer Lift Station Standardization Policy is intended to provide standards for both the rehabilitation of existing lift stations and for the design and construction of future lift stations within the City of Waconia. This Policy will simplify operation and maintenance of the lift stations and will establish equipment standards to reduce the spare parts inventory for the City.

II. Lift Station Design and Construction

A. General

1. Each lift station will be provided with two or three pumps at the City's discretion, a pump controller, submersible level transducer, and backup controller. The control panel shall be located next to the lift station a minimum of four (4) feet from the wet well and protected by bollards.
2. New lift stations shall be required to have a separate valve manhole. Existing lift stations currently without separate valve manholes will be upgraded with separate valve manholes where site and flow conditions permit. The standard wet well and valve manhole size for lift stations will be 96" diameter. Smaller diameter structures may be allowed on stations with low horsepower pumps at the City's discretion.
3. Permanent standby power may or may not be required at the lift station site. Standby power requirements will be based upon the service area of the lift station and emergency response times as well as the availability of the City's existing portable standby power. Standby power requirements shall be at the sole discretion of the City for each lift station.
4. A concrete slab shall be provided around the wet well and for the lift station control panel. A concrete driveway shall be provided for operation and maintenance access as determined by the City. The control panel shall be protected by bollards. Additional landscaping measures may be necessary for screening the station from neighboring properties. Final site improvements shall be at the discretion of the City.
5. Drawings are provided in the Appendix to detail the general requirements for sanitary sewer lift stations and forcemains. Sheet No. 1 provides the construction plan for the lift station and valve manhole construction. Sheet No. 2 and No. 3 provide construction details for the lift station and forcemain construction. Sheet No. 4 provides a general installation detail for the lift station electrical equipment, and a detail of the lift station control panel.

B. Wet Well and Valve Manhole

1. Submittals
 - i. Detailed work plan describing means and methods to be used for constructing the lift station and valve manhole structures and the

sanitary sewer piping. This shall include support of trench side walls and control of ground water. Work plan shall consider the available construction area, soil and groundwater conditions, and existing utilities.

- ii. Plan for maintaining sanitary sewer service during construction for lift station rehabilitation projects.
- iii. Shop drawings of the wet well and valve manhole construction shall be submitted prior to their fabrication. The submittal shall indicate the pipe penetration locations in the wet well and the valve manhole and the access hatch location on the top slab.
- iv. Buoyancy calculations for lift station structure.

2. Precast Concrete Structure

- i. For standard lift stations the pump station and valve manhole structures shall be constructed of Class I precast reinforced concrete with R4 joints and having an inside diameter as shown on the plans. The structure base shall be integrally cast with the bottom barrel section. The base, as shown on the plans, shall be fabricated to accommodate the loading condition. The pump station structure shall be constructed as shown on the detail drawings and in accordance with the approved shop drawings. The concrete mix shall be Type I or II cement with C3A content less than 8 percent (Sulfate resistant) with entrained air content of not less than 4 percent and not more than 7 percent, Grade A concrete with a cement-water ratio of 0.50 and a minimum compressive strength of 4,000 psi at 28 days. Cut-outs to accommodate all piping entering the wet well shall be performed or pre-cut and provided with a seal or water stop to ensure a watertight connection between pipe and wet well. The type of seal proposed shall be submitted to the City for approval before installation of the wet well is undertaken. Precast structures shall have attained the specified design strength when delivered to the project site. Cast in place concrete structures may be required by the City on non-standard lift stations when the flow conditions, size of pumps and/or station depth preclude the use of precast structures.
- ii. The top slab of the structures shall be Type II precast reinforced concrete having the dimensions shown on the detail drawings. The top slab shall be designed to accommodate AASHTO H20 wheel loads. Frames for access hatches and vent pipe shall be cast in the slab when fabricated.

- iii. Joints between barrel riser sections and top slab shall be sealed with two strips of flexible bitumastic preformed joint compound. In addition, external joint seal, Infrashield or equal, shall be provided on all structure section joints. Weld plates shall be provided at each joint to prevent separation.
- iv. The wet well, wet well base slab, and wet well cover shall be designed to overcome the buoyant forces on the lift station assuming a ground water elevation at the surface, no soil interaction with the structures, and a minimum safety factor of 1.10 based on the dead loads of the concrete structure, excluding all equipment, hatches, piping, etc.
- v. Wet Well Requirements
 - a) The bottom portion of the wet well shall be sloped as shown on the drawing to prevent solids accumulation.
 - b) The interior of the wet well shall be painted as specified in Section II.B.11.
 - c) The high water alarm elevation shall be at least 6 inches below the invert of the deepest influent pipe.
 - d) The low water alarm shall be above the pump manufacturer's minimum operating water level.
- vi. Valve Manhole Requirements
 - a) Provide adequate space for maintenance personnel to enter the valve vault to repair or replace piping, valves, etc. The minimum valve manhole size shall be 84" diameter.
 - b) Provide a minimum of 12 inches of clear space between the valve manhole structure and flanged or otherwise bolted fittings for ease of construction and repair.
 - c) The valve manhole shall have a drain to the wet well with an isolation gate valve.

3. Access Hatches

- i. A Flygt pump representative (Electric Pump) shall supply hatches to the contractor to be cast into the lift station top slab. The hatch shall be placed in the top slab for clearance of pumps positioned as shown on the Drawings. Minimum clearance of 3-inches is required. Flygt shall verify the size and location shown on the Drawings and notify the Engineer of any changes if necessary.
- ii. Door leaves shall consist of a minimum of ¼-inch aluminum, diamond pattern, to accommodate H2O wheel loads.
- iii. Channel frame shall consist of minimum 3-inch welded aluminum with anchor flange around the perimeter. The channel frame shall be embedded in the concrete with a minimum 6-inch cover. Drainage shall be provided from channel frame.
- iv. Each door leaf shall be equipped with heavy duty recessed hinges and totally enclosed spring torsion bar operators as necessary for easy operation, drop handle, and automatic hold open arm with release handle. Locate hold open arm release handle such that it can be easily operated without endangering personnel.
- v. Maximum hatch opening force shall not exceed 15 pounds when applied perpendicularly to the hatch edge through any part of the hatch-operating arc.
- vi. Each door leaf shall be secured with snap lock with removable handle and padlock hasp welded to each leaf and frame.
- vii. Aluminum surfaces shall be mill finished. Apply bituminous paint to the exterior of the frame in contact with concrete.
- viii. Mechanical fasteners and hardware shall be Series 300 stainless steel.
- ix. Hatch shall be provided with concealed padlock hasp.

4. Safety Grating

- i. The protective grating panel shall be supplied as part of each hatch and shall be 1-1/2 inch "I" bar aluminum grating with Safety Orange powder-coated finish. Grating shall be hinged and shall be supplied with a positive latch to maintain unit in an upright position. Grating shall have a 6-inch viewing area on each lateral unhinged side for visual observation and limited maintenance. Grating support ledges on 300 psf loaded access

covers only shall incorporate nut rail with a minimum of four (4) stainless steel spring nuts. A padlock hasp for owner-supplied padlock shall be provided.

- ii. Safety grating shall be supplied by a Flygt pump representative (Electric Pump).

5. Discharge Piping

- i. All buried piping shall have a minimum of 7.5 feet of cover. Discharge piping shall be spaced in accordance with pump manufacturer's recommendations.
- ii. Discharge piping velocities shall be a minimum of 2.5 feet per second and a maximum of 8 feet per second at the ultimate peak flow.
- iii. Ductile Iron Pipe (DIP)
 - a) Ductile iron pipe shall conform to the requirements of ANSI A221.51 (AWWA C151) standard specification for centrifugally cast ductile iron pipe for water or other liquids.
 - b) Ductile iron pipe in exterior locations shall be Class 52 and shall be provided with flanged, or mechanical joint type ends as shown on the plans. All interior ductile iron piping shall be ANSI/AWWA thickness Class 52 with flanged joints.
 - c) Ductile iron flanges shall conform to ANSI/AWWA C115 standard 125# template and shall be rated for 250 psi. Mechanical joints and push-on joints shall conform to ANSI/AWWA C111 standard for rubber gasket joints for ductile iron and gray iron pressure pipe and fittings.
 - d) Unless otherwise shown on the plans, ANSI/AWWA short-body ductile iron fittings shall be furnished. Short body fittings shall conform to ANSI/AWWA C153, Class 350. Flanged long radius elbows, reducing on-the-run tees, side outlet fittings eccentric reducers and laterals shall conform to ANSI B16.1 standard specification for flanged fittings and flanges. All fittings shall be ductile iron. Compact fittings conforming to ANSI/AWWA C15./A21-53 may be supplied for mechanical and push-on joints.

6. Bolts and Anchor Bolts

- i. Pump anchor bolts shall be 18-8 stainless steel. All nuts and bolts on the piping inside the wet well and valve manhole shall be 304 stainless steel. All below grade fittings, and valves shall be secured with Cor- Blue T-Bolts as manufactured by NSS Industries or equal.

7. Gate Valves

- i. All valves furnished and installed on the force main shall be AWWA C-509-80, non-rising stem, iron body, resilient-sealed gate valves, with a two-inch square opening nut rated for a 200-psi working pressure. These valves shall be Kennedy Ken-Seal, American Flow Control, or approved equal. All valves shall open 'left' unless noted otherwise.
- ii. All exposed bolts shall be stainless steel.
- iii. For existing lift stations without a valve manhole and for which the City approves not adding a valve manhole, the gate valves shall be placed outside the wet well on each pump discharge force main in the approach area of the lift station site. Standard valve boxes shall be included.

8. Rubber Flapper Swing Check Valve

- i. The rubber flapper swing check valve shall have a heavily constructed ductile iron body and cover. The body shall be a long pattern design (not wafer), with integrally cast-on-end flanges. The flapper shall be Buna-N having an "O" ring seating edge and be internally reinforced with steel.
- ii. Flapper shall be easily removed without the need to remove the valve from the line. The seating surface is to be on a 45° angle requiring the flapper to travel only 35° from a closed to a fully open position for minimum head loss and non-slam closure.
- iii. The valve shall have a Buna-N flapper (Hi-Strength coated fabric - coated on both sides with 70 Duro), which creates an elastic spring effect, molded internally, to assist the flapper to close against a slight head to prevent slamming.
- iv. An external backflow device shall be furnished.

- v. Materials of construction shall be certified in writing to conform to ASTM specifications as follows:
 - a) Body & Cover:Ductile Iron - ASTM A296
 - b) Flapper:.....Buna-N
 - c) Exterior Paint: Phenolic Primer Red Oxide
- vi. Manufacturer
 - a) APCO Series 100
 - b) Val Matic
 - c) Milliken

9. Ball Check Valve

- i. Ball check valve shall only be used on existing lift stations which do not have a valve manhole and for which the City determines a valve manhole should not be added.
- ii. Ball valves shall be installed in the vertical orientation on the pump discharge piping within the wet well structure.
- iii. Ball valves shall be for sewage system use and of clog-free design.
- iv. Ball valves shall be Flygt Type 5087 Ball Check Valves.

10. Flanged Coupling Adapters (FCA)

- i. Flanged coupling adapters shall be provided where indicated. CONTRACTOR may install additional FCA at no additional cost as he desires for ease of piping installation. FCA and piping shall be secured against movement with fixed supports or tie rods. FCA shall be Dresser Style 127, Rockwell/Smith-Blair Type 912, Romac or equal with anchor studs for 12 inches and under; Type 913 for 14 inches and over. Coupling Adapters shall be of cast iron construction with shop coating.

11. Painting

- i. For new wet wells all interior concrete surfaces shall be coated with Quadex Structure Guard Epoxy. The total coating thickness shall be not less than 125 mils DFT. For wet well rehabilitation, all interior concrete surfaces in the wet well shall be coated with Quadex Dynastone to a minimum ½ inch thickness.
- ii. Exterior ductile iron pipe and fittings shall be furnished with cement mortar lining with asphalt seal coating, and standard bituminous exterior coating.
- iii. Interior ductile iron pipe and fittings shall be furnished with cement mortar lining with asphalt seal coating, and factory applied primer. Primer shall be compatible with overcoating with field applied coatings.
- iv. All exposed piping, valves, fittings, and vent pipes in the wet well and valve manhole shall be coated as follows:
 - a) Sandblast and/or pressure wash as recommended by the coatings manufacturer.
 - b) Prior to coatings application, the annular space between pipe and pipe flanges shall be sealed with a bead of paintable silicone caulk. Caulk shall be allowed to adequately cure per the manufacturer's specifications before additional coatings are applied.
 - c) Apply two (2) coats of Tnemec N140F (low VOC) Pota Pox Plus or Sherwin Williams Macropoxy 646 FCE. Total coating thickness shall not be less than 12-14 mils.

C. Pumps and Lift Station Appurtenances

1. Submittals

- i. Shop drawings: Shop drawings shall be submitted for review by the City. Shop drawings shall contain the following information:
 - a) Pump name, identification number and specification number.
 - b) Performance curve and pump data. Pumps exceeding the specified horsepower at any point on the performance curve will not be acceptable.

- c) The manufacturer shall indicate points on the H/Q curves, and the limits recommended for stable operation between which the pumps may be operated without surge, cavitation and vibration. The stable operating range shall be as wide as possible based on actual hydraulic and mechanical tests.
 - d) Pump detailed description and specification.
 - e) Electrical data including control and wiring diagrams.
 - f) Assembly and installation drawings including shaft size, coupling, anchor bolt plan, part nomenclature, material list, outline dimensions and shipping weights.
 - g) The pump supplier shall submit lift station layout drawings showing the spacing of the pumps relative to the centerline of the manhole structure and the location of the access hatch on the top slab.
- ii. Test Data: Shall be electronically submitted in PDF format to the Engineer for approval prior to shipment. Prototype model tests will not be acceptable.
 - iii. Field Procedures: Instructions for field procedures for installation, adjustments, inspection, and testing shall be provided prior to installation of the pumps.

2. Pump Construction

- i. Pumping units shall be of the centrifugal, non-clog submersible type. The design shall be such that pumping units will be automatically connected to the discharge piping when lowered into place on the discharge connection. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or other fastenings to be removed for this purpose, and no need for personnel to enter the wet well. Each pump shall be fitted with a stainless steel chain of adequate strength and length to permit raising the pump for inspection and removal.
- ii. Pump casting, pump discharge elbow, and impeller shall be Class 30 or 40B cast iron. Pump volute shall be non-concentric design. All exposed nuts and bolts shall be stainless steel 304. All mating surfaces where watertight sealing is required shall be machined and fitted with nitrile

rubber o-rings. No secondary sealing compounds, rectangular gaskets, elliptical o-rings, grease or other devices shall be used.

- iii. All surfaces coming into contact with sewage, other than stainless steel, shall be protected by an approved sewage-resistant coating.
- iv. The pump shaft shall be ASTM A276, Type 420 stainless steel or ASTM A576, Grade 1045 carbon steel. The carbon steel pump shaft shall not be exposed to the pumped liquid and shall be protected and completely isolated by an ASTM A276, Type 420 stainless steel.
- v. Each pump shall be provided with a tandem mechanical rotating shaft seal system. Seals shall run in an oil reservoir. The lower seal unit, between the pump and oil chamber, shall contain one stationary and one positively driven rotation tungsten carbon and ceramic. The upper seal unit, between the oil sump and motor housing, shall contain one positively driven rotating carbon ring. Each interface shall be held in contact by its own spring system.
- vi. The seals shall not require maintenance or adjustment, but shall be easily inspected or replaceable. No seal damage shall result from operating the pumping unit out of its liquid environment.
- vii. The pump shall be equipped with a seal leak detection probe and warning system designed to alert maintenance personnel of lower seal failure.
- viii. There shall be an electric probe installed in the seal chamber between the two tandem seals. The probe shall be designed to sense contaminants within the seal chamber and send a signal to operate a warning device.
- ix. The following seal types shall not be considered acceptable or equal to the dual independent seal specified:
 - a) Rotating shaft seals that are not clipped or set screwed to the shaft.
 - b) Conventional double mechanical seals containing either a common single or double spring acting between the upper and lower units.

- c) Seals that require a differential to offset external pressure to affect sealing.
- x. Each pump shall be provided with an oil chamber for the shaft sealing system. The drain and inspection plug, with positive anti-leak seal, shall be easily accessible from the outside.
- xi. The pump shaft shall rotate on two (2) permanently greased lubricated bearings.
- xii. The impeller shall be of hard iron, Class 60 HRC, Flygt N-Technology type characterized by a constant area throughlet. The impellers must be hydraulically and dynamically balanced to run “vibration free” both in air and water. The impeller design shall be as indicated in the pump schedule above. The fit between the impeller to the shaft shall be made by a locking assembly which is perfectly sealed from the liquid by a protective rubber cap and a bolt threaded to the shaft terminal.
- xiii. A rotating wear ring system shall be installed to provide sealing between the volute and impeller. The stationary volute and rotating impeller wear ring shall be stainless steel.
- xiv. One pump shall be fitted with Flygt Flush Valve, (Automatic sump desludging) unit. Model 4901 for most pump applications, and Model 4910 for grinder pumps.

3. Pump Motor

- i. Equipment requiring electric motors shall be equipped with motors conforming to the following unless specifically noted otherwise.
 - a) The motor furnished shall have its design voltage inscribed on the nameplate.
 - b) All motors less than 30 HP shall be designed, constructed, and tested in accordance with NEMA Standards MG1-1972 and MG2-1973.
- ii. The pump motor cable shall be S.P.C. suitable for submersible pump applications. The power cable shall be sized according to NEC and ICDA standards and have P-MSHA approval. The pump cable end will be sealed with a protective covering prior to electrical installation. The length of the power cable shall be sized such that it is continuous from the motor to

the control panel while maintaining a five (5) foot loop at the top of the wet well for maintenance purposes. No splicing will be permitted.

- iii. Design cable entry with a machined precision fit. It shall preclude specific torque requirements to ensure a watertight and submersible seal. Do not use epoxies, silicones, or other secondary sealing systems.
- iv. The junction chamber containing the terminal board shall be sealed from the motor by an O-ring seal. The connection between the cable conductors and stator leads shall be made with a threaded compressed type binding post permanently affixed to a terminal board and thus perfectly leakproof.
 - a) The pump motor shall be squirrel-cage, induction, shell-type design, air-cooled, NEMA Design B. Motor shall be explosion-proof, suitable for use in Class 1, Division 1, Group C& D hazardous locations. The stator winding and stator leads shall be insulated with moisture-resistant Class F insulation, which will resist a temperature of 311°F. The motor shall be designed for continuous operation in a totally, partially, or non-submerged condition. The pump shall be capable of sustaining a minimum of ten (10) starts per hour. All three-phase motors shall be dual voltage. Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with three (3) thermal switches embedded in the end coils of the stator windings (one switch in each stator phase). These shall be used in conjunction with a supplement to the external motor over protection and wired to the control panel. If separate leakage sensors are provided, contractors shall be responsible for wiring those sensors.
 - b) Pump Protection Features: Thermal overload in each pump that will de-energize the pump starter and allows for automatic restart when the condition clears. The control panel shall contain relays for monitoring pump seal failure conditions. Coordinate equipment and circuitry requirements with the pump supplier. Input alarms to the pump controller. Seal failure alarms shall not shut down the associated pump.

4. Accessories

i. Pump Guide Rails and Discharge Connections

- a) The Contractor shall furnish and install a complete set of guide bars designed to permit the raising and lowering of pumps. Guide bars shall be Schedule 40, 304 stainless steel pipes. Each pump shall ride on two guide bars. Pumps with only one guide bar will not be accepted. The guide bars shall be of adequate length to extend from the lower guide holders on the pump discharge connections to the upper holders. Intermediate stainless-steel supports shall be installed at intervals not to exceed ten (10) feet. Pumps with guide cables will not be acceptable.
- b) The Contractor shall furnish and install the required discharge connections in each lift station, each consisting of a discharge elbow connected to a mounting base, which will be permanently installed in the lift station. Sealing of the pumping unit to the discharge connection elbow shall be accomplished by a simple linear downward motion of the pump unit. The entire weight of the pump unit shall be guided by no less than two guide bars and pressed tightly against the discharge connection elbow with cast-iron-to-cast-iron contact. The guide bars or cables shall not support any portion of the weight of the pump. Sealing of a discharge interface by means of a diaphragm, O-ring, or another device will not be acceptable. No portion of the pump shall bear directly on the floor of the sump. The pump, with its appurtenances, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet.
- c) The accessories shall include a stainless steel upper guide bar holder, cable rack, stainless steel hook to attach the pump lifting gear when not in use, and intermediate stainless-steel guide bar supports. Lower guide bar holders shall be integral to the discharge connection.

III. Forcemains

A. General

1. All buried forcemain shall have a minimum of 7.5 feet of cover. Forcemain flow velocities shall be a minimum of 2.5 feet per second and a maximum of 8 feet per second. The ultimate lift station capacity shall be considered in sizing the forcemain. Thrust restraint shall be provided at all fittings and valves.
2. The minimum forcemain diameter for sewage (non grinder) pump stations shall be 4 inch. Forcemain piping from 4 to 12 inch diameter shall be C900 PVC. Forcemains over 12 inch diameter shall be HDPE or ductile iron pipe as specified below. Forcemains shall have a minimum of 7.5 feet of cover. High points or severe changes of grade shall have sewage air relief/vacuum breaker combination valves. Low points shall have maintenance manholes. Air relief and maintenance manhole structures shall be adequately sized for servicing valves and cleanouts as shown on Sheet No. 3. The forcemain grade and depths shall be adjusted to minimize high and low points.
3. Forcemain piping material, air relief and maintenance manhole locations and structure sizing shall be at the discretion of and subject to approval by the City.

B. Open Cut Forcemain Pipe and Fitting Materials

1. Ductile Iron Pipe
 - i. Forcemain pipe shall be Class 52 with conductivity gaskets or conductivity straps.
 - ii. Mechanical joints and push-on joints shall conform to ANSI/AWWA C111 standard for rubber gasket joints for ductile iron and gray iron pressure pipe and fittings.
 - iii. All ductile iron forcemain shall be encased in polyethylene complying with AWWA C105, minimum 8 mil thickness.
2. Pressure Polyvinyl Chloride (PVC) Pipe
 - i. Forcemain pipe shall meet the requirements of AWWA C900.
 - ii. Forcemain/discharge pipe shall be made of compounds conforming to ASTM D1784 with a cell classification of 12454.

- iii. Gasketed joints shall be bell and spigot type meeting the requirements of ASTM D3139 and ASTM F477.
- iv. Pipe shall be DR-14 with a pressure classification of 305 psi with the nominal diameter as shown on the plans, unless a lower pressure classification is approved by the City.
- v. PVC forcemain/discharge pipe shall be colored green in accordance with all applicable industry color standards for waste water piping.
- vi. PVC pipe shall have DIP outside diameter, unless otherwise approved.

3. High Density Polyethylene (HDPE) Pipe and Fittings

- i. The pipe material shall be extra high molecular weight, high density polyethylene (EHMW-HDPE, PE3408) conforming with the minimum structural standards of ASTM D3350 with cell classification 345464C for black pipe, 345464E for non-black & color, as manufactured by DriscoPlex 4300 (DIPS) Series, or equal. All HDPE pipe material shall meet the requirements of ASTM D1248 for a Type III, Class C, Category 5, Grade P34 material.
- ii. The grade used shall be resistant to aggressive soils or corrosive substances present. Unless otherwise specified, the dimensions and tolerances of the pipe barrel should conform to ductile iron or cast iron pipe equivalent outside diameters (4300 series).
- iii. The pipe shall be DR 11 with a 160 psi pressure class for open trench installation.
- iv. HDPE pipe shall have butt-fused joints.
- v. The Contractor shall verify the lengths of conduit necessary in the field before fabrication.
- vi. Polyethylene adaptors shall be butt-fused, EHMW-HDPE, PE3408 meeting the same resin requirements as specified for the pipeline.
- vii. Fittings shall be mechanical class 350 ductile iron fittings complying with Section 3.1.E.4.

- viii. Mechanical joint forcemain joints shall be restrained using ductile iron clamps (series 15PF00 or 2000PV Ebaa Iron, Inc. or equal) supplied with a sufficient number of ductile iron bolts to restrain the working and test pressures for this application. Internal pipe stiffeners must be used.

4. Pressure Pipe Joint Restraint

- i. Joint restraint shall be provided by use of restrained joint pipe or joint restraint clamps.
- ii. Restrained joint PVC pipe shall be Eagle Loc 900 as manufactured by JM Eagle or approved equal.
- iii. Restrained joint DIP pipe shall be Flex-Ring as manufactured by American Ductile Iron Pipe or Field Lok gasket joints as manufactured by U.S. Pipe, or approved equal.
- iv. The clamps (Series 6500 Ebaa Iron, Inc.) shall be ductile iron and supplied with a sufficient number of ductile iron bolts to restrain working and test pressures for this application.

5. Pipe Fitting Materials

- i. The following pressure pipe fitting materials will be allowed for use on this project:
- ii. Mechanical Class 350 ductile iron fittings shall be used.
- iii. All fittings shall be coated with a 6-8 mil nominal thickness fusion bonded epoxy conforming to the requirements of ANSI/AWWA C550 and C116/A21.16.
- iv. All fittings, valves and retaining rods shall be protected by using sacrificial zinc anode caps such as 175P190 Protecto Caps as manufactured by Ebaa Iron or an approved equal and shall also be encased in polyethylene. Contractors shall supply 2 Protecto Caps per mechanical joint gland installed.
- v. All fittings, valves, hydrants, etc., shall be secured utilizing COR-BLUE T-BOLTS as manufactured by NSS Industries or approved equal.

- vi. All Restraining devices (megalugs) shall be coated with a 6-8 mil nominal thickness, fusion bonded epoxy conforming to the requirements of ANSI/AWWA C550 and C116/A21.16.
- vii. Adaptors, back-up rings and oversize sleeves shall be provided for transitions and connections to dissimilar types of pipe materials. All sleeve fittings shall be long mechanical joint.
- viii. All fittings shall have been manufactured in the year of construction or prior calendar year.

C. Trenchless Pipe Material & Structural Requirements

- 1. High Density Polyethylene (HDPE) Pipe and Fittings
 - i. The pipe and fittings shall comply with the requirements for open cut HDPE pipe in Section 3.2.C.

D. Tracer Wire

- 1. All PVC and HDPE force main shall be provided with a tracer wire.
- 2. Tracer wire shall meet one of the following requirements:
 - i. 1/8" galvanized aircraft wire clear PVC coated to 3/16".
 - ii. 1/8" 304 stainless steel wire clear PVC coated to 3/16".
 - iii. #12AWG solid copper or copper clad steel (CCS) wire with 30 mil high density polyethylene (HDPE) insulating jacket.
- 3. Connectors
 - i. Connectors shall be "wire nut" or "twist on" type connectors filled with silicone waterproofing sealant suitable for direct bury applications according to UL 486D test standard. Connectors shall be DryConn™ connectors as manufactured by King Innovation or approved equal.
- 4. Tracer wire for forcemains shall be terminated within the valve manhole, discharge manhole, air relief or maintenance manhole structures or tracer wire boxes. Maximum spacing between tracer wire access points shall not exceed 500 feet. Tracer wire shall be appropriately mounted to the manhole structure, and brought up near the top for easy connection for testing.

E. Valves and Valve Housing

1. General

- i. All valves shall have been manufactured in the year of construction or prior calendar year.
- ii. Valve Housing
 - a) Cast-iron screw type valve boxes shall be installed where indicated on underground valves. The cast-iron valve boxes shall be of either the two-piece or three-piece style and shall be furnished with a stay-put cover with raised letters indicating "SEWER". The shaft shall be 5 ¼" inside diameter.
 - b) All valve box assemblies shall be furnished with a valve umbrella anchorage assembly. The valve umbrella anchorage assembly shall be manufactured by Adaptor, Inc., Oak Crest, WI, or equivalent.
 - c) High Density Polyethylene valve housings will not be allowed.

2. Testing Requirements

- i. Electrical Conductivity Test
 - a) Conductive pipe materials - perform test in compliance with CEAM 2611.3F.
 - b) Non-conductive pipe materials - demonstrate the electrical continuity of the tracer wire.
- ii. Hydrostatic Test
 - a) The Contractor shall perform a hydrostatic pressure test as specified in CEAM Specification 2611.3G to a pressure of 100 psi. Each forcemain section that can be isolated by closing valves shall be tested separately.

3. Gate Valves

- i. All valves furnished and installed on the forcemain shall be AWWA C-509-80, non-rising stem, iron body, resilient-sealed gate valves, with two-inch

square opening nut rated for a 200 psi working pressure. These valves shall be Kennedy Ken-Seal, American Flow Control, or approved equal. All valves shall open 'left' unless noted otherwise.

- ii. All exposed bolts shall be stainless steel.

4. Air Relief and Maintenance Manholes

- i. Locations

- a) Air relief/vacuum breaker valve manholes shall be placed at high points or severe changes of grade in the forcemain.
- b) Maintenance manholes shall be placed at low points in the forcemain and also as required to limit the total volume of flow from draining of the forcemain to 15,000 gallons or less.

- ii. Precast Concrete Manholes

- a) Air relief and maintenance manholes shall conform to the details on Sheet No. 3 including integral base sections and rubber gasketed tongue and groove joints. All pipe openings shall have integral cast watertight seal.

- iii. Castings

- a) The casting assembly to be used on the air and vacuum relief manhole and on the maintenance manhole shall be Neenah R-1758G, frost retardant assembly with an inner lid.

- iv. Air and Vacuum Relief Valves

- a) The Combination Air Valve shall be designed to exhaust large amounts of air during filling, release small amounts of accumulated air during operation, and admit large amounts of air upon impending vacuum during draining.
- b) The valve shall be float operated, and both the Air & Vacuum and Air Release functions shall be housed in a single body. The body and cover shall be housed in a single body. The body and cover shall be of cast iron conforming to ASTM A126, Class B, or ductile iron ASTM A536 grade 65-45-12. All leverage mechanism parts and the float shall be stainless steel. No plastic or bronze

parts shall be permitted. The large and small orifice seats shall be Buna-N and shall be renewable.

c) The Combination Air Valve shall be supplied with “Flushing Attachments” to allow periodic flushing of sediment, grease, and solids. Attachments consist of an inlet isolating valve, bronze blow-off, and flushing valves.

d) Manufacturers or Equal

- APCO Series 443 SCAV
- Golden Anderson Figure 942.
- Val Matic
- Henry Pratt WWCV Wastewater Combination Air Valves

IV. Electrical Controls

A. General

1. The lift station electrical requirements, available utility voltages and standby power requirements must be identified prior to completing the lift station electrical design.
2. Sheet No. 4 provides a general installation detail for the lift station electrical equipment, and a detail of the lift station control panel.

B. Operating Voltage and Standby Power

1. The City will contact the serving electric utility to determine which service voltages are available. Three-phase power is preferred to avoid the use of variable frequency drives (VFDs) as phase converters, or to avoid other types of phase conversion equipment. If there are utility charges to provide three-phase service, the City will obtain an estimate of the charges from the serving utility, and will conduct a cost comparison between a three-phase installation and a single-phase installation.

Preferred Three-Phase Voltages:

- 277/480VAC, three-phase, four-wire grounded wye (larger stations)
- 120/240VAC, three-phase, four-wire, delta with grounded center tap (locations with existing electrical service at this voltage)
- 120/208VAC, three-phase, four-wire grounded-wye (smaller stations)

Preferred Single-Phase Voltages:

- 120/240VAC, single-phase, three-wire grounded center tap
2. Stations that receive single-phase utility supply shall utilize variable frequency drives (VFDs) as phase converters to power the three-phase pump motors. Other forms of phase conversion are not acceptable.
 3. All lift stations will require standby power facilities. For each station, the City will determine whether portable or stationary standby power equipment will be required:

Stationary Standby Power:

- Include outdoor diesel engine-generator set with weatherproof housing, double-wall base tank, reinforced concrete pad and all accessories required for automatic, unattended operation. Include an open-transition automatic transfer switch. The engine-generator shall be sized to continuously operate the station at design capacity, plus auxiliary loads. The fuel tank shall be sized for 48 hours operation at full pumping capacity. The engine-generator housing shall have sound abatement features for sound levels at property lines in compliance with MPCA Noise Rules, latest edition, using the nighttime residential limits. Engine-generators shall be Caterpillar, Cummins, or approved equal.

Portable Standby Power:

- Include a weatherproof power connector with angle adaptor and spring-loaded cover. The power connector shall be compatible with the City's existing portable engine generator connectors. Verify project loads and operating voltage with the City to confirm that the City's existing generator sets can power the station.
4. The final voltage selection and type of standby power shall be determined by the City, based on a cost-benefit comparison of available operating voltages, equipment costs, and portable generator capabilities.

C. Fault Current

1. Obtain information from the serving electric utility regarding available fault current at the selected service voltage. The entire lift station electrical system and control panel shall be designed to withstand the available fault current.

D. Lift Station Control Panel

1. Enclosure and General Requirements

- i. Control panel enclosure shall be NEMA Type 3R, constructed of Type 304 stainless steel of not less than 12 gauge thickness. The enclosure shall be low-profile, two-door design, with stainless steel hinges, stainless steel three-point latch, and stainless steel vault handle with padlock provisions. Control panel enclosure shall be free-standing type with 18" high stainless steel supporting legs and skirting secured with stainless steel tamperproof hardware.
- ii. Size the enclosure to accept all electrical equipment without overcrowding, and in accordance with UL 508 and UL698A requirements. The maximum panel height shall be 48" (plus 18" high legs), with panel width as required by the internal components and wiring, for overall height not to exceed 66 inches.
- iii. The completed panel shall bear UL labels in accordance with Minnesota Board of Electricity requirements, UL 508 and applicable portions of UL698A and UL913.
- iv. Provide front-panel components as required by equipment, and as indicated on Sheet No. 4. Sheet No. 4 shows the general control panel layout requirements.

2. Circuit Breakers

- i. Circuit breakers shall be molded-case units with thermal-magnetic trip units, UL-labeled for the available fault current and application.
- ii. Circuit breakers for across-the-line pump motors shall be magnetic-trip only units with adjustable magnetic trip element.

3. Automatic / Manual Transfer Switch

- i. For stations with stationary engine-generator set, provide open-transition automatic transfer switch in the lift station control panel, so that the unit will automatically start and transfer upon loss of utility power, or upon abnormal supply voltage conditions. Acceptable manufacturers: Automatic Switch Company (ASCO), General Electric / Zenith, or approved equal.
- ii. For stations with connections for portable standby power, provide main and standby circuit breakers with circuit breaker manufacturer's "walking-beam" interlock, to allow only one breaker to be closed at a time.

4. Devices

- i. All control devices including, but not limited to, selector switches, pushbutton switches, and indicating lights, shall be of the heavy duty, oil tight type. The contacts shall meet NEMA rating designation A600.

5. Starters

- i. For constant-speed pumps, starters shall be NEMA-style, NEMA-rated for the application. Starters shall have replaceable contacts and solid-state type adjustable overloads that provide NEMA Class 10 protection for submersible pump motors. Approved starter manufacturers: Allen-Bradley Bulletin 509, Square D Company Class 8536, or approved equal.

6. Variable Frequency Drives

- i. For variable-speed pumps, or where phase conversion equipment is needed to convert single-phase utility power to three-phase power for pump motors, provide variable frequency drives (VFDs) that are rated for single-phase input voltage by the drive manufacturer. When VFDs are used, the control panel shall be oversized to dissipate heat from the VFDs, and the panel shall be located in an area that is not exposed to direct sunlight. Approved VFD manufacturers: Allen-Bradley "Power Flex", or approved equal.

7. Level Sensing and Pump Control

- i. Level control shall be accomplished using a submersible pressure/level transducer and city approved Allen Bradley controller for pump control and alternation. In addition, float switches with relay logic shall be provided as a backup system to the submersible transducer and controller. The float switch backup circuitry shall be independent of the primary level control circuitry for redundancy. Provide two float switches with the following functions:
 - High Level Alarm / Start Pumps
 - Low Level Alarm / Stop Pumps
- ii. Float switches shall be non-mercury type. Provide intrinsically-safe barrier relays on each float switch circuit. Provide a stainless steel aircraft cable and weight kit for suspending the submersible level transducer and float switches in the wetwell. All of the suspension kit components shall be Type 316 stainless steel or non-metallic construction.

E. SCADA Communication

1. All new lift station control panels shall use the Allan Bradley level controller to communicate with the City's existing Flygt supervisory control and data acquisition (SCADA) system. The SCADA system includes radio communication that operates on a licensed frequency in the 450MHz band. The lift station control panel shall include an MDS radio, Yagi-style antenna, antenna lightning arrester, power supplies, and related equipment for radio communication. The lift station shall include a direct-buried dark bronze fiberglass light pole with non-corrosive hardware for mounting the antenna at approximately 20 feet above grade.
2. The City has commissioned a radio path study addresses radio communication requirements at existing lift station sites, and several proposed lift station sites. The installation at each lift station shall be in conformance with the requirements of the radio path study.
3. All lift station control panels shall be set up to allow future fiber connection. Spare 2" conduit from control panel to outside panel pad extents to be provided.

F. Software Programming at SCADA Master

1. Each Lift Station installation project shall include related software revisions at the existing SCADA master computer(s). Modify the City's existing software and WIN911 alarm dialing software so that each new station is integrated in the same manner as existing stations. Develop new graphic screens, trend displays, control screens, alarm handling screens and related operator interfaces to match the appearance and functionality of existing lift stations.

V. As-Built Documentation

A. As-Built Documentation

1. The Contractor shall provide the following items:
 - i. Complete set of drawings, documentation and manufacturer's operation and maintenance instructions for the project. Construction record drawings shall be updated to show "as-built" conditions.
 - ii. Complete electrical schematics showing control panel "as-built" conditions.
 - iii. Complete instrumentation and control "as-built" information including ladder logic, and software application files.
2. All drawings shall be submitted in reproducible hard copy format and in electronic format (either AutoCAD .DWG or Adobe .PDF format). Software application files shall be submitted in electronic format in the software manufacturer's file format.

VI. Spare Parts

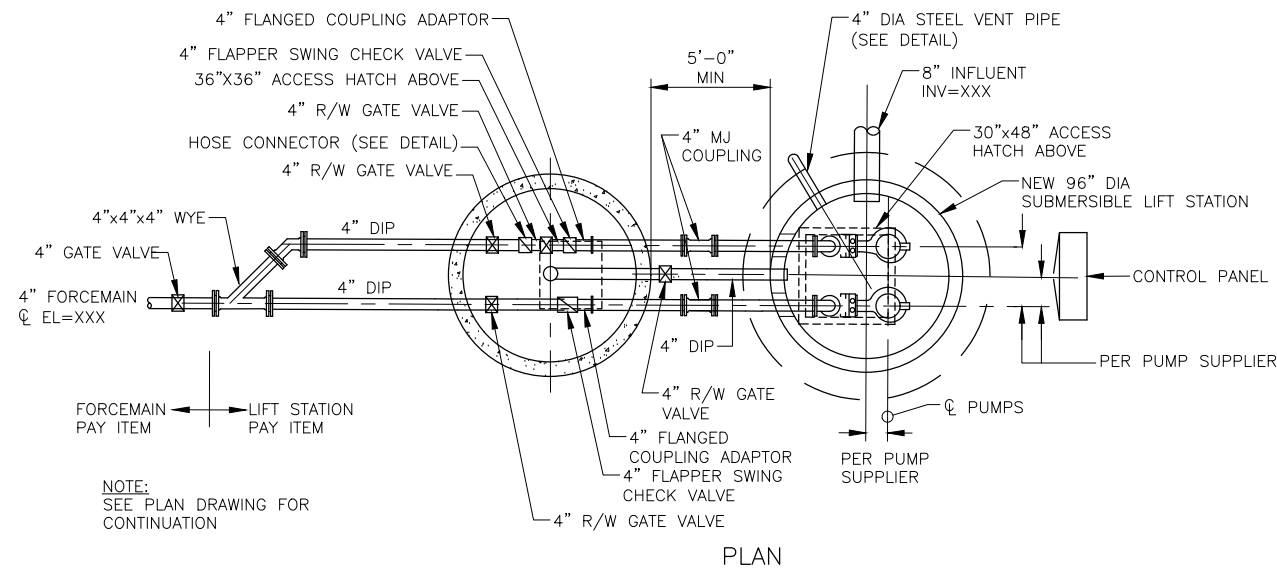
A. Spare Parts

1. A spare parts package shall be provided for each lift station. The package shall contain the following items:
 - i. One set of upper and lower pump seals for each pump.
 - ii. Fuses and lamps, consisting of a minimum of 10% spare of each type used, or a quantity of 6 of each type used, whichever is greater.
 - iii. One spare set of Hand-Off-Auto selector switches.
 - iv. Control panel relays, two spares of each relay type used on the project.
 - v. For projects with stationary engine-generator sets, two full sets of spare filters (air filters, oil filters, fuel filters).

VII. Start-Up and Testing

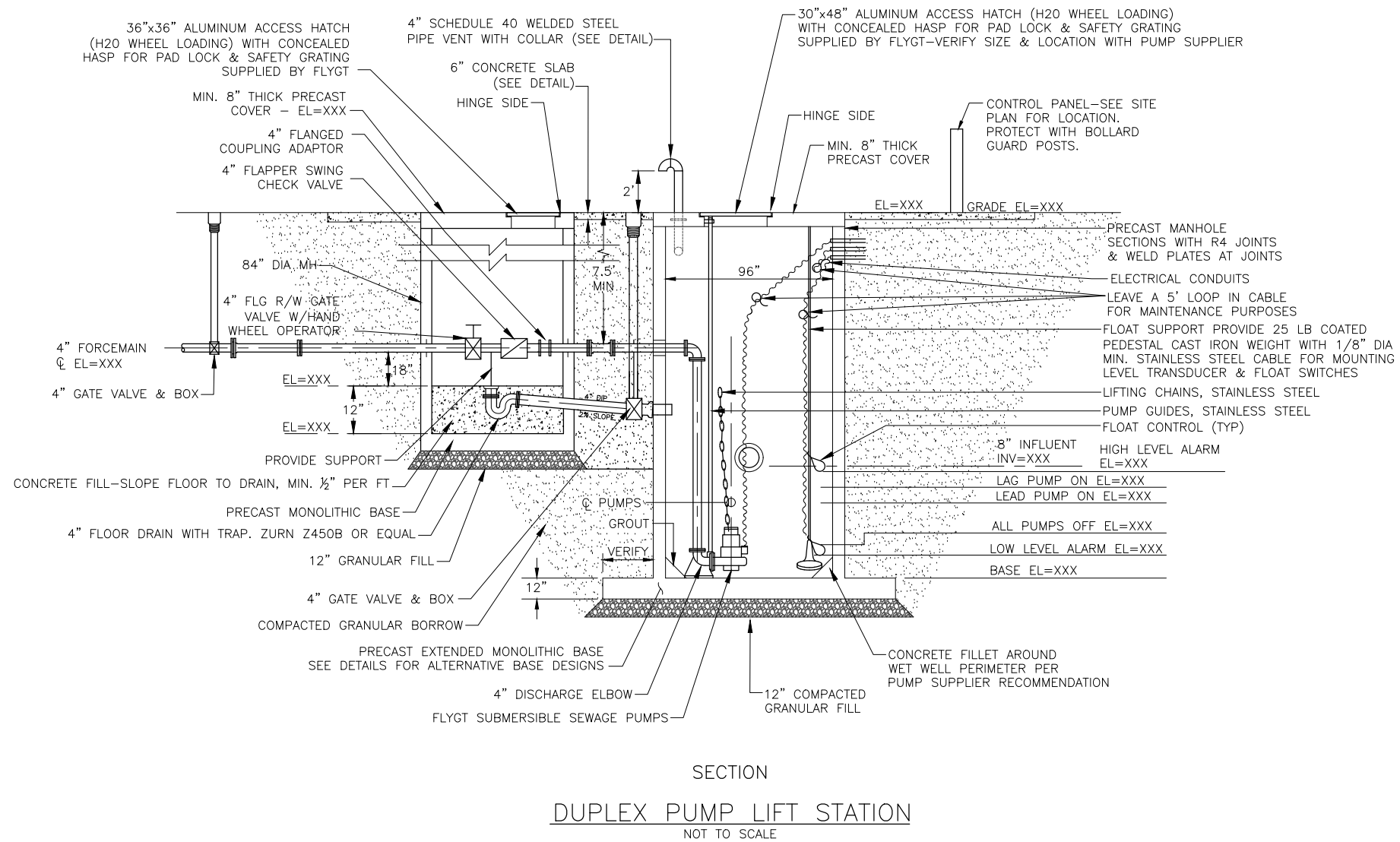
A. Start-Up and Testing

1. A factory trained service representative shall be present at the time when the station is to be put into service and turned over to the Owner. The service representative shall instruct the Owner in the proper operation and maintenance of the equipment. The service representative shall provide a minimum of eight (8) hours for field testing and training.
2. At the time of start up, the Contractor shall conduct the necessary pumping test to determine the proper operation of the system. The Contractor shall furnish all meters, equipment and water required for these tests and the tests shall be so conducted as to check the operation of the pumping system. Necessary measurements of the electrical consumption shall be made to determine whether or not the pump is operating within the conditions recommended by the pump manufacturer. Perform a witnessed operational test of all equipment. Confirm proper operation of all station features and functions. Record phase-to-phase and phase-to-ground voltages during no-load conditions and during all pump operating conditions. Record pump motor phase currents during all pump operating conditions. Determine the pumping rate of each pump operating individually and together by volume drawdown in the wet well. In the event that the tests show the equipment does not comply with the specifications of the pump manufacturer, this shall be sufficient cause to reject the pump. All tests therein required shall be supervised by the Engineer.
3. For stations having stationary engine-generator sets, test and demonstrate proper operation of the engine-generator, automatic transfer switch and monitoring equipment. Verify that the engine-generator can start and run the pumps as required for design flow conditions.
4. For stations having portable engine-generator connections, schedule and conduct an operational test using the City's portable generator set. Verify proper phase rotation, and make phase rotation corrections as required.
5. No "start ups" shall be scheduled for Fridays.



GENERAL NOTES:

1. SEE CITY OF WACONIA LIFT STATION STANDARDIZATION POLICY FOR DETAILS ON LIFT STATION AND VALVE MANHOLE STRUCTURES AND EQUIPMENT.
2. VERIFY SUBMERSIBLE PUMP PLACEMENT AND ALIGNMENT WITH PUMP SUPPLIER.
3. CONTRACTOR TO VERIFY ORIENTATION OF LIFT STATION AND PIPING PRIOR TO INSTALLATION OF LIFT STATION.
4. ACCESS HATCH SIZE AND LOCATION SHALL BE VERIFIED WITH PUMP SUPPLIER.
5. ALL BOLTS AND HARDWARE INSIDE WET WELL AND VALVE MANHOLE SHALL BE STAINLESS STEEL.
6. QUADEX STRUCTURE GUARD EPOXY SHALL BE APPLIED TO ALL INTERNAL CONCRETE SURFACES IN WET WELL. QUADEX DYNASTONE SHALL BE APPLIED TO ALL INTERNAL CONCRETE SURFACES FOR REHABILITATED WET WELLS. ALL EXPOSED PIPE, VENT PIPES, VALVES, AND FITTINGS IN WET WELL AND VALVE MANHOLE SHALL HAVE TWO COATS OF SHERWIN WILLIAMS MACROPOXY 646 FCE WITH TOTAL COATING THICKNESS NOT LESS THAN 12-14 MILS DFT.
7. ALL PRECAST SECTIONS SHALL BE JOINED WITH WELD PLATES AT EACH JOINT—4 AT 90° SPACING. PLATES MAY BE INTERIOR OR EXTERIOR. INTERIOR PLATES SHALL BE STAINLESS STEEL. EXTERIOR PLATES SHALL BE GALVANIZED OR STAINLESS STEEL.
8. PROVIDE EXTERNAL JOINT SEAL, INFRASHIELD OR EQUAL, ON ALL STRUCTURE JOINTS.
9. CONTRACTOR SHALL SUBMIT BUOYANCY CALCULATIONS DETERMINING DIAMETER OF EXTENDED MONOLITHIC LIFT STATION BASE OR THE DEPTH OF THE CONCRETE BALLAST FOR THE BASE OPTION SHOWN ON SHEET 2.
10. THIS STANDARD PLAN IS BASED ON 4" DIAMETER PUMP DISCHARGE PIPING AND FORCEMAIN. VALVE MANHOLE DIAMETER MAY NEED TO INCREASE FOR LARGER DIAMETER PIPING.
11. SITE SHALL BE GRADED TO DRAIN WATER AWAY FROM THE LIFT STATION STRUCTURES.



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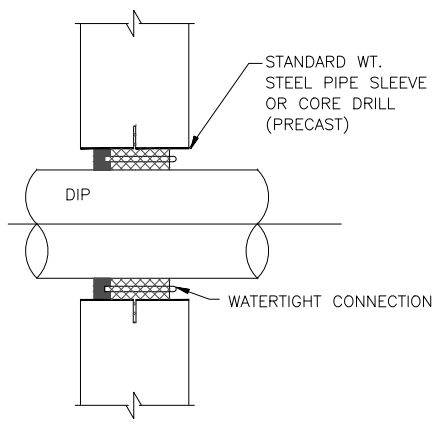
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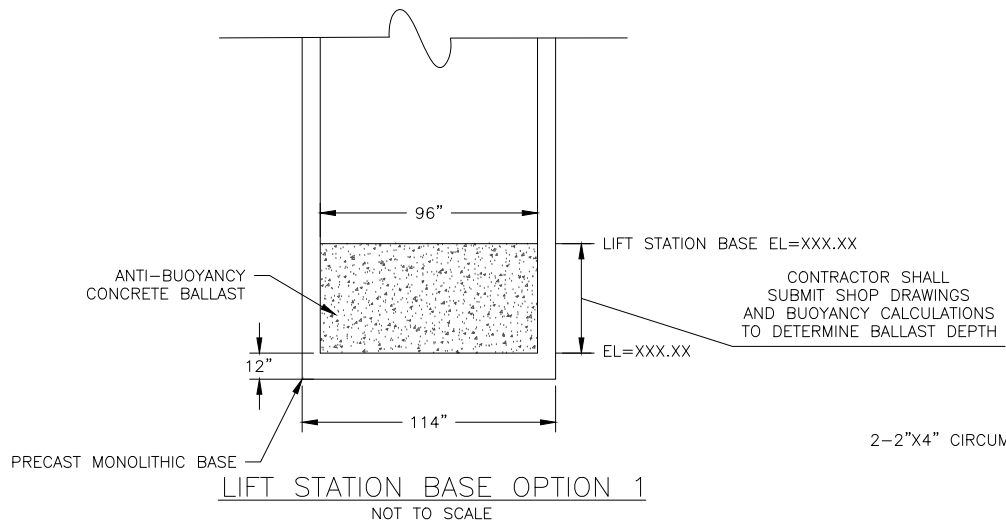
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 LIFT STATIONS STANDARDIZATION PLANS
 DUPLEX PUMP LIFT STATION

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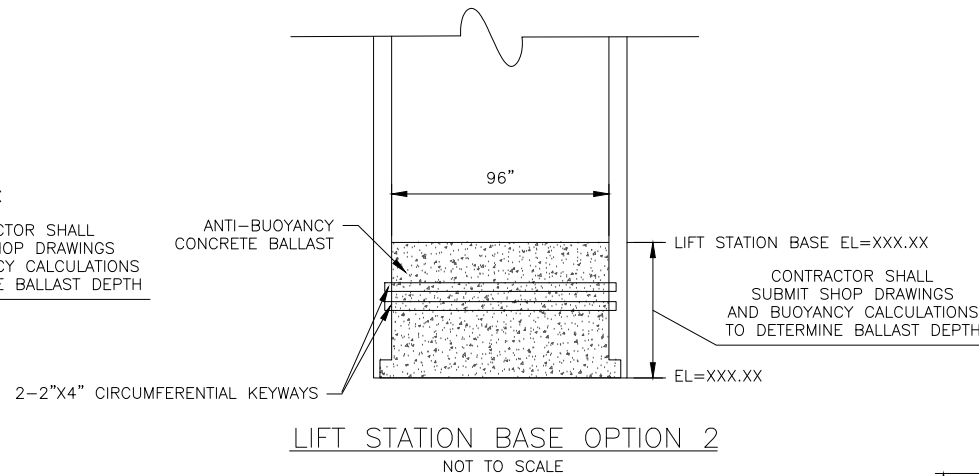
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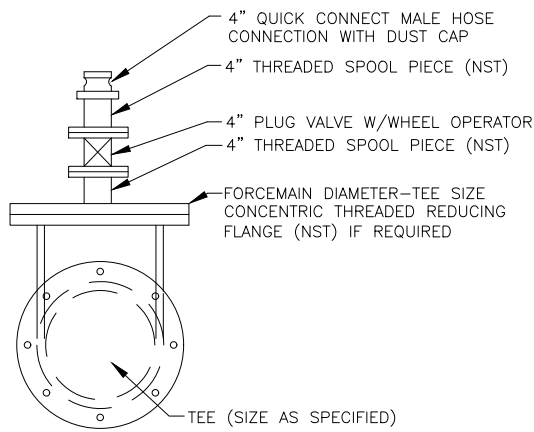
DISCHARGE STRUCTURE WALL PENETRATION
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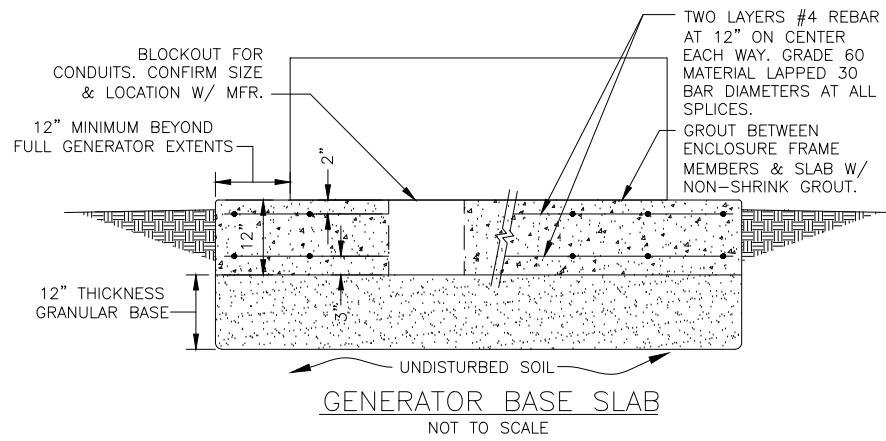
LIFT STATION BASE OPTION 1
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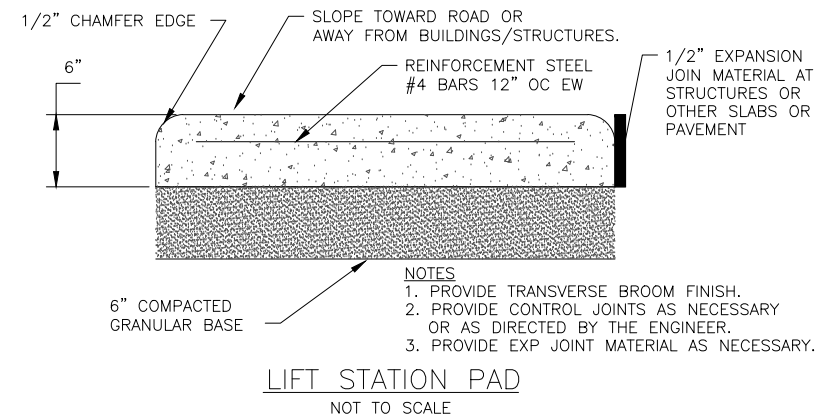
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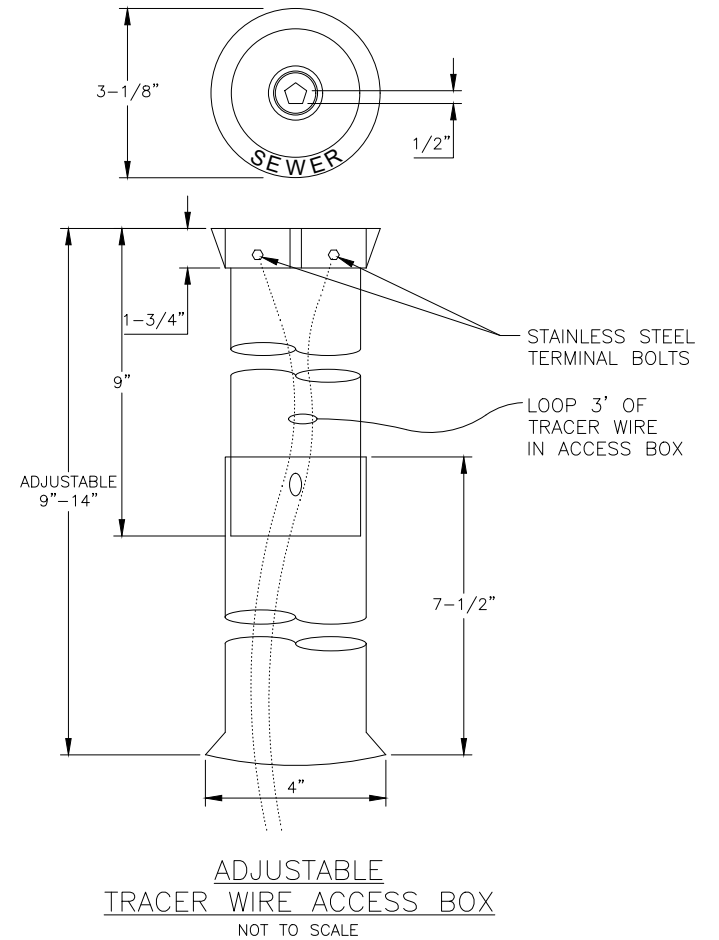
HOSE CONNECTOR
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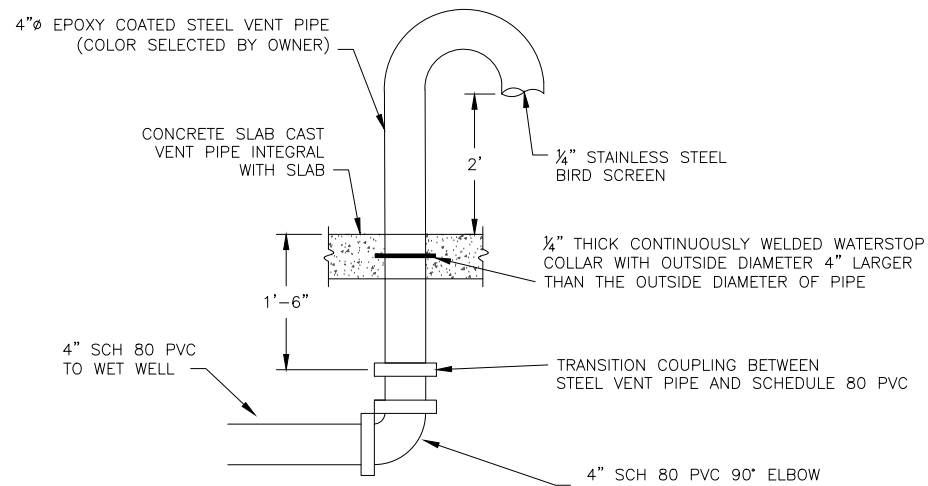
GENERATOR BASE SLAB
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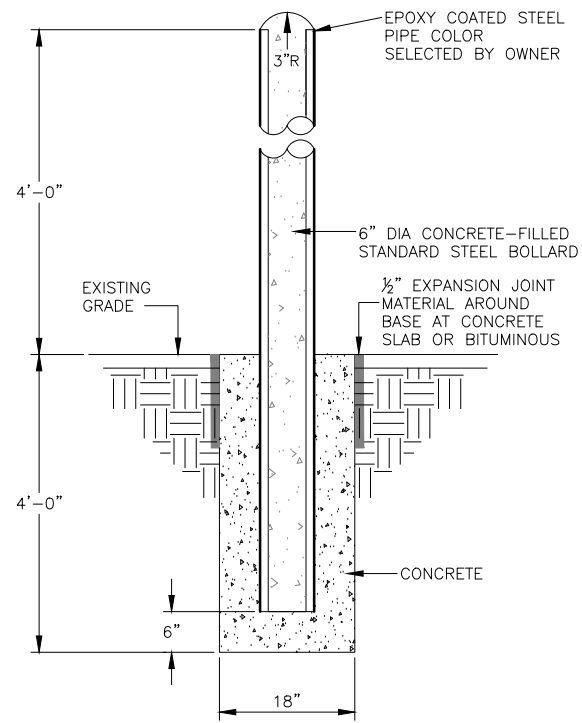
LIFT STATION PAD
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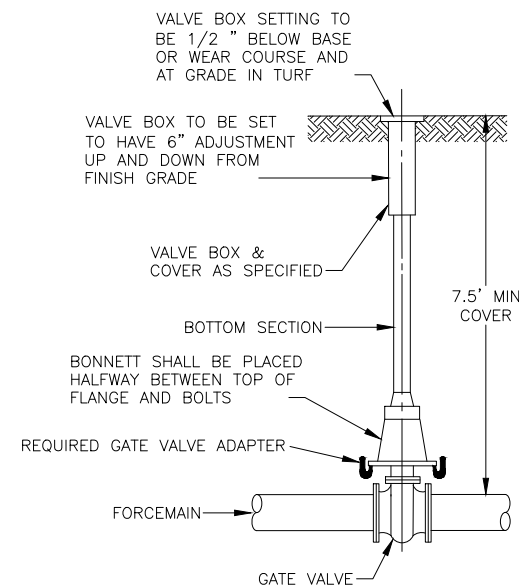
ADJUSTABLE TRACER WIRE ACCESS BOX
NOT TO SCALE



VENT PIPE DETAIL
NOT TO SCALE



BOLLARD GUARD POST
NOT TO SCALE



GATE VALVE BOX INSTALLATION
NOT TO SCALE

- NOTES:
1. VALVE BOX SHALL BE CENTERED ON OPERATING NUTS, STRAIGHT, FREE FROM DEBRIS, AND ALL SECTIONS UNBROKEN
 2. VALVES IN EASEMENTS SHALL HAVE CHANNEL POST WITNESS MARKERS WITH REFLECTIVE "GV" SIGN
 3. DEEP VALVES SHALL HAVE NUT EXTENSIONS INSTALLED TO ELEVATION TO ACCOMMODATE STANDARD 10' KEY; BOTTOM NUT SHALL BE BOLTED TO VALVE NUT AND ONLY ONE SECTION
 4. COMPACTION WITH MECHANICAL TAMPER AROUND VALVE BOX SHALL BE PLACED AND COMPACTED WITH 2" LIFTS TO ACHIEVE 95% COMPACTION
 5. GATE VALVES LOCATED WITHIN THE CONCRETE SIDEWALK SHALL INCLUDE A METAL SEPARATOR BETWEEN THE VALVE BOX AND THE CONCRETE

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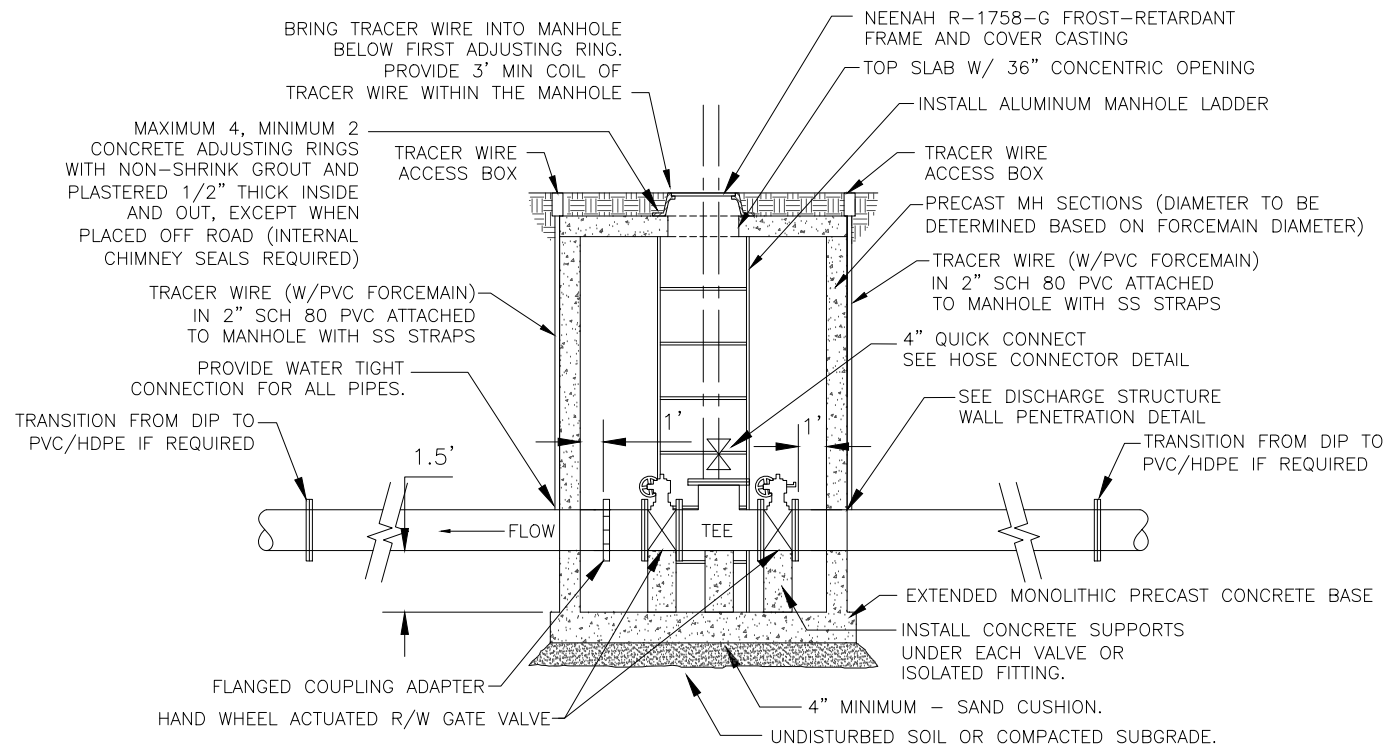
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CITY OF WACONIA
LIFT STATIONS STANDARDIZATION PLANS
LIFT STATION DETAILS

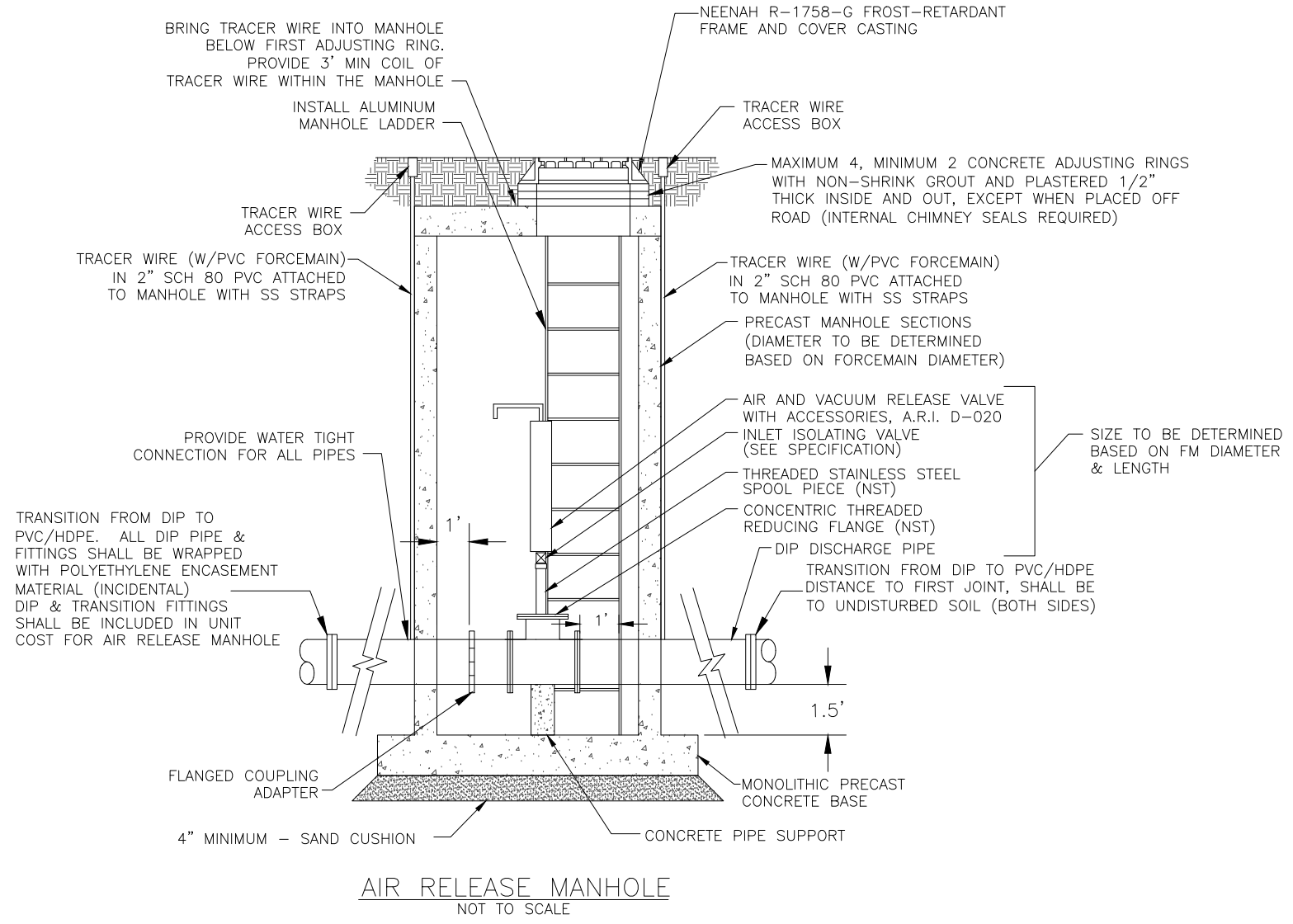
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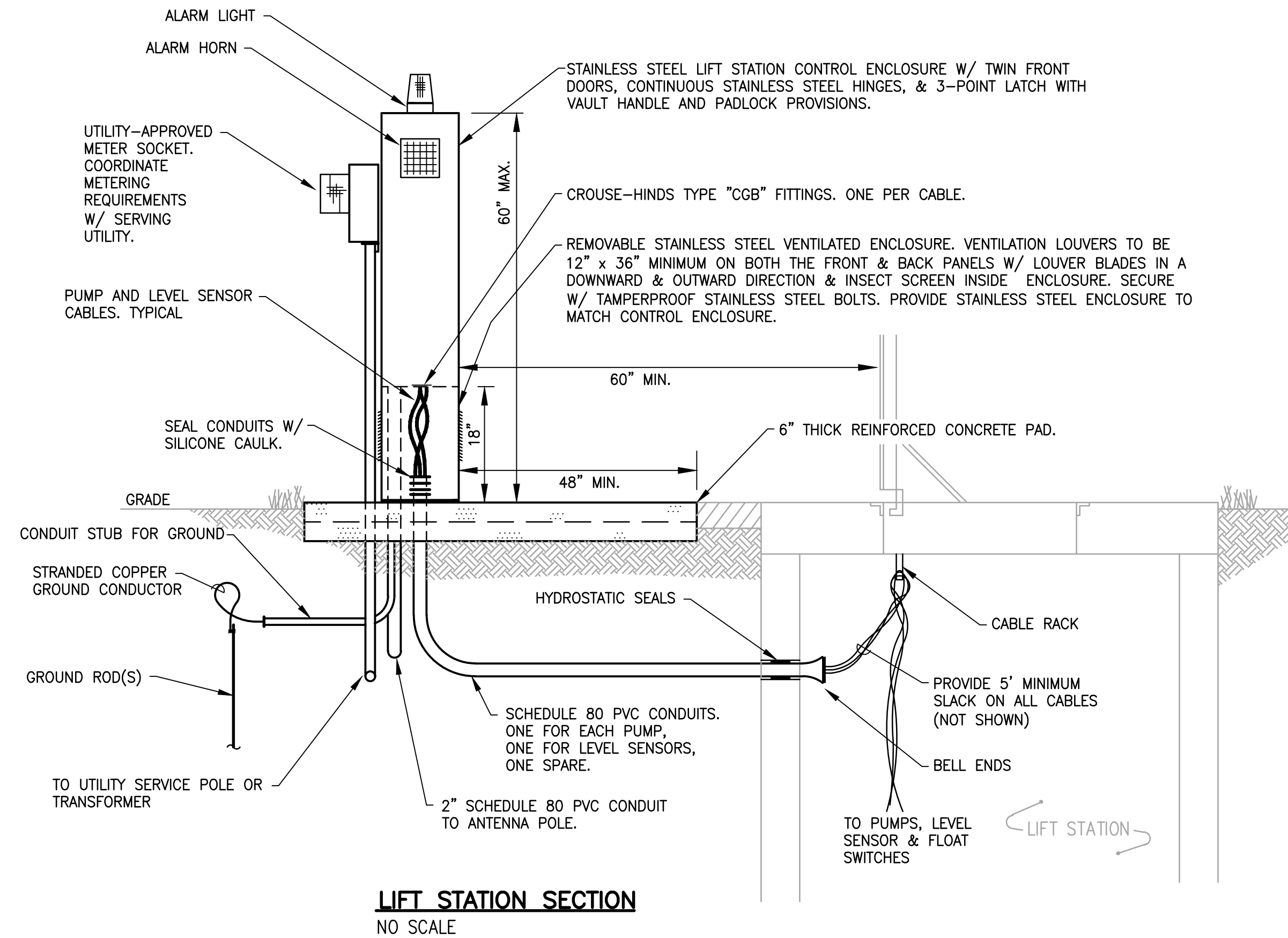


MAINTENANCE MANHOLE

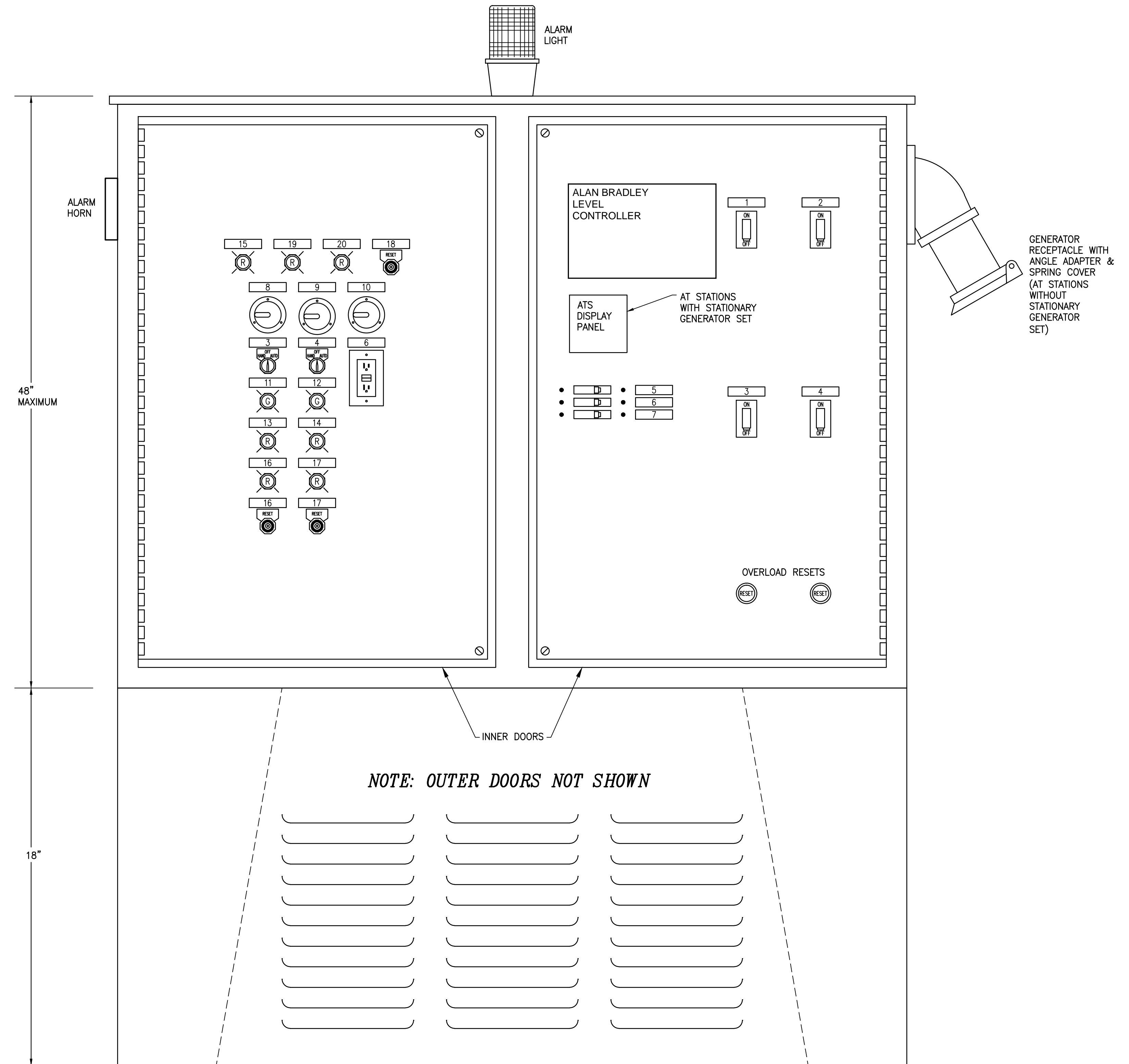
- NOTES:**
1. EXTEND DUCTILE IRON PIPE (CL.52) TO UNDISTURBED SOIL EACH SIDE OF STRUCTURE USE TRANSITION FITTINGS AS REQUIRED. ALL DIP PIPE & FITTINGS OUTSIDE STRUCTURE SHALL BE WRAPPED WITH POLYETHYLENE. ENCASEMENT MATERIAL (INCIDENTAL)
 2. DIP & TRANSITION FITTINGS SHALL BE INCLUDED IN UNIT COST FOR MAINTENANCE MANHOLE.
 3. CONTRACTOR SHALL SUBMIT BUOYANCY CALCULATIONS DETERMINING DIAMETER OF EXTENDED MONOLITHIC BASE REQUIRED.



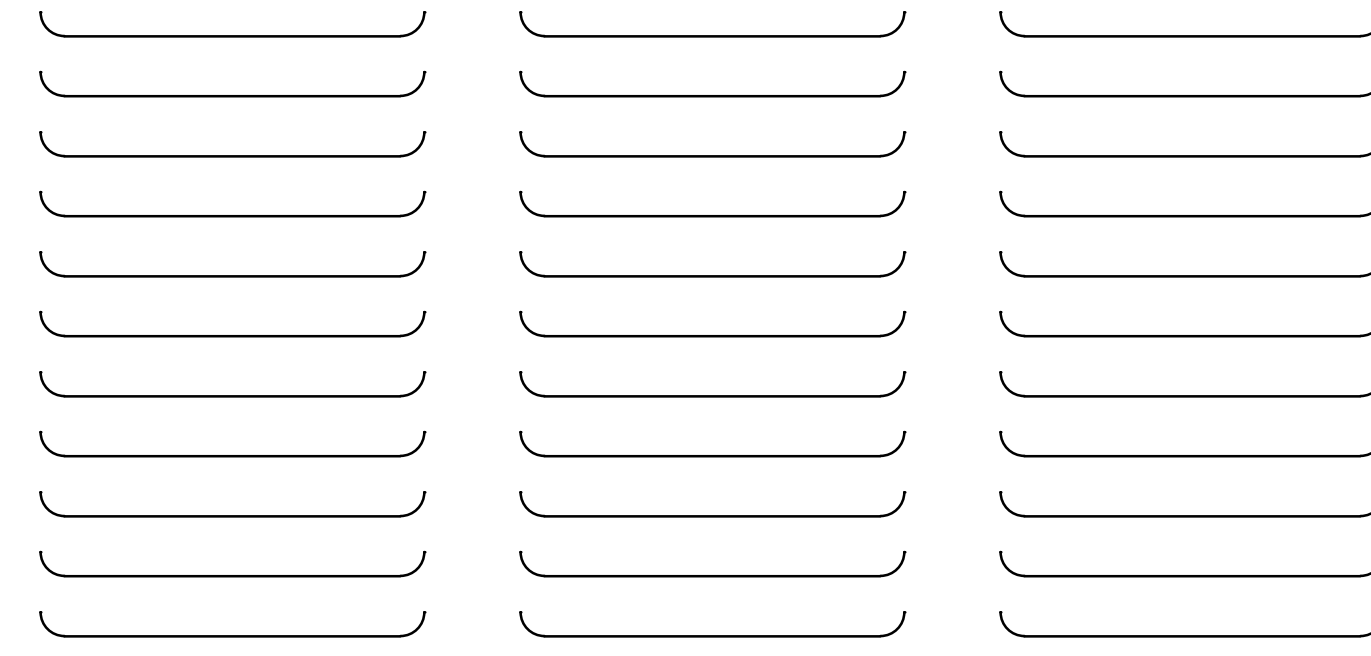
AIR RELEASE MANHOLE
NOT TO SCALE



Notes:
 1. Provide spare 2" schedule 80 conduit to beyond control panel pad extents for future fiber connection.



NOTE: OUTER DOORS NOT SHOWN



TYPICAL CONTROL PANEL LAYOUT
 NO SCALE

NAMEPLATE LEGEND

- | | | |
|-------------------------------|------------------|----------------------|
| 1. MAIN CIRCUIT BREAKER | 8. PUMP 1 RTM | 15. HIGH LEVEL FLOAT |
| 2. GENERATOR CIRCUIT BREAKER | 9. PUMP 2 RTM | 16. PUMP 1 OVERTEMP |
| 3. PUMP 1 | 10. PARALLEL RTM | 17. PUMP 2 OVERTEMP |
| 4. PUMP 2 | 11. PUMP 1 RUN | 18. ALARM SILENCE |
| 5. CONTROL POWER | 12. PUMP 2 RUN | 19. HIGH LEVEL |
| 6. CONVENIENCE GFI RECEPTACLE | 13. SEAL 1 FAIL | 20. LOW LEVEL |
| 7. HEATER | 14. SEAL 2 FAIL | |



APPENDIX C
Stormwater Reuse Standardization Policy



Real People. Real Solutions.

Stormwater Reuse Standardization Policy

City of Waconia

February 2021



Submitted by:
Bolton & Menk, Inc.
2638 Shadow Lane
Suite 200
Chaska, MN 55318


Certification

Stormwater Reuse Standardization Policy

City of Waconia
Waconia, MN
C14.120525

February 2021

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

By: 
Kenneth Adolf, P.E.
License No. 12048

Date: February 8, 2021

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Appendix

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- B. Stormwater Drainage and Reuse Agreement
- C. Figures
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 - Figure 2 - Typical Pump Skid Station
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Figure 6 - Hunters Crossing Reuse Pump Station

D. Construction Details - Stormwater Reuse Details

C-101 - Plastic Valve Box (For Turf Areas)

C-102 - Isolation Valve - 2.5" and Smaller

C-103 - Blowoff in Precast Concrete Handhole

C-104 - Blowoff

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9-200 - PVC Trench

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9-303 - Tracer Wire Access Box

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9-313 - Tracer Wire System Schematic

9-400 - Gate Valve Adaptor

9-401 - Gate Valve Box Alignment Device

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9-601 - Cathodic Protection Pipe Joint Bonding

9-602 - Cathodic Protection Thermite Welding

9-603 - Cathodic Protection Galvanic Anode Splice

9-604 - Cathodic Protection Reference Electrode

9-605 - Cathodic Protection Test Station

I. GENERAL

The Stormwater Reuse Standardization Policy is intended to provide standards for the design and construction of facilities for the reuse of stormwater for irrigation.

The goals of stormwater reuse for irrigation include:

- Reduce the demand on the City's potable water system from lawn sprinkling which reduces the need and related costs of future water system expansions.
- Manage future demands on groundwater to ensure adequate supply into the future.
- Reduce flooding potential.
- Reduce the volume and mass loading of pollutants contained in stormwater discharging to surface waters.
- Create a beneficial use for stormwater.

Stormwater reuse is also an effective method for complying with Carver County Water Management Organization's (CCWMO) rules for controlling the increase in the volume of storm runoff that results from development and related addition of impervious areas.

The City of Waconia is a leader in Minnesota on implementing stormwater reuse for irrigation. The City currently has several systems that provide stormwater for reuse for lawn sprinkling. In general, it is anticipated that the City will operate and maintain future reuse systems. This Policy will establish equipment standards to simplify operation and maintenance of the facilities and to reduce the spare parts inventory for the City.

The purpose of individual reuse systems vary and generally are in the following categories:

1. Systems with the primary purpose of disposal of stormwater to reduce stormwater runoff volume to comply with CCWMO rules.
2. Systems that supply irrigation water to reduce the demand on the potable water system in addition to reducing runoff volumes.
3. Systems that convey stormwater from individual developments to existing City reuse systems. Conveyance may require pumping from the on-site stormwater basin to the existing reuse system storage facility. The benefit to the development is that the stormwater volume control and water quality treatment is provided off-site. This reduces on-site volume control facilities such as infiltration basins and allows this area to be developed. The benefit to the City is that the additional water supply enhances the reliability of the reuse system and allows expansion of the reuse water irrigation service area.

To help defray the costs of establishing, constructing and maintaining stormwater reuse systems, the City has established connection charges and consumption charges. The connection charge is a cost paid by individual developments to allow the stormwater to be discharged offsite to the water reuse systems for treatment and volume reduction as required by CCWMD rules. The consumption charge is the cost paid by individual properties for the volume of reuse water supplied by the reuse system for its irrigation system. This is very similar to the charge for water usage from the potable water system. The policies and procedures for the stormwater reuse charges are detailed in the Stormwater Drainage and Reuse Agreement and the Stormwater Reuse Ordinance which are included in the Appendix.

A preliminary engineering study is required to evaluate the costs, benefits and overall feasibility of a stormwater reuse system.

A stormwater reuse system consists of the following components:

1. Pumping Equipment
2. Reuse Water Storage
3. Treatment and Disinfection
4. Reuse Water Distribution System
5. Irrigation System
6. Storm Sewer System

The above components except for the storm sewer are discussed in the following Sections. Storm sewer is required to convey storm runoff to the storage and it only requires typical design standards.

II. PUMPING EQUIPMENT

A. General

Pumps are required to pump the stormwater from storage and to convey it through the distribution system to the individual irrigation systems at adequate water pressure. Pumping equipment includes a control system which in general monitors the demand flow and pressure in the system and adjusts the pumps to supply the demand.

B. Stormwater Supply

The first step in the evaluation of a stormwater reuse system is determining if the supply of stormwater will be adequate to provide water to the area that is to be irrigated with reasonable reliability. Impervious surface area is required to generate the volume of storm runoff for irrigation. The Metropolitan Council's Stormwater Reuse Guide has a Water Balance Tool which is a spreadsheet. This takes inputs of impervious area within the drainage area and the area proposed for irrigation and calculates the average percentage of weeks for which the reuse system will meet typical sprinkling demand. This is based on the most current precipitation data for the metro area projected over a 30-year period. For the balance of the weeks, the irrigation demand will need to be provided by a supplemental water source such as from the potable water supply or a groundwater well.

In general, the reliability of the reuse systems to meet demand should be over 50 percent. This is not critical for reuse systems with the primary purpose of providing volume control to comply with CCWMO rules and that can irrigate only when stormwater supply is available.

C. Pump Station Type

1. Wetwell Station

Pumping equipment for reuse systems is available in two general categories. Both utilize pumps with variable frequency drives (VFDs) which adjust the pumping rate to meet variable demand rates. Reuse systems do not have storage tanks like the potable water systems which requires that the entire demand be supplied by pumping.

A wetwell pumping station is similar to a typical sanitary lift station. It consists of a precast concrete wetwell structure that receives water flow by gravity from storage. Submersible pumps convey the stormwater from the wetwell to the reuse distribution system and individual irrigation systems. An example of this station type is shown on Figure 1. The pumping equipment and electrical controls are available as a package.

Waconia currently (2021) has three reuse systems of this type with the pumping

equipment and controls provided by Flowtronex. These systems are the 10th Street/Highway 5, Hunters Crossing and Bayview systems.

2. Pump Skid Station

This station type has the submersible pumps mounted on a skid with wheels which is placed on the pond bottom. A flexible pipe connects the skid to the controls enclosure. The pump skid eliminates the need for a wetwell but otherwise this station operates the same as a wetwell station. The significant difference is that the pump skid needs to be removed from the pond every fall and replaced every spring. An example of this system type is shown on Figure 2.

The City currently (2021) has a system of this type at the Crosswinds subdivision stormwater pond. This pumping system is a BlackMax system manufactured by Watertronics.

3. Required Pumping Equipment

The wetwell pumping station is the preferred station type primarily because the annual pump skid removal and replacement is not required. This station type is required for higher capacity reuse systems that may also provide disinfection treatment of the stormwater. The pump skid system will be considered for approval for smaller capacity systems.

To provide uniformity with existing reuse systems the pumping equipment shall be as manufactured by Flowtronex and Watertronics. It is anticipated that reuse pumping equipment designs will evolve over time and that other manufacturers may become available. Alternatives may be considered for City approval. An absolute requirement is that parts and service for the station are available with a Twin Cities metro area firm.

4. Design Criteria

Compared to potable water systems which have storage tanks to supplement pumping capacity during peak demand, the reuse pumping system must meet peak demand entirely by pumping. In addition, it must also accommodate minimum demand.

Peak demand results when the maximum number of irrigation system zones and sprinkler heads are in service. Ideally the irrigation system controls stagger the individual zone use over time so the demand rate is relatively uniform. This is easily controlled if there is a single user but more difficult with multiple users which could result in a wide range in demand rates.

The wide range in pumping rates is accomplished by use of pumps with variable frequency drives (VFDs) in the controls that adjust the pump speed and capacity to meet varying demand. Two or more pumps of varying capacities are typically required to provide the full range of demand rates.

The pumping station needs to provide a minimum of 45 psi of pressure throughout the reuse distribution system during peak demand.

Irrigation demand calculations and pump total dynamic head (TDH) calculations shall be provided to the City for review and approval.

5. Control System

Controls shall be an industrial grade PLC operator interface with software programming written specifically for the pumping station's intended use. Pumps will start on a pressure drop and send pressurized water through an automatic self-cleaning filter. A flow sensor will totalize all water pumped. The controls will

provide flow-based pressure regulation to maintain stable discharge pressure with varying irrigation demand.

The system shall monitor and provide alarms for low pressure, high pressure, individual motor overload/phase loss, VFD fault shutdown, low water level shutdown and high pressure loss through the filter.

The control panel along with pressure and flow monitoring equipment, manifold, valves and the filter shall be housed in weather resistant marine grade painted aluminum enclosure with vandal resistant lock enclosure.

Pump control systems as manufactured by Flowtronex or Watertronics shall be used.

6. Filter

The stormwater basins that typically provide the storage for the reuse system provide for some sedimentation removal treatment. Additional filtering is required to ensure that the stormwater does not plug the sprinkler heads. For high volume sprinkler heads such as those used on athletic fields a 200 micron screen filter is typically adequate. For sprinkler systems with drip tubes an 80 micron screen filter is typically required. Reuse systems that include ultraviolet (UV) light disinfection require a higher level of filtration to allow the UV light disinfection to be effective. In this case a 25 micron screen filter may be required. The filter must be sized to accommodate the peak flow at the required screen size.

The filter shall have a self cleaning screen. The sediment from the cleaning shall be discharged to a sump manhole to trap the sediment. The sump manhole can discharge to the stormwater pond but not in close proximity to the pump station inlet.

The filter shall be a stainless steel V-Series Automatic Screen Filter as manufactured by VAF Filtration Systems, or City-approved equal.

III. REUSE WATER STORAGE

A. General

The reliability of the stormwater reuse system is dependent upon the storage volume. Storage is most cost-effectively provided in stormwater ponds that also provide water quality treatment and discharge rate control to comply with CCWMO rules. Storage can also be provided in below grade tanks. The large storage volume required make tanks costly and therefore feasible only when there is no space available for a pond. Storage in tanks also requires a separate treatment structure for water quality. The Bayview Reuse System has polyethylene tanks for water quality treatment and storage.

B. Design Criteria

The Water Balance spreadsheet from the Metropolitan Council's Stormwater Reuse Guide provides the optimum required storage volume given the impervious surface area and the proposed irrigation area. Figure 3 shows a typical stormwater pond that provides both reuse storage for irrigation and water quality treatment and discharge rate control, as required by the Carver County Water Management Organization (CCWMO). As the CCWMO requires volume control for non-irrigation periods of the year, an infiltration or filtration bed area is typically required. The outlet pipe from the underdrains in the bed has a valve which is closed during the irrigation season which retains the reuse storage in the pond.

C. Supplemental Water Supply

A Supplemental water supply is required to provide water for periods when the storage has been depleted. The average number of weeks that this is expected is determined by the Water Balance spreadsheet. This can be provided by the City's potable water system or a groundwater well. A direct connection from the supplemental source to the reuse distribution system is preferred versus discharging into the pond as it eliminates water losses through exfiltration and evaporation. All interconnections of the reuse system with the potable water system or wells must have backflow prevention in compliance with the plumbing code.

IV. TREATMENT AND DISINFECTION

A. Solids and Floatables Removal

Stormwater ponds are required to provide water quality treatment by CCWMO rules. This will generally remove the larger solids through sedimentation. The inlet to a wetwell pump station shall have a sump manhole with BMP Snout baffle as shown on Figure 6 on the outlet to contain floatable trash and leaves in the manhole. The pump inlets on a pump skid type station shall have self-cleaning screens that retain floatables in the pond. The filter described in Section II.C.6. completes the required solids removal.

B. Disinfection

1. Standards

The State of Minnesota does not currently (2021) have standards for disinfection of stormwater for reuse as irrigation water supply. A State agency workgroup led by the Department of Health prepared a report, Advancing Safe and Sustainable Water Reuse in Minnesota, in 2017 which provided recommendations for water reuse. This report was reviewed by the Minnesota Cities Stormwater Coalition (MCSC). MCSC concluded that the recommendations for treatment and monitoring are too stringent and would result in stormwater reuse generally not being financially feasible. This subject is still under review with no standards established.

Lacking any Minnesota standards, the Met Council Stormwater Reuse Guide references California Department of Public Health's Title 22 Regulations for water reuse. Simplified, these regulations require the following disinfection standards:

- 23 MPN (Most Probable Number Coliform)/100 ml for no anticipated human contact
- 2.2 MPN/100 ml when human contact is anticipated

Stormwater and surface waters have been historically used for irrigation of areas including golf courses, athletic fields and lakeshore properties without disinfection with virtually no adverse health impacts. Providing disinfection to 2.2 MPN/100 ml, which is a 99.99% reduction of pathogens in typical urban storm water, significantly increases both the initial construction cost and also the cost to operate and maintain the system. Therefore establishing treatment requirements to protect the public health while controlling costs to sustainable levels is a delicate balance.

The City of Waconia's policy on disinfection has evolved to compliance with the 2.2 MPN/100 ml standard when human contact is anticipated. Control of application times and irrigated locations to limit the possibility of human contact is used for reuse water that is not disinfected to 2.2 MPN/100 ml.

The requirements for disinfection will be determined by the City for each specific system based on the areas to be irrigated, size of the system and financial feasibility of disinfection.

2. Chlorination

Addition of chlorine in various forms is used on most potable water systems. The 10th Street/Highway 5 reuse system in Waconia feeds sodium hypochlorite into the wetwell prior to the reuse water getting pumped to the distribution system. Testing of water samples from the 10th Street system was done by the University of Minnesota in 2019 and 2020. In 2020 water samples were from the pond, at the pump station and at one location on the distribution system. The test results showed a wide range in the pre-chlorination and post-chlorination samples for total coliform and E-coli levels. The highest levels were from samples obtained after a rainfall event. The test results show that chlorination provides varying levels of disinfection, but generally is not to the 2.2 MPN/ml level. This results from insufficient contact time. The testing shows that the system is effective in maintaining chlorine residual in the distribution system. Figure 4 shows the plan for the chlorination equipment and buildings at the 10th Street/Highway 5 reuse system.

3. Ultraviolet (UV) Light

With this process the reuse water is pumped through a cylindrical stainless steel vessel that contains low pressure, high intensity UV lamps which provide the disinfection. The system needs to be custom designed for each application based on the following:

- a) Design flow
- b) Total suspended solids - requires 25 micron screen filter
- c) UV transmittance (water clarity)
- d) Influent total coliform count
- e) Effluent disinfection standard of 2.2 MPN/100 ml
- f) UV dose rate

The City's Hunter Crossing reuse system provides UV disinfection. The UV unit is about 10-feet long and along with the related controls needs to be housed in a structure. Figures 5 and 6 shows the plans for the equipment building housing the UV unit and for the wetwell. The building was expanded to allow placing the pump controls and filter in the building. This eliminates the separate enclosure for these and places them inside a heated structure which eliminates the need to winterize the equipment. The VFD's generate heat and require cooling so the building also includes air conditioning.

The UV lamps require 5 to 10 minutes to warm up before the disinfection is effective. The UV unit can monitor the system demand and adjust the lamp power to provide the disinfection dosing required. The UV lamps require constant flow through the unit for cooling. The lamp life is extended by minimizing startups. The above factors make the UV system not conducive to an on-demand reuse system with periods of no demand which must be considered for the feasibility evaluation and design of future reuse systems. The Hunter's Crossing system which irrigates athletic fields addresses this by starting up the system no more than once a day.

C. Equipment Enclosure

The equipment, consisting of pump controls, manifold piping, valves, pressure and flow monitoring equipment and filter, for systems without disinfection shall be contained in a weather resistant marine grade painted aluminum enclosure with vandal resistant lock enclosure. Ventilation and possibly air conditioning are required to dissipate heat generated

by the VFDs. This is located adjacent to the pump station for wetwell type systems and adjacent to the pond above the high-water elevation for pump skid type systems. Winterization to remove all water is required with this enclosure.

Disinfection equipment, both UV and chlorination, needs to be housed in a structure. Pump controls are more accessible and better protected from weather and vandalism inside a structure and are therefore also housed in the equipment building. For a chlorination system, the electrical controls and chlorination equipment need to be in separate rooms as shown on Figure 4.

Structures shall be of masonry or precast concrete panel construction with exterior finishes comparable to the structures at the 10th Street/Highway 5 and Hunter's Crossing stations. Both of these structures consist of precast concrete walls and roof panels and were manufactured by Huffcutt Concrete. A general contractor was required to construct the foundation and floor, install doors, paint interior and exterior, install mechanical and electric equipment and related work.

V. REUSE DISTRIBUTION SYSTEM

A. General

The two categories of stormwater reuse piping are the distribution system that conveys water to individual irrigation systems and piping within the individual irrigation systems. The requirements for the distribution system would also generally apply to forcemains that convey stormwater from remote sites to centralized reuse pumping and treatment facilities.

B. Design Criteria

The distribution system piping must be sized to convey peak water demand from the pump station to throughout the system without excessive loss in pressure due to friction. The pipe sizing needs to be coordinated with the total dynamic head calculations for the sizing of the pumps and motors. The peak demand should be controlled by use of the following:

- Limiting the size of service connections to individual irrigation systems. This limitation requires the individual systems to have multiple zones with a controller that sequences zone use over time.
- Limiting the number of connections that can irrigate simultaneously. This is commonly done by allowing even street addresses to irrigate on even numbered days and odd on odd days. This can also be done by assigning specific time slots for irrigation to each connection.

Once the peak demand is determined the pipe sizing can be done by calculating head losses and checking the available system pressure at critical locations. Available pressure must also consider the relative ground elevations.

C. Materials - Reuse Distribution System

1. The following pipe materials shall be used for both directional drilling and open trench irrigation main construction:
 - a) 2 and 3-inch diameter - PVC, DR-26 with 160 psi pressure classification.
 - b) 4,6 and 8-inch diameter - For open cut construction - PVC, C-900, DR-18. For directional drilling - fusible PVC, C-900, DR-18 with 150 psi pressure classification or HDPE, DR-11 (DIPS) with 160 psi pressure classification.
 - c) Pipe for water reuse systems shall be colored or color coded with manufactured striping purple in accordance with all applicable industry standards for irrigation or reclaimed water piping.

2. Class 160 PVC Pipe
 - a) Pipe shall be Class 160 PVC pipe. Pipes shall be pressure rated for 160 psi @ 73.4° with standard dimension ratio SDR-26. All PVC pipe 3” in diameter or greater shall have rubber gasket joints. All PVC pipe less than 3” in diameter shall be bell end with solvent weld joints.
3. Fusible C900™ Pipe
 - a) As manufactured by Underground Solutions (www.undergroundssolutions.com), or equal, ASTM D 1784-02 with cell classification 12454.
 - b) Butt joint fused PVC pressure pipe conforming to the current requirements of AWWA C900 (DR 18) for pipe diameters 4” through 12”.
 - c) Pipe fusing shall meet manufacturer requirements.
4. Restrained Joint DIP Pipe
 - a) Flex-Ring Joint Pipe (DIP), as manufactured by American Ductile Iron Pipe or equal. The pipe shall be pressure pipe with a 350 psi working pressure for diameters up to and including 12 inch.
 - b) Joints shall be Flex-Ring Restrained Joint couplings as manufactured by American Ductile Iron Pipe or equal.
5. High Density Polyethylene (HDPE) Pipe
 - a) The pipe material shall be extra high molecular weight, high density polyethylene (EHMW-HDPE, PE3408) conforming with the minimum structural standards of ASTM D3350 with cell classification 345434C as manufactured by Chevron Phillips Chemical Company 4000/4100 Series, or equal. All HDPE pipe material shall meet the requirements of ASTM D1248 for a Type III, Class C, Category 5, Grade P34.
 - b) The pipe to be used shall be (HDPE) pressure pipe conforming to the requirement of AWWA C-906 of a 160 psi working pressure.
 - c) The dimension ratio (DR) shall be 11.
 - d) HDPE pipe shall have butt-fused joints. Fusing shall meet manufacturer’s requirements.
 - e) Four inch and larger diameter shall be furnished in ductile iron pipe outside diameter (DIPS).
6. Reuse Main Fitting Materials - 4-Inch and Large Diameter Pipe
 - a) Mechanical Class 350 ductile iron fittings shall be used.
 - b) All fittings shall be coated with a 6-8 mil nominal thickness fusion bonded epoxy conforming to the requirements of ANSI/AWWA C550 and C116/A21.16.
 - c) All fittings, valves and retaining rods shall be protected by using sacrificial anodes.
 - d) All fittings, valves, hydrants, etc. shall be secured utilizing COR-BLUE T-BOLTS as manufactured by NSS Industries or approved equal.
 - e) All restraining devices (megalugs) shall be coated with a 6-8 mil nominal thickness, fusion bonded epoxy conforming to the requirements of ANSI/AWWA C550 and C116/A21.16.

- f) Adaptors, back-up rings and oversize sleeves shall be provided for transitions and connections to dissimilar types of pipe materials. All sleeve fittings shall be long mechanical joint.
- g) All fittings shall be American made.

7. Reuse Main Fitting Materials - 2-Inch and 3-Inch Diameter Pipe

- a) All pipe fittings 3 inches and under to be installed shall be molded fittings manufactured of the same material as the pipe and shall be suitable for either solvent weld or screwed connections. No fittings of other material shall be used.
- b) When connecting plastic to metal, male adaptors shall be used. The male adaptor shall be hand tightened, plus one turn with a strap wrench, screwed joint and shall be coated with Teflon tape.

8. Tracer Wire

- a) Tracer wire materials are described in Section VI, Underground Utility Location Systems.

9. Galvanic Cathodic Protection

a) Galvanic Anodes

- a. Each anode shall be furnished with a lead wire attached to one end of the steel core. The entire connection shall be insulated with an electrical potting compound. The cable attached to the anode shall be No. 12 AWG, Type TW or THWN solid, single conductor copper.
- b. Each anode shall conform to the following chemical composition:

Element	Percentage
Aluminum	0.010 Maximum
Manganese	0.50 to 1.30
Copper	0.02 Maximum
Nickel	0.001 Maximum
Zinc	0.05 Maximum
Iron	0.03 Maximum
Silicon	0.05 Maximum
Other	0.05 Each or 0.30 Maximum Total
Magnesium	Remainder

- c. The anode shall be prepackaged in a permeable cloth bag filled with a mixture of 75 percent ground hydrated gypsum, 20 percent powdered bentonite, and 5 percent anhydrous sodium sulfate.

a) Cables

- a. All cables for test stations shall be Type THWN, stranded, copper, size as shown on the plans.
- b. All cables for pipe joint bonds shall be Type HMW/PE, stranded, copper, sized in accordance with the design criteria.

10. Valve and Valve Housing

- a) All water valves shall have been manufactured in the year of construction or prior two calendar years.

b) Valve Housing

- a. Cast-iron screw type valve boxes shall be installed where indicated on underground valves. The cast-iron valve boxes shall be of either the two-piece or three-piece style and shall be furnished with a stay-put cover with raised letters indicating "Reclaimed Water". The shaft shall be 5 ¼" inside diameter.
- b. All valve box assemblies shall be furnished with a valve umbrella anchorage assembly. The valve umbrella anchorage shall be manufactured by Adaptor, Inc., Oak Crest, WI, or equivalent.
- c. Valve and irrigation boxes shall be rectangular and consist of molded high density polyethylene. Covers shall be overlapping and purple color for reuse system. Boxes shall be as manufactured by Dura or approved equal.

c) Gate Valves

- a. Valves shall be single disc, resilient seat valves meeting the requirements of AWWA C-509 and C-515. All valves shall be provided with a two-inch square operating nut opening counterclockwise and mechanical joint ends. Valves shall have stainless steel body bolts.

d) Ball Valves

- a. Ball valves shall be full port brass Red White Valve or approved equal.

e) Automatic Control Valves

- a. Automatic control valves shall be ICV-R series with Decoders as manufactured by Hunter.
- b. All 24-volt Decoder wiring shall be as recommended by the valve and controller manufacturer and shall conform to all electrical codes. All underground wire splices shall be installed with waterproof connectors and installed in valve boxes.

11. Automatic Controllers

- a) Automatic Controllers shall be X-Core Outdoor in weather-proof lockable stainless steel panel, with 12 stations as manufactured by Hunter. Each controller shall be mounted on 7-foot galvanized steel posts and located as shown on the plans. Controller may be battery or solar power if electric service is not readily available.

12. Restrained Joint Retainer Glands

- a) Mechanical joints shall be restrained using ductile iron clamps (series Ebaa Iron Inc. or equal) supplied with a sufficient number of bolts to restrain the working and test pressure.

13. Polyethylene Encasement

- a) The Contractor shall furnish and install polyethylene encasement for all non-plastic main and all appurtenances in accordance with the referenced specification.

D. Materials - Irrigation System

1. Pipe

- a) PVC pipe shall be Schedule 40, with 200 psi pressure classification. Standard size is 2 inch.
 - b) Polyethylene pipe shall be 100 psi pressure classification with standard fittings.
 - c) Funny pipe shall be standard ½” diameter.
2. Valves
- a) Mainline isolation valves shall be 1 ½” or 2” brass gate valves.
 - b) Zone valves shall be Hunter 1 ½” to 3” ICV-R valves for large zones and Hunter 1” ICV-R for small drip zones.
3. Fittings
- a) Saddles shall be Dawn Kwik Seal.
 - b) Clamps for polyethylene pipe shall be Crimp Oetiker 331 for 1” pipe and 425 for 1 ¼” pipe.
 - c) Stick sprays shall be Hunter parts.
4. Drip Zone System
- a) Drip pipe shall be NETAFIM with 12” spacing and rated for 1.0 gpm and with NETAFIM standard fittings.
 - b) Provide 40 psi pressure reducing valve.
 - c) Provide 100 micron 140 mesh filters.
5. Heads
- a) Large Areas - Hunter I-25 Commercial Rotors
 - b) Building Areas - Hunter PGP Ultra Series Rotors
 - c) Small Areas - Hunter PGJ Series Rotors
 - d) Flower and Planting Beds - 6”, 12” and 18” Hunter Pro-Spray
 - e) Nozzles for Popups - Hunter various
 - f) Small Rotors - Hunter RGJ210
6. Automatic Controller
- a) Automatic controllers shall be X-Core Outdoor in weatherproof lockable stainless steel panel with 12 stations as manufactured by Hunter. Each controller shall be mounted on 7-foot galvanized steel posts.
7. Flow Meter
- a) Flow meters for service connections from the distribution main to individual sprinkler systems shall be 1.5” T-10 turbine meter as manufactured by Neptune.
8. Meter Box
- a) Meters may be required to measure use volume.
 - b) Reuse water supplied by City-owned reuse system to private properties for irrigation shall be metered. Metering is not required for reuse water used on public properties.
 - c) Meter box shall consist of an above grade welded steel painted enclosure as

shown on Detail C-106. Enclosure shall have a hinged overlapping top for access with a pad lock hasp. Enclosure shall be attached to a base of 6-inch by 6-inch treated timbers. Enclosure shall be as manufactured by OEM Services in Green Isle, Minnesota.

E. Construction Requirements

1. Irrigation mains shall be placed with a minimum of 2.5 feet of cover over the top of the pipe.
2. The trench backfill shall be compacted to 100 percent of maximum proctor density for all street, sidewalk and parking lot areas. Turf areas may be compacted based on the Quality Compaction Method.
3. All buried ductile iron pipe, fittings and valves shall be encased in polyethylene.
4. Gate valves shall be installed at the following locations:
 - d) On all branches off mainline.
 - e) Approximately every 500 feet on mainline.
 - f) At downstream side of a mainline within a casing (i.e. under a road).
5. Irrigation mains shall have valves and blowoffs to allow blowing out water by use of compressed air.
6. Air release valves shall be placed at significant high points in the reuse mains.
7. A valved blowout shall be placed at the reuse supply main connections to individual irrigation systems.
8. Tracer wire shall be installed with all reuse mains 2-inch diameter and larger as described in Section VI, Underground Utility Location Systems.
9. Blocking and Anchoring of Pipe
 - a) A thrust block of cast-in-place concrete, which covers the installed fitting, is not permitted. Pre-cast concrete thrust blocks and other restraining devices such as adjustable rods or cables, shall be provided at all bends, tees, hydrants and plugged crosses or wherever the irrigation main changes direction or dead ends. Valves shall be tied to the nearest tee.
10. Auxiliary mainline stubs shall be provided at key points for possible future expansion.
11. All deviations from the specifications and any substitution of components must be approved by the City of Waconia Public Services prior to construction.
12. Construction of reuse distribution system mains shall comply with CEAM Specifications 2600 and 2611. Irrigation system components installation shall comply with the manufacturer's recommendations. Contractor shall follow all safety protocols.
13. Install water reuse distribution system in compliance with City of Waconia Standard Construction Details included in the Appendix.

F. Testing Requirements

1. Hydrostatic Testing
 - a) Provide temporary equipment for testing, including pump and gauges. Test piping system before insulation is installed wherever feasible and remove control devices before testing. Test each natural section of each piping

system independently, but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize to indicated pressure two hours.

- b) Test Pressure: 150 psi for a period of 2 hours.
- c) Observe each test section for leakage at end of test period. Test fails if leakage is observed or if pressure drop exceeds 5 percent of test pressure.
- d) If this test requirement cannot be met, the Contractor shall investigate the cause, make corrections, and retest until the pressure drop requirement can be met.

2. Electrical Conductivity Test

- a) Non-Conductive Pipe Materials - demonstrate the ability to locate the entire tracer wire system using a hand-held locating device. Locating shall be witnessed by the City of Waconia Public Services and the Engineer.

VI. UNDERGROUND UTILITY LOCATION SYSTEM

A. General

1. Summary

- a) This section covers the furnishing of all labor, materials, tools, equipment and performances of all work and services necessary or incidental to providing a system for location of underground utilities as indicated on the drawings or as specified herein.

2. Method of Measurement and Payment

- a) Payment for all work associated with the construction of the underground utility location system shall be incidental to the unit price bid for the utility associated with the system and no separate compensation will be granted, unless bid items are specifically identified in the bid form.

3. Submittals

- a) Submit the following items:
 - a. Complete catalog information, descriptive literature, specification, and identification of materials of construction.

B. Materials

1. Tracer Wire

- a) All wire shall be rated for direct burial use at 30 volts. The insulation color shall meet the APWA color code standard for identification of buried utilities (purple for reclaimed water). High density polyethylene (HDPE) insulation shall be ROHS compliant and utilize virgin grade material.
- b) Tracer wire for open cut trench installation shall be #12 AWG copper clad steel (CCS) wire with 30 mil HDPE insulation, as manufactured by Copperhead Industries, or approved equal.
- c) Tracer wire for directional drilling applications shall be #12 AWG Extra High Strength CCS wire with 45 mil HDPE insulation as manufactured by Copperhead Industries, or approved equal. The Contractor shall use a smaller wire gauge if increased breaking strength is needed.

- d) Tracer wire for pipe bursting, bore & jack or slip lining applications shall be SoloShot™ Xtreme tracer wire, 7 x 7 stranded CCS with 50 mil HDPE insulation, as manufactured by Copperhead Industries or approved equal.

2. Connectors

- a) Tracer wire connectors shall be filled with silicone waterproofing sealant suitable for direct bury applications according to UL 486D test standard.
- b) Where two wires are connected end to end along a continuous run, the connectors shall be DBSR Aqua as manufactured by King Innovation or approved equal.
- c) Where a tracer wire is branched off of the mainline tracer wire for a service or intersecting main, the connector shall be DryConn™ Direct Bury Lug Aqua as manufactured by King Innovation or approved equal.
- d) Where three wires are connected together, the connector shall be SnakeBite Connector as manufactured by Copperhead Industries, or approved equal. The mainline tracer wire shall not be cut to create a three-way splice.

3. At-Grade Access Boxes

- a) Tracer wire access boxes for at-grade installation shall be SnakePit as manufactured by Copperhead Industries, or approved equal. Covers shall be cast iron, with locking pentagon nut and appropriate labeling, and color coded purple for reclaimed water. Covers shall have two tracer wire terminals inside the cover, with a removable electrical shunt between the terminals.

4. Grounding Anodes

- a) Grounding anodes shall consist of a one-pound magnesium alloy anode rod, with approximate dimensions of 1.3-inches in diameter and 18-inches in length. The anode rod shall come preassembled with a PE cap and 12.0-feet of #14 AWG copper clad steel (CCS) wire with 30 mil high density polyethylene (HDPE) insulating jacket. The insulation shall be red or black in color.

C. Construction Requirements

1. Tracer Wire System Installation

- 2. Tracer wire shall be installed with all reuse mains and services in accordance with the details shown on the plans.

- a) The tracer wire along the main shall be installed in a continuous manner, without cutting or splicing the main wire at services and intersecting mains. Wire shall not be looped or coiled. The completed tracer wire system shall be fully sealed, with no exposed wire or connections.
- b) Wire damaged during installation must be repaired by removing the damaged wire and installing a new section of wire with approved connectors. Taping and/or spray coating is not an acceptable repair method.
- c) All service lateral or intersecting main tracer wires shall be a single wire, connected to the mainline wire using a main to lateral lug connector, installed without cutting or splicing the mainline wire.
- d) All exposed connections shall receive a coat of an approved bituminous

rust preventative material such as Carboline Bitumastic 50, or equal.

e) Tracer Wire at Irrigation Services

- a. At irrigation services, a single strand of tracer wire shall be connected to the main wire and installed along the service to the blowoff and connection box. A one-pound grounding anode rod shall be installed at the base of each box. Both the purple tracer wire and the black/red anode wire shall be extended to the ground surface inside the blowoff and connection box.

f) Tracer Wire at Connections to Existing Mains and Dead Ends

- a. Where connection is made to an existing main with an existing tracer wire, the tracer wires shall be connected. A grounding anode shall be connected to the tracer wires at the connection point.
- b. Where connection is made to an existing main without tracer wire, or where constructing a new dead end stub, or where connecting to an existing conductive pipe material, the tracer wire shall terminate at the end of the new main. Provide a grounding anode at the end of the tracer wire. Do not connect tracer wire to conductive mains.

g) Tracer Wire along Reuse Mains and Forcemains

- a. Provide tracer wire access boxes and grounding anodes at various locations along the reuse main and forcemain, as noted in the plans.

D. Testing Requirements

1. The Contractor shall demonstrate the ability to locate the entire tracer wire system using a handheld locating device. Locating shall be witnessed by Public Services and Engineer.

Appendix

A. Storm Water Reuse Ordinance

CITY OF WACONIA
ORDINANCE NO. _____

**AN ORDINANCE ADDING CHAPTER 415, STORM WATER REUSE, AND
AMENDING CHAPTER 1100, FEE SCHEDULE**

The City Council of the City of Waconia ordains:

FINDINGS AND PURPOSE

The City Council finds it is in the best interests of the City of Waconia and its residents to add Chapter 415 to the Waconia City Code addressing storm water reuse. In this regard, the City Council hereby adopts the specific findings and purposes set forth in Section 415.01 of Chapter 415, as set forth below. The City Council further finds it is appropriate to amend Chapter 1100 of the Waconia City Code to set forth the City fees associated with storm water reuse systems.

AMENDMENT ADDING CHAPTER 415, *STORM WATER REUSE*

The Waconia City Code is amended to add the following chapter:

CHAPTER 415
STORM WATER REUSE

415.01 Findings and Purposes.

The City of Waconia has an extensive storm water drainage system that includes storm pipe, holding ponds, drainage ways, infiltration basins and creeks to serve the needs of the community. The City Council finds that water conservation is a sustainable strategy that allows for population and economic growth while meeting the increased demands for water. Storm water reuse supports conservation and sustainability by reducing impacts on potable water used for irrigation and by supporting efforts for meeting increasingly stringent storm water requirements. As competition for water increases and supply becomes more uncertain, implementing conservation measures will help ensure the City's economic viability in the decades to come while preserving its environment.

Based upon the above findings, the City desires to install and operate storm water reuse systems where it is feasible to do so. Nearby property owners will be allowed to voluntarily connect to these systems to both drain storm water to designated ponds and to reuse collected storm water for irrigation.

To help defray the cost of establishing, constructing, repairing, replacing, maintaining, and improving storm water reuse systems within the City, the City Council finds it is appropriate to establish connection and consumption charges. The City Council further finds it is appropriate to levy such charges against the property owners using such systems.

415.02 Authority.

Connection and reoccurring charges shall be levied and assessed against benefiting properties pursuant to Minn. Stat. Sec. 444.075, Subd. 3, and pursuant to agreements with property owners voluntarily using storm water reuse systems. Further, the City Council finds that, although Minn. Stat. Sec. 444.075, Subd. 3b prohibits setting storm water charges based upon the volume of water used, this prohibition should be interpreted to only prohibit charging storm water rates based upon the volume of potable water supplied to a property through the City's waterworks system. As such, this prohibition does not prohibit charging property owners for recycled water based on volume of recycled water used.

415.03 Definitions.

The following terms, as used in this Chapter, shall have the meanings stated in this section:

"Chapter 415" means this Chapter 415 of the Waconia City Code, as amended.

"Delivery point" means the primary irrigation box for an owner's irrigation system.

"Drainage and reuse agreement" means a written agreement between the City and an owner that controls, subject to this Chapter 415, the owner's use of the system and grants appropriate easements to facilitate such use.

"Irrigation season" means, regarding each calendar year, the period starting on the day the City first provides reuse water to the delivery point for use on an owner's parcel and ending on the day that the City terminates the delivery of reuse water to the delivery point. Subject to weather conditions, each irrigation season will generally start in early April and end in late October.

"Owner" means the owner of fee simple title to a parcel, whether by sale, assignment, inheritance, operation of law, trustee's sale, foreclosure, or otherwise, but not including the holder of any lien or encumbrance on such parcel unless such holder becomes a fee simple owner thereof.

"Owner's irrigation improvements" means the facilities and apparatus installed, maintained and operated on an owner's parcel to disperse reuse water on such parcel for landscape irrigation uses.

"Parcel" means a parcel of real property.

"Public Services Director" means the person acting as the public services director for the City, however titled, or such person's designee.

“Public Services Department” means the department of the City overseeing waterworks and storm water facilities, however designated.

“Reuse water” means moderately treated storm water. If at any time the City does not have enough moderately treated storm water to meet the City’s obligations, then the City may substitute other water of at least equal quality (e.g., potable water) in lieu of moderately treated storm water and all references to reuse water shall be deemed to include the substituted water.

“System” means the pressurized pumps, pumping systems, distribution systems, and water treatment units maintained and operated by the City for the purpose of delivering reuse water from a storm water retention pond to parcels of real property connected to the system for landscape irrigation uses, as the same may be modified, reconstructed, replaced or improved from time to time.

415.04 Systems.

Subd. 1 Establishment of Systems. The City may, from time to time, establish systems and determine the parcels eligible to connect to such systems. The City may add a system by amending this ordinance to list the system and the parcels eligible to connect to such system in Subd. 6 below.

Subd. 2 Public Utility. Each system shall be owned, operated and maintained by the City and operated as a public utility pursuant to Minnesota Statutes Section 444.075 et. seq. and this Chapter 415. Each system shall be under the administrative oversight of the Public Services Director. All revenues shall be derived subject to the provisions of Minnesota Statutes, this Chapter 415 and the agreements between the City and each owner. All systems will be designed and monitored to meet filtration development requirements as established by agreement between the City and the Carver County Water Management Organization.

Subd. 3 Availability of Systems. Each system shall be generally available during each irrigation season. The City reserves the right to determine when a system is available and when weather dictates the system should be connected and disconnected for the irrigation season. The City shall provide written notice to all owners prior to system start-up and shut-down each year. The City Council may, by resolution, regulate, restrict, or limit the use of reuse water during water shortage periods and shall have the power to enact any necessary regulations, as circumstances may require, to protect the City’s water supply.

Subd. 4 Minimum and Maximum Reuse Water Volumes. Each owner connecting a parcel to a system shall be informed, as part of the application process described in Section 416.06 below, of the minimum and maximum reuse water volume amounts applicable to the parcel. During each day of the irrigation season, the parcel will be required to consume not less than the minimum volume, subject to abatement as described in the drainage and reuse agreement for the parcel. Such volume amounts shall be calculated based upon the size of the parcel by the Public Services Director and memorialized in the drainage and reuse agreement for the parcel.

Subd. 5 Owner's Irrigation Improvements. The City will deliver reuse water to a single delivery point on each parcel connected to the system. Owner's irrigation improvements shall be installed at owner's expense and shall have the capacity to meter and disburse not less than the maximum volume of reuse water assigned to the owner's parcel. Each meter shall be approved by the Public Services Director before it is installed. Frost protection of Owner's irrigation improvements must be coordinated with the Public Services Director annually each season prior to winter.

Subd. 6 List of Approved Systems.

A. 10th Street Regional Pond System. The 10th Street Regional Pond System has a pond located on real property legally described as Outlot B, Sudheimer Homestead Addition, Carver County, Minnesota. In addition, there is an associated pump house located on real property legally described as Outlot B, Sudheimer Retail Addition, Carver County, Minnesota. Owners of the following parcels may voluntarily connect to this system:

PARCEL ID NUMBER	WACONIA ADDRESS
750235200	10594 10 th Street West
750235100	10590 10 th Street West
753080010	10610 10 th Street West
753080020	10600 10 th Street West
754630030	(Sudheimer Homestead Addn.)
754630010	10451 10 th Street West
752560040	10550 10 th Street West

The parcels listed above and their owners shall not acquire any rights regarding the 10th Street Regional Pond System until a drainage and reuse agreement is fully executed by the City and the parcel owner. As such, the City may amend this ordinance to remove any parcel from the list of eligible parcels if such an agreement does not exist. Further, the City may amend this ordinance to add any parcel to the eligible list of parcels notwithstanding the existence of drainage and reuse agreements with other parcel owners. If a parcel listed above is subdivided, the provisions of any drainage and reuse agreement for the parcel shall control.

Subd. 7 Conditions and Prohibitions Regarding Use of Systems.

A. No owner or other person shall waste or allow any reuse water to be wasted by improperly maintained facilities (i.e., valves, leaky joints or pipes). Additionally, reuse water shall not be wasted by allowing reuse water to run

continuously from faucets, broken pipes or sprinkler heads or other apparatus, or to use the reuse water in such a manner as to cause it to overflow into the neighboring properties, streets, or sidewalks.

- B. No owner or other person shall, after a parcel has been shut off for non-payment of charges or for violation of City Code, turn on or allow reuse water to be turned on or used without authorization from the Public Services Director.
- C. No owner or other person shall destroy, deface, injure, or interfere with the operation of any part of the system.
- D. No owner or other person shall place or introduce into the system (or any source of reuse water utilized as part of the system) any matter, substance, chemical, or compound without express authorization from the Public Services Director.
- E. No owner or other person shall connect any part of the system to any part of any drinking water (potable) system, creating a cross-connection whereby reuse water could be introduced into any system that provides potable drinking water.
- F. No owner or other person shall use reuse water from the system for flood irrigating any parcel unless the Public Services Director has granted prior authorization in writing. Except for incidental watering of shrubs, flowers, and other limited use applications, reuse water from the system used for landscape irrigation must be applied through either a sprinkler or drip irrigation system, including sprinklers attached to garden hoses.
- G. No owner or other person shall permit any person to use or obtain reuse water intended for one parcel for another parcel.
- H. No owner or other person shall terminate a connection to a system without the Public Services Director's consent.
- I. No owner or other person, except under the direction of the Public Services Director, shall be allowed to dig into the street, sidewalk, or other public property or right-of-way for the purpose of laying, removing, or repairing the system service pipe.
- J. No owner or other person shall use reuse water to drive any motor, siphon, turbine, wheel, hydraulic engine, elevator, or other machinery of any kind.
- K. Properties located outside the City limits are not allowed to connect to any system.

415.05 Charges.

Charges for connecting to a system and charges for reuse water consumed shall be determined by resolution of the City Council upon advice of the Public Services Director and other City staff and shall be set forth in Chapter 1100 of the Code.

Connection charges shall be payable in full with building permits, unless agreed otherwise by the owner and the City. Charges for reuse water consumed shall be collected in conjunction with other City utility charges. All fees shall be just and equitable and in accordance with Minnesota Statutes Section 444.075, et seq.

415.06 Process.

Subd. 1 Eligibility. If a parcel is listed in Section 415.04, Subd. 6, above, the owner of such parcel may apply to connect the parcel to the applicable system.

Subd. 2 Application and Inspection. Each application must be made at City Hall. After the City confirms that the parcel has access to the applicable system, the applicant must schedule an inspection with the Public Services Department. Upon determination that the subject parcel has owner's irrigation improvements installed and that such improvements are compatible with the system, the applicant must pay the connection charge pursuant to Section 415.05 above.

Subd. 3 Connection. Upon completion of the requirements herein to the City's satisfaction, the Public Services Department shall issue a permit and connect the applicant's parcel to the system. The Public Services Department shall not issue a permit until the required compliance documents and any required fees have been paid as established under Chapter 1100 of the Code.

Subd. 4 Multiple Connections. Eligible owners who desire to connect additional, secondary irrigation improvements to a system shall do the following:

- A. Complete the installation permit form and pay applicable fees;
- B. Schedule an initial inspection with the Public Services Department;
- C. Upon approval from the Public Services Director, enter into an amendment to the applicable drainage and reuse agreement for the parcel documenting the addition of the additional irrigation improvements;
- D. Disconnect the applicable irrigation improvements from the potable line and connect them to the system;
- E. Fill in the old stop and waste access pipe with concrete and ensure the new opening is within the immediate area so that the connection is visible for final inspection; and
- F. Schedule final inspection with the Public Services Department and receive final approval once all requirements have been met.

415.07 Penalties.

Any party who damages or misuses a system, impedes the function of a system or otherwise fails to comply with this Chapter 415 shall be guilty of a petty misdemeanor.

415.08 Appeal.

Any person or entity reporting to be unfairly dealt with, suffering any hardship, or otherwise aggrieved by the provisions of this Chapter 415 shall be entitled to appeal to the City Council, which shall have the power to resolve any hardships or grievances under any of the provisions hereof.

AMENDMENT REVISING CHAPTER 1100, FEE SCHEDULE

Chapter 1100, *Fee Schedule*, of the Waconia City Code is amended to add the following provisions:

Department	Fee Description	Current Rate	Unit	Related Code	Additional Information
Storm Water	Reuse Connection Charge	See Additional Information column	Unit	415	60% of owner's estimated cost, as calculated by the City Engineer, to construct all on-site water quality and filtration improvements that would be required if owner's parcel did not connect to the reuse system <i>plus</i> 100% of the City's estimated cost, as calculated by the City Engineer, to construct all improvements necessary to connect owner's parcel to the reuse system.
Storm Water	Reuse Water Charge	\$2.50	Per 1,000	415	

SUMMARY

The following official summary of Ordinance No. ____ has been approved by a four-fifths vote of the City Council of the City of Waconia as clearly informing the public of the intent and effect of the Ordinance:

The ordinance is titled as follows: *AN ORDINANCE ADDING CHAPTER 415, STORM WATER REUSE, AND AMENDING CHAPTER 1100, FEE SCHEDULE* and it amends the Waconia City Code as described below.

The ordinance adds Chapter 415, *Storm Water Reuse*, as a new chapter. Chapter 415 contains the following major sections:

- 415.01 *Policy and Purpose*, which sets forth the findings and purposes supporting adoption of the ordinance. Among other things, the City Council finds that water conservation is a sustainable strategy that allows for population and economic growth while meeting increased demands for water. As such, the City Council finds that it is desirable to install and operate storm water reuse systems when it is feasible to do so.
- 415.02 *Authority*, which provides that connection and reoccurring charges shall be levied and assessed against benefiting properties pursuant to Minn. Stat. Sec. 444.075, Subd. 3, and pursuant to agreements with property owners voluntarily using the systems.
- 415.03 *Definitions*, which defines certain terms used in the ordinance.
- 415.04 *Systems*, which provides that the City may establish storm water reuse systems and designate properties that are eligible to connect to such systems on a voluntary basis. This section also provides that such systems shall be operated as public utilities that will be available to provide reuse water to designated properties for irrigation purposes. This section further lists the 10th Street Regional Pond System as the first storm water reuse system. The properties initially eligible to connect to the 10th Street Regional Pond System are as follows:

PARCEL ID NUMBER	WACONIA ADDRESS
750235200	10594 10 th Street West
750235100	10590 10 th Street West
753080010	10610 10 th Street West
753080020	10600 10 th Street West
754630030	(Sudheimer Homestead Addn.)
754630010	10451 10 th Street West
752560040	10550 10 th Street West

This section also lists various conditions and prohibitions that apply regarding properties connected to a storm water reuse system.

- 415.05 *Charges*, which provides that charges for connecting to a storm water reuse system and charges for reuse water consumed shall be determined by resolution of the City Council upon advice of the Public Services Director and other City staff and shall be set forth in Chapter 1100 of the Waconia

City Code. This section also addresses the payment and collection of applicable charges.

- 415.06 *Process*, which sets forth the application process for connecting to a storm water reuse system and describes required inspections. This section also addresses applications for secondary connections.
- 415.07 *Penalties*, which provides that any party who damages or misuses a storm water reuse system, impedes the function of a system or otherwise fails to comply with this Chapter 415 shall be guilty of a petty misdemeanor.
- 415.08 *Appeal*, which provides that any person or entity reporting to be unfairly dealt with, suffering any hardship, or otherwise aggrieved by the provisions of Chapter 415 shall be entitled to appeal to the City Council, which shall have the power to resolve any hardships or grievances.

The ordinance also amends Chapter 1100, *Fee Schedule*, to include a storm water reuse connection charge and a consumption charge. The connection charge has initially been set as a one-time fee equal to: i) 60% of owner's estimated cost, as calculated by the City Engineer, to construct all on-site water quality and filtration improvements that would be required if owner's parcel did not connect to the reuse system, *plus* ii) 100% of the City's estimated cost, as calculated by the City Engineer, to construct all improvements necessary to connect owner's parcel to the reuse system. The storm water reuse consumption charge has initially been set at \$2.50 per 1,000 gallons of water used.

The full text of the ordinance is available for public inspection during regular office hours at the office of the City Clerk, 201 South Vine Street, Waconia, and at the Waconia Public Services Building, 310 10th Street East, Waconia. Further, any person may request the City to send the full text of the ordinance via standard or electronic mail by calling City Hall at (952) 442-2184.

EFFECTIVE DATE

This ordinance is effective upon publication.

Passed and adopted by the City Council of the City of Waconia this 1st day of May, 2017.

James P. Sanborn, Mayor

ATTEST: _____
Susan MH Arntz, City Administrator

M/ _____ Ayers _____
Bloudek _____
S/ _____ Carrier _____
Erickson _____
Sanborn _____

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B. Storm Water Drainage and Reuse Agreement

AGREEMENT FORM – VERSION 05-12-2020

Document Preparation Checklist:

- Obtain vesting deed for the property at issue from the fee title owner. This is the deed provided to the owner when the owner obtained title to the property. If the owner does not have a copy of the vesting deed, ask the City Attorney to obtain a copy from Carver County records.*
 - Provide the vesting deed to the City Attorney and ask the City Attorney to order an Owner and Encumbrance Report (O&E Report) for the property. The O&E Report is prepared by a third-party abstractor and requires time – proceed to next steps while waiting for report.*
 - Insert the owner’s name and entity type (e.g., Minnesota limited liability company or Minnesota corporation) from the vesting deed into the introductory paragraph (page 1) and on the owner’s signature page (page 15). If the owner is an individual, a married couple, or a group of people, then use the owner name[s] and, if applicable, marital status designation from the vesting deed. Copy vesting deed language exactly.*
 - Insert the legal description for the owner’s property into Recital C exactly as the legal description appears on the vesting deed.*
 - Insert applicable water, green space and date information into Sections 1, 3.3, and 3.4.*
 - Insert owner’s name and address information into Section 11.1.*
 - Insert applicable diagrams as Exhibits A, B and C, following the exhibit specific instructions.*
 - After all information has been inserted, delete this checklist from the top of the draft document and provide it to the City Attorney. The City Attorney will confirm the document is in recordable form and attach any required lender consents.*
 - After the City Attorney approves the draft document and attaches any required consents, obtain City Council approval (if required under the circumstances), City signatures, owner signature[s] and, if applicable, lender signatures.*
 - Confirm all signatures have been notarized.*
 - Return fully executed document to the City Attorney to submit for recording.*
-

STORM WATER DRAINAGE AND REUSE AGREEMENT

This Storm Water Drainage and Reuse Agreement is dated [insert date], (the “Effective Date”) and is between the City of Waconia, a Minnesota municipal corporation (the “City”) and [insert name[s] of owner, a [insert state where owner entity was organized] [insert type of entity] (“Current Owner”).

RECITALS

- A. The City has constructed a storm water retention pond known as the “10th Street Storm Water Regional Pond” on real property legally described as follows:
- Outlot B, SUDHEIMER HOMESTEAD ADDITION, Carver County, Minnesota
(the “**Pond Parcel**”).
- B. Further, the City has installed, or will install, a System (defined below) to deliver storm water from such pond to certain parcels of real property for landscape irrigation uses. As part of the System, the City will install a pump house on the real property legally described as follows:
- Outlot B, SUDHEIMER RETAIL ADDITION, Carver County, Minnesota
(the “**Pump House Parcel**”).
- C. The Current Owner holds fee simple title to a parcel of real property legally described as follows:
- [insert legal description from vesting deed]**
(“**Owner’s Parcel**”).
- D. The Pond Parcel, the Pump House Parcel and Owner’s Parcel are collectively referred to in this agreement as the “**Parcels.**”
- E. Chapter 415 of the Waconia City Code addresses pressurized storm water reuse systems. Pursuant to Chapter 415, certain parcels of real property may connect to the above-described pond and the System for storm water drainage and landscape irrigation purposes if the requirements of Chapter 415 are met. Owner’s Parcel is listed in Chapter 415 as a parcel of real property that may voluntarily connect.
- F. After evaluating the costs and benefits associated possible storm water management options, Current Owner desires to voluntarily subject Owner’s Parcel to the requirements of Chapter 415 and this agreement.
- G. The City and Current Owner have entered into this agreement to memorialize their agreements regarding the matters set forth below.

AGREEMENTS

NOW, THEREFORE, in consideration of mutual obligations contained herein, the City and Current Owner agree the Parcels and all present and future owners and occupants of the Parcels shall be and hereby are subject to the terms, covenants, easements, restrictions and conditions set forth below:

1. **Definitions.**

“**Chapter 415**” means Chapter 415 of the Waconia City Code, as amended, renumbered and re-codified from time to time.

“Code” means the Waconia City Code, as amended, renumbered and re-codified from time to time.

“Delivery Commencement Date” means the date the City first makes Reuse Water available at the Delivery Point.

“Delivery Point” means the primary irrigation box for Owner’s Irrigation Improvements, the location of which is depicted on attached Exhibit A.

“Green Space” means pervious area covered with grass, shrubs, trees or other vegetation.

“Hard Space” means area that is paved or cannot otherwise be irrigated with sprinkler or drip irrigation, excluding any area on which a building or some other structure has been constructed.

“Irrigation Season” means, regarding each calendar year, the period starting on the day the City first provides Reuse Water to the Delivery Point for disbursement onto Owner’s Green Space and ending on the day that the City terminates the delivery of Reuse Water to the Delivery Point. Subject to weather conditions, each irrigation season will generally start in early April and end in late October.

“Maximum Volume” means [insert number] inches of water applied to Owner’s Green Space per week, which is estimated to equal approximately [insert number] U.S. gallons per day.

“Minimum Volume” means [insert number] inches of water applied to Owner’s Green Space per week, which is estimated to equal approximately [insert number] U.S. gallons per day.

“Natural State” means a wild, primitive state untouched by civilization or, in the case of restoration, a state substantially similar thereto.

“Open Space” means the aggregate of all Green Space and Hard Space.

“Owner” means Current Owner and all successors and assigns of Current Owner as the owner of fee simple title to all or any portion of Owner’s Parcel, whether by sale, assignment, inheritance, operation of law, trustee’s sale, foreclosure, or otherwise, but not including the holder of any lien or encumbrance on Owner’s Parcel unless such holder becomes a fee simple owner of Owner’s Parcel.

“Owner’s Green Space” means approximately [insert number] square feet of Green Space on Owner’s Parcel, as depicted on the diagram attached as Exhibit B.

“Owner’s Open Space” means the Open Space on Owner’s Parcel, as depicted on the site plan attached as Exhibit C.

“Owner’s Irrigation Improvements” means the facilities and apparatus installed, maintained and operated on Owner’s Parcel to meter and disperse Reuse Water on Owner’s Green Space using sprinklers and/or drip irrigation.

“Permittees” means the tenant(s), subtenant(s) or occupant(s) of Owner’s Parcel and the respective employees, agents, contractors, customers, invitees and licensees of such parties and Owner.

“Pond” means the 10th Street Storm Water Regional Pond that has been constructed on the Pond Parcel, as the same may be modified and reconstructed.

“Reuse Water” means moderately treated storm water. If at any time the City does not have enough moderately treated storm water to meet the City’s obligations under this agreement, then the City may substitute other water of at least equal quality (e.g., potable water) and all references to Reuse Water shall be deemed to include the substituted water.

“System” means the pressurized pumps, pumping systems, pipes, distribution systems, and water treatment units maintained and operated by the City for the purpose of delivering Reuse Water from the Pond to certain parcels of real property for landscape irrigation uses, as the same may be modified, reconstructed, replaced or improved from time to time. Without limiting the general nature of the proceeding sentence, all improvements installed and maintained on the Pond Parcel and the Pump House Parcel shall be deemed part of the System.

Additional terms are defined in the introductory paragraph, the recitals and later in this agreement. All defined terms, when capitalized, shall have the meanings ascribed to them unless the context clearly requires otherwise.

2. **Storm Water Drainage from Owner’s Parcel to the Pond Parcel.**

- 2.1. **Pond Drainage Easement.** Subject to the conditions, limitations and reservations contained in this agreement, the City hereby grants Owner a nonexclusive, perpetual easement to drain storm water from Owner’s Parcel into the Pond (the **“Pond Drainage Easement”**). Such easement is an appurtenant easement that benefits Owner’s Parcel and burdens the Pond Parcel. Except for the drainage of storm water as described above, the Pond Drainage Easement does not grant Owner any rights to enter onto or possess any portion of the Pond Parcel.
- 2.2. **Conveyance of Storm Water.** Owner’s Parcel and the Pond Parcel are not contiguous. As such, the City agrees to provide and maintain facilities sufficient to convey storm water from Owner’s Parcel to the Pond Parcel using public drainage easements and right-of-way. The City shall determine, in its discretion, the nature and location of such facilities and the City may, from time to time, reconstruct, replace and relocate such facilities as the City desires. Further, the City shall determine, in its discretion, where the catch basin(s) for such facilities will be located to capture storm water drainage from Owner’s Parcel. Owner, at Owner’s sole expense, shall direct all storm water drainage from Owner’s Parcel to such catch basin(s). Notwithstanding anything in this agreement to the contrary, the City has not granted any ownership or easement rights to Owner regarding any

public drainage easements and right-of-way used by the City to meet its obligations under this Section 2.2 and Owner shall not claim any such rights.

- 2.3. **Maintenance and Repair of Pond.** Subject to Owner's obligations under this Agreement, the City shall maintain the Pond in good condition and repair.
- 2.4. **Payment of Storm Water Fees.** Regarding Owner's Parcel, Owner shall timely pay all fees required by the Code for discharge, drainage, detention and retention of storm water runoff. Owner acknowledges that it has reviewed an initial estimate of such fees prior to executing this agreement. These fees are in addition to any storm water reuse fees described in Section 3 below.

3. **Storm Water Reuse.**

- 3.1. **Green Space Easement.** Subject to the conditions, limitations and reservations contained in this agreement, Owner hereby grants the City and its successors and assigns an in gross easement under, across and over Owner's Green Space (the "**Green Space Easement**") for the following purposes: i) disbursing Reuse Water onto Owner's Green Space; and ii) examining Owner's Irrigation Improvements to ascertain the manner in which Reuse Water is being used, the quantity of Reuse Water being used, and any other information regarding Owner's Green Space, the System, Owner's Irrigation Improvements or Reuse Water that the City deems pertinent. Owner shall not use Owner's Green Space for any purpose that will interfere with the rights and uses granted by the Green Space Easement. The Green Space Easement shall exist as a commercial in gross easement that is perpetual, irrevocable, and assignable. While exercising its rights under the Green Space Easement, the City shall not unreasonably interfere with any business being conducted on Owner's Parcel by Owner or Permittees.
- 3.2. **Delivery Point Easement.** Subject to the conditions, limitations and reservations contained in this agreement, Owner hereby grants the City and its successors and assigns an in gross easement under, across and over Owner's Open Space (the "**Delivery Point Easement**") for the purposes of installing, maintaining, repairing and replacing pipes and apparatus to deliver Reuse Water to the Delivery Point. Owner shall not use Owner's Open Space for any purpose that will interfere with the rights and uses granted by the Delivery Point Easement. Such Delivery Point Easement shall exist as a commercial in gross easement that is perpetual, irrevocable, and assignable. While exercising its rights under the Delivery Point Easement, the City shall not unreasonably interfere with any business being conducted on Owner's Parcel by Owner or Permittees.
- 3.3. **Owner's Green Space Improvements.** Owner, at its expense, shall design and install landscaping improvements on Owner's Green Space as required by the Code or any applicable Development Agreement. Owner shall complete the construction of such landscaping improvements by no later than [insert date]. Thereafter, Owner shall, at its expense, keep all such landscaping improvements in good condition and repair (and install replacements when necessary).

- 3.4. **Owner's Irrigation Improvements.** Owner, at its expense, shall design and construct Owner's Irrigation Improvements in a manner capable of disbursing the Maximum Volume of Reuse Water onto Owner's Green Space each day during the Irrigation Season. Owner shall complete the construction of Owner's Irrigation Improvements by no later than [insert date]. Thereafter, Owner shall, at its expense, keep Owner's Irrigation Improvements in good condition and repair (and install replacements when necessary). Owner shall not excavate or otherwise attempt to enter upon City streets, parking strips, sidewalks, or other public right-of-way to lay, remove or repair Owner's Irrigation Improvements nor allow any Permittees to do so.
- 3.5. **Meter.** As part of Owner's Irrigation Improvements, Owner shall install and maintain a meter capable of measuring, in U.S. gallons, the volume of Reuse Water used on Owner's Green Space. The initial meter installed by Owner and any replacement meters are subject to the City's prior approval.
- 3.6. **City's Delivery of Reuse Water.** Commencing on the Delivery Commencement Date, the City shall make Reuse Water available at the Delivery Point for use on Owner's Green Space during each Irrigation Season, subject to the following:
- 3.6.1 **Volume Control.** The City shall have exclusive control over the volume of Reuse Water delivered to Owner's Green Space. *For example, The City may vary the volume of Reuse Water delivered to meet Carver County volume control and water quality requirements.* Except as provided in Section 3.6.2 below, the City shall use commercially reasonable efforts to deliver no less than the Minimum Volume of Reuse Water each day during an Irrigation Season.
- 3.6.2 **Interruption.** The City does not warrant continuous service. Any interruption in the City's delivery of Reuse Water to Owner's Green Space during an Irrigation Season ("**Interruption**") shall not be deemed a breach of this agreement by the City nor render the City liable to Owner for damages. During any period of Interruption, however, Owner's obligation to consume Reuse Water under Section 3.7 below shall abate until service is restored by the City. Further, the following provisions shall apply, as applicable:
- 3.6.2.1. **Involuntary.** In the event of an involuntary Interruption, the City shall make commercially reasonable efforts to restore service once it becomes aware of the Interruption. If Owner becomes aware of any Interruption (excepting any voluntary interruption pursuant to Section 3.6.2.2 below), Owner shall give the City prompt, written notice of the Interruption.
- 3.6.2.2. **Voluntary.** The City may, at any time, modify or suspend the delivery of Reuse Water to Owner's Green Space: i) to make repairs, modifications, replacements and improvements to the

System; or ii) if the City determines that Reuse Water usage needs to be scheduled, restricted or otherwise limited due to demands on the System caused by drought, mechanical failure or other reasons.

- 3.7. **Owner's Use of Reuse Water.** Owner shall fully comply with the following requirements:
- 3.7.1 **No Assignment.** Reuse Water delivered to the Delivery Point shall only be used to irrigate Owner's Green Space and for no other purpose. Owner shall not allow any other person or property owner to use such Reuse Water.
 - 3.7.2 **No Contamination.** Owner shall not connect any part of Owner's Irrigation Improvements to any part of the City's potable water system. Owner shall not place or introduce into the System any matter, substance, chemical, or compound without written authorization from the City.
 - 3.7.3 **No Waste.** Owner shall not waste Reuse Water or allow it to be wasted by Permittees or improperly maintained facilities (*e.g., valves, joints or pipes*). Flood irrigation using Reuse Water is prohibited unless authorized by the City in writing.
 - 3.7.4 **No Interference.** Unless the City and Owner agree to the contrary, confirmed in writing, the City shall turn the delivery of Reuse Water on and off at the Deliver Point each Irrigation Season. As such, Owner shall not turn Reuse Water on or off at the Deliver Point nor allow any Permittee to do so unless the above-described agreement has been reached.
 - 3.7.5 **No Destruction.** Owner shall not destroy, deface, injure, or interfere with the operation of any part of the System.
 - 3.7.6 **No Improper Use.** Owner shall not use nor allow any Permittee to use Reuse Water to drive or propel any motor, siphon, turbine, wheel, hydraulic engine, elevator, or other machinery of any kind.
- 3.8. **Water Quality Disclaimer and Signage.** Owner acknowledges that Reuse Water will have only limited treatment or chemical modification. Owner shall not use or allow any Permittees to use Reuse Water for potable or consumptive use. Owner shall place no less than four (4) signs on Owner's Parcel providing notice to Permittees and the public of such restrictions.
- 3.9. **Connection Charge.** Owner shall pay the City a connection charge ("**Connection Charge**") to connect Owner's Irrigation Improvements to the System equal to:
- 60% of Owner's estimated cost, as calculated by the City Engineer, to construct the on-site water quality and filtration improvements that would be required if Owner's Parcel was not connected to the System;
- plus*

100% of the City's estimated cost, as calculated by the City Engineer, to construct all improvements necessary to connect Owner's Parcel to the System.

Owner acknowledges and agrees the Connection Charge is fair and equitable. The Connection Charge is due and payable within 10 days after the City approves connection to the System. If Owner fails to timely pay the Connection Charge, the City may immediately terminate this agreement upon written notice to Owner. If termination occurs, the City shall have no obligation to connect Owner's Parcel to the System and Owner shall address all storm water drainage requirements on-site in full compliance with Applicable Storm Water Laws (defined in Section 4.1.2 below).

3.10. **Reoccurring Charges.** The City shall bill Owner for all Reuse Water consumed regarding Owner's Green Space pursuant to Chapter 415, subject to the following requirements:

3.10.1 **Rate.** The initial Water Reuse rate shall be \$2.50 for each 1,000 U.S. gallons of Reuse Water consumed. This rate may be unilaterally adjusted by the City, from time to time, in a fair and equitable manner.

3.10.2 **Invoices.** Owner shall pay each invoice for Reuse Water consumption as required by Chapter 415.

3.10.3 **Minimum Volume Requirement.** If on any day during an Irrigation Season the Minimum Volume of Reuse Water is not disbursed on Owner's Green Space because Owner's Irrigation Improvements are incapable of disbursing such amount, then the charge for such day shall equal the charge that would have applied had the Minimum Volume of Reuse Water been disbursed (subject to abatement pursuant to Section 3.6.2 above).

3.10.4 **Maximum Volume Limitation.** If on any day during an Irrigation Season the City disburses more than the Maximum Volume of Reuse Water on Owner's Green Space, then the charge for such day shall equal the charge that would have applied had the Maximum Volume been disbursed.

4. Remedies and Enforcement.

4.1. **Breach by Owner.** If Owner breaches this agreement and fails to cure such breach within 10 days of the date that the City gives Owner notice of such breach, then the City may enforce any of the following remedies (or any combination thereof):

4.1.1 **Suspension.** The City may suspend Reuse Water service to Owner's Parcel.

4.1.2 **Termination.** The City may terminate this agreement and the easements contained herein, in which event Owner shall reconfigure and reconstruct Owner's Parcel to fully comply with Applicable Storm Water Laws using on-site solutions located solely on Owner's Parcel (*e.g., holding ponds, rain gardens, amended soils, and runoff controls*). For purposes of this

agreement, “**Applicable Storm Water Laws**” means laws, regulations, ordinances and governmental orders, directives and policies regarding storm water and the drainage, retention and treatment thereof.

4.1.3 **Collection of Delinquent Charges.** If the breach relates to any amount past due, the City may treat such amount as a delinquent utility charge under the Code. Without limiting the general nature of the immediately preceding sentence, Owner specifically agrees the City may assess Owner’s Parcel for all delinquent charges.

4.1.4 **Self Help.** If Owner fails to install or maintain Owner’s Irrigation Improvements as required by this agreement or Chapter 415, the City may enter onto Owner’s Parcel for the purposes of curing such breach at Owner’s expense (and Owner hereby grants the City a temporary easement for making such entry). Owner shall reimburse the City for any costs incurred by the City in exercising its rights under this Section 4.1.4. Any such reimbursement shall be due and payable 10 days after the City gives Owner notice of its reimbursement request.

4.1.5 **Other Legal and Equitable Remedies.** In addition to the above, the City may seek any other remedy available at law or in equity including, but not limited to, damages, specific performance and injunctive relief.

4.2. **Breach by the City.** If the City breaches this agreement and fails to cure such breach within 10 days of the date that Owner gives the City notice of such breach, then Owner may seek any remedy available at law or in equity.

4.3. **Ordinance Violation.** Any violation of Chapter 415 or any other provision of the Code may result in civil or criminal penalties pursuant to Code in addition to any remedies available to the City pursuant to this agreement.

5. **Warranties and Liability Limitations.** Except as expressly provided in this agreement to the contrary, the City makes no warranty, express or implied, with respect to the System and the City specifically disclaims any warranty of merchantability and of fitness for a particular purpose. Notwithstanding anything in this agreement to the contrary, the City shall not be liable for any damage or injury to vegetation caused by Reuse Water or for any damage or injury caused by a person ingesting Reuse Water. Further, notwithstanding anything in this agreement to the contrary, neither party shall be liable to the other for consequential, special or exemplary damages. Moreover, nothing in this this agreement shall be construed as waiving or altering any immunity afforded the City or any liability limitations applicable to the City. The provisions of this Section 5 shall survive the expiration or earlier termination of this agreement.

6. **Chapter 415.** To the extent any provision of this agreement conflicts with any provision of Chapter 415, Chapter 415 shall control.

7. **Subdivision.** Owner agrees that Owner shall not subdivide Owner's Parcel without the City's consent. The City may condition any such consent on the owners of the resulting parcels entering new agreements for each resulting parcel that are substantially similar to this agreement. The City may further require reimbursement of all costs incurred by the City regarding reconfiguration of the System to accommodate the subdivision request. All such conditions and similar conditions shall be deemed reasonable.
8. **Mortgagees.** Owner shall cause each mortgagee holding a mortgage on Owner's Parcel as of the Effective Date to subordinate its mortgage to this agreement using a recordable document approved by the City and recorded against Owner's Parcel at Owner's expense.
9. **Change in Laws.** If any law is enacted or becomes effective, any regulation is promulgated or becomes effective, any court or administrative agency decision is rendered, any administrative agency interpretation is issued, or any similar action is taken which, in the City's reasonable opinion, is likely to cause any of this agreement's provisions to be in violation of any such law, regulation, decision, interpretation or similar action, then the parties will use their best efforts, proceeding with dispatch and without unnecessary delay, to reform this agreement so as to achieve, as nearly as possible, the original goals of the parties to this agreement without the risk of such violation.
10. **Termination.** This agreement may only be terminated under the following circumstances:
 - 10.1. **Agreement.** The agreement shall terminate if the City and Owner agree to terminate the agreement.
 - 10.2. **Breach.** This agreement shall terminate if the City exercises its right to terminate this agreement based on Owner's breach as described in Section 4.1.2.
 - 10.3. **Restoration of Owner's Parcel to its Natural State.** Owner may unilaterally terminate the agreement if Owner razes all improvements on Owner's Parcel and restores Owner's Parcel to its Natural State, provided all the following requirements are met:
 - 10.3.1 **Notice.** Owner gives the City written notice, not less than 180 days prior to razing any improvements, of Owner's intent to restore Owner's Parcel to its Natural State.
 - 10.3.2 **Permits.** Owner obtains all required permits and approvals to perform such work.
 - 10.3.3 **Inspection.** Owner allows the City, Carver County, the State of Minnesota, and their consultants to inspect Owner's demolition and restoration work.
 - 10.3.4 **Cost Reimbursement.** Owner allows the City to disconnect the System from the Delivery Point and Owner reimburses the City for all costs incurred by the City to disconnect the System.
 - 10.3.5 **Disconnection from Potable Water System.** Owner has the City, at Owner's expense, disconnect Owner's Parcel from the City's potable water system.

10.3.6 **Recordable Termination.** Owner, at its expense, prepares a written termination agreement, the form of which shall be subject to the City's approval, and records such termination in the property records for the Parcels.

10.4. **Termination by the City.** The City may unilaterally terminate this agreement by written notice to Owner if the City determines, in its sole discretion, that it is no longer economically feasible or desirable to continue providing the System, provided all the following requirements are met:

10.4.1 **Notice.** The City gives Owner not less than 180 days prior written notice that the City is electing to terminate this agreement and stating the termination date.

10.4.2 **Replacement Drainage Easement.** With its notice, the City delivers a new drainage easement to Owner that allows Owner's Parcel to drain up to 100% of its excess storm water into the Pond (the "Replacement Easement") notwithstanding the termination of this agreement.

10.4.3 **Disconnection from System.** The City disconnects the System from the Delivery Point at the City's expense on or before the date of termination at the City's expense.

10.4.4 **Recordable Termination.** The City at its expense, prepares a written termination agreement, the form of which shall be subject to Owner's approval, and records such termination in the property records for the Parcels.

11. **Miscellaneous.**

11.1. **Notices.** Notices or other communication hereunder shall be in writing and shall be sent certified or registered mail, return receipt requested, or by other national overnight courier company, or personal delivery addressed to a party at its address listed below. Notice shall be deemed given upon receipt or refusal to accept delivery. A party may change from time to time its respective address for notice hereunder by like notice to the other party to this agreement.

The address of the City is as follows:

City Administrator
201 South Vine Street
Waconia, MN 55387

The address of Owner is as follows:

[name]
[street address]
[city] [state] [zip code]

- 11.2. **Entire Agreement.** This agreement contains the complete understanding and agreement of the parties hereto with respect to all matters referred to herein, and all prior representations, negotiations, and understandings of the parties are superseded by this agreement.
- 11.3. **Interpretation.** The language in this agreement shall be construed as a whole according to its fair meaning and not strictly for or against any party. No easements, except those expressly set forth herein, shall be implied by this agreement.
- 11.4. **Attorneys' Fees.** In the event either party to this agreement institutes any legal action or proceeding against the other party for the enforcement of any right or obligation herein contained, the prevailing party, after a final adjudication shall be entitled to recover its costs and reasonable attorneys' fees incurred in the preparation and prosecution of such action or proceeding.
- 11.5. **Amendment.** The provisions of this agreement may be modified or amended, in whole or in part, or terminated, only by the written consent of the City and Owner, evidenced by a document that has been fully executed and acknowledged by the City and Owner and recorded in the official records of the County Recorder/Registrar of Titles of Carver County, Minnesota.
- 11.6. **Consents.** Wherever in this agreement the consent or approval of a party is required, unless otherwise expressly provided herein, such consent or approval shall not be unreasonably withheld or delayed. Any request for consent or approval shall: (i) be in writing; (ii) specify the section hereof which requires that such notice be given or that such consent or approval be obtained; and (iii) be accompanied by such background data as is reasonably necessary to make an informed decision thereon. The consent of a party under this agreement, to be effective, must be given, denied or conditioned expressly and in writing.
- 11.7. **No Waiver.** No waiver of any default of any obligation by any party bound hereunder shall be implied from any omission by the other party with rights hereunder to take any action with respect to such default.
- 11.8. **No Agency.** Nothing in this agreement shall be deemed or construed to create the relationship of principal and agent or of limited or general partners or of joint ventures or of any other association between the City and Owner.
- 11.9. **Covenants Run with Land.** Each of the easements, covenants, conditions, restrictions, rights and obligations set forth herein shall run with the land and shall bind every person or entity now or hereafter having any fee, leasehold or other interest therein and shall inure to the benefit of the respective parties and their successors, assigns, heirs, and personal representatives.
- 11.10. **Grantee's Acceptance.** The grantee or assignee of any of the Parcels, or any portion thereof, by acceptance of a deed conveying title thereto or the execution of a contract for the purchase thereof, shall accept such deed or contract upon and

subject to the easements, covenants, conditions, restrictions and obligations contained herein.

- 11.11. **Severability.** Each provision of this agreement and the application thereof to the Parcels are hereby declared to be independent of and severable from the remainder of this agreement. If any provision contained herein shall be held to be invalid or to be unenforceable or not to run with the land, such holding shall not affect the validity or enforceability of the remainder of this agreement. In the event the validity or enforceability of any provision of this agreement is held to be dependent upon the existence of a specific legal description, the parties agree to promptly cause such legal description to be prepared. Ownership of all of the Parcels or any combination of them by the same person or entity shall not terminate this agreement nor in any manner affect or impair the validity or enforceability of this agreement.
- 11.12. **Time.** All references in this agreement to “days” shall mean calendar days unless expressly referred to as “business days.” If the day for performance of any obligation under this agreement is a Saturday, Sunday or legal holiday recognized by the City, then the time for performance of that obligation shall be extended to the first following day that is not a Saturday, Sunday or legal holiday recognized by the City. Time is of the essence.
- 11.13. **Governing Law.** The laws of the State of Minnesota shall govern the interpretation, validity, performance, and enforcement of this agreement.
- 11.14. **Estoppel Certificates.** Either party, within 10 days of its receipt of a written request from the other, shall from time to time provide the requesting party, a certificate binding upon such party stating: (i) to the best of such the party’s knowledge, whether any party is in default or violation of this agreement and if so identifying such default or violation; and (ii) that this agreement is in full force and effect and identifying any amendments to the agreement as of the date of such certificate.
- 11.15. **Bankruptcy.** In the event of any bankruptcy affecting any party or occupant of any of the Parcels, this agreement shall, to the maximum extent permitted by law, be considered an agreement that runs with the land and that is not injectable, in whole or in part, by the bankrupt person or entity.
- 11.16. **Commercially Reasonable.** With respect to matters arising under this agreement, each party shall act in a commercially reasonable manner except when another standard is expressly provided.
- 11.17. **Inapplicability of MCIOA.** Declarant hereby declares that (i) this agreement is being filed primarily for the purpose of creating rights with respect to access and utilities, and (ii) the parties do not intend or elect to have the Parcels or any part thereof governed by the Minnesota Common Interest Ownership Act (“MCIOA”), Minnesota Statutes Chapter 515B. Accordingly, the terms and provisions of MCIOA shall have no applicability to the Parcels.

11.18. Recitals and Exhibits. The recitals set forth above, and the exhibits attached hereto, are incorporated and made a part of this agreement.

This agreement is entered into as of the Effective Date.

[Signature pages follow.]

SIGNATURE PAGE TO STORM WATER DRAINAGE AND REUSE EASEMENT

CITY OF WACONIA

By: Kent Bloudek
Its: Mayor

Susan M H Arntz
Its: City Administrator/Clerk

STATE OF MINNESOTA)
) ss.:
COUNTY OF CARVER)

The foregoing was acknowledged before me this ____ day of _____, [insert year] by Kent Bloudek and Susan MH Arntz, the Mayor and City Administrator/Clerk, respectively, of the City of Waconia, a Minnesota municipal corporation, on behalf of the municipal corporation.

Notary Public

SIGNATURE PAGE TO STORM WATER DRAINAGE AND REUSE EASEMENT

[INSERT NAME OF OWNER ENTITY]

Signature

Name (Printed)

Title

STATE OF MINNESOTA)
) ss.:
COUNTY OF CARVER)

The foregoing was acknowledged before me this ____ day of _____, [insert year] by [insert name of person signing for owner], the [insert title of person signing for owner] of [insert name of owner entity], a [insert state where owner entity was organized], on behalf of the [list type of owner entity].

Notary Public

THIS INSTRUMENT WAS DRAFTED BY:

City of Waconia
201 South Vine Street
Waconia, MN 55387
(952) 442-2184

EXHIBIT A

Diagram Depicting Delivery Point

[Insert a black and white diagram clearly depicting the delivery point. The diagram must be easy to read and sharp. Do not use a diagram that has already been copied or that has color elements.]

EXHIBIT B

Diagram Depicting Owner's Green Space

[Insert a black and white diagram clearly depicting the Owner's Green Space (as defined in the agreement). The diagram must be easy to read and sharp. Do not use a diagram that has already been copied or that has color elements.]

EXHIBIT C

Site Plan for Owner's Parcel

[Insert a black and white diagram clearly depicting the Site Plan for the Owner's Parcel. The diagram must be easy to read and sharp. Do not use a diagram that has already been copied or that has color elements.]

CONSENT AND SUBORDINATION BY MORTGAGEE

In consideration of Ten and No/100 Dollars (\$10.00) and other valuable consideration, the receipt and sufficiency of which is hereby acknowledged, [insert name of lender], as mortgagee under that certain [insert title of mortgage document] dated [insert date] and recorded [insert date] as Document No. [insert recording number] in the office of the Carver County Recorder, Carver County, Minnesota (the "Mortgage") hereby consents to the Storm Water Drainage and Reuse Agreement to which this instrument is attached (the "Agreement") and subordinates the Mortgage and the liens created by the Mortgage to the Agreement and the easements, covenants, obligations and other matters contained in the Agreement.

IN WITNESS WHEREOF, the undersigned has caused its duly authorized representative to execute this Consent and Subordination by Mortgagee as of [insert date].

[INSERT NAME OF LENDER]

Signature

Name (Printed)

Title

STATE OF MINNESOTA)
) ss.:
COUNTY OF CARVER)

The foregoing was acknowledged before me this ____ day of _____, [insert year] by [insert name of person signing for lender], the [insert title of person signing for lender] of [insert name of lender], a [insert state type of lender], on behalf of the [insert name of lender].

Notary Public

THIS INSTRUMENT WAS DRAFTED BY:
Melchert Hubert Sjodin, PLLP
121 West Main Street, Suite 200
Waconia, MN 55387
(952) 442-7700

Version: 05-12-2020

C. Figures

PUMP STATION CONSTRUCTION NOTES:

1. WORK BY THE CONTRACTOR

- a. CONSTRUCT PRECAST CONCRETE WET WELL AND RELATED WORK
- b. CONSTRUCT PIPING CONNECTION TO EXISTING STORAGE TANK
- c. CONSTRUCT STORM SEWER
- d. CONSTRUCT CONCRETE SLAB FOR EQUIPMENT ENCLOSURE
- e. CONSTRUCT CHAIN LINK FENCE
- f. PERFORM ALL SITE RESTORATION
- g. UNLOAD EQUIPMENT FROM DELIVERY TRUCK
- h. INSTALL PUMPS, PIPING AND LEVEL CONTROL EQUIPMENT IN THE WET WELL
- i. PLACE AND ATTACH THE EQUIPMENT SKID ON THE CONCRETE SLAB
- j. INSTALL THE VALVES AND PIPING CONNECTIONS FROM THE WET WELL TO THE EQUIPMENT SKID
- k. INSTALL ALL EQUIPMENT AS RECOMMENDED BY EQUIPMENT MANUFACTURER
- l. COORDINATE WORK WITH EQUIPMENT SUPPLIER AND ELECTRICAL CONTRACTOR

2. EQUIPMENT INCLUDED IN EQUIPMENT AND CONTROLS PACKAGE

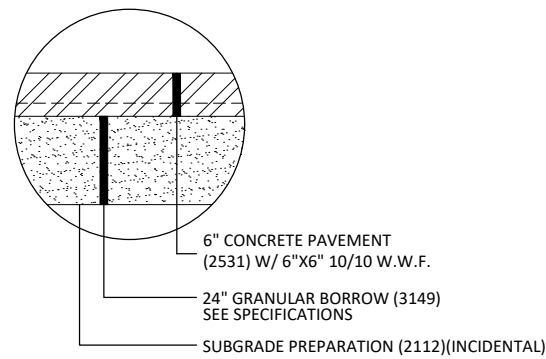
- a. PUMPS, SUBMERSIBLE MOTORS AND DISCHARGE PIPING
- b. EQUIPMENT SKID CONTAINING CONTROLS, FILTER, PRESSURE AND FLOW MONITORING AND PIPING
- c. PIPING AND VALVES TO CONNECT PUMP DISCHARGE PIPES TO THE EQUIPMENT SKID

3. WORK BY OTHERS

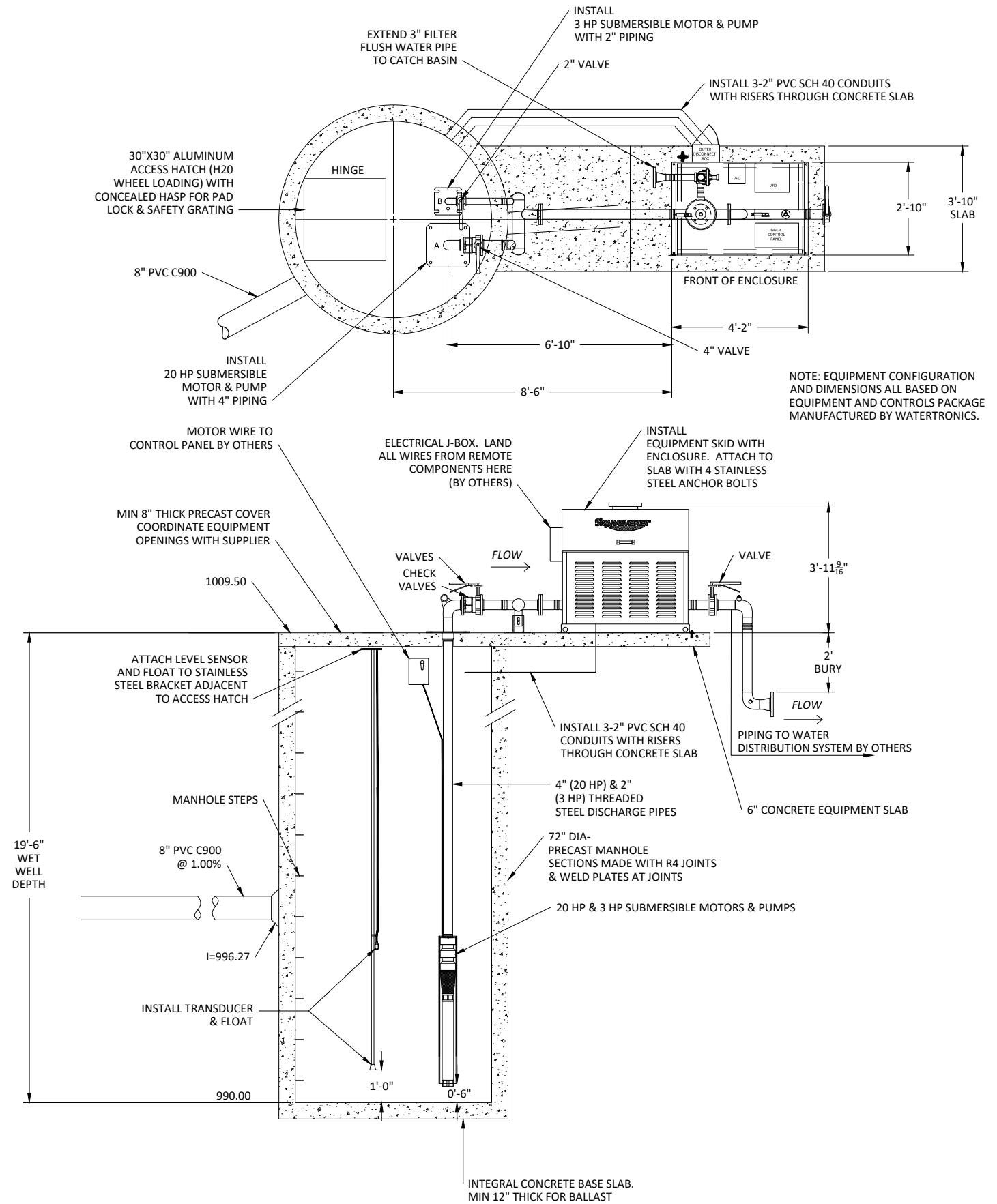
- a. ELECTRICAL CONSTRUCTION INCLUDING POWER CONNECTION TO CONTROLS, CONNECTION OF PUMP MOTORS TO CONTROLS AND CONNECTION OF LEVEL CONTROL EQUIPMENT TO CONTROLS
- b. CONSTRUCTION OF PIPING FROM THE EQUIPMENT SKID TO THE IRRIGATION SYSTEM

4. START UP

- a. CONTRACTOR SHALL COORDINATE THE PUMP STATION START UP WITH THE EQUIPMENT SUPPLIER AND THE ELECTRICAL CONTRACTOR
- b. START UP WILL OCCUR IN SPRING 2015



CONCRETE EQUIPMENT PAD



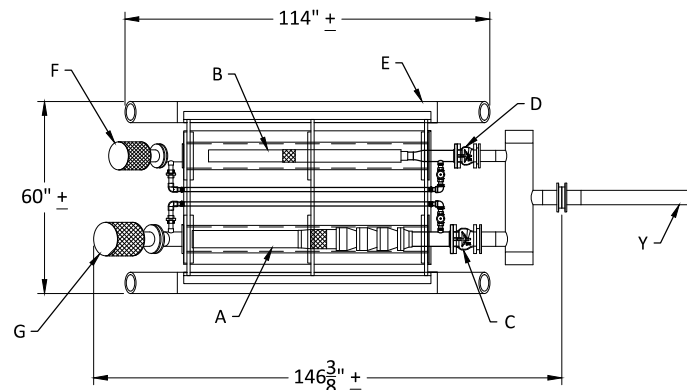
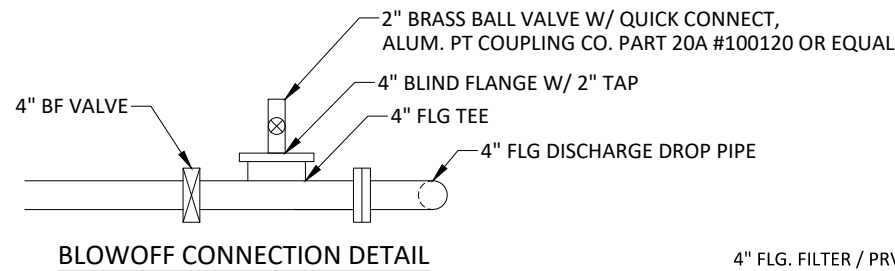
NOT TO SCALE

PUMP STATION SPECIFICATIONS:
 NAME: TEWAPA WATER REUSE, TEWAPA, MN
 STATION MODEL: BMXV-1-25V/7.5STV-460-3-280-95
 STATION TOTAL PERFORMANCE: 280 GPM @ 95 PSI
 PUMP HORSEPOWER:
 JOCKEY: 7.5HP
 PUMP NO.1: 25HP
 CHECK VALVE SIZE:
 JOCKEY: 3"
 PUMP NO.1: 4"
 ISOLATION VALVE SIZE:
 STATION DISCHARGE ISOLATION VALVE SIZE: 4"
 DISCHARGE MANIFOLD SIZE: 4"

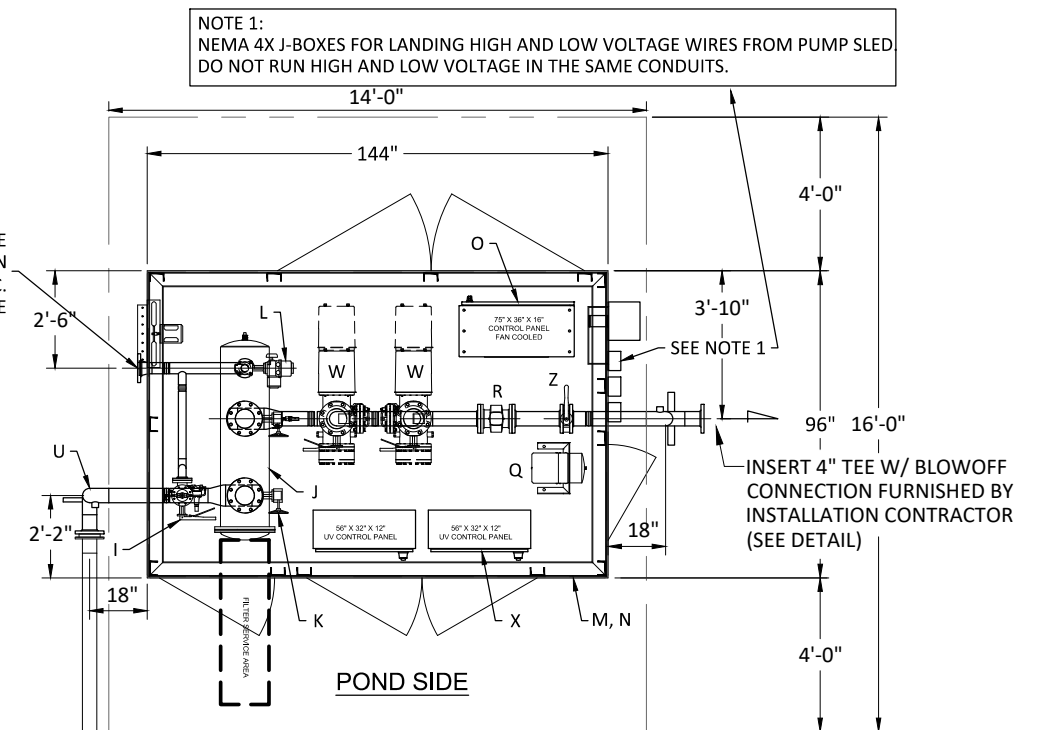
STATION DISCONNECT: 125 AMP
 POWER REQUIREMENTS: 460V, 3PH, 60HZ, 95 FLA
 ENCLOSURE EXHAUST FAN: 1700 CFM @ 0.250-in. SP

STATION COMPONENTS:

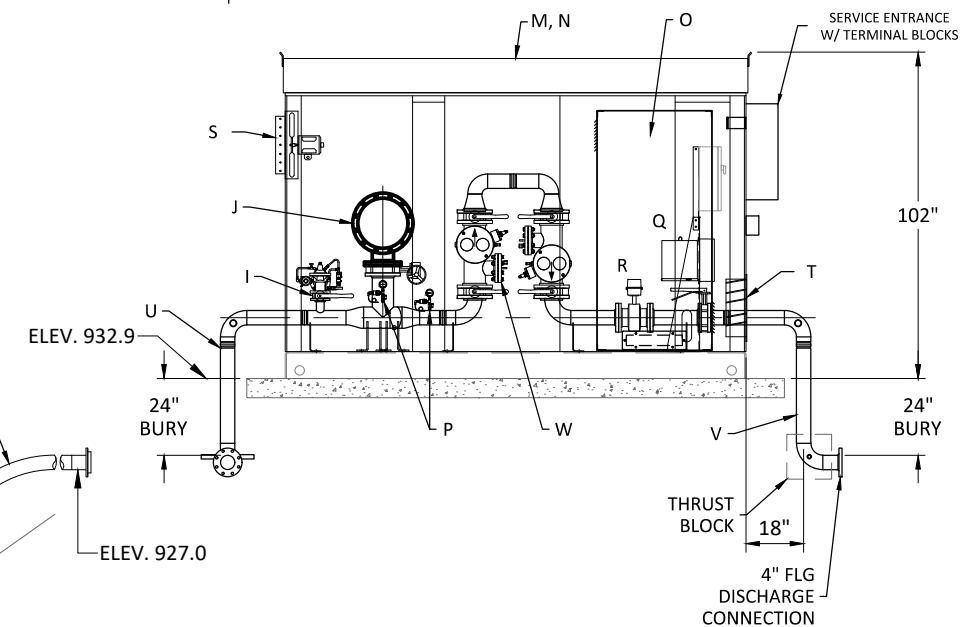
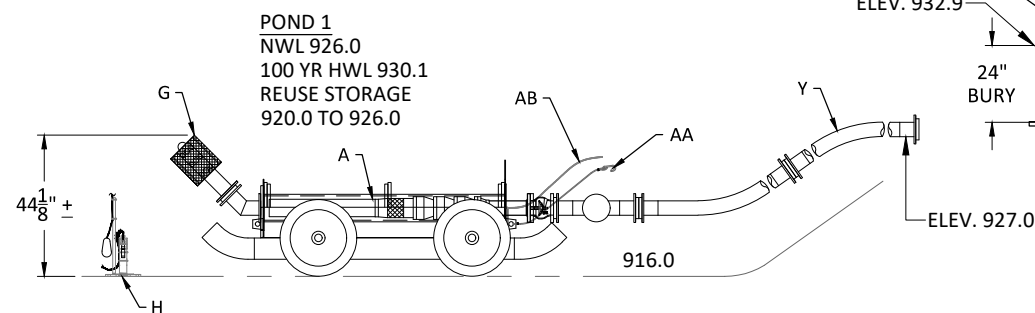
- A 25HP PUMP AND MOTOR
- B 7.5HP JOCKEY PUMP & MOTOR
- C 4" CHECK VALVE
- D 3" CHECK VALVE
- E HDPE PUMP SLED W/ 2-AXLE WHEEL KIT
- F 3" SCS-3 SELF-FLUSHING INTAKE SCREEN
- G 4" SCS-4 SELF-FLUSHING INTAKE SCREEN
- H SUBMERSIBLE LEVEL TRANSDUCER w/ BACKUP FLOAT & 100FT CABLE
- I 2" PRESSURE RELIEF VALVE
- J VAF V1000-6 FILTER w/ 25 MICRON SCREEN
- K FILTER ISO VALVE
- L FILTER DISCHARGE VALVE W/ EBV CONTROL
- M PAINTED COMPOSITE ENCLOSURE (GREEN)
- N PAINTED STEEL BASE (GREEN)
- O PUMP CONTROL PANEL
- P PRESSURE TRANSDUCER
- Q 3 KVA LOAD CENTER
- R ELECTROMAGNETIC FLOW METER
- S ENCLOSURE COOLING FAN
- T ENCLOSURE AIR INTAKE LOUVERS
- U 4" FLG. INTAKE DROP PIPE
- V 4" FLG. DISCHARGE DROP PIPE
- W SW-425-6 UV UNIT 280 GPM @ 64 mJ/cm2 @ 55% UVT (x2)
- X UV CONTROL PANEL w/ LOCKABLE TOUCH SCREEN COVER
- Y 4" X 20'-0" HDPE PUMP DISCHARGE PIPE (QTY. 3)
- Z 4" STATION DISCHARGE ISOLATION VALVE
- AA 100FT PULL CABLE
- AB 100 FT MOTOR LEADS



4" FLG. FILTER / PRV DISCHARGE TO OPEN DRAIN BY INSTALLATION CONTRACTOR 60 GPM / 15 SEC. FLUSH CYCLE



NEMA 4X REMOTE PUMP DISCONNECTS AND LOW VOLTAGE J-BOXES TO BE MOUNTED CLOSE TO EDGE OF WATER BY INSTALLATION CONTRACTOR. DO NOT RUN HIGH AND LOW VOLTAGE IN THE SAME CONDUITS.

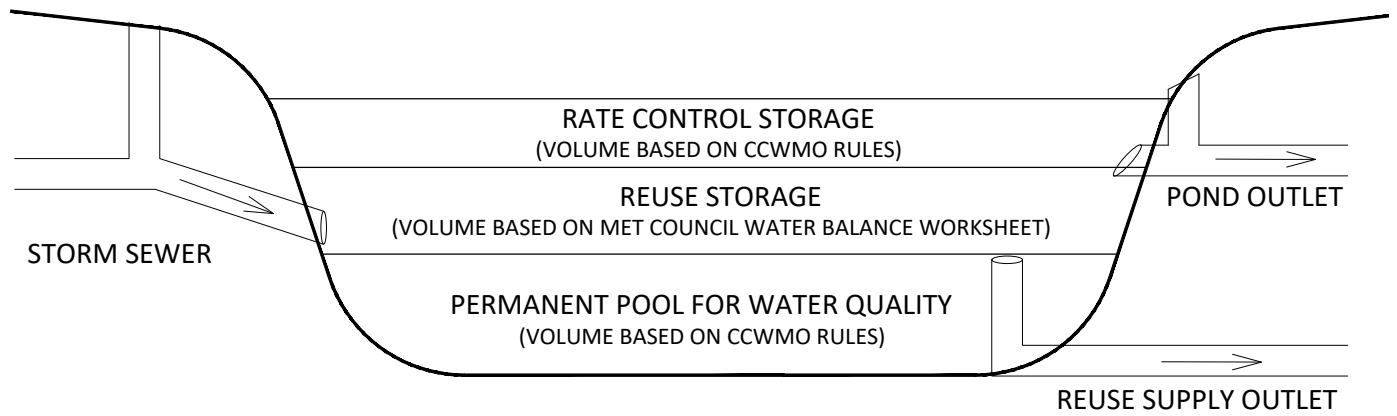


COMPOSITE ENCLOSURE DOOR LOCATIONS ARE FOR REFERENCE ONLY. SIZE AND LOCATION OF DOORS TO BE DETERMINED AT TIME OF ORDER.

FROM WATERTRONICS DRAWING NO. PRBMX1024

NOT TO SCALE

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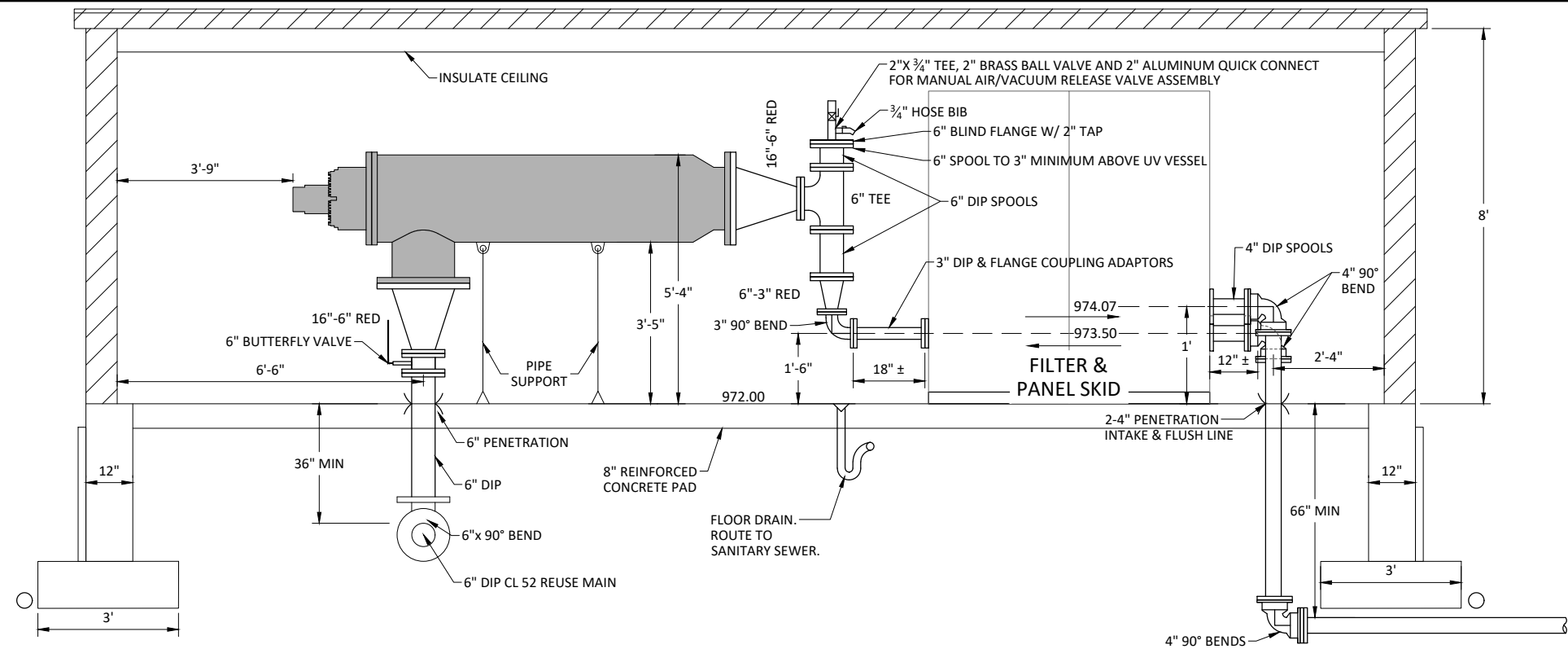


TYPICAL SECTION STORMWATER POND

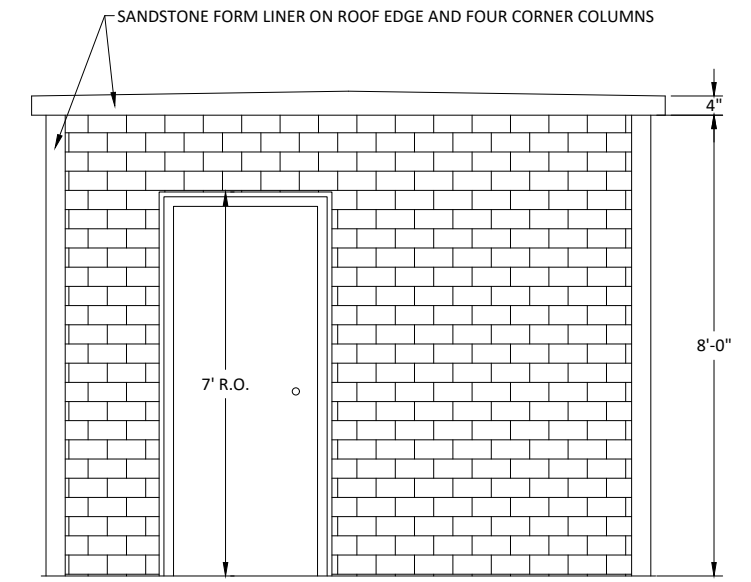
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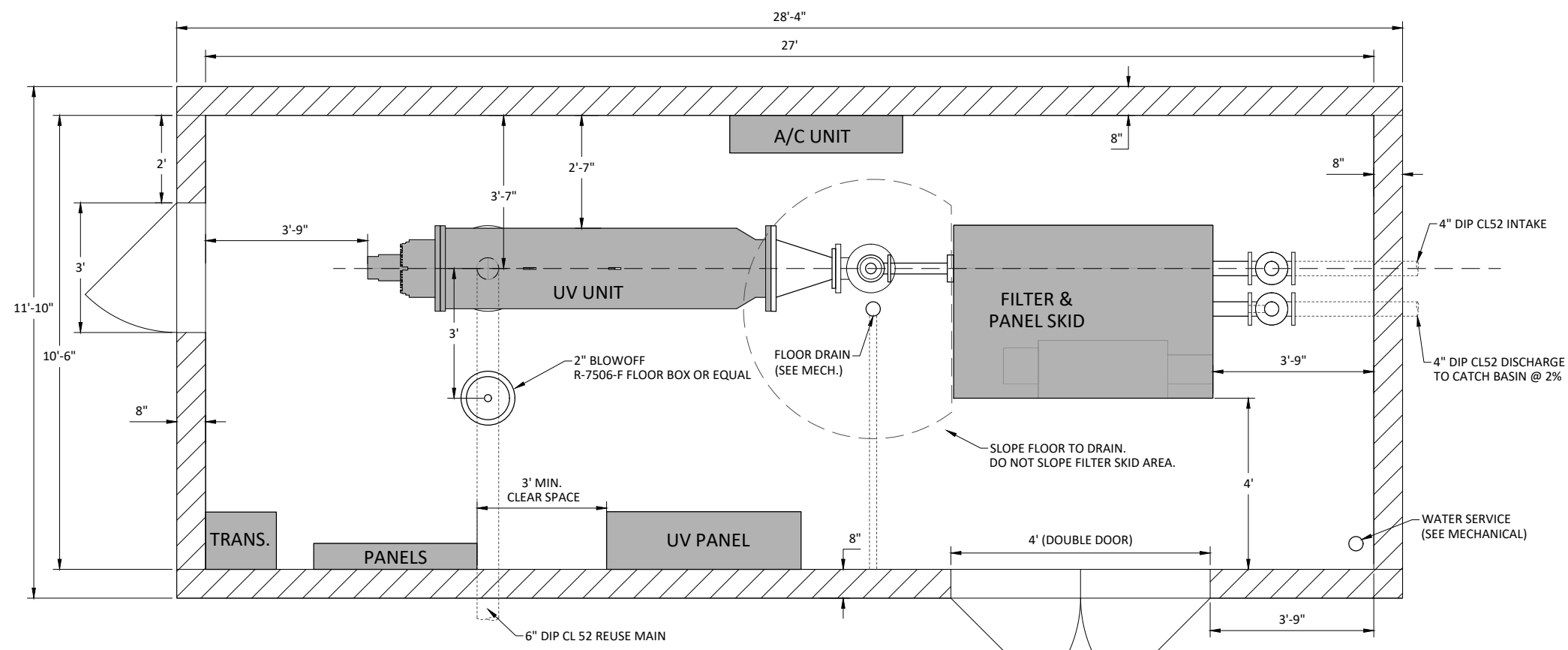
CITY OF WACONIA
STORMWATER REUSE STANDARDIZATION POLICY
TYPICAL SECTION STORMWATER POND



EQUIPMENT BUILDING - PROFILE VIEW



WEST ELEVATION
NOT TO SCALE



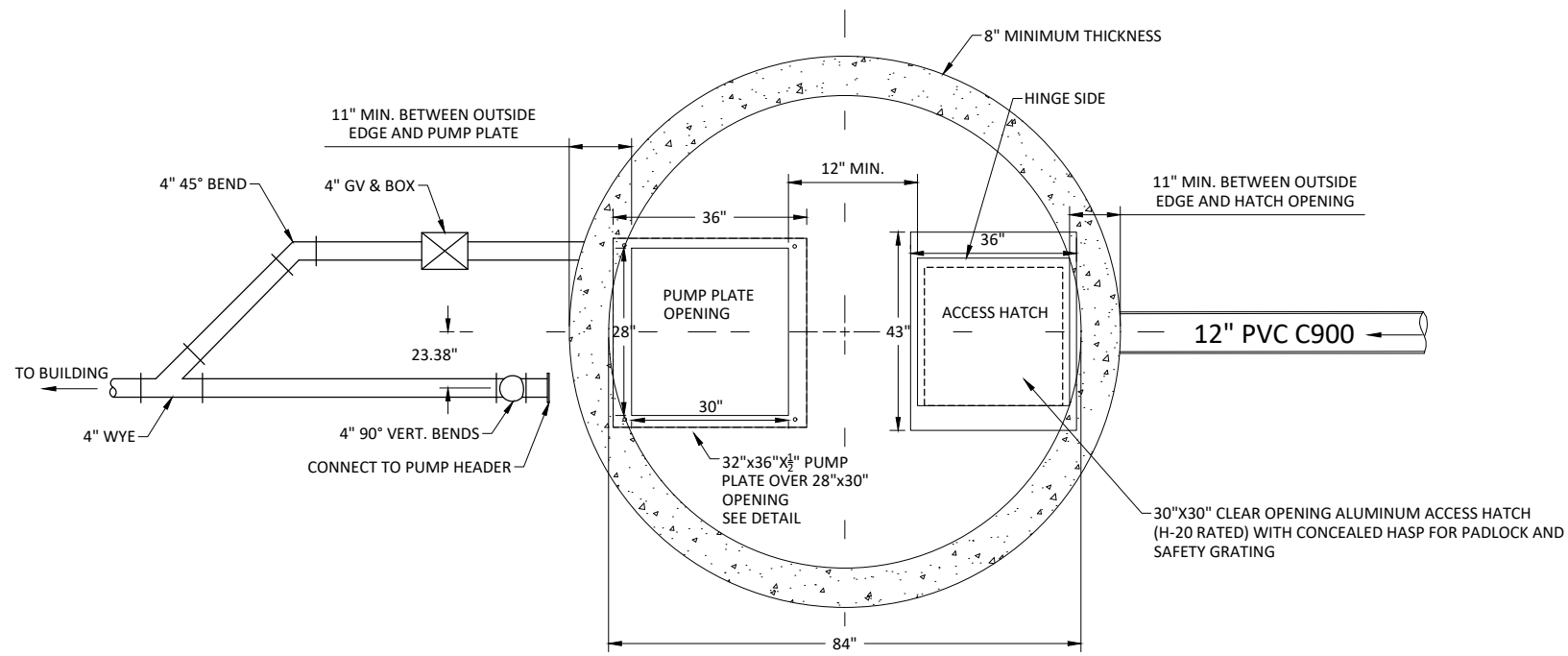
EQUIPMENT BUILDING LAYOUT - PLAN VIEW
NOT TO SCALE

NOTE:
WALL PENETRATIONS MAY BE FORMED OR CORED AT THE CONTRACTORS OPTION; FULLY GROUT AROUND PIPE. ENSURE CMU'S ARE FULLY GROUTED BENEATH WALL PENETRATIONS. IF PIPE INTERFERES WITH WALL REINFORCEMENT, PLACE REINFORCING IN NEAREST ADJACENT CELL - DO NOT EXCEED 24\"/>

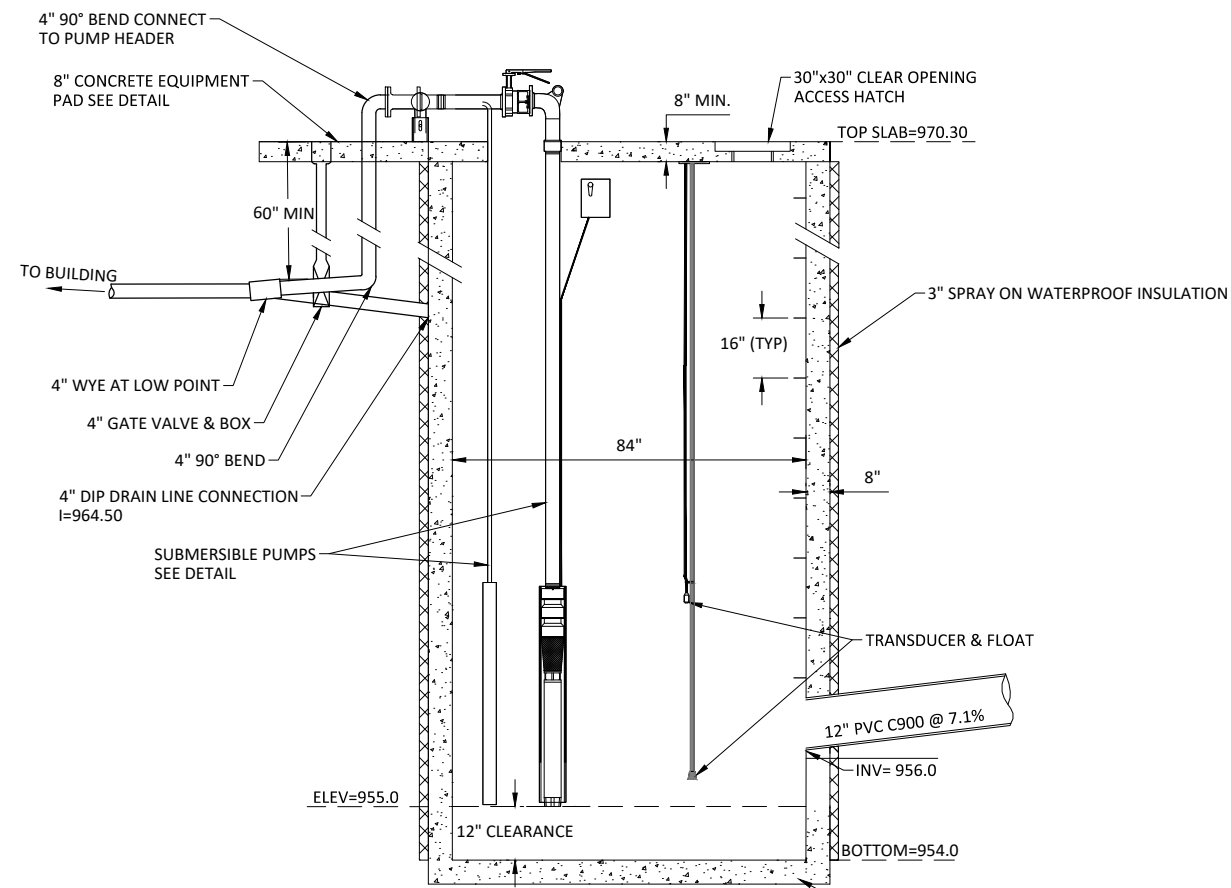
FINISHES SCHEDULE			
CALL OUT	FORMLINER	TYPE	COLOR
INTERIOR		SATIN ACRYLIC	CUSTOM NP1
EXTERIOR	SMOOTH BRICK (3X8, ROUND MORT.)	SATIN ACRYLIC	RICHARDSON RED
ROOF	CEDAR SHAKE	SATIN ACRYLIC	CUSTOM JAVA
TRIM	SANDSTONE	SATIN ACRYLIC	DOVER WHITE
DOORS		DTM ACRYLIC	RICHARDSON RED
FLOOR		TK-290	

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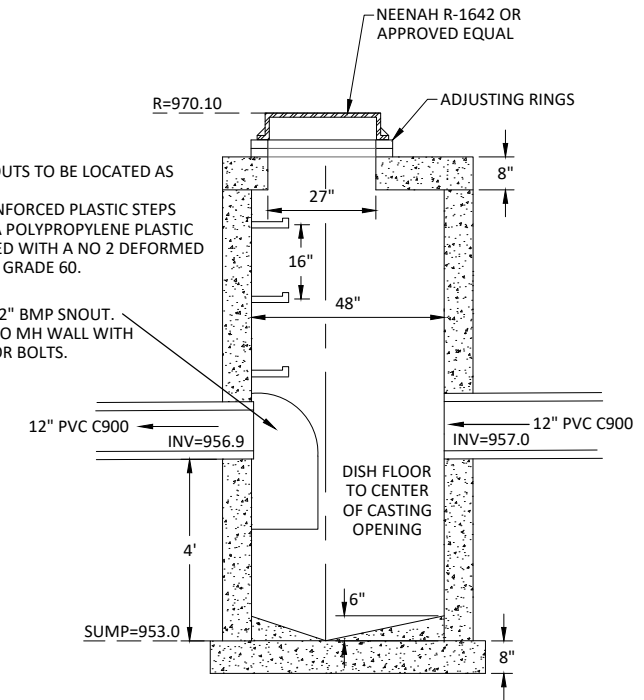




WET WELL TOP SLAB
NOT TO SCALE



HUNTERS CROSSING PUMP STATION WET WELL CONSTRUCTION
NOT TO SCALE



- NOTES:
1. PIPE CUTOUTS TO BE LOCATED AS SPECIFIED
 2. STEEL REINFORCED PLASTIC STEPS SHALL BE A POLYPROPYLENE PLASTIC REINFORCED WITH A NO 2 DEFORMED STEEL ROD GRADE 60.

INSTALL 12" BMP SNOOT. ATTACH TO MH WALL WITH SS ANCHOR BOLTS.

SECTIONAL VIEW

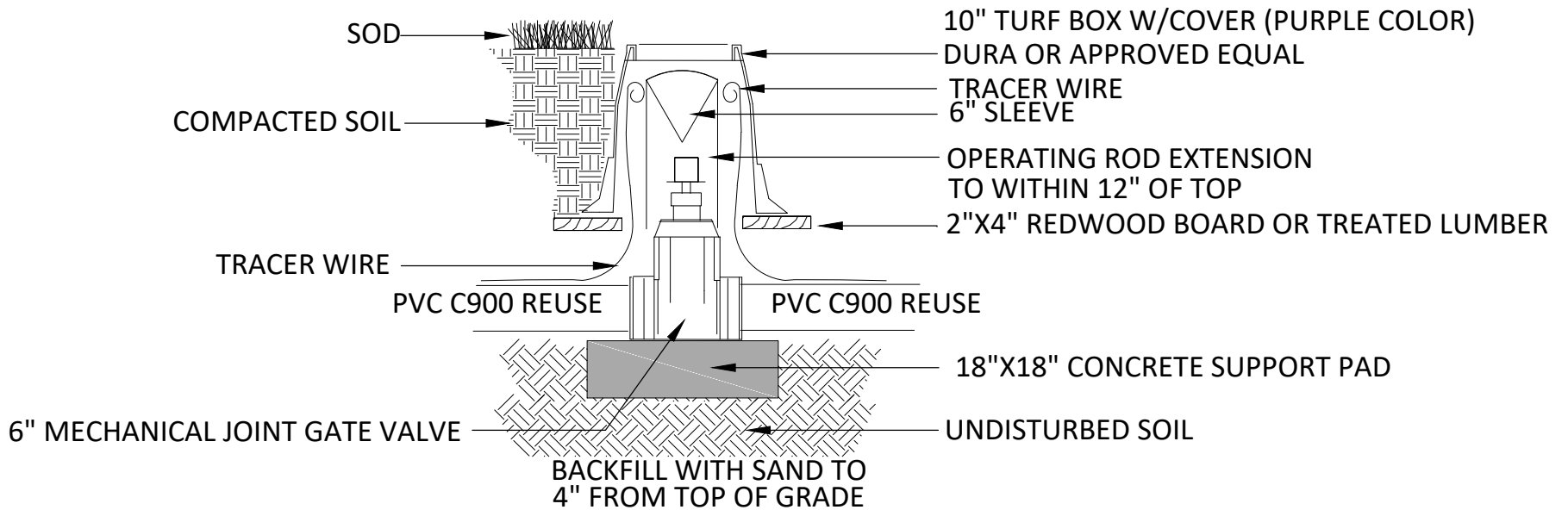
DRAINAGE STRUCTURE WITH SNOOT
NOT TO SCALE

- GENERAL NOTES:
1. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR WET WELL STRUCTURES AND LID WHICH INCLUDE REINFORCEMENT TYPE AND LOCATION, BUOYANCY CALCULATIONS.
 2. ITEMS HIGHLIGHTED GRAY OR LABELED "PUMP PACKAGE" WILL BE PROVIDED BY THE CITY. THE CONTRACTOR IS RESPONSIBLE FOR ACQUIRING ITEMS FROM CITY AND INSTALLING THEM. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGES TO THE ITEM AND MUST REIMBURSE THE CITY ANY COSTS ASSOCIATED WITH FIXING OR REPLACING THAT ITEM. UNTIL THE CONTRACT IS COMPLETE.
 3. CONTRACTOR SHALL VERIFY PUMP PACKAGE ITEMS AND REPORT TO THE ENGINEER IMMEDIATELY IF DIFFERENT.

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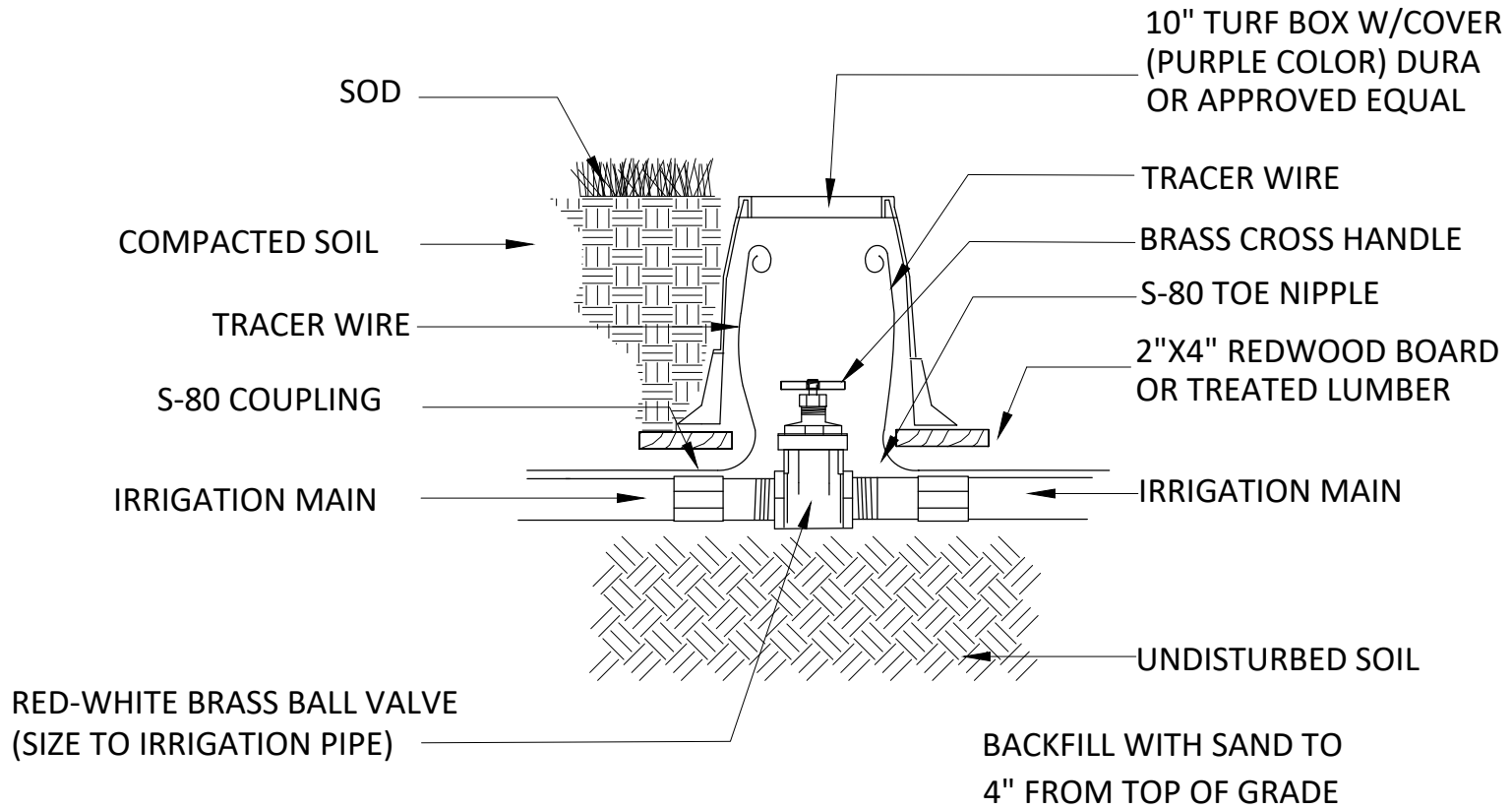
D. Construction Details - Stormwater Reuse Details

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**STORMWATER REUSE
PLASTIC VALVE BOX (FOR TURF AREAS)**
NOT TO SCALE

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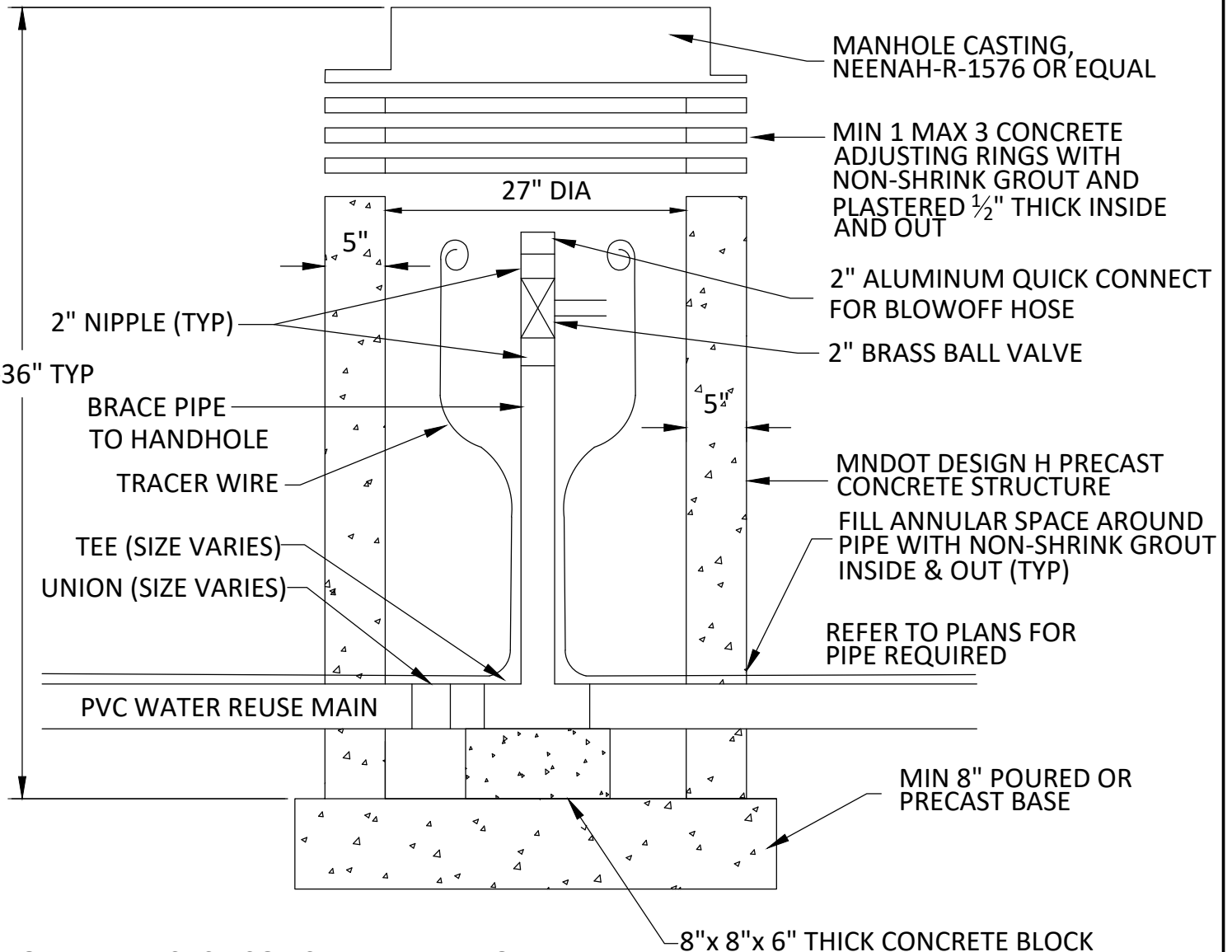
**STORMWATER REUSE
ISOLATION VALVE - 2.5" AND SMALLER**

NOT TO SCALE

H:\WACA\C14120525\CAD\C3D\2020 Revised Detail Manual\120525-BLOWOFF-PRECAST HH.dwg 2/8/2021 11:15 AM

NOTES

1. 2" PIPE SHALL BE THREAD SCH. 80 PVC OR SCH. 40 GALVANIZED STEEL PIPE.
2. BALL VALVES SHALL BE 2" BRASS RED-WHITE VALVE.
3. QUICK CONNECT SHALL BE 2" ALUMINUM PT COUPLING CO. PART 20A, #1000120, OR EQUAL. (MATES WITH CAM ARM COUPLER PART 20D, #1000420).
4. VALVE BOX SHALL BE DURA 12" X 12" X 19" BOX WITH OVERLAPPING SOLID PLASTIC COVER, PURPLE COLOR FOR RECLAIMED WATER OR EQUAL IF LOCATED IN GREEN SPACE. ALL OTHER BOXES SHALL BE PRECAST CONCRETE HANDHOLE.



STORMWATER REUSE BLOWOFF IN PRECAST CONCRETE HANDHOLE

NOT TO SCALE



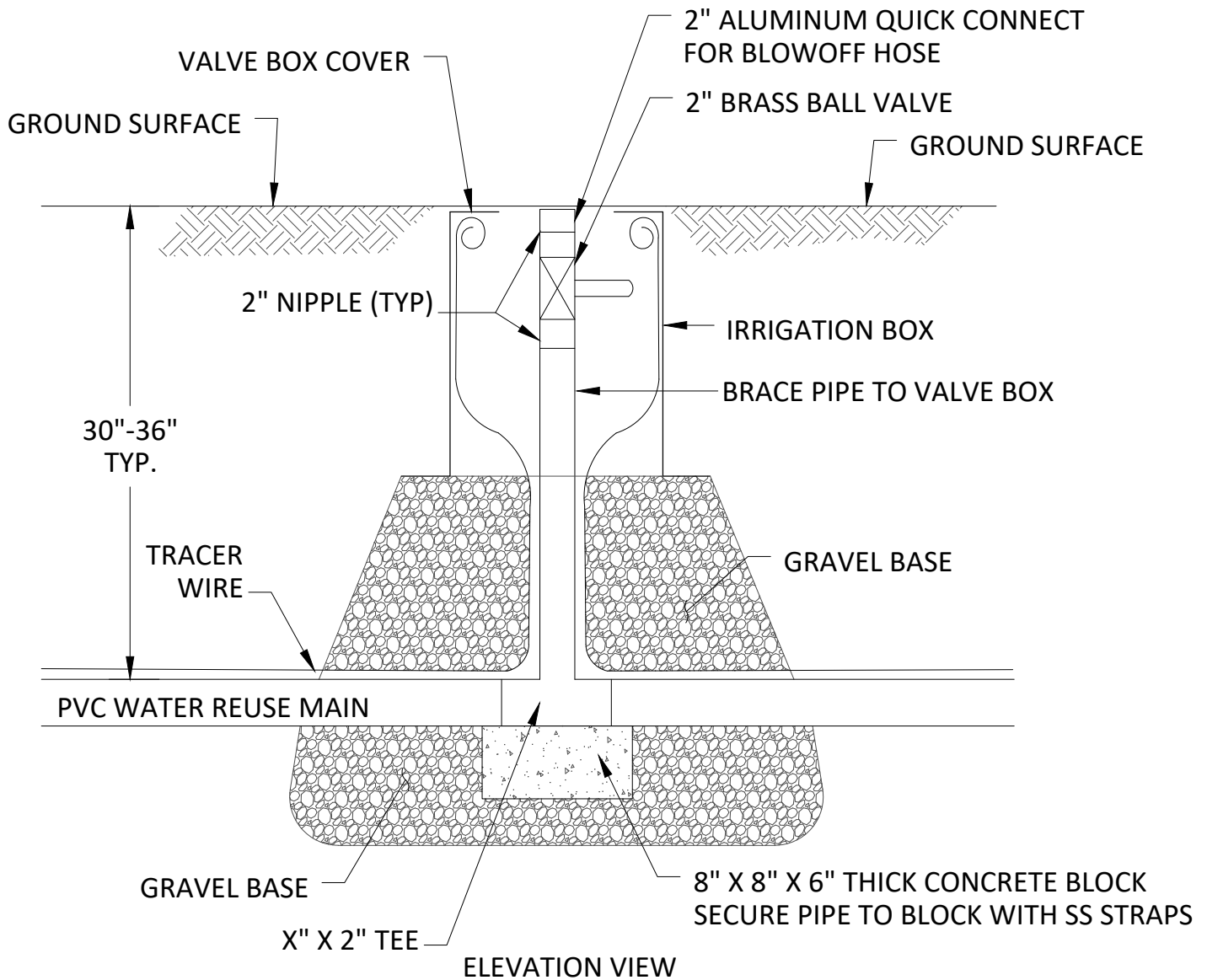
CITY OF WACONIA - STANDARD DETAILS

BLOWOFF IN PRECAST CONCRETE HANDHOLE

REVISION DATE
FEBRUARY 2021

DETAIL NO.

C-103



NOTES:

1. 2" PIPE SHALL BE THREAD SCH. 80 PVC OR SCH. 40 GALVANIZED STEEL PIPE.
2. BALL VALVES SHALL BE 2" BRASS RED-WHITE VALVE.
3. QUICK CONNECT SHALL BE 2" ALUMINUM PT COUPLING CO. PART 20A, #1000120, OR EQUAL. (MATES WITH CAM ARM COUPLER PART 20D, #1000420).
4. VALVE BOX SHALL BE NDS 12" X 12" X 19" BOX WITH OVERLAPPING SOLID PLASTIC COVER, PURPLE COLOR FOR RECLAIMED WATER MANUFACTURED BY DURA OR APPROVED EQUAL.

**STORMWATER REUSE BLOWOFF
IN PLASTIC BOX DETAIL**

NOT TO SCALE

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CITY OF WACONIA - STANDARD DETAILS

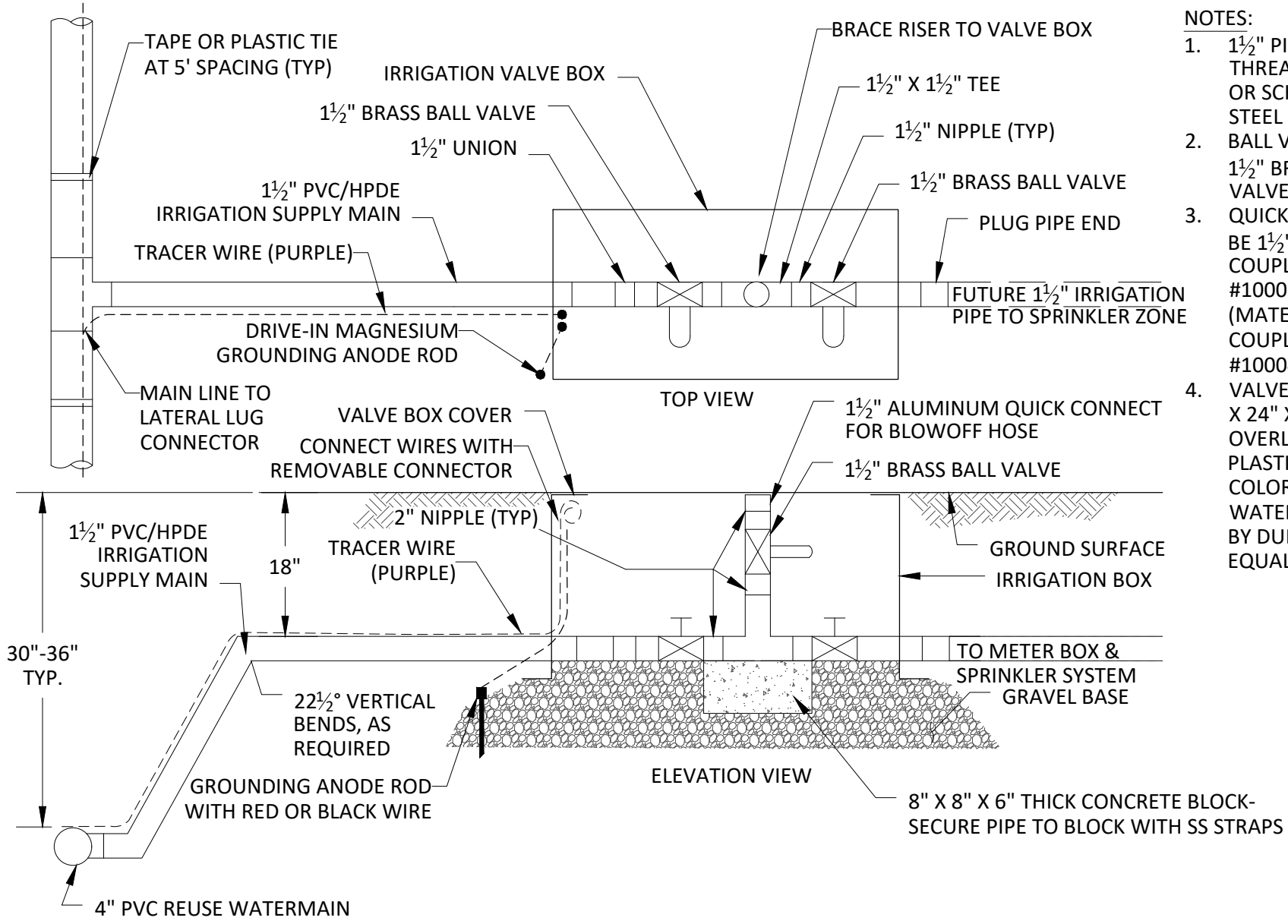
BLOWOFF

REVISION DATE
FEBRUARY 2021

DETAIL NO.

C-104

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- NOTES:**
1. 1 1/2" PIPE SHALL BE THREADED SCH. 80 PVC OR SCH. 40 GALVANIZED STEEL PIPE.
 2. BALL VALVES SHALL BE 1 1/2" BRASS RED-WHITE VALVE.
 3. QUICK CONNECT SHALL BE 1 1/2" ALUMINUM PT COUPLING CO. PART 20A, #1000115, OR EQUAL. (MATES WITH CM ARM COUPLER PART 20D, #1000415).
 4. VALVE BOX SHALL BE 17" X 24" X 18" BOX WITH OVERLAPPING SOLID PLASTIC COVER, PURPLE COLOR FOR RECLAIMED WATER MANUFACTURED BY DURA OR APPROVED EQUAL.

STORMWATER REUSE BLOWOFF AND CONNECTION BOX

NOT TO SCALE

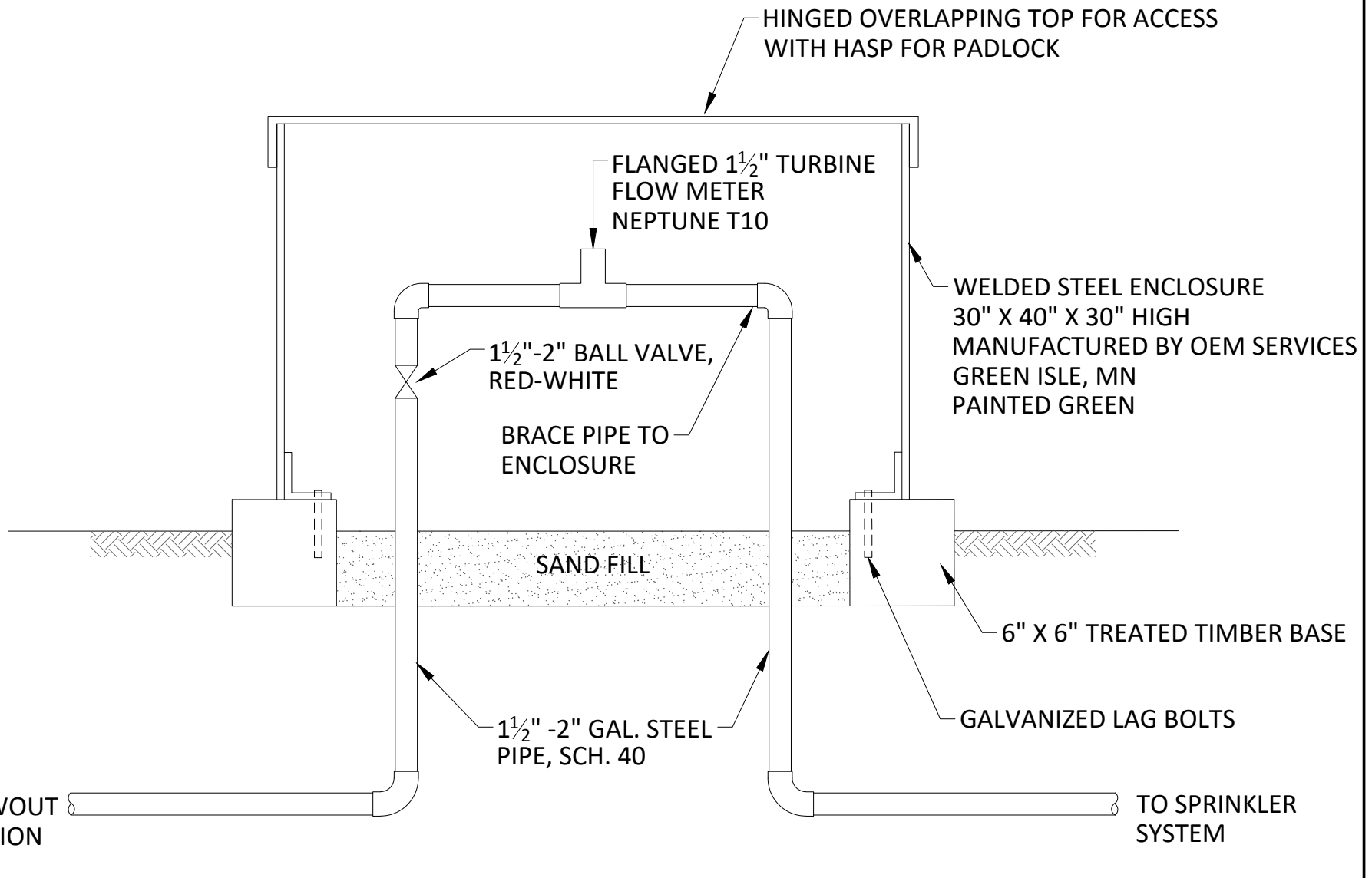


CITY OF WACONIA - STANDARD DETAILS

BLOWOFF & CONNECTION BOX

REVISION DATE	DETAIL NO.
FEBRUARY 2021	C-105

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METER BOX DETAIL

NOT TO SCALE

FROM BLOWOUT & CONNECTION BOX

TO SPRINKLER SYSTEM



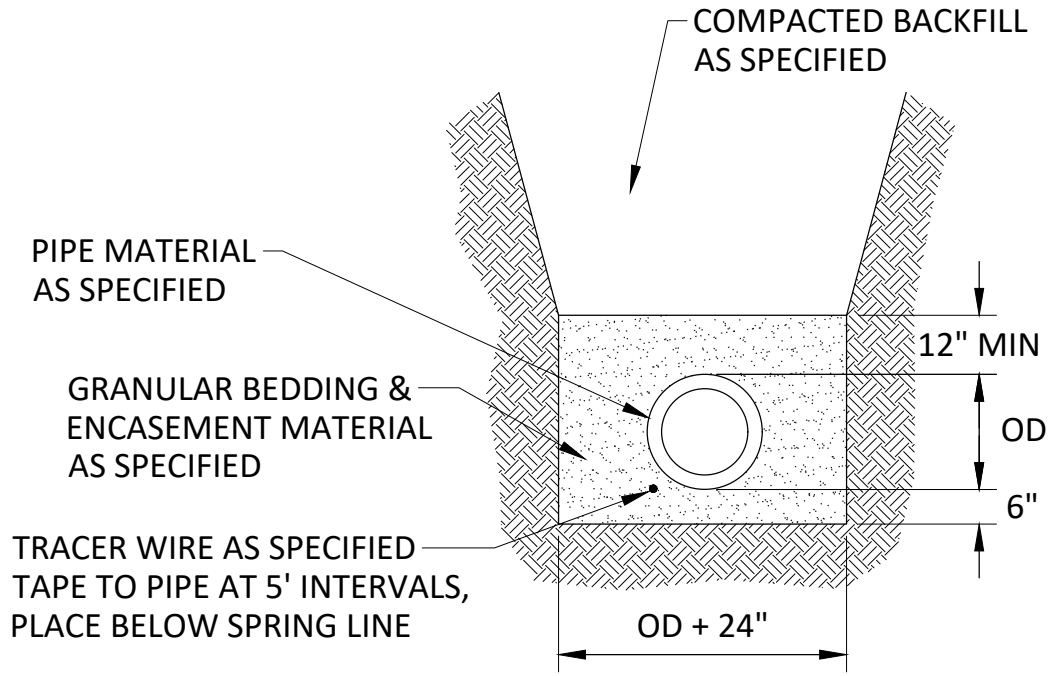
CITY OF WACONIA - STANDARD DETAILS

METER BOX DETAIL

REVISION DATE	DETAIL NO.
FEBRUARY 2021	C-106

E. Construction Details - Watermain Details (Also Used for Stormwater Reuse)

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PVC WATERMAIN TRENCH
NOT TO SCALE

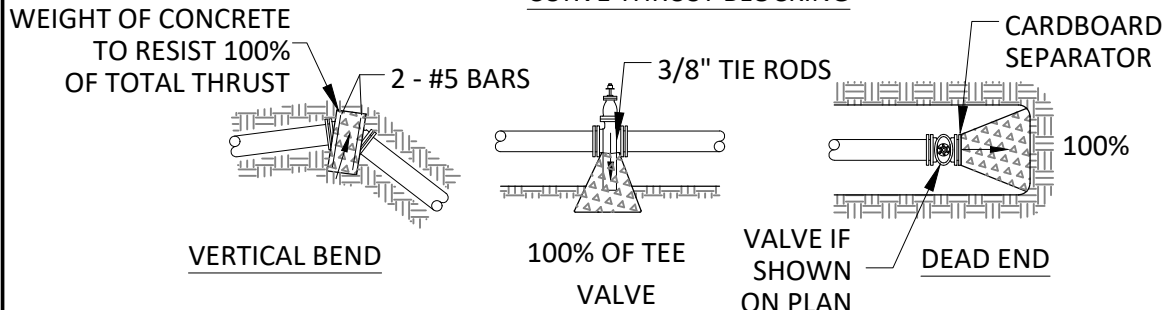
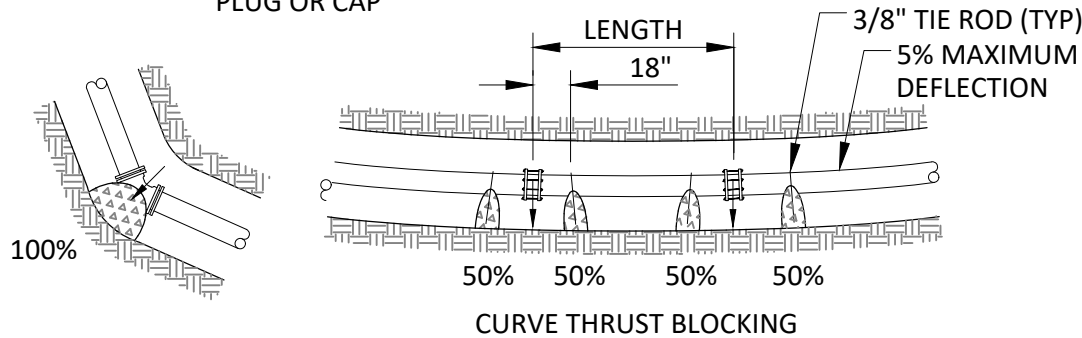
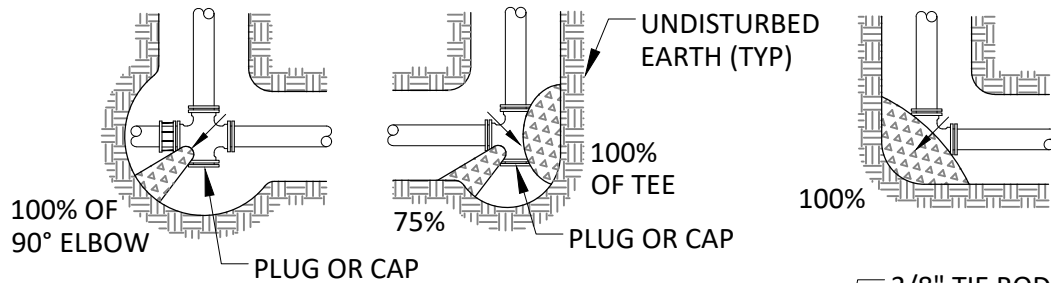
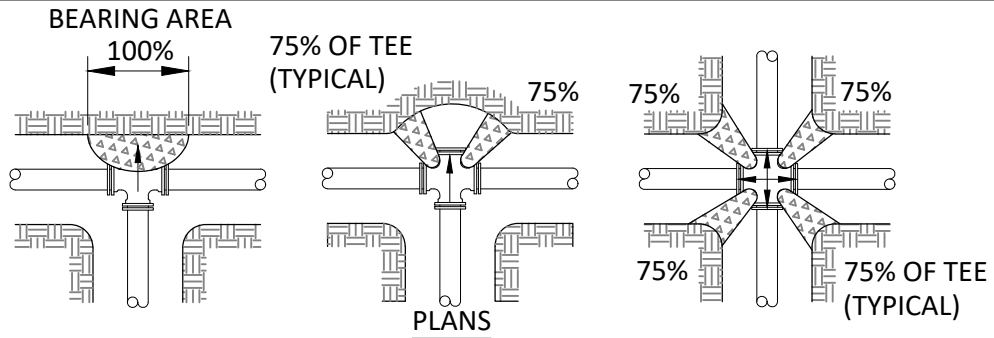


CITY OF WACONIA - STANDARD DETAILS

PVC WATERMAIN TRENCH

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-200

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ARROWS (→) INDICATE THRUST DIRECTION

CONCRETE THRUST BLOCKS

NOTES:

- FIGURE (100%) AT THRUST BLOCK INDICATES PER CENT OF TOTAL THRUST TO BE APPLIED FOR BEARING AREA.
- CONCRETE FOR THRUST BLOCKS TO BE 2000 PSI.
- RESTRAINING RODS ARE REQUIRED AT ALL TEES AND AT BENDS DEFLECTING 22 1/2° OR MORE.
- WRAP THE PIPE WITH POLYETHYLENE WRAPPING PRIOR TO POURING THE THRUST BLOCK.
- SEE SOILS REPORT FOR BEARING STRENGTH OF SOIL. IN ABSENCE OF A SOILS REPORT, AN AVERAGE SOIL (SPADABLE MEDIUM CLAY) CAN BE ASSUMED TO HAVE A BEARING STRENGTH OF 2000 PSI.
- THRUST BLOCKS ARE NOT REQUIRED ON PVC WITH SOLVENT WELDED JOINTS.

100% BEARING AREA (SQ FT)				
PIPE SIZE	DEAD END OR TEE	90° ELBOW	45° ELBOW	22 1/2° ELBOW
4	2.4	3.4	1.9	0.9
6	4.9	6.9	3.8	1.9
8	8.4	11.8	6.4	3.4
10	13.7	19.3	10.5	5.4
12	19.4	27.3	14.9	7.7
14	26.3	37.0	20.1	10.3
16	34.0	47.9	26.2	13.3
18	43.9	61.8	33.7	17.2
20	54.3	76.4	41.7	21.2
24	77.9	109.8	59.8	30.5

NOTE:
BEARING AREAS ARE BASED ON 250 LB MAXIMUM PRESSURE AND SOIL BEARING STRENGTH OF 2000 LB/SQ FT.

SIDE THRUST PER 100 LB/SQ IN PRESSURE PER DEGREE OF DEFLECTION			
PIPE SIZE	SIDE THRUST-LB	PIPE SIZE	SIDE THRUST-LB
4	35	14	377
6	72	16	486
8	122	18	665
10	197	20	790
12	278	24	1150

MULTIPLY THRUST BY DEGREE OF DEFLECTION TO OBTAIN TOTAL THRUST



CITY OF WACONIA - STANDARD DETAILS

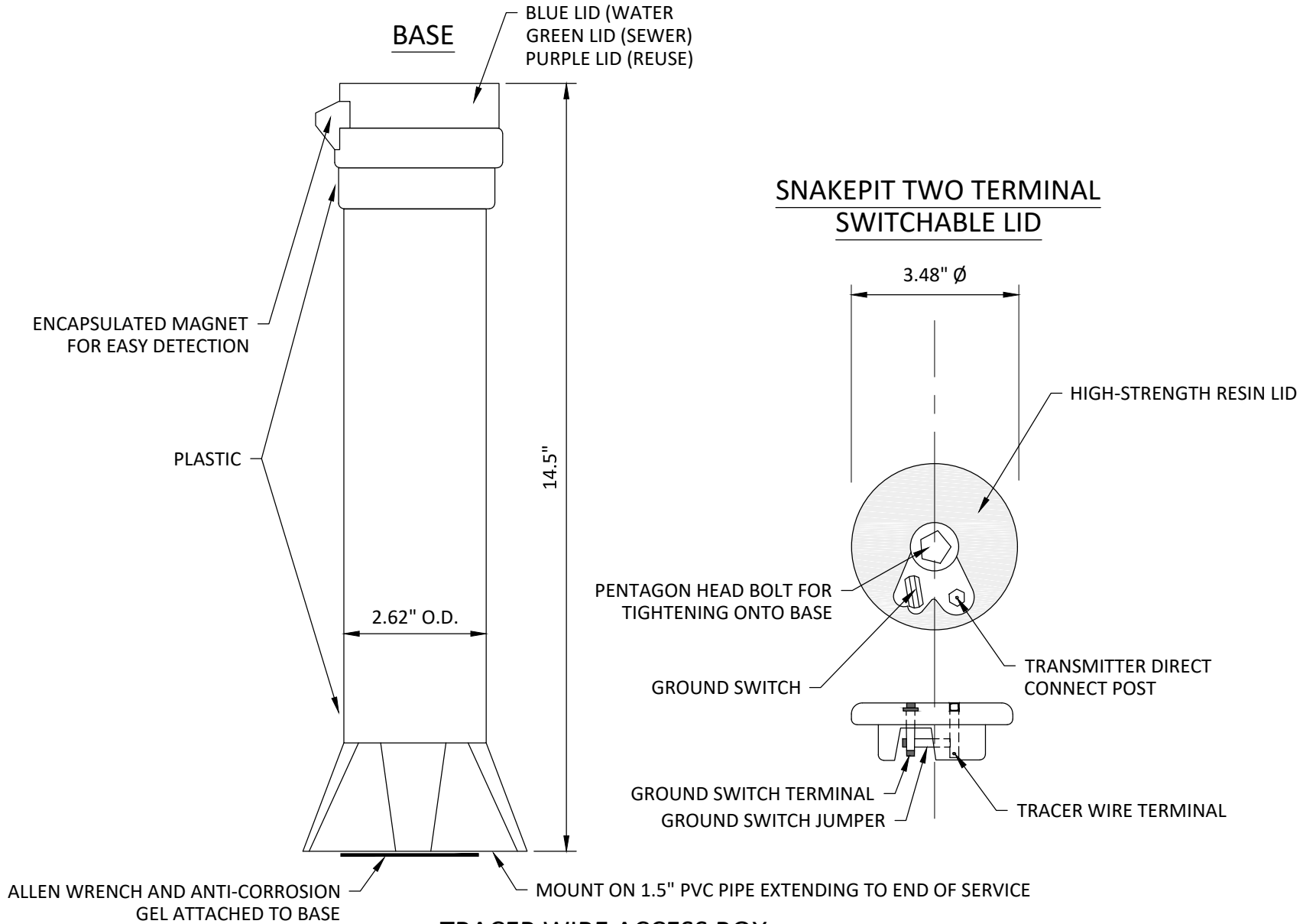
CONCRETE THRUST BLOCKS

REVISION DATE
FEBRUARY 2021

DETAIL NO.

9-207

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CITY OF WACONIA - STANDARD DETAILS

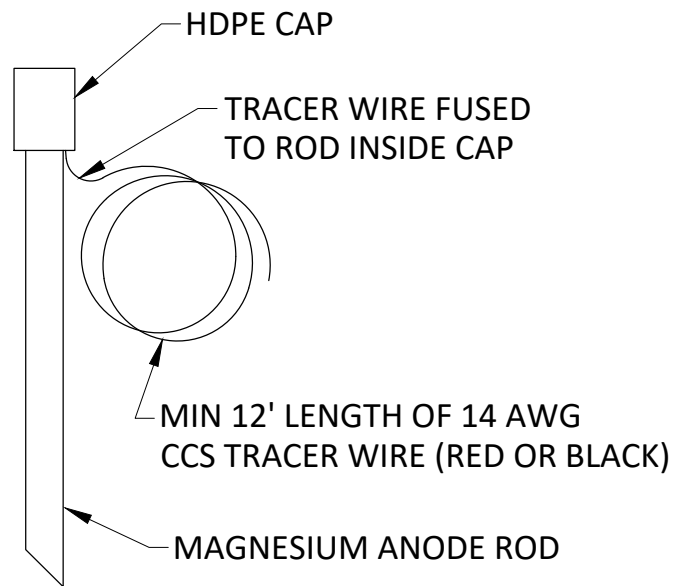
TRACER WIRE ACCESS BOX-DUAL TERMINAL SEWER

REVISION DATE
FEBRUARY 2021

DETAIL NO.

9-303

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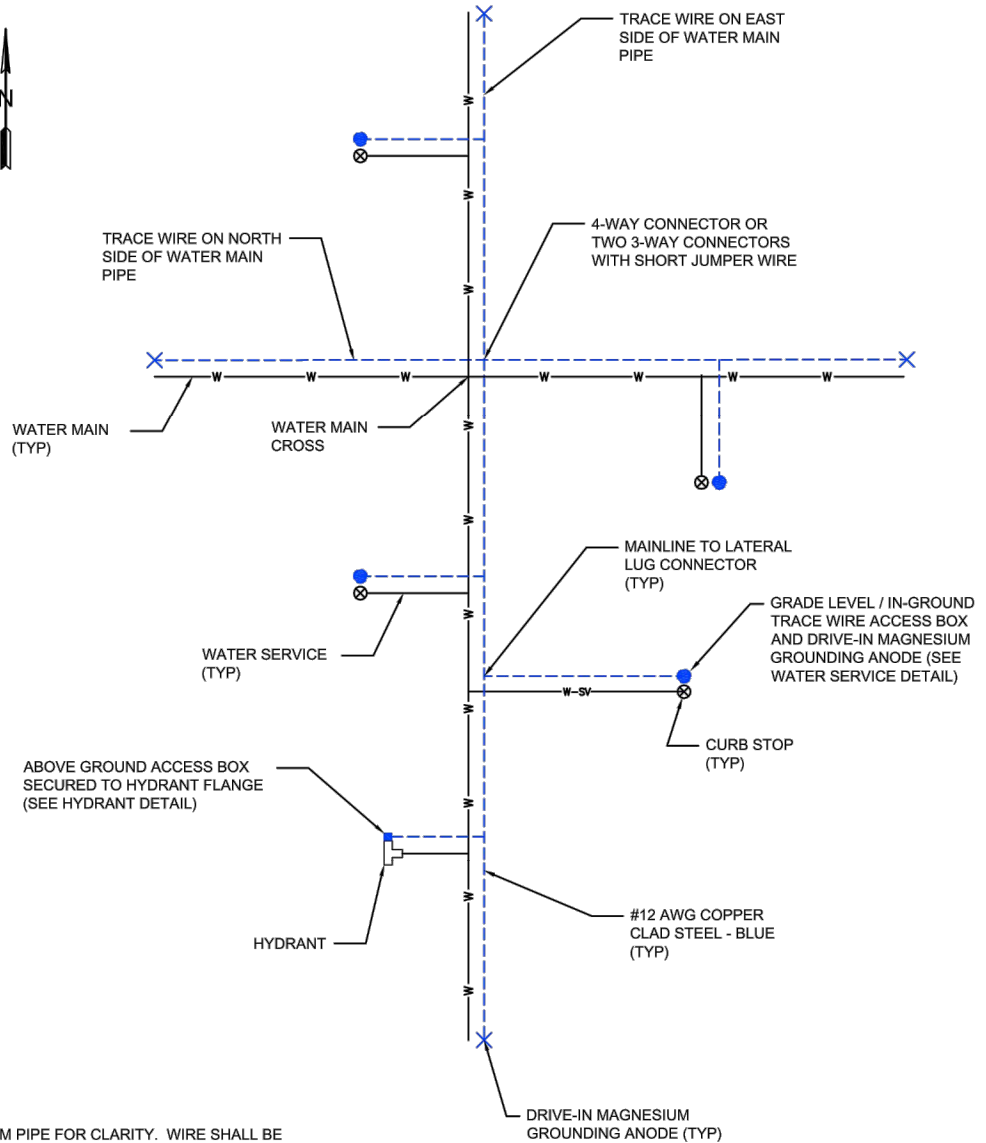
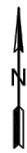


NOTE: MAGNESIUM ROD DIMENSIONS SHALL BE APPROX 18" LONG BY 1.3" DIA, AND APPROX 1 LB IN WEIGHT.

GROUNDING ANODE

NOT TO SCALE

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NOTES:

1. WIRE SHOWN AWAY FROM PIPE FOR CLARITY. WIRE SHALL BE INSTALLED ON THE BOTTOM SIDE OF THE PIPE BELOW THE SPRING LINE. THE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 5' INTERVALS.

TRACE WIRE PLAN (WATER)

NO SCALE



MINNESOTA RURAL WATER ASSOCIATION
STANDARD DETAIL

TRACE WIRE
SAMPLE WATER PLAN

May 28, 2014

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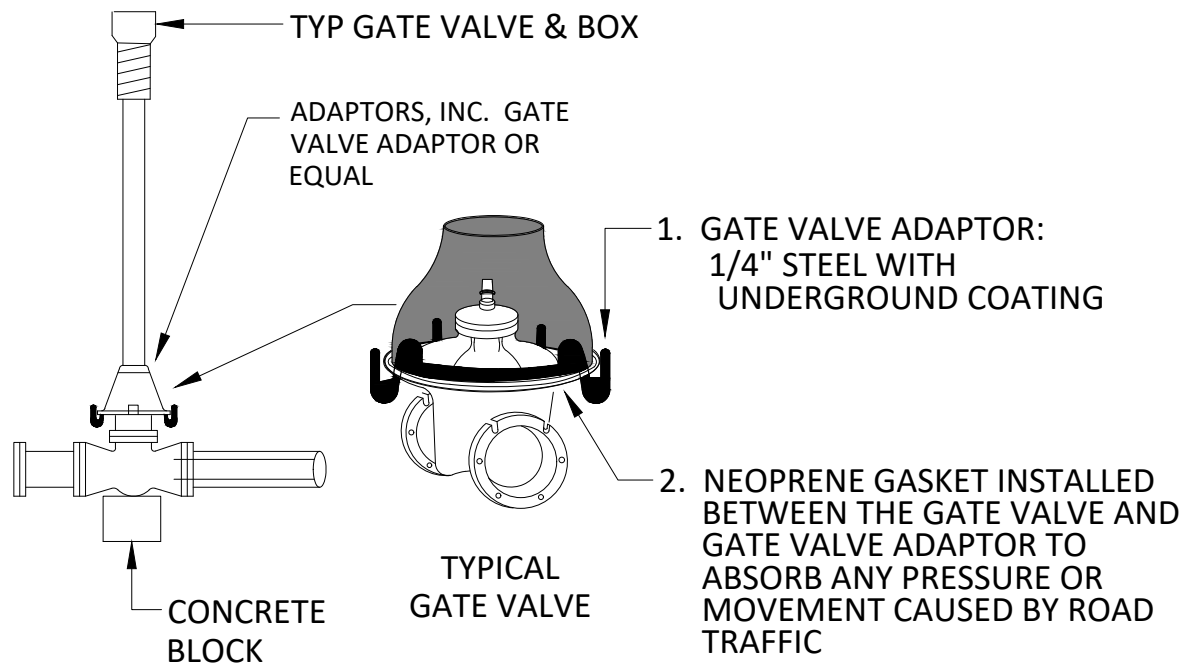
CITY OF WACONIA - STANDARD DETAILS

TRACER WIRE-WATER PLAN

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-313

9-313

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GATE VALVE ADAPTOR

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CITY OF WACONIA - STANDARD DETAILS

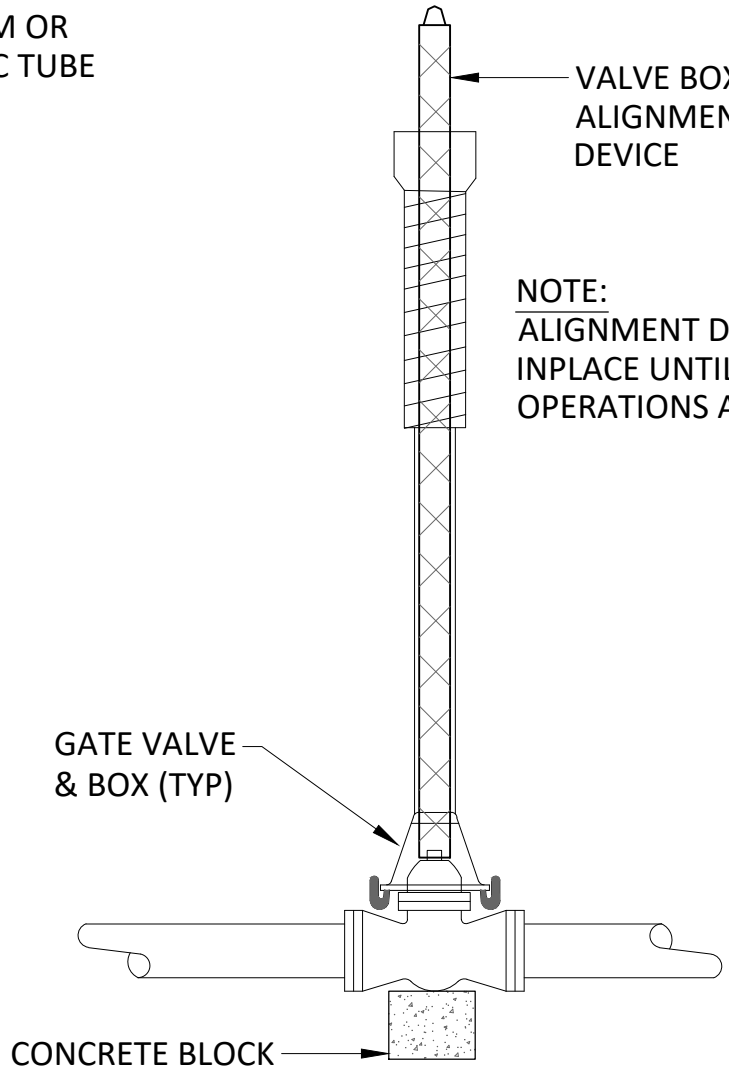
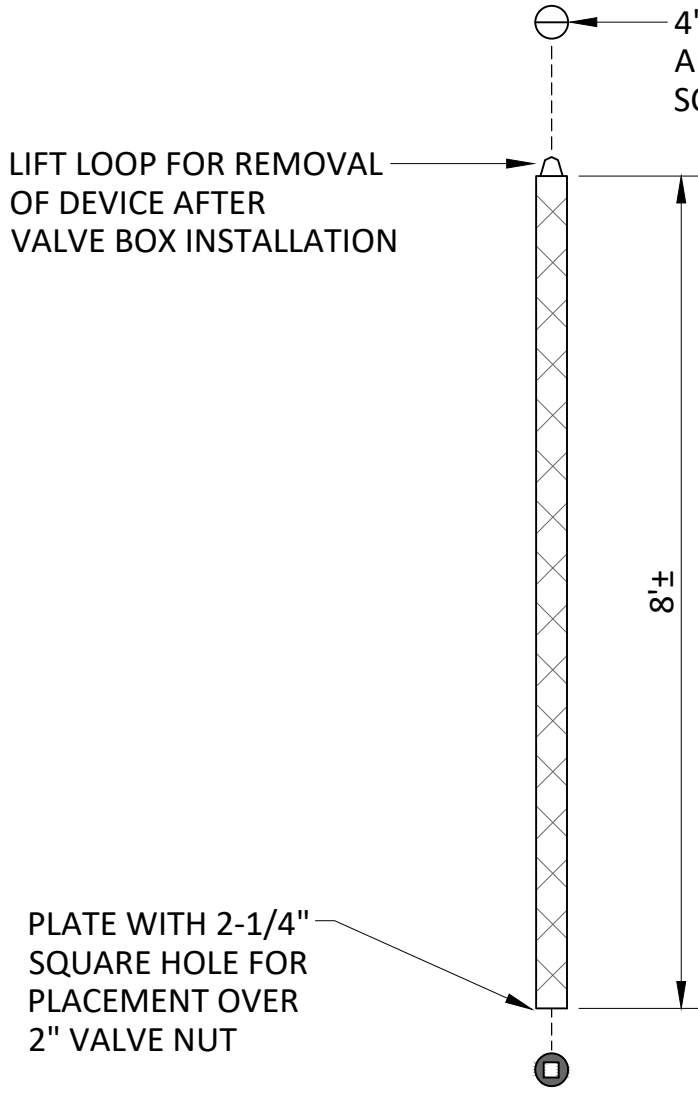
GATE VALVE ADAPTOR

REVISION DATE
FEBRUARY 2021

DETAIL NO.

9-400

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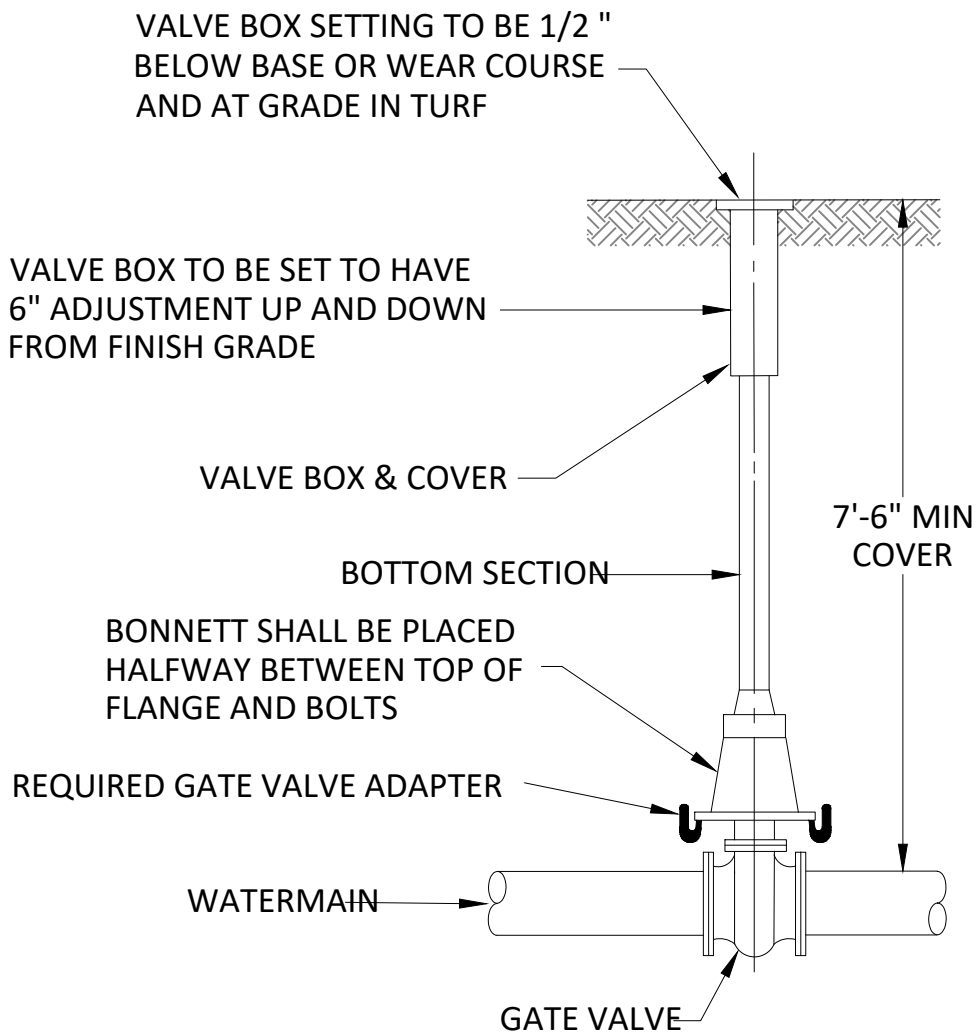


NOTE:
ALIGNMENT DEVICE TO BE LEFT IN PLACE UNTIL BACKFILL OPERATIONS ARE COMPLETE

GATE VALVE BOX ALIGNMENT DEVICE
NOT TO SCALE

NOTES:

1. VALVE BOX SHALL BE CENTERED ON OPERATING NUTS, STRAIGHT, FREE FROM DEBRIS, AND ALL SECTIONS UNBROKEN.
2. VALVES IN EASEMENTS SHALL HAVE CHANNEL POST WITNESS MARKERS WITH REFLECTIVE "GV" SIGN.
3. DEEP VALVES SHALL HAVE NUT EXTENSIONS INSTALLED TO ELEVATION TO ACCOMMODATE STANDARD 10' KEY; BOTTOM NUT SHALL BE BOLTED TO VALVE NUT AND ONLY ONE SECTION.
4. COMPACTION WITH MECHANICAL TAMPER AROUND VALVE BOX SHALL BE PLACED AND COMPACTED WITH 2' LIFTS TO ACHIEVE 95% COMPACTION.
5. GATE VALVES LOCATED WITHIN THE CONCRETE SIDEWALK SHALL INCLUDE A METAL SEPARATOR BETWEEN THE VALVE BOX AND THE CONCRETE.



GATE VALVE BOX INSTALLATION

NOT TO SCALE

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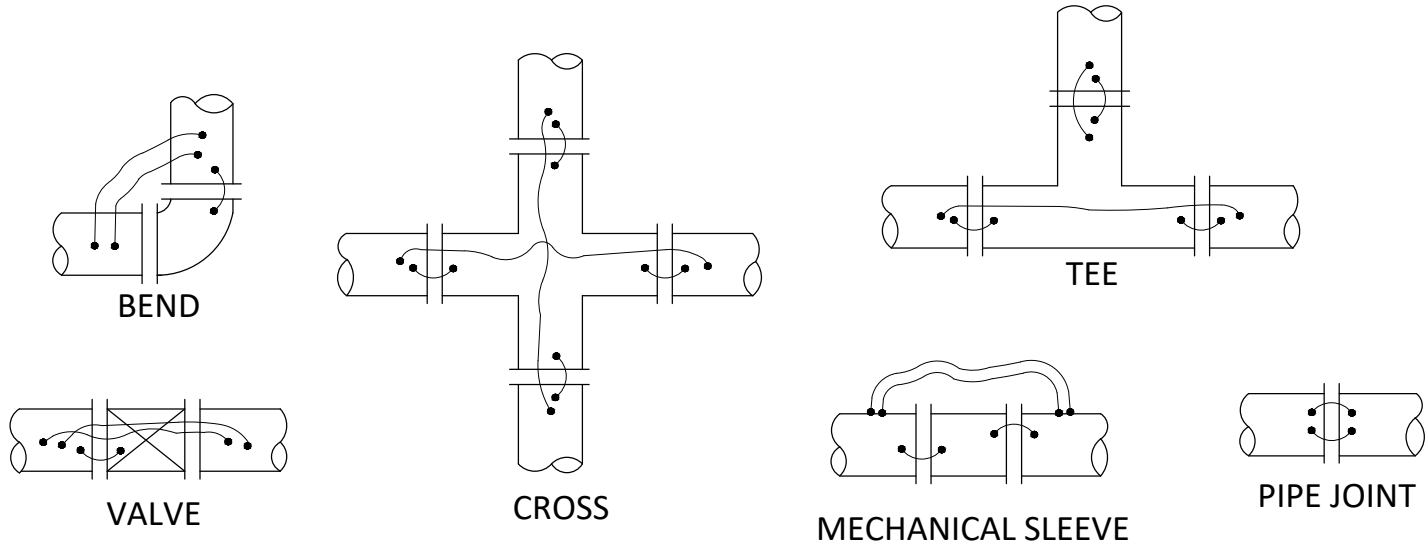
CITY OF WACONIA - STANDARD DETAILS

GATE VALVE BOX INSTALLATION

REVISION DATE
FEBRUARY 2021

DETAIL NO.

9-402



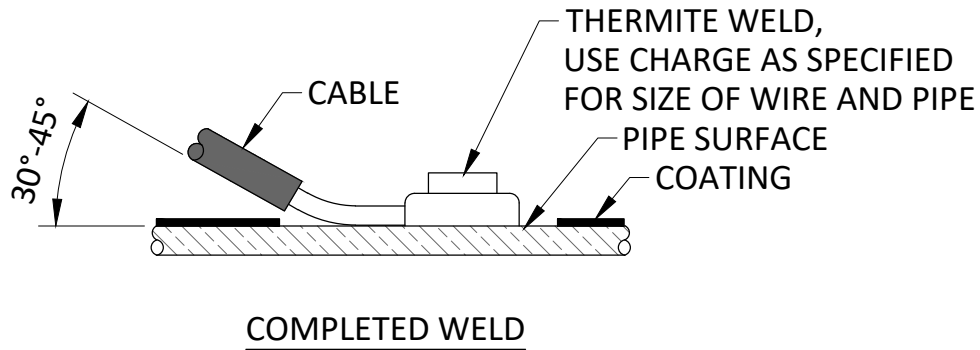
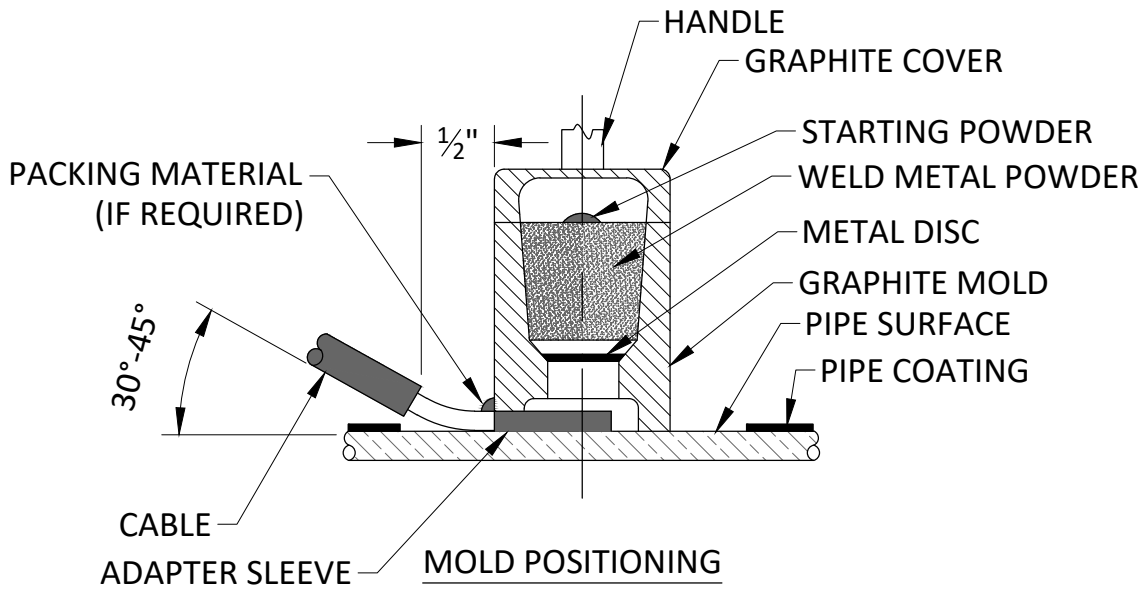
NOTES:

1. COATING REQUIRED FOR ALL WELD LOCATIONS
2. WIRE SIZE SHALL BE #4 AWG COPPER WIRE
3. USE A MINIMUM OF TWO BONDS PER PIPE JOINT-SEE THERMITE WELDING DETAIL

CATHODIC PROTECTION PIPE JOINT BONDING DETAIL

NOT TO SCALE

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NOTES:

1. CLEAN SURFACE OF PIPE OR BONDING PLATE TO BRIGHT METAL.
2. STRIP INSULATION FROM END OF COPPER WIRE.
3. INSTALL ADAPTER SLEEVE ON WIRE.
4. HOLD THERMITE MOLD FIRMLY AGAINST PIPE OR BONDING PLATE, INSERT WIRE, IGNITE WELD METAL.
5. REMOVE SLAG FROM THERMITE WELD.
6. STRIKE WELD FIRMLY WITH HAMMER TO VERIFY CONNECTION.
7. COAT WELD AREA AND ALL EXPOSED COPPER.
8. FOR MORTAR COATED PIPE, COVER PIPE WELD WITH A MORTAR COATING.

CATHODIC PROTECTION THERMITE WELDING DETAIL

NOT TO SCALE



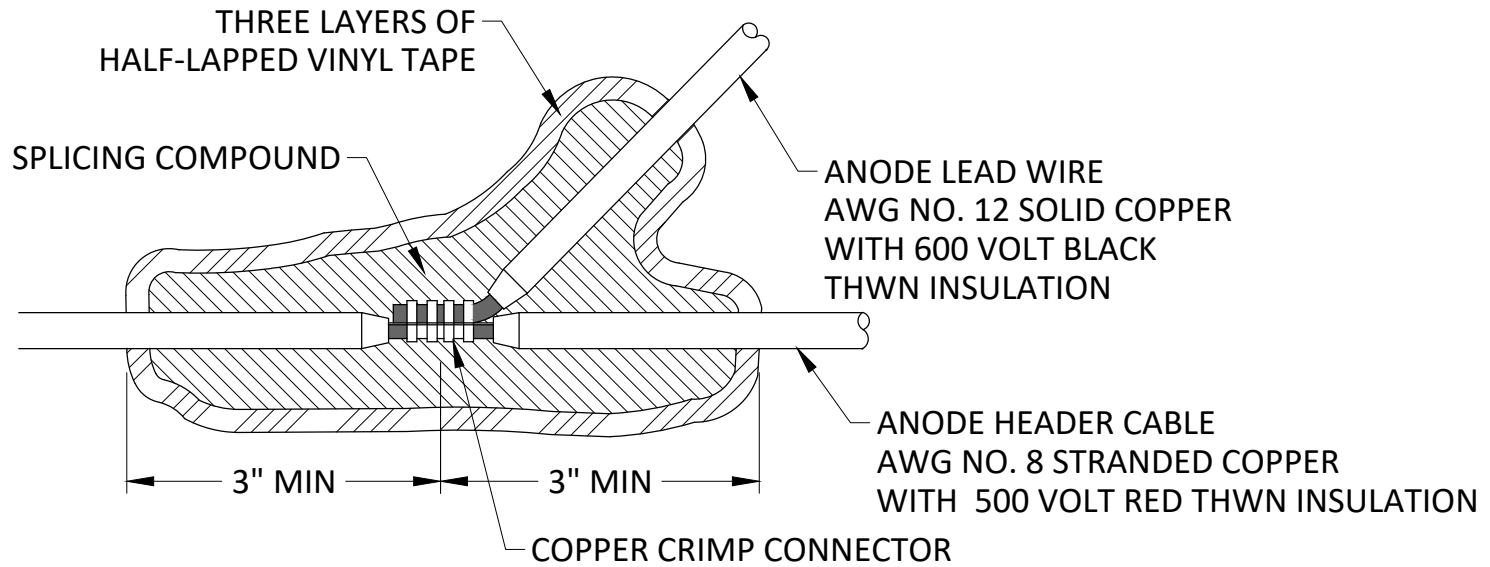
CITY OF WACONIA - STANDARD DETAILS
CATHODIC PROTECTION THERMITE WELDING

REVISION DATE
FEBRUARY 2021

DETAIL NO.

9-602

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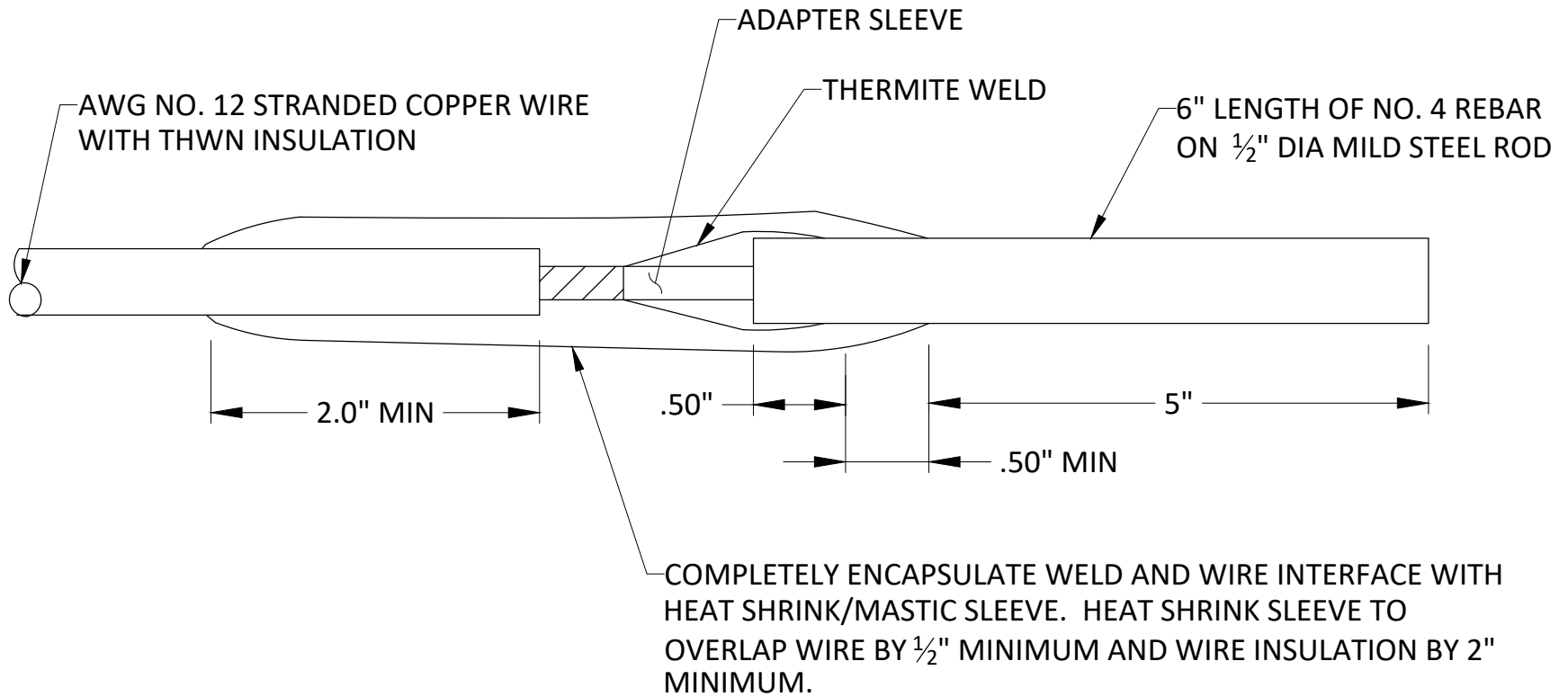
NOTES:

1. TAPER AND ROUGHEN WIRE INSULATION IN SPLICING COMPOUND.
2. COAT ENTIRE SPLICE WITH ELECTRICAL COATING COMPOUND.

CATHODIC PROTECTION GALVANIC ANODE SPLICE

NOT TO SCALE

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CATHODIC PROTECTION REFERENCE ELECTRODE

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CITY OF WACONIA - STANDARD DETAILS

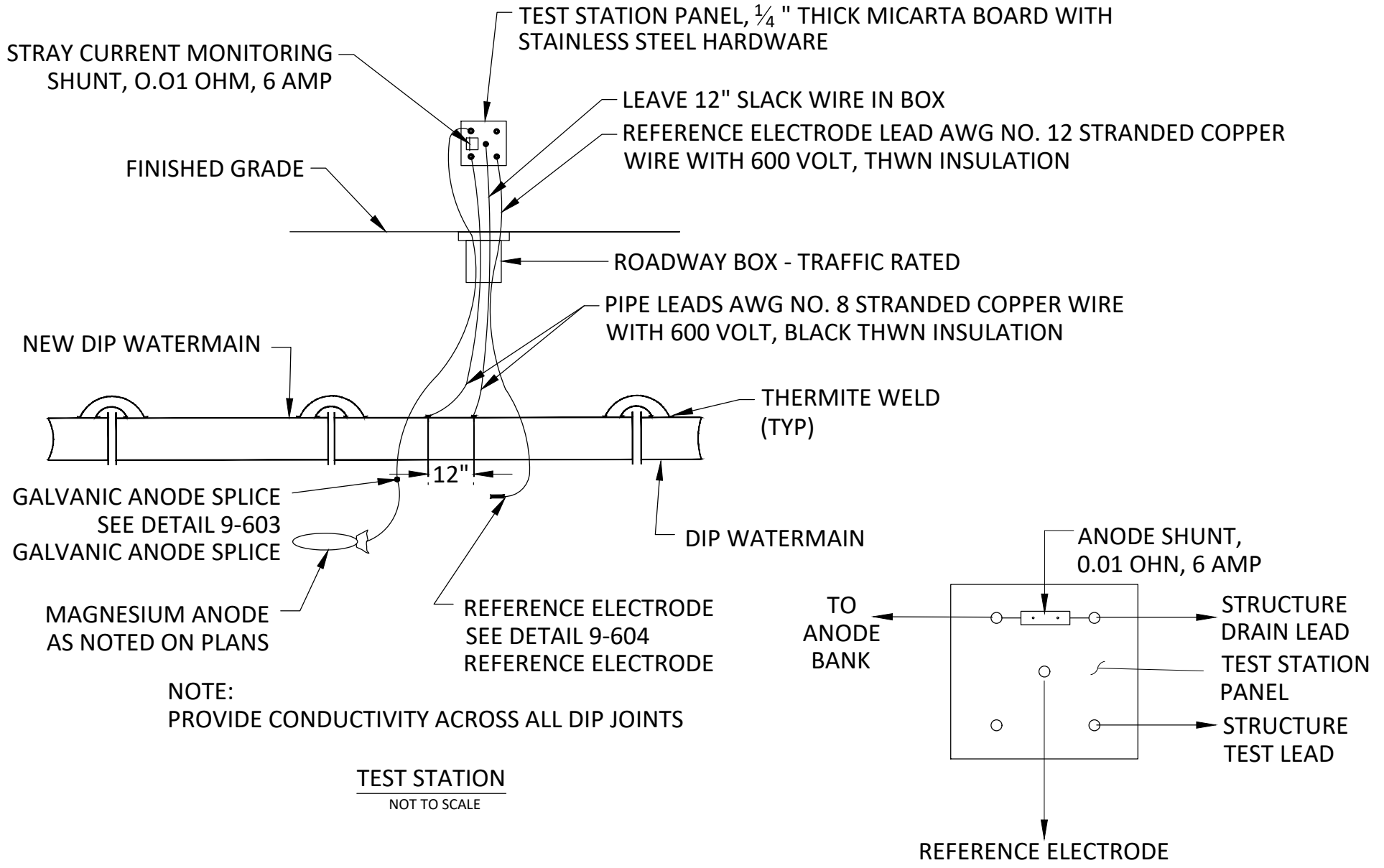
CATHODIC PROTECTION REFERENCE ELECTRODE

REVISION DATE
FEBRUARY 2021

DETAIL NO.

9-604

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TEST STATION
NOT TO SCALE

GALVANIC CATHODIC PROTECTION TEST STATION
NOT TO SCALE



CITY OF WACONIA - STANDARD DETAILS
CATHODIC PROTECTION TEST STATION

REVISION DATE	DETAIL NO.
FEBRUARY 2021	9-605