STANDARDS AND SPECIFICATIONS
FOR
PUBLIC AND PRIVATE IMPROVEMENTS

ADOPTED: SEPTEMBER 12, 2023

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Resolution 2023-156

BE IT RESOLVED by the President and Board of Trustees of the Village of Northbrook, County of Cook and State of Illinois, THAT:

A Resolution Authorizing Updates to the Northbrook Engineering Standards and Specifications for Public and Private Improvements

is hereby adopted, as follows:

Section 1. Recitals.

The Northbrook Standards and Specifications for Public and Private Improvements ("***Standards and Specifications Manual***") is the reference manual used by Village staff, civil engineering consultants, general contractors, and property owners to understand the minimum design and construction requirements applicable to civil engineering within the community. The current Standards and Specifications Manual was adopted in 1990 and has been amended and appended eleven times since its adoption. The Standards and Specifications Manual has become outdated and many areas of the document do not reflect current industry design standards and requirements. To address the outdated text in the Standards and Specifications Manual, staff reviewed similar manuals from other communities and concluded an in-depth review and rewrite of this document was required to maintain and align our design and construction standards with current best practices ("***Project***").

The Village prepared a Request for Qualifications ("***RFQ***") package that was advertised on the Village's website. Two firms submitted responses to the RFQ and both firms were interviewed. Staff determined that Clark Dietz, Inc. of Oakbrook Terrace, Illinois ("***Consultant***") submitted the most responsive and responsible proposal and best demonstrated their ability to complete the work. The Consultant worked with Village staff in cross-departmental workshops to produce updates to the Standard and Specifications Manual.

The updates were presented to the Village Board during a Committee of the Whole meeting on August 8, 2023. Staff took notes and incorporated comments from the Village Board into the final document. Staff recommends these revisions to the Standards and Specifications for Public and Private Improvements. The inclusion of updated materials, construction industry standards and practices, technological changes, and information provided in the Appendix provides a clear and concise document for end users.

The President and the Board of Trustees have considered the updates made to the Standards and Specifications for Public and Private Improvements and determined that it is in the best interests of the Village and the public to adopt the changes.

Section 2. Adoption of the Standards and Specifications for Public and Private Improvements.

The Village of Northbrook Standards and Specifications Manual, with a latest revision date of September 12, 2023, a copy of which is attached to, and by this reference made a part of this Resolution as ***Exhibit A***, is hereby adopted.

Adopted: 9/12/2023

RESULT:	**ADOPTED BY CONSENT VOTE [4 TO 0]**
MOVER:	Dan Pepoon, Trustee
SECONDER:	Muriel Collison, Trustee
AYES:	Muriel Collison, Heather Ross, Johannah Hebl, Dan Pepoon
ABSTAIN:	Kathryn Ciesla
ABSENT:	Bob Israel, Joy Ebhomielen

ATTEST:

/s/ Kathryn L Ciesla
Village President

/s/ Debra J. Ford
Village Clerk

northbrook

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SECTION I

ADMINISTRATION

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A. PURPOSE

The purpose of this document is to present standards and specifications for the design of public and private improvements that will result in uniform, long-lasting, quality construction. It is not intended as a substitute for good engineering judgment, and it anticipates that actual design work will be done by qualified professional engineers.

These standards also expect and require only the highest quality in construction procedures, workmanship, and finished product. Defective, inappropriate, damaged, or unacceptable construction, as determined by the Village Engineer, shall be removed and replaced at no expense to the Village.

The design and construction of certain types of improvements also falls under the legal responsibility of other public agencies in addition to the Village. The requirements of these other public agencies must also be met while being in conformance with these Village standards. Where conflict arises, the more stringent regulation shall govern as approved by the Village Engineer. Additionally, any and all permits and bonds required by these other agencies must also be secured in addition to providing the bonds and guarantees required to protect the Village.

These regulations shall be applicable to all lands within the corporate limits of the Village and in contiguous unincorporated territory within 1½ miles of the corporate limits of the Village in accordance with 65 ILCS 5.

All interpretation of the Village Standards and Specifications for Public and Private Improvements manual is reserved for the Village Engineer or their duly appointed representative. These standards apply whenever any person requests development, is performing development of land, redevelopment or subdivision of land, and shall be done in conformance with this manual.

The Village Engineer is authorized to approve an alternative to a particular improvement standard based on their professional engineering judgment that the alternative equals or exceeds the standard.

B. REFERENCES

The following publications are hereby incorporated by reference.

1. "Zoning Code," Village of Northbrook, current edition.
2. "Subdivision and Development Code," Village of Northbrook, current edition.
3. "Municipal Code," Village of Northbrook, current edition.
4. "Standard Specifications for Water and Sewer Construction in Illinois," published by the Illinois Society of Professional Engineers, latest edition.
5. "Watershed Management Ordinance," Metropolitan Water Reclamation District of Greater Chicago, latest edition.
6. "AWWA Standards," published by the American Water Works Association, latest edition.
7. "Guide for Determination of Needed Fire Flow," published by the Insurance Services Office, latest edition.
8. "Standard Specifications for Road and Bridge Construction," published by the Illinois Department of Transportation, latest edition.
9. "Highway Standards," and "District 1 Specific Standards," published by the Illinois Department of Transportation, latest edition.
10. "Drainage Manual," published by the Illinois Department of Transportation, latest edition.

11. "Manual on Uniform Traffic Control Devices for Streets and Highways," published by the Federal Highway Administration and "Illinois Supplement to the Manual on Uniform Traffic Control Devices," published by the Illinois Department of Transportation, latest edition.
12. "Bureau of Local Roads and Streets Manual," published by the Illinois Department of Transportation, latest edition.
13. "Bureau of Design and Environment Manual," published by the Illinois Department of Transportation, latest edition.
14. "Annual Book of ASTM Standards," published by the American Society for Testing and Materials, latest edition.
15. "Recommended Practice: Lighting Roadway and Parking Facilities," published by the Illuminating Engineering Society, latest edition.
16. "American Standard for Nursery Stock," published by AmericanHort, latest edition.
17. "Illinois Urban Manual," published by the Illinois Urban Manual Partnership, latest edition.
18. "Illinois Recommended Standards for Sewage Works," Ill. Admin. Code Title 35 Part 370
19. "NASSCO Specification Guidelines," published by the National Association of Sewer Service Companies, latest editions.
20. "Fire Suppression Rating Schedule," published by the Insurance Services Office, latest edition.
21. "Lighting Roadway and Parking Facilities Standards Collection," published by the Illuminating Engineering Society, latest edition.
22. "FHWA Lighting Handbook," published by the Federal Highway Administration, latest edition.
23. "National Electrical Code," published by the NFPA, as adopted by the Board of Trustees.

C. GENERAL CONDITIONS

Open cutting roadway pavement within the Village shall not be allowed between November 1st and April 1st unless approved in writing by the Director of Public Works or Village Engineer.

D. AMENDMENTS

These standards may be amended from time to time by Resolution duly adopted by the Board of Trustees. However, the Village Engineer is granted the authority to make periodic revisions to the standard details contained in the Appendix based on their professional judgment.

E. VARIATIONS

Upon application to the Village Engineer variations of the provisions of these Standards may be considered unless otherwise prohibited by code.

A Developer may petition the Village Manager who will make a recommendation to the Village Board of Trustees regarding the requested relief from these Standards or the determinations of the Village Engineer. The developer shall submit to the Village Manager detail in writing the specific section and relief requested demonstrating:

- The requested variation is in keeping with the overall purpose and intent of the Standards and Specifications;
- The granting of the variation will not be to the detriment of adjacent properties;
- The granting of the variation will not be contrary to the public health, safety and general welfare; and
- An instance of usage does not set a precedence for future use.

SECTION II

WATER DISTRIBUTION SYSTEM AND APPURTENANCES

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A. GENERAL

All development under the jurisdiction of the Village of Northbrook shall include provisions for construction of water distribution and service facilities complete with valves, fire hydrants, and other appurtenances designed in accordance with the standards herein. Where more than one building is located or planned on one parcel of property, or where fire protection is required, the proposed initial phase of construction shall include all water main construction and appurtenances.

The design of all water distribution system improvements proposed for construction as independent projects under the control of the Village shall meet these technical requirements and the requirements of the Illinois Environmental Protection Agency (IEPA).

B. ENVIRONMENTAL PROTECTION AGENCY

Water main design and construction shall in all respects be in accordance with the regulations of the IEPA Division of Public Water Supplies. An IEPA Public Water Supply Construction Permit shall be obtained prior to construction commencing.

C. PUBLIC EASEMENTS AND UTILITIES

All public water main extensions shall be located within publicly dedicated rights-of-way or easements. If located within an easement, the easement shall be centered on the pipe and appurtenances and extend 10 feet to either side.

To protect existing utilities all underground utility work shall be performed in accordance with the Illinois Underground Utility Facilities Damage Prevention Act and JULIE Excavator Handbook.

D. SYSTEM EXTENSION

Extensions to the water distribution system shall form a complete network and be compatible with the existing water system network. Mains shall be extended to the property lines along public rights-of-way and at any location indicated by the Village Engineer. As required by the Village Engineer, the developer shall have the proposed water main improvements added to the Village's water system model to verify the capacity of the existing system to support the new development.

Transmission mains within or adjacent to a development shall be sized and located as directed by the Village Engineer. Distribution mains shall form a grid, be sized, looped, and spaced as required for water quality and fire flows, and shall have a minimum diameter of 8-inches. Dead legs shall not be allowed.

The proposed system extension shall be arranged so that the isolation of any section of main will require closure of no more than 3 valves and minimize the interruption of service.

E. MAIN OVERSIZING

When the construction of a transmission main is deemed necessary by the Village Engineer, the additional incremental construction cost to oversize the water main in the same location may be accommodated by a recapture agreement or borne by the Village if so accepted and authorized by the Board of Trustees.

F. FIRE PROTECTION

1. Anticipated Fire Flow Loadings

If required by the Village Engineer or Fire Chief, the design engineer shall show, in a separate report to both the Village's Engineering Department and the Fire Prevention Bureau, that at various locations, selected by the Village Engineer, the proposed water main system will supply the required fire flows in excess of domestic consumption demands. A "C" factor of 140 may be used for new water main and the "C" factor shall be reduced by 5 for each decade of age. A minimum fire flow requirement of 1200 GPM, 20 psi, residual gallons per minute should be used for single-family residential fire flow calculations. The Fire Department jointly with the Engineering Department shall determine the minimum required fire flows for other proposed developments.

2. Private Booster Pumps for Fire Protection

No pump shall be installed without specific approval of the Fire Prevention Bureau. The Standards of the National Fire Protection Association have been adopted by reference in the Village Building and Fire Prevention Code. Proper backflow prevention devices are required in accordance with the Illinois Plumbing Code.

G. INSTALLATION REQUIREMENTS

All water main pipe shall be protected in accordance with IEPA requirements. There shall be a minimum 12-inch vertical separation from all non-sewer utilities.

H. MATERIAL SPECIFICATIONS AND DETAILS

1. Water Main Pipe

Pipe shall be furnished in nominal 18-to-20-foot laying lengths as supplied by the manufacturer. Each pipe shall have the manufacturer's mark and year in which the pipe was manufactured in addition to the current AWWA, thickness class, pressure class, diameter, and listing standards.

Pipe shall be specified for a working pressure of 150 psi. Higher pressure or thickness classes of pipe may be required when installed outside of the right-of-way, in rear or side yards, in casings, and as otherwise specified by the Village Engineer.

Ductile Iron Pipe
Ductile iron water main pipe shall be minimum thickness Class 52, cement lined, bituminous coated and comply with AWWA C151. Pipe shall be encased in an 8-mil thick polyethylene encasement installed in accordance with the manufacturer's instructions. Polyethylene encasement shall be secured to the pipe main with plastic tie straps.

Polyvinyl Chloride Pipe
Polyvinyl chloride water main pipe shall have a minimum DR18 pressure rating and comply with AWWA C900.

Tracer Wire
Tracer wire shall be installed with all water main and shall be a minimum #12 AWG single strand copper or copper clad conductor with blue colored 30 mil minimum thickness HDPE insulation or as approved by the Engineer. Tracer wire shall be placed alongside the pipe between the 3 o'clock and 6 o'clock position, and fastened at

minimum of 5 foot intervals within the limits of the initial backfill. Tracer wire shall extend through all valves and fittings and shall be brought up to grade inside all valve vaults and with fire hydrants.

Tracer wire shall not be looped and underground splices shall be performed using locking connectors or lugs specifically designed for direct bury applications.

Tracer wire termination or access boxes shall be installed as required by the Village Engineer.

All new tracer wire installations shall be tested by the developer at the developer's expense using low frequency line locating equipment. Testing shall be observed by the Village Engineer who shall be the final authority for approval. Testing shall be performed prior to public improvement acceptance. Continuity testing in lieu of actual line locating shall not be accepted.

Fittings
All underground fittings and related fittings/hardware shall be ductile iron and connected to water main pipe by means of mechanical joints with Grade 304 stainless steel fasteners. All fittings shall be encased in high-density cross-laminated polyethylene encasement.

All fittings shall meet current AWWA C110.

2. Pipe Joints

Sections of water main pipe shall be connected by means of slip joints, consisting of bells extruded with the pipe which have interior angular recesses conforming with the shape and dimensions of a rubber sealing gasket, the interior dimension of which is such that it will admit the insertion of the spigot end of the joining pipe in such manner as to compress the gasket tightly between the bell of the pipe and the inserted spigot, thus securing the gasket and sealing the joint.

The lubricant used in conjunction with slip joints shall be NSF approved and as recommended by the pipe or fitting manufacturer.

Mechanical joint pipe shall meet the above requirements. Fasteners shall be Grade 304 stainless steel.

3. Restrained Joints

The unbalanced forces at pipe bends, tees, etc., shall be restrained by transmitting those forces of the pipe wall by means of concrete thrust blocks, mechanically restrained joint restraining glands, a tie rod system, field locking gaskets, or a combination of these systems to stabilize the pipe. Mechanical systems shall consist of Grade 304 stainless fasteners and shall include polyethylene encasement. Mechanically restrained joint systems shall be approved by the Village Engineer.

4. Thrust Blocks

Thrust blocks, mechanical joint restraints, or combinations of these systems are required at all valves, hydrants, tees and bends. Engineering drawings shall indicate the location of each concrete thrust block to be installed. Where undisturbed earth is not available or not

likely to be available to back up pressure type concrete thrust blocks, the design engineer shall specify tie rods or mechanically restrained joints with or without anchor type concrete thrust blocks.

Thrust blocks shall be precast concrete block or poured in place Class SI concrete as approved by the Village Engineer.

5. Fire Hydrants

Fire hydrants with auxiliary valves shall be the break flange type and the make and model shall conform to the current Standard Detail W-1.

Spacing:

Fire hydrants shall be installed so that residential property will not be further than one hundred and 150 feet from a fire hydrant. Fire hydrants shall be provided so as to provide the required fire flows to structures as described in the "Fire Suppression Rating Schedule". Where water transmission lines or offsite water lines are installed on private property, the first private hydrant must be installed at no more than a 500 foot interval distance from the street hydrant and at 300 foot intervals thereafter to the most remote point of the building. Commercial areas require a fire hydrant within 100 feet of a building's Fire Department Connection.

Installation Specifications:

(1) The hydrants shall be installed to meet the requirements as indicated on the Standard Detail.

(2) Fire hydrants shall be typically installed not further than 7 feet nor less than 4 feet from the back of curb. Parking lots shall be designed to provide not less than 15 feet of hydrant clearance on one side of the hydrant on which a steamer or hose connection is located to permit access.

6. Valves

Valves shall be located on water mains to effectively isolate the sections from the system with minimal disruption should a shutdown be required. Valves shall be spaced such that not more than 1,200 feet of main will be shut off at any given time. The Village Engineer may require closer spacing of valves.

Valves 12 inches and smaller shall be iron body, resilient seat gate valves, and conform to AWWA C509. Valves over 12-inch diameter shall be iron body, rubber seat, butterfly valve, Class 150B, conforming to AWWA C504.

All valves shall open counterclockwise and flange ends shall conform to AWWA C111.

Pressure testing against existing water main valves will not be permitted. Developer shall remove and replace existing valves prior to testing new main to ensure protection of the water supply.

7. Valve Vaults

Valve vaults shall be watertight and provided for each valve and shall be precast reinforced concrete circular barrel and cone sections (ASTM C478) with mastic watertight joints. The exterior of all valve vaults shall be treated with waterproofing materials.

Water Valve or Tap Size	Minimum Valve Vault Diameter
Less than 10-inch	48-inch
10-inch or 12-inch	60-inch
14-inch or 16-inch	72-inch
Greater than 16-inch	84-inch
Pressure Tap on 8-Inch	60-inch
Pressure Tap on 10-inch or 12-inch	72-inch
Pressure Tap on 14-inch or 16-inch	84-inch
Pressure Tap over 16-inch	96-inch

A minimum of 2 inches of precast adjusting rings shall be installed on every structure. No more than 3 adjusting rings with an 8-inch maximum height adjustment shall be allowed. Two butyl rubber sealant strips shall be installed between adjusting rings, the structure, and the casting.

8. Castings

Manhole frame and solid cover shall be Neenah No. R-1772 in non-pavement areas and Neenah R-1713 in paved areas. Covers shall have concealed pick holes and embossed "WATER".

9. Air Release Valves

Air release valves shall be placed on the water main at high points as deemed necessary by the design engineer or the Village Engineer to serve as air vents preventing air locking of the water main. Air release valves shall be of the APCO Body Style 200A or an approved equivalent. Valve vaults for air release valves shall be sized according to Pressure Tap sizing.

10. Sampling Tap

Copper testing whips and minimum 3/4 inch lead free bronze corporation cocks shall be installed in all water main valve vaults.

11. Water Service Line

The water service line and connection shall be in accordance with the Water Service Detail. The minimum size for a residential water service shall be a minimum of 1-1/2 inch in diameter.

I. CONSTRUCTION REQUIREMENTS

1. Pipe Installation

Pipe shall be installed in accordance with "Standard Specifications for Water and Sewer Main Construction in Illinois", the applicable AWWA standards, and the requirements of the Village Engineer.

2. Backfill

Excavation in existing pavement shall be backfilled to the pavement base layer with controlled low strength material unless otherwise approved by the Village Engineer.

Water main constructed via open cut within 3 feet of existing pavement or across proposed pavement shall be backfilled with approved granular backfill, thoroughly compacted in 8-inch lifts in place.

3. Water Services Less Than 4 Inches Diameter

The required minimum 1-1/2 inch diameter Type K copper line shall be laid in a trench at a minimum depth of 5-1/2 feet.

Excavation in existing pavement shall be backfilled to the pavement base layer with controlled low strength material unless otherwise approved by the Village Engineer.

Sewers constructed via open cut within 3 feet of existing pavement or across proposed pavement shall be backfilled with approved granular backfill, thoroughly compacted in 8-inch lifts in place.

The water service line for each property shall be laid from the buffalo box (B-Box) into the building, through a water meter and then into the plumbing system of the building. All plumbing shall conform, at a minimum, to the Illinois Plumbing Code (77 Ill. Adm. Code 890).

The location of the B-Box shall be sawcut in the curb as a “W” and the location field marked with a painted “blue” 4 x 4 hardwood timber installed vertically.

The B-Box shall be located in the center of the lot frontage and located in the street right-of-way or street easement.

No meter will be placed into service until an inspection of the existing building's plumbing system has been made by Village personnel to insure positive and permanent disconnection of previous well water supply and adequate flushing and disinfection. There shall be no cross connection of the municipal and individual well water supplies in the building's plumbing. Continued use of a well water supply is permitted for non-domestic benefit (sprinkling and irrigation, etc.) only if the potable Village water supply is completely physically disconnected from the non-Village supply.

An approved backflow prevention device shall be installed wherever, in the Director of Development's opinion, such installation is necessary in order to comply with the Illinois Plumbing Code (77 Ill. Adm. Code 890). All backflow prevention devices or methods required shall conform to the Illinois Plumbing Code.

The water meter must be installed within the building at a location which ensures protection from freezing, allows convenient access for repair, replacement, periodic reading, and is as close to the supply line entrance as possible.

4. Connections to Existing Mains

All connections to the Village water distribution system shall be made under full water service pressure unless otherwise approved by the Village Engineer.

5. Pipe Cutting

The cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat and workmanlike manner without damage to the existing pipe and so as to leave a smooth end at right angles to the axis of the pipe.

6. Steel Casing Pipe for Auger Boring or Tunneling

Circular steel casing pipe for auger boring or tunneling shall conform to the approved and permitted plans. Stainless steel casing spacers and rubber end seals are required on all installations. Record drawings are required for casing location and elevation.

J. WATER MAIN TESTING

All water main and service line 4-inches and greater shall be tested according to the Standard Specifications for Water and Sewer Main Construction in Illinois or as approved by the IEPA. The contractor shall notify the Engineering Department at least 48 hours in advance to arrange for observation of the testing, disinfection, and sampling.

K. WATER METERS

It will be the responsibility of the general contractor to contact Public Works for an appointment to install Village water meters. Installation of water meters must occur prior to final inspection and occupancy approval by the Development Department.

In general, cold water displacement meters, manufactured in accord with AWWA Standard C700 shall be used for domestic and lower usage commercial buildings. For larger users, compound meters meeting AWWA Standard C702 shall be used. Compound meters shall be single register.

L. WATER SERVICE DISCONNECTION

Disconnection of the water service from the water main shall be completed prior to demolition or elimination of a building or property that has existing water service supplied to it from the Village.

Water services with tapping saddles 2-inches and smaller shall be shut off at the corporation stop and have a brass cap installed on the stop. Direct taps or deteriorated tapping saddles shall be removed completely and a stainless-steel repair clamp shall be installed over the tap location to seal the main. This operation shall be performed under pressure to ensure the integrity of the public water supply.

Water services larger than 2-inches shall be removed by removing the tee or valve from the main and replacing with new pipe and restraint joint pipe couplings as necessary to reestablish the integrity of the pipe main.

M. RECORD DRAWINGS

Prior to acceptance of the water distribution systems, Record Drawings must be delivered to the Village in electronic and hard copy formats as approved by the Village Engineer. The Record Drawings shall indicate the location of all valves and B-Boxes, and size, location, and depth of all water lines, and shall be certified as to accuracy by an Illinois licensed Professional Engineer or Illinois licensed Professional Land Surveyor. See As-Built Checklist for required format of As-Built submittals.

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SECTION III

SANITARY SEWER COLLECTION SYSTEM & APPURTENANCES

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A. GENERAL

All development under the jurisdiction of the Village of Northbrook shall include provisions for the construction of or connection to sanitary sewerage facilities. At a minimum, proposed sanitary sewer construction shall include a system of sewers between a connection to an existing sewer system at an approved location and the boundary line of each individual parcel of property within or adjacent to the development. Where more than one building is located or planned on one parcel of property, the proposed initial phase of construction shall include all sanitary sewer construction and appurtenances within the parcel.

The design of all sanitary sewerage facilities shall meet the technical requirements of these Standards and the requirements of the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC).

B. SERVICE AREAS

The design plans submitted to the Village Engineer for approval shall include a map of the Ultimate Service Area. The Ultimate Service Area shall include the entire area proposed to be ultimately served by all or a portion of the proposed sanitary sewer.

By decision of the Village, the Ultimate Service Area may be required to be extended beyond the limits of any development. The additional expense for such extension of the Ultimate Service Area beyond the limits of the development may result in provisions to recover such incremental cost through a recapture ordinance.

Adequate details shall be shown on the Ultimate Service Area map relative to future sewer sizes, elevations and topography to establish the adequacy of construction plans submitted for approval to serve possible future extensions beyond the Ultimate Service Area.

C. PUBLIC EASEMENTS AND UTILITIES

All public sewer main extensions shall be located within publicly dedicated rights-of-way or easements. If located within an easement, the easement shall be centered on the pipe and extend 10 feet to either side.

To protect existing utilities all underground utility work shall be performed in accordance with the Illinois Underground Utility Facilities Damage Prevention Act and JULIE Excavator Handbook.

D. SYSTEM CONNECTIONS

The location of proposed connections to the existing sanitary sewer system shall be approved by the Village Engineer with due regard to the available capacity of the entire system. The developer shall be responsible for providing a sewer capacity report to the Village Engineer for review and approval. The available capacity of receiving sewers shall be determined by the developer by comparing the theoretical capacity of the receiving sewer to the design flow calculated as the sum of the following factors:

- Monitored flow baseline
- Wet weather groundwater infiltration
- Rain dependent infiltration and inflow
- Proposed development peak flow

E. BASIC DESIGN STANDARDS

Sewer mains shall be designed in accordance with these standards and the “Watershed Management Ordinance”. The more stringent requirements contained in these standards shall apply. Sewer mains

shall be of adequate size to serve the entire development proposed and, except as otherwise approved by the Village Engineer, shall be installed in the street right-of-way, or in an easement adjacent thereto. Sewer mains shall not be installed within 10-feet of a building.

Before commencing the sewer layout, the developer shall confer with the Village Engineer to determine the required size and grades for any trunk sewers traversing the subdivision to complement the Village system capacity to existing MWRDGC interceptor facilities together with the estimated additional flow created by the development to such facilities.

Sanitary sewers shall be extended to the boundary of the development along public rights-of-way and at other locations indicated by the Village Engineer.

Every effort shall be made to avoid lift stations in the engineering design.

1. Design Flows and Slopes

   Average design flow for a sanitary sewer facility shall be 100 gallons per capita per day (gpcpd). Maximum design flow for sanitary sewer lines shall be determined by MWRDGC design criteria, provided, however, that the maximum design flow for sewer laterals need not exceed 400 gpcpd and the maximum design flow for collecting sewer mains and trunks shall not be less than 250 gpcpd. The design engineer is to provide detailed design calculations for approval.

   The design of flows, slopes, and sewerage facilities shall be in accordance with the "Watershed Management Ordinance".

2. Sewer Size and Design Hydraulics

   (a) Minimum sanitary sewer main size shall be 8-inches internal diameter.

   (b) Minimum building sanitary service sewer size shall be a 4-inch internal diameter.

   (c) Sewer size changes - Sanitary sewers of different diameters shall join only at manholes. The invert elevations shall be adjusted to maintain a uniform energy gradient by matching the 0.8 depth points of different diameters.

3. Alignment

   Sewers shall be laid straight in both horizontal and vertical planes between manholes, unless otherwise approved by the Village Engineer.

4. Manholes

   Manholes shall be precast concrete, waterproof to prevent infiltration, and constructed in accordance with the Village's Standard Detail.

   Manholes shall be installed not more than 400 feet apart for sewers 15 inches in diameter or less, and 500 feet apart for sewers 18 to 30 inches in diameter, at the end of each line, and all changes in grade, size, alignment, and material.

   A 1/10th of a foot difference in invert elevations should be used when a change of direction of flow is necessary within the manhole. In no case shall the invert of a pipe discharge more than 24 inches above the invert. When connecting into an existing manhole the existing structure shall be rehabilitated as necessary to eliminate all sources of infiltration.

   A minimum of 2 inches of precast adjusting rings shall be installed on every structure. No more than 3 adjusting rings with an 8-inch maximum height adjustment shall be allowed.

Two butyl rubber sealant strips shall be installed between adjusting rings, the structure, and the casting.

5. Drop Manholes

An exterior drop pipe shall be provided for a sewer entering a manhole whenever the elevation is 24 inches or more above the manhole invert. The minimum diameter of the drop pipe shall conform to the requirements of the Illinois Recommended Standards for Sewage Works and shall not be less than 8 inches diameter. If a smaller drop is desired, design calculations and configurations shall be submitted for review and approval by the Village Engineer.

6. Inspection Manholes

Inspection manholes shall conform to the requirements of the MWRDGC.

7. Sewer Depth

For sewer depths less than 4 feet, thickness Class 55 ductile iron cement lined pipe shall be used.

8. Lift Stations

(a) Whenever possible, sanitary sewerage gravity facilities shall be designed to avoid the necessity of providing lift stations.

(b) Lift station and force main designs shall be submitted for review and approval by the Village Engineer prior to submission to the MWRDGC. Lift stations shall be submersible with dual pumps.

(c) A natural gas standby generator shall be provided for each lift station. Generator shall have a block heater and an automatic transfer switch with automatic exercise capability. Generator shall have an all-weather enclosure and be sized to power the entire station including pumps, controls, alarms, emergency lighting and other appurtenances.

(d) Lift station shall be equipped with a telemetry system and connected to the Village's existing monitoring and control system as approved by the Village Engineer.

(e) Force mains shall be constructed of polyvinyl chloride pipe conforming to AWWA C900 with a DR18 pressure rating or as approved by the Village Engineer.

9. Pipe Bedding and Initial Backfill

Bedding and Initial Backfill shall consist of CA-11 crushed aggregate or washed stone.

The pipe shall be laid so that it will be uniformly supported and the entire length of the pipe barrel will have full bearing. No blocking of any kind shall be used to adjust the pipe to grade except when concrete embedment is used. Bedding shall be required for all sanitary sewer.

10. Separation of Sewer/Water Mains

Water main pipe shall be protected in accordance with IEPA requirements.

F. MATERIAL SPECIFICATIONS

All sanitary sewer system elements shall conform to the "Watershed Management Ordinance" and "Standard Specifications for Water and Sewer Construction in Illinois".

1. Sewer Main Pipe

Polyvinyl chloride (PVC) SDR 26, ASTM 3034 with joints conforming to ASTM D3212. Where water main quality pipe is required, it shall conform to the requirements of Section II.

2. Cured in Place Pipe Liner

(a) The installation of cured in place pipe (CIPP) liner may be permitted by the Village Engineer to rehabilitate existing sewer mains or services. CIPP shall be designed and installed in accordance with the "NASSCO Specification Guidelines" for CIPP Installation and as approved by the Village Engineer.

(b) Where water quality pipe is required for protection of potable water systems CIPP shall be designed and installed in accordance with AWWA C623 and as approved by the Village Engineer.

3. Castings

(a) Manhole frame and cover - Neenah No. R-1713 (pavement) and R-1772 (lawn).

(b) Concealed pickholes with gasketed cover embossed "SANITARY SEWER".

(c) To prevent entry of overland flow, when designated by the Village Engineer, use a watertight frame and bolted lid, Neenah No. R-1916 Series, embossed "SANITARY SEWER".

G. INSTALLATION REQUIREMENTS

1. MWRDGC and IEPA

Sewer system construction shall in all respects be in accordance with the regulations of the MWRDGC and the IEPA. No construction shall commence until copies of the approved permits are on file with the Village Engineer.

2. Sewer Service Stub Locations

The contractor shall keep a "field record" of all sewer services or stub locations by measurement to the nearest downstream manhole. Such records shall be delivered to the Village Engineer prior to scheduling testing and acceptance of the sewer construction.

Sanitary service stub location shall be field marked with a painted "red" 4" x 4" hardwood timber installed vertically.

3. Casing Pipe for Auger Boring or Tunneling

Circular steel casing pipe for auger boring or tunneling shall conform to the approved and permitted plans. Stainless steel casing spacers and rubber end seals are required on all installations. Record drawings are required for casing location and elevation.

4. Pipe Laying

The laying of pipe in finished trenches shall be accomplished using a laser beam system to establish proper line and grade. The sewer line shall start at the outlet end with the spigot ends pointing in the direction of flow and shall proceed upstream with pipes abutting true to line and grade. The ends of the pipes shall be carefully cleaned before the pipes are lowered into the trenches. As each length of pipe is laid, the mouth of the pipe shall be properly protected to prevent the entrance of earth or bedding material. The pipe shall be fitted and matched so that when laid in the work they will form a sewer with a smooth, uniform invert.

All jointing material shall be used in accordance with the recommendations of the manufacturer. Each pipe shall be pushed or pulled as tightly as possible to the section in place to insure tight joints.

Sewer pipe shall not be dropped or thrown from the site delivery vehicle. All pipe shall be lowered into the trench with suitable apparatus for that purpose.

5. Inspection

All sewer pipe installations and connections must be inspected by the Village. No backfilling or closing of a sewer pipe trench shall occur until specific permission to do so has been given by the Village Engineer. Upon approval, backfilling or closing of trenches shall be completed immediately.

6. Sewer Connections

(a) Connection of new sewers to existing sewers, shall be made as directed by the Village Engineer. Such connections shall be made within a manhole, connection via bell and spigot, or using a shielded, non-shear coupling.

(b) When connections are made to sewers, special care must be taken that no part of the work is built under water. A flume or dam shall be installed and bypass pumping maintained, if necessary, to keep the new work dry until completed and cementitious material has properly cured.

(c) Junctions, service stubs or extensions of main sewer line for future sewer connections shall be plugged at the ends, or otherwise sealed off in a manner approved by the Village Engineer.

7. Sanitary Sewer Service

(a) All service pipe through a foundation wall and within 10 feet of the building shall be ductile iron. Transitions in pipe material shall be performed using a shielded, non-shear coupling. Pipe material beyond 10 feet from the foundation may be ductile iron, extra heavy cast iron or SDR26 PVC laid at a minimum slope of 1% to provide for self-cleaning velocity. A cleanout shall be installed at the 10-foot pipe transition.

(b) The following restrictions apply to services between the structure and the connection with the sewer stub on private property:

(1) No run of pipe shall exceed 100 feet without providing a suitable cleanout. This cleanout should not be less than 4 inches in inside diameter.

(2) Cleanouts should be provided whenever the sewer makes a turn exceeding 45 degrees. Cleanout openings should terminate at grade and be suitably protected against damage. Cleanouts shall be cast iron with brass covers in pavement and may be PVC in non-pavement areas.

(3) If a cleanout has not been provided inside the building one shall be installed on the sewer service line outside and adjacent to the building.

(4) Pipe bedding and initial backfill shall consist of CA-11 crushed aggregate or washed stone.

(5) No cleanouts are to be placed within the public right-of-way or easement.

(6) The minimum depth at the foundation wall shall be 3 feet.

(c) All sewer services in the public right-of-way shall be installed by auguring up to the point of connection at the sewer main. Open cut or trenching installation within public road pavement is not permitted unless approved by the Village Engineer.

(d) All abandoned septic tanks shall have all contents removed. The empty tank shall then be removed, or holes shall be punched in the bottom and filled with sand or similar granular material. Inspection and approval of this work is required prior to final approval by the Village Engineer.

(e) No storm water drainage from roof drains, footing tiles or outside drains, etc., shall be directed to the sanitary sewer.

(f) Individual sanitary sewer service shall enter the sewer main by way of an existing wye. In the event no such wye exists, the connection to the sewer service shall conform to the Village's Standard Detail.

8. Wyes and Plugs

(a) Wyes

Wyes for existing or future lateral connections shall be inserted in the sewer as specified on approved construction plans. Wyes shall be constructed to be an integral part of the main sewer pipe. The wye bell shall be placed midway between the top of the pipe and the horizontal center line of the pipe at an angle of approximately 45 degrees to 60 degrees, with the upstream face of the pipe.

(b) Plugs

Wyes not immediately utilized at the time of the sewer construction shall be plugged in such a manner as to be watertight and to facilitate future removal without damage to the fitting.

9. Backfilling

The developer shall not backfill sewers above the top of pipe until the sewer elevations, gradient, alignment, and pipe joints have been inspected and approved by the Village Engineer.

Upon approval of the sewer pipe installation, granular initial backfill shall be carefully placed and mechanically compacted as required per MWRDGC standards. Suitable trench backfill shall then be placed and mechanically compacted.

Excavation in existing pavement shall be backfilled to the pavement base layer with controlled low strength material unless otherwise approved by the Village Engineer.

Sewers constructed via open cut within 3 feet of existing pavement or across proposed pavement shall be backfilled with approved granular backfill, thoroughly compacted in 8-inch lifts in place.

H. INSPECTION AND TESTING

1. Costs

All inspection, testing, repair, and retesting costs shall be the responsibility of the developer.

2. Cleaning

All sewers and appurtenances shall be cleaned prior to inspection and testing as required by the IEPA and MWRDGC.

3. Defect Repairs

(a) All dips, cracks, leaks, improperly sealed joints, and departures from approved grades and alignment detected by such inspections shall be repaired by the developer at their expense.

(b) All defects and corrective work required as the result of such inspection shall be performed by the developer without delay. Upon completion thereof, the sewer shall be reinspected and tested as deemed necessary by the Village Engineer.

4. CCTV Inspection - Internal Televising Inspection of Pipe

Upon completion of construction but prior to initiation of the maintenance guarantee period, or as deemed necessary during the construction of the sanitary sewer, an internal inspection of the sewer shall be performed. CCTV footage and a written report of all CCTV inspections conforming to NASSCO standards shall be provided to the Village prior to connecting individual services and prior to the initial acceptance required by these Standards. The form of the report and format of the video footage shall be approved by the Village Engineer. The video shall be high quality and resolution, and the report shall explicitly identify all sags, connections, leaks, and defects.

5. Leakage Testing

Air testing new sewer shall be performed in accordance with the “Standard Specifications for Water and Sewer Construction in Illinois” or as approved by the Village Engineer.

6. Deflection Testing

Deflection testing of new flexible sewer shall be performed in accordance with the “Standard Specifications for Water and Sewer Construction in Illinois” or as approved by the Village Engineer.

7. Manhole Testing

Negative pressure testing of new sewer manholes shall be performed in accordance with the “Standard Specifications for Water and Sewer Construction in Illinois” or as approved by the Village Engineer.

I. SEWER SERVICE DISCONNECTION

Disconnection of a sanitary sewer lateral shall be done at the sanitary sewer main. The lateral pipe shall be disconnected and removed from the main. The wye fitting shall be sealed with a rubber friction plug installed as close to the main line pipe as possible and the remaining part of the fitting shall be sealed with hydraulic cement.

J. RECORD DRAWINGS

Prior to acceptance of the Sanitary Sewer systems, Record Drawings shall be submitted to the Village in electronic and hard copy formats as approved by the Village Engineer. The record drawings shall indicate all manhole and individual service locations, elevations, length, slope, and material of all sewers, and shall be certified as to accuracy by an Illinois licensed Professional Engineer or Illinois licensed Professional Land Surveyor. See As-Built Checklist for required formal of As-Built submittals.

SECTION IV

STORM WATER DRAINAGE SYSTEMS AND APPURTENANCES

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A. GENERAL

All development under the jurisdiction of the Village of Northbrook shall include provisions for construction of stormwater management facilities designed in accordance with the standards herein.

No residential, commercial, or industrial subdivision or development shall be approved unless it is served by storm water drainage and detention facilities designed in accordance with this Section.

All storm sewers which are installed in the public rights-of-way or in public drainage and utility easements serving a central drainage system concept, shall be deemed to be dedicated to the Village of Northbrook upon acceptance of the subdivision.

Every subdivision shall have storm sewers separate and independent of the sanitary sewer system and with an adequate outlet or connection to an existing storm sewer system.

Storm sewers and appurtenances shall be sized to accept and convey storm water runoff from a 10-year design runoff rate as defined by the Watershed Management Ordinance. Storm sewer systems shall be installed in accordance with the Standard Specifications for Road and Bridge Construction and the Standard Specifications for Water and Sewer Main Construction in Illinois. Storm sewers emptying into a river or stream shall be designed using the 10-year, 24-hour storm event tailwater elevation.

B. SERVICE AREAS

All storm sewers, streams, channels, ponds, and basins shall be designed to accommodate all areas which naturally flow to the area of the development and any additional areas which are planned to contribute to the drainage area as identified by the Village Engineer. If extending the ultimate service area beyond the natural drainage area limits served by the proposed development results in additional construction costs within the development, a written agreement may be made with the Village for the recapture by the developer of the additional cost when future system extensions are made.

C. PUBLIC EASEMENTS AND UTILITIES

All public storm sewer extensions shall be located within publicly dedicated rights-of-way or easements. If located within an easement, the easement shall be centered on the pipe and appurtenances and extend 10 feet to either side.

To protect existing utilities all underground utility work shall be performed in accordance with the Illinois Underground Utility Facilities Damage Prevention Act and JULIE Excavator Handbook.

D. SYSTEM EXTENSION/CONNECTIONS

The location of proposed extensions and connections to the existing storm sewer system shall be approved by the Village Engineer.

E. BOUNDARY FLOW WAYS

Where the storm sewer system is being designed for connection to a development, and the tributary drainage area extends more than 100-feet beyond the boundary of the development, surface flow ways shall be constructed along the upstream boundary of the development to intercept and safely convey and bypass all storm water runoff from the upstream watershed. The bypass flows must not increase upstream flood stage or increase downstream flood stage or velocity for the 100-year design runoff rate.

F. DESIGN

1. Storm Sewer, Stream Improvement, and Open Channel Hydraulics

(a) Storm sewers, stream improvements and open channels shall be designed to provide adequate design flow capacity using Manning's formula:

$$Q = \frac{1.486}{n} * A * R^{\frac{2}{3}} * S^{\frac{1}{2}}$$

Q	=	Design flow rate (cubic feet/second)
n	=	the roughness coefficient of the pipe or channel (dimensionless)
A	=	the cross-sectional area of the pipe or channel (square feet)
R	=	The hydraulic radius of the pipe or channel (foot)
S	=	slope of the pipe or channel's energy gradient (foot/foot)

Storm sewer sizing software programs in addition to Manning's equation spreadsheets will be accepted. All software generated data shall include a visual representation of the storm sewer network and hydraulic grade line to demonstrate that the storm sewer system is not under pressure flow.

(b) Roughness coefficients ("n") shall be in accordance with the "Drainage Manual".

(c) The minimum velocity allowed in storm sewer pipe systems shall be three feet per second and the design mean velocity shall not exceed the following:

(1) Storm sewers - 10 feet per second.
(2) Open channels, concrete or asphalt lining – 15 feet per second.
(3) Open channels, sodded – five feet per second.

(d) Storm sewer manhole spacing shall be as follows:

Storm Sewer Pipe Diameter (inches)	Maximum Manhole Interval Spacing (feet)
12-24	350
27-36	400
42-54	500
60 or larger	600

(e) Inlet grate capacities shall meet or exceed design flows. Double inlets shall be installed where flows warrant their installation.

(f) All developments must be provided an overland flow path that will pass the 100-year, 24-hour storm event flow at a stage at least one feet foot below the lowest adjacent grade and 2 feet below the lowest entry elevation of adjacent structures, in the vicinity of the flow path.

2. Sewer Size

Storm sewers serving inlet structures shall not be less than 12 inches in diameter.

Storm sewer house service lines shall not be less than 4 inches in diameter.

Storm sewers of different inside diameters shall join only at structures. The invert elevations shall be adjusted to maintain a uniform energy gradient by matching the 0.8 depth points of the different diameters.

The end of storm sewer service leads shall be plugged with a pre-manufactured cap and shall be marked with a painted "green" 4" x 4" timber installed vertically.

3. Storm Sewer Depth

Storm sewers shall be constructed with a minimum depth of cover of 2 feet.

4. Storm Sewer Manholes

Manholes shall be located as follows:

- At the termination of all sewers which do not otherwise provide for access to the sewer pipe.
- At changes in direction, horizontal or vertical.
- At changes in pipe shape or size.
- At junctions with other storm sewers.

5. Storm Sewer Pipe

Storm sewer pipe class and type shall be determined based upon the "Standard Specifications for Road and Bridge Construction" and as approved by the Village Engineer. Pipe joints shall be bell and spigot with a rubber gasket. CMP, Clay, or Vitrified Clay Pipe is not an approved material for storm sewer.

Storm sewer pipe bedding shall be to the spring line of CA-7 or CA-11 crushed aggregate. At the direction of the Village Engineer, granular bedding and initial backfill may be omitted if the storm sewer is in an easement or near the foundation structure of an adjoining building.

Excavation in existing pavement shall be backfilled to the pavement base layer with controlled low strength material unless otherwise approved by the Village Engineer.

Sewers constructed via open cut within 3 feet of existing pavement or across proposed pavement shall be backfilled with approved granular backfill, thoroughly compacted in 8 inch lifts in place.

Storm sewer pipe concrete cradle, arch, or fill encasement shall be constructed whenever dictated by trench or embankment conditions and shall be approved by the Village Engineer prior to use.

6. Storm Sewer Pipe Alignment/Size

Storm sewer shall be laid using a laser beam and be straight in both horizontal and vertical planes between manholes, unless otherwise approved by the Village Engineer. Adequate separation from wells, water mains, and water services shall be provided in accordance with regulatory requirements.

All open channels and storm sewers shall be sized by the Rational Method of runoff determination for service areas up to 50 acres on the basis of a critical duration 10 year storm event and shall be sized to adequately carry flow from all tributary areas. The size calculations shall verify the capacity of the receiving sewer or channel.

$$Q = C\,i\,A$$

Where:	Q	=	Runoff flow, cubic feet per second (CFS)
	C	=	Runoff coefficient, characteristic of tributary drainage area in dimensionless units (C)
	A	=	Tributary drainage area, (acres)
	i	=	Average rainfall intensity, (inches per hour) using approved MWRDGC table

(a) Rainfall intensity:

The average rainfall intensity used for design shall be selected from Rainfall – Duration data as published in the Illinois State Water Survey Bulletin No. 75, Section 2, Northeast, or the latest published edition.

(1) Underground storm sewer water conduit sizes shall be determined using a minimum of a critical duration 10 year storm event.

(2) Surface streams and open channels shall be designed using a 24 hour, 25 year storm event, contained within stream or channel banks, including at any culverts.

(3) Overland flow and overbank flow shall be designed for a 24 hour, 100 year storm event, such that the storm flow can be conveyed to a storm water basin or downstream system without endangering structures or making roadways impassable. The overland flow way shall be clearly identified on the design drawings.

(b) Runoff Coefficient:

(1) The runoff coefficient C is the ratio of runoff to rainfall. Runoff coefficients shall be in accordance with the “Drainage Manual” except as follows:

i. All paved or impervious areas including gravel, decks, buildings, and patios shave have a C value of 0.95.
ii. All water features including pools, ponds, and other water surface, shall have a C value of 1.0.
iii. All pervious areas such as lawn areas (all areas not classified as impervious), shall have a C value of 0.50
iv. No Runoff Curve Number reductions will be allowed for any storm water analysis or design.

(2) The runoff coefficient used in design shall be the weighted average for the proposed tributary watershed.

(3) Within a development, the runoff coefficient shall be computed assuming ultimate development and a minimum future impervious area of 50 percent of the design area. Where ultimate development plans are not available at the time of the design of the storm sewer system, a runoff coefficient will be selected by the Village Engineer, based on the zoning classification, knowledge of the specific development, and the previous experience of the Village with similar developments. The area within the watershed, but outside the development, shall be computed for existing conditions if future development will be under Village control.

7. Drainage Computations

The drainage area, in acres, used for design shall be the entire watershed service area tributary to the point in the drainage system under design. It shall include any tributary service area that may be outside the development.

Design computations and drainage area drawings prepared by a professional engineer for the following facilities shall be submitted to the Village Engineer for review.

(a) On site ditches, swales, and storm sewers:

The minimum grade for a grass bottom ditch shall be 1.50 percent. For lesser ditch grade, the engineer shall submit design for paved invert or underdrain system as directed by the Village Engineer.

(b) Street drainage design:

Surface drainage inlets shall be provided so that surface water is not carried across any street intersection, parking lot or depressed drives. Surface runoff shall not extend more than 400 feet along the surface of the ground. Inlets shall discharge into storm sewers and shall not discharge into side lot or rear lot drainage ditches. Inlet structures shall be provided at all low points. Overland flow maximum depth allowed at centerline of roadway is 1.0 foot based on a 24-hour, 100-year storm event.

(c) Vacant lot drainage design:

Positive drainage and soil erosion control measures shall be established for each lot within seven calendar days following the end of active hydrologic disturbance.

(d) Parking lot drainage design:

Overland flow within and from parking lots shall be shown by arrows on design drawings. Inlet structures shall be provided so that flow from said lots is not carried across any public sidewalk or across or around any major intersection. The maximum depth for storm water detention provided in parking lots shall be limited to one foot.

The minimum longitudinal slopes shall be 0.5% and the maximum shall be 5% in the paved area of the parking lot. Inlet structures shall be located in driving aisles wherever possible.

Restrictors shall conform to the Village's Standard Detail and as approved by the Village Engineer.

An additional 1.5 inches of storage depth of parking lot detention shall be provided to allow for future parking lot resurfacing.

(e) Building drainage:

The point of discharge of sump pumps shall be shown on the Development Plan for each building served having a basement or crawl space. Storm sewer service lines from that point shall be provided to the storm sewer system in accordance with the Standard Detail.

Buildings shall be positioned on lots and the lots graded to drain away from the building to the lot line swales or ditches, which shall merge as quickly as possible and then discharge into a storm sewer. The route of flow of storm water away from each building into swales, ditches, and storm sewers, to where it leaves the site, shall be shown on the engineering plans.

Downspouts shall not drain directly onto paved surfaces intended for pedestrian or vehicular use. On single-family residences, downspouts shall be directed to the front or rear property lines and shall discharge a maximum of 9 feet from the building foundation, or as approved by the Village Engineer. Downspouts located at the middle of the home shall also be directed to front or rear property lines, and not pointed towards neighboring properties. Splash blocks are required on all downspouts and shall be directed towards on-site drainage swales or other infiltration practices. Where necessary, downspouts shall be connected to underground piping with a minimum 4-inch vertical air gap and discharge at a 'pop-up' emitter. Pipe shall be PVC SDR 26 conforming to ASTM D-3034 and Pop-up emitters shall terminate at a maximum of 9 feet from all foundations, or as approved by the Village Engineer.

G. DESIGN FLOW

Design flow used in sizing storm sewers and flow ways shall be the sum of the runoff determined as described herein plus the permitted release rate from any existing storm water detention facilities tributary to the point under consideration.

H. CONVEYANCE

1. Swales

All swales bottoms shall have a minimum width of 18 inches, must be sodded, and limited to a maximum water depth of 12 inches. Maximum side slopes of swales shall not be steeper than 3 feet horizontal to 1 foot vertical with a minimum longitudinal slope of 1.5 percent.

Underdrains may be required by the Village Engineer.

2. Open Channels

(a) Open channels in nonresidential areas may be provided subject to approval of the Village Engineer in lieu of enclosed storm sewer pipe when the channel will be draining large areas

(b) All open channels located within a development or in right-of-way or easements within 150 feet of the development shall be improved as follows:

(1) Maximum side slopes of channels shall not be steeper than 3 feet horizontal to 1 foot vertical with a minimum 1 foot bottom width.

(2) Underdrains, paved inverts, or other flow line protection measures may be required by the Village Engineer in channels with minimal slopes.

(3) The sides shall be stabilized with approved vegetation or structural measures, as approved by the Village Engineer.

(4) An easement for drainage, access, and public utilities, extending no less than 15 feet from the top of bank, shall be provided along open channels with a width adequate to include the area covered by the limits of a 24-hour, 100-year storm event.

(c) No open channel shall be permitted within 30 feet of a habitable residential structure as measured from the top of bank.

(d) Open channels shall be designed such that the high-water level from the 24-hour, 100-year storm event shall be at least 2 vertical feet below the lowest entry elevation of adjoining buildings.

(e) The Village Engineer may require that the channel be concrete lined to reduce maintenance costs and retain conveyance capacity.

(f) Where an existing waterway traverses a proposed development, the waterway and shoreline shall be cleared of obstructions and the shoreline shall be stabilized to create a stable cross section. Permits from regulatory agencies to perform this work shall be obtained by the developer.

(g) No open channel shall be permitted to be enclosed with a storm sewer unless approved by the Village Engineer. Hydrologic, hydraulic, and storage volume

calculations shall be provided by the developer as required by the Village Engineer.

3. Driveway Culverts

In areas where there is no storm sewer system, the Village Engineer may permit an open channel storm water drainage system with sodded swales and driveway culverts. Culverts shall be reinforced concrete pipe sized to convey the critical duration 25-year storm event with a minimum diameter of 12 inches. The culvert profile shall provide a minimum 8 inches of cover from the top of pipe to the pavement surface. Culvert length shall be sufficient to provide maintainable side slopes with a flared end section or headwall.

I. STORM WATER DETENTION REQUIREMENTS

1. General

Storm water detention is required for all development resulting in 1,000 square feet or more of new impervious surface area. Stormwater detention facilities shall be constructed during the initial phases of construction of a development. All detention systems shall be fully functional before any new impervious surface is constructed, or proposed building foundations are constructed.

2. Release Rate

The release rate of storm water for the 100-year storm event shall not exceed the storm water runoff from the area in its natural undeveloped state and shall not be greater than 0.15 cfs per acre. The release rate of storm water for the 2-year storm event shall not be greater than 0.04 cfs per acre.

3. Design Standards

The required detention storage volume must be a minimum of 100 percent of the calculated amount necessary to detain the runoff of the critical duration 100-year storm event, from the fully developed drainage area tributary to the reservoir, less that volume discharged during the same duration at the approved release rate.

All above ground detention basins shall be located such that the design high water level is a minimum of 10 feet from any property line, structure, and right-of-way. Underground detention shall be constructed a minimum of 10 feet from any existing or proposed building foundation in undisturbed earth.

Roof detention, infiltration trenches, and “under-building” storage is prohibited.

Streets or homes built adjoining storm water management facilities in flood prone areas shall meet the requirements of all current flood plain regulations.

If the Village elects that storm water management basin ownership shall remain with the Developer or property owner's association, the responsibility for the long-term operation and maintenance shall be identified in a written agreement with a copy being retained in the office of the Village Engineer or as noted on the Subdivision Plans. The fully executed long-term operation and maintenance agreement shall be submitted to the Village prior to

approval of project plans. Easements shall be provided for the inspection and emergency maintenance of all privately maintained facilities by the Village Public Works Department at the property owner's expense in case of failure to properly maintain the facility. Agreements and easements are to be included as part of the final plan submittal and Plat of Subdivision and properly recorded against the property.

A water quality treatment structure, type and size to be approved by the Village Engineer, shall be provided for all underground detention systems on all properties that are 0.5 acre, or larger in size.

All privately maintained underground detention facilities shall be inspected and cleaned a minimum of once per calendar year at the property owner's expense. A written inspection report and photographs or video evidence of the condition shall be provided to the Village Engineer demonstrating compliance. Property owner shall provide a notice of intent to perform any maintenance work identified by a specific date to be approved by the Village Engineer.

4. Residential Development

Where the development of a single residential property occurs the proposed stormwater detention system may include the following types of gravity drained stormwater detention facilities:

Surface stormwater detention. For detention on single family lots, the maximum water depth in dry detention basins shall not exceed 1 foot in depth; otherwise another suitable means for the detention requirements shall be utilized. No vertical walls will be permitted, and the maximum side slopes shall be 5:1. A restrictive covenant is required to be recorded for this type of stormwater management facility.

Permeable pavers. Detention volume shall be credited for installations conforming to the MWRDGC permeable paver standard for volume control. A restrictive covenant is required to be recorded for this type of stormwater management facility including long-term operation and maintenance requirements. The design engineer shall inspect and certify the elevation and area of the infiltration zone, the gradation of aggregate used, and as-built volume created.

Underground detention systems. Detention chambers may be constructed of pre-cast concrete, cast-in-place concrete, sewer pipe, and arc-chamber systems. Metallic materials shall not be permitted. Underground storage chambers are to be clearly labeled on Engineering plans as "Private Stormwater Storage Chamber". Sewer pipe connecting the building to the chamber shall be backfilled with bentonite to prevent migration of water along the trench. Access ports shall be constructed to permit access to all areas of the system for maintenance. A sump and access port shall be provided a the location of the incoming sewer pipe. A restrictive covenant is required to be recorded for this type of stormwater management facility including long-term operation and maintenance requirements. The design engineer shall inspect and certify all critical elements of the system and as-built volume created.

5. Detention Outlet

The outfall system shall include the outfall structure and the outfall sewer conveyance system. The outfall shall meet all requirements for storm sewer and appurtenance and shall operate by gravity unless otherwise approved by the Village Engineer.

Restrictors for detention basins serving residential property shall have a minimum 1.5 inch diameter and shall be easily accessible for cleaning and maintenance. Restrictors for other uses shall conform to MWRDGC Standard Details. The maximum discharge capacity of an outlet structure shall be its flow capacity with water in the reservoir at the design high water level and the water in the downstream receiving sewer at the crown of the sewer or, in the case of a surface receiving channel, with the water level at the hydraulic gradient under design storm conditions. An approved overflow shall be designated at 0.1 feet above design high water. Other edges of the detention area shall be 0.5 feet minimum above design high water to direct any overflow to the designated overflow.

6. Secondary Benefits

The design of storm water management facilities for low annual maintenance costs and to provide secondary aesthetic, recreational, and other benefits is encouraged. Approval of the design for such benefits shall consider protecting the public health, safety, and adjacent property values.

7. Storm Water Pumping Facilities and Force Mains

If necessary, for commercial or industrial properties, pumping facilities shall be designed in accordance with sound engineering practice and the detailed requirements of the Village Engineer. Standby power systems shall be required.

8. Control Facilities

When required by the Village Engineer for those pumping facilities where satisfactory performance is considered particularly critical, telemetering control and report back capability to the Village Public Works Department will be required.

9. Guard Rails and Fencing

All sharp or vertical breaks in grade at inlet and outlet structures shall be protected with guard rails or fencing with a locking gate.

10. Willow Trees

All existing willow trees within 75 feet of any proposed storm water facility or pipe shall be removed. If willow trees are not located on the property to be developed, the developer shall use their best efforts to obtain approval from the appropriate property owner for their removal. If the removed willow tree is the only tree within 1,000 square feet it shall be replaced with a minimum 3 inch caliper tree planted within the property limits.

J. MATERIAL SPECIFICATIONS

All storm sewer system elements shall conform to the following specifications:

1. Sewer Pipe

   (a) Sump pump service and sewer service pipe under 12 inches diameter shall be PVC SDR 26 ASTM D-3034 or Ductile Iron Class 52 pipe.

   (b) PVC storm sewer pipe shall be SDR 26 ASTM D-3034 or equivalent.

   (c) Reinforced concrete pipe (12-inch diameter and larger), circular reinforcement, minimum Class III, ASTM C76.

   (d) Reinforced concrete arch culvert pipe - double line reinforcement, minimum Class III, ASTM C506.

   (e) Reinforced concrete elliptical culvert pipe - minimum Class HE-III or VE-III, ASTM C507.

   (f) PVC underdrain pipe – PVC SDR 26 ASTM D2729.

2. Sewer Pipe Joints

   (a) PVC pipe – ASTM D3212, push-on type, except underdrain pipe, which shall have solvent, welded joints.

   (b) Reinforced concrete pipe shall have ASTM C443 O-ring gaskets.

   (c) Reinforced concrete arch or elliptical pipe – ASTM C877.

3. Casing Pipes

   Circular steel casing pipe shall conform to the approved and permitted plans. Stainless steel casing spacers and rubber end seals are required on all installations. Record drawings are required for casing location and elevation.

4. Manholes and Structures

   (a) Precast circular reinforced concrete structures – ASTM C478 and ASTM C443. All sections shall be tongue and grooved and sealed with butyl rubber joint sealant.

   (b) Control Structures must have a minimum of 10-inches of clearance between the top of the baffle wall and bottom of the concrete flat top structure.

   (c) A minimum of 4-inches of bedding stone shall be provided under the proposed structure.

   (d) Structures shall be sized in accordance with National Precast Concrete Association recommendations and the following:

- Single pipe inlet structures may be 24 inch inside diameter to a maximum depth of 4 feet.

- Minimum inside diameter of other structures shall be 48 inches inside diameter.

(e) Adjustment:

A minimum of 2 inches of precast adjusting rings shall be installed on every structure. No more than 3 adjusting rings with an 8-inch maximum height adjustment shall be allowed. Two butyl rubber sealant strips shall be installed between adjusting rings, the structure, and the casting.

(f) Pipe connections:

- All pipe connection openings shall be precast with mastic watertight pipe to manhole seals. External flexible watertight sleeves may also be used from the manhole cone to the manhole frame.

Or

- All pipe connection openings shall be precast and sealed with concrete brick and hydraulic cement in a workmanlike manner.

(g) Bottom sections:

- All bottom sections shall be precast concrete.
- Concrete benches shall be poured in all inverts to eliminate standing water.
- Catch basin sumps shall be 30 inches.

(h) Top Sections:

- Cone sections shall be eccentric and have a 3-inch integrally cast concrete collar.

5. Castings

(a) Manhole frames shall be Neenah R-1713 in pavement or R-1772 in turf areas, or equivalents. Solid covers shall be embossed “STORM SEWER” with concealed pickholes.

(b) All open grate castings shall be embossed “DUMP NO WASTE”.

(c) Curb and gutter inlet frames shall be Neenah R-3275, or equivalent.

(d) Yard inlets shall be Neenah R-4340-B, or equivalent.

(e) Parking lot inlets shall be Neenah R-2502, or equivalent

(f) “Vane” type open grates shall be utilized in gutter sections roadway to improve the hydraulic capacity where dictated by flow calculations.

(g) ADA compliant grates are required when installed within the limits of a pedestrian crosswalk.

6. Headwalls and Flared End Sections

Storm pipe discharging to a waterway or detention basin shall terminate at a reinforced concrete headwall with wing walls or with a precast concrete flared end section as approved by the Village Engineer.

Flared end sections shall be installed with precast concrete toe blocks and shall be joined to the adjoining pipe segment with 2 tie rods. Steel grates shall be provided for all flared end section 18 inches and larger.

Grating shall be installed on all headwalls for storm sewer pipe 18 inches and large and as approved by the Village Engineer.

7. Underground Detention Systems

Pre-cast, or cast-in-place, reinforced concrete only.

K. CONSTRUCTION REQUIREMENTS

Storm sewer and storm water management facilities shall be constructed in accordance with the Standards listed in this section. Where there is conflict between standards the more restrictive requirement shall govern.

All newly constructed structures shall be cleaned of any accumulation of silt, debris or foreign matter of any kind and shall be free from such accumulations at the time of final inspection.

L. INSPECTION AND TESTING

1. CCTV Inspection

Upon completion of construction but prior to initiation of the maintenance guarantee period, or as deemed necessary during the construction of the storm sewer, an internal inspection of the sewer shall be performed. CCTV footage and a written report of all CCTV inspections conforming to NASSCO standards shall be provided to the Village prior to connecting individual services and prior to the initial acceptance required by these Standards. The form of the report and format of the video footage shall be approved by the Village Engineer. The video shall be high quality and resolution, and the report shall explicitly identify all sags, connections, and defects.

2. Deflection Testing

Deflection testing of new flexible sewer shall be performed in accordance with the "Standard Specifications for Water and Sewer Construction in Illinois" or as approved by the Village Engineer.

M. RECORD DRAWINGS

Prior to acceptance of the Storm Sewer and Drainage systems, Record Drawings shall be submitted to the Village in electronic and hard copy formats as approved by the Village Engineer. The Record Drawings shall indicate all structure locations, the size, length, slope, and material of all sewer lines, and shall be certified as to accuracy by an Illinois licensed Professional Engineer or Illinois licensed Professional Land Surveyor. See As-Built Checklist for required format of As-Built submittals.

SECTION V

PAVEMENT

A. GENERAL

All development under the jurisdiction of the Village shall include provisions for the construction of roadways and appurtenances to serve each parcel of property within the development designed in accordance with this Section. Where more than one building, other than an accessory building, is located or planned on one parcel of property, the proposed construction shall also include access roadways as required to serve each such building. Shared driveways or frontage roads shall be encouraged along major roadways.

The design of all roadways and driveways proposed for construction as independent projects under the jurisdiction of the Village shall also meet the technical requirements of this Standard. All traffic signal installations, both new and replacement, shall meet the regulatory Highway Department Standards and be equipped with the signal control preemption system with confirmation beacon as approved by the Village of Northbrook Fire Chief.

The arrangement, character, extent, width, grade and location of all streets to be dedicated to the public, parking lots, driveways and all private streets shall be compatible and complimentary to existing and planned streets, to reasonable circulation of traffic within any development and adjoining lands, to topographical conditions, to runoff of storm water, to public convenience and safety, and in their relation to the proposed uses of the area to be served. All traffic intersections, driveways and confluences must encourage safe and efficient traffic flow.

Contractors engaged in the construction of improvements on dedicated street rights-of-way must be qualified for such work by the Village Engineer.

B. STREET CLASSIFICATION

Geometrics and structural design discussed in this Section are dependent on the functional classification of the street in question. The functional classification shall be as set out in the Village's Subdivision and Development Code and as approved by the Village Engineer.

The following Pavement Design and Right-of-Way Chart is intended to show minimum right-of-way widths and the minimum design standards for a particular street classification. If, in the opinion of the Village Engineer, traffic use or geometric considerations for a road or a part of a road warrant a greater right-of-way width, a wider pavement width or a greater structural number than listed on the Chart, the Village Engineer shall submit their written reasons to the Village Manager. Variation requests must follow the procedure outlined in Section I, Administration.

Pavement Design and Right-of-Way Chart

STREET CLASSIFICATION	MINIMUM RIGHT-OF-WAY WIDTH	MINIMUM PAVEMENT WIDTH (BACK TO BACK)	MINIMUM CROWN	MINIMUM STRUCTURAL NUMBER	MINIMUM CURB AND GUTTER REQUIREMENT
Regional Arterial	100 feet*	60-63 feet	Variable	4.5	B-6.24
Community Arterial	80 feet*	43 feet or 2 @ 24 feet with median	6 inches	4	B-6.24
Community Collector	80 feet*	43 feet*	6 inches	3.5	B-6.12
Neighborhood Collector	66 feet*	43 feet*	6 inches	3.75	B-6.12
Local Street (Dedicated)	60 feet*	27 feet*	4 inches	3.0	B-6.12
Local Street Cul-de-sac	140 feet diameter	107 feet diameter	2 percent	3.0	B-6.12
Local Street Private (PUD)	Not applicable	24 feet	4 inches	3.0	Not applicable
Industrial	66 feet	43 feet without parking	5 inches	3.75	B-6.12
Minor Business	60 feet	32 feet without parking	5 inches	3.5	B-6.12
Frontage Road	Variable	24 feet	3 inches	3.0	B-6.12

*Subdivision and Development Code 4-102.A

C. DESIGN

1. General

Proposed new streets shall be designed and located in relation to existing and planned streets, to topographical conditions, and natural terrain features such as streams and existing tree growth, to public convenience and safety, and in appropriate relation to the proposed uses of land to be served by such streets.
All streets shall be properly integrated with the existing and proposed system of thoroughfares and dedicated rights-of-way as established on the current Village street map and the Northbrook Comprehensive Plan for Future Land Use.

Pavement design shall relate to the street classification. All new streets, either public or private, within the corporate limits of the Village shall be improved with hot-mix asphalt (HMA), portland cement concrete pavement, or interlocking paving blocks bordered by portland cement concrete curbs and gutters. Driveways to individual residential buildings do not require curbs and gutters or barrier curbs. Driveways to all other uses and buildings may require curbs and gutters or barrier curbs where deemed necessary by the Village Engineer.

All thoroughfares shall be properly related to special traffic generators such as industries, business districts, schools, churches, and shopping centers; to population densities; and to the pattern of existing and proposed land uses.

Local and collector streets shall be laid out to conform as much as possible to the topography, to discourage use by through traffic, to permit efficient drainage and utility systems, and to require the minimum number of streets necessary to provide convenient and safe access to property.

The rigid rectangular gridiron street pattern need not necessarily be adhered to for collector streets, and the use of curvilinear streets may be acceptable. Cul-de-sacs, U-shaped streets, and dead ends shall be discouraged.

In business and industrial developments, the streets and other accessways shall be planned in connection with the grouping of buildings, location of rail facilities, truck loading and maneuvering areas, walks, and parking areas to minimize conflict of movement between the various types of traffic, including pedestrian.

Where adequate right-of-way is available, or can be made available, turning bays, protected with barrier median or rumble strips, shall be provided on all community arterial streets at all major intersections and on community collector streets at their intersection with all regional and community arterial streets as deemed necessary by the Village Engineer.

2. Pavement Cross-Section

The pavement cross section shall be determined using the Pavement Design or Pavement Rehabilitation process prescribed in the IDOT Bureau of Local Roads and Streets (BLRS) Manual and as approved by the Village Engineer. New HMA pavement may use the following coefficients when calculating the pavement Structural Number:

Structural Layer	Coefficient
New HMA surface or binder course	0.44
Type A crushed granular base	0.14

When rehabilitating existing HMA pavement, the developer shall obtain existing condition pavement cores and use the BLRS Manual to evaluate the existing pavement structure and necessary improvements to achieve the desired pavement Structural Number.

The following table of minimum pavement course thickness shall be utilized for all new pavement designs:

Structural Layer	Minimum Thickness
HMA surface course	2.0 inches
HMA binder course	4.0 inches
Portland cement concrete	6.0 inches
Type A crushed granular base*	6.0 inches

*Granular base to be used for HMA and PCC Pavement

(a) Flexible Pavement and Medians

Flexible pavement designs shall be based on IDOT's BLRs Manual using a 20-year design life and traffic factors as approved by the Village Engineer. All pavement sections shall consist of a HMA Surface course, HMA Binder course, and crushed Aggregate Base Course, Type A.

HMA binder course shall set for a minimum of nine months, including a winter and a spring, unless otherwise waived by the Village Engineer. After this setting period has passed, one pavement core per 900 lineal feet of measured pavement shall be taken. A report shall be submitted to the Village Engineer listing thickness of aggregate base and binder courses and the type and condition of subgrade

material as determined from the cores. The developer shall remediate all pavement deficiencies to the satisfaction of the Village Engineer.

(b) Rigid Pavements and Medians

The design of rigid pavements shall be based on IDOT's BLRS Manual using reliability and traffic factors as approved by the Village Engineer. Concrete pavement shall be reinforced with rigid wire mesh (6" x 6", #6). The pavement shall have a longitudinal center line joint and transverse joint design approved by the Village Engineer.

(c) Base Course

Type A crushed aggregate base courses are required under all pavement sections and shall extend 12 inches past the back of curb.

(d) Testing and Acceptance

Upon completion of all construction within any development pavement tests shall be performed at the developer's expense as directed by the Village Engineer. Testing may include density verification, material properties, section cores, Dynaflect, and smoothness testing. All deficiencies shall be repaired as approved by the Village Engineer.

3. Street Intersections

Streets shall be laid out to intersect as nearly as possible at right angles. A proposed intersection of two new streets at an angle of less than 75 degrees shall not be acceptable. Not more than two streets shall intersect at any one point unless approved by the Village Board of Trustees.
Proposed new intersections along one side of an existing street shall, wherever practicable, align with any existing intersections on the opposite side of such street. Street jogs with centerline offsets of less than 150 feet shall not be permitted, except where the intersected street has separated dual drives without median breaks at either intersection. Where streets intersect major streets, their alignment shall be continuous.

Minimum curb radius at the intersection of two local streets shall be at least 25 feet and minimum curb radius at an intersection involving a collector street shall be at least 30 feet. Alley intersections and abrupt changes in alignment within a block shall have the corners cut off in accordance with standard engineering practice to permit safe vehicular movement.

Intersections shall be designed with a minimum grade wherever practical. In hilly or rolling areas, at the approach to an intersection, a leveling area for vehicular storage shall be provided, having no greater than a 2 percent grade over a distance of 60 feet, measured from the nearest right-of-way line of the intersecting street.

Where any street intersection will involve grades or existing vegetation inside any lot corner that would create a traffic hazard by limiting visibility, the developer shall cut the grade or vegetation (including trees) in connection with the grading of the public right-of-way to the extent deemed necessary to provide an adequate sight distance.

The cross-slopes adjoining all streets, including intersections, shall be 2 percent minimum.

4. Alleys

New alleys are not preferred and if warranted are to be maintained privately. Existing alleys shall be maintained to a minimum pavement Structural Number of 3.0 or higher as required by the actual traffic factor as approved by the Village Engineer.

5. Grades

The vertical grades shall not be in excess 5 percent on arterial and collector streets nor in excess of 6 percent on other streets, unless approved by the Village Engineer. Streets shall not have a grade of less than 0.5 percent.

6. Vertical Curves

All changes in street grades shall be connected by vertical curves of a minimum length in feet as prescribed below:

Classification	Minimum Vertical Curve Length
Regional or Community Arterial	300 feet
Community or Neighborhood Collector	150 feet
Local	100 feet
Industrial Minor Business	As approved by the Village Engineer

If the difference in street grade does not exceed 1.0 percent, no vertical curve is necessary, and the pavement must be designed to provide positive drainage. If the average running speed is projected to exceed 40 miles per hour, or if the algebraic difference in tangent grades so warrant, vertical curves in excess of those specified above may be required by the Village Engineer.

7. Sight Distances

At the points of intersections of proposed roads with existing roads, the minimum stopping sight distance indicated below for the legal speed limits shall be provided on existing roads.

Legal Speed Limit (MPH) *	Minimum Stopping Sight Distance
25 - 30	200 feet
35 - 40	275 feet
45 - 50	350 feet
55	475 feet

*If in the opinion of the Village Engineer, the projected future legal speed limit may be higher than the existing legal speed limit, the higher speed shall be used to determine the minimum stopping sight distance.

8. Subgrade Preparation

The subgrade of all public and private roadways shall be graded and proof rolled. The removal and replacement of soft and unstable material with appropriate backfill must be approved by the Village Engineer in the field prior to placement of the aggregate base course. Density testing or evaluation by a geotechnical engineer may be required at the developer's expense as required by the Village Engineer.
Subgrade depth and crown shall be checked with stringline and witnessed by the Village Engineer prior to placement of any aggregate base course.

All subgrade material shall have a minimum Immediate Bearing Value (IBV) of 6.0. Subgrade material having an IBV less than 6.0 shall be removed and replaced with a suitable fill material or the pavement must be designed to compensate for the soil conditions. The soil support IBV values selected for use by the designer shall represent a minimum value for the soil to be used.

At the request of the Village Engineer, a copy of all pavement design and computations for the proposed pavement data shall be submitted.

Subgrade excavation shall be a minimum of 1 foot wider than the proposed back of curb. The entire subgrade shall be thoroughly compacted.

D. CONSTRUCTION MATERIALS

Pavement materials approved for street construction shall comply with the minimum requirements of the Illinois Department of Transportation.

E. SPECIAL REQUIREMENTS FOR HOT MIX ASPHALT PAVEMENT

The following qualifications and requirements shall apply to HMA pavements regardless of design method used:

1. No construction required by this Section shall be done after November 1st or before May 1st without approval of the Village Engineer.

2. Longitudinal joint sealer shall be applied to all longitudinal cold joints prior to placing the surface course in accordance with IDOT standards.

3. In new construction, surface course shall be placed no earlier than the construction season following the season in which the binder course was placed.

4. Prior to final HMA surface being installed a non-tracking tack coat shall be applied in accordance with IDOT standards.

F. SPECIAL REQUIREMENTS FOR CONCRETE

The following qualifications and requirements shall apply to portland cement concrete pavements.

1. No concrete pavement shall be constructed in any year after November 1st without the approval of the Village Engineer.

2. Concrete pavement shall not be constructed when frost is present in the subgrade.

3. All exposed surfaces of newly poured concrete shall be protected against rain.

4. The concrete shall be cured with the application of a membrane curing compound conforming to IDOT standards.

5. When the temperature of the air is expected to drop below 45 degrees Fahrenheit within 72 hours after placing, the concrete shall be protected in accordance with IDOT standards.

6. All concrete placed later than October 1st of the year shall have protective coat applied.

7. Use of ready-mixed concrete from an IDOT approved supplier is required. Delivery tickets shall note the mix designation, time dispatched, date, project name, contractor, and shall be available for review by the Village Engineer.

G. CURBS AND GUTTERS

Combination curbs and gutters shall be constructed on both sides of all street pavements.

Two No. 4 reinforcing bars shall be placed continuously between expansion joints. Expansion joints shall be doweled and spaced no more than 60 feet on center and at tangent points of all radii. Dowels shall be 1 inch x 18 inch and epoxy coated. Control joints shall be provided at 15-foot intervals on center and shall consist of a saw cut at least 1.5 inches deep.

Unless otherwise approved by the Village Engineer, a 6-inch barrier curb shall be provided on all streets. Depressed curb sections shall be provided at all driveways whose locations are known at the time of curb installation. Depressed curbs shall also be provided at all sidewalk crossings.

H. SIDEWALKS

Concrete sidewalks shall be constructed along both sides of all public and private streets. Such sidewalks shall have a minimum width of 5 feet and a minimum thickness of 5 inches, with a 3-inch crushed aggregate base course with a CA-6 gradation. Sidewalk thickness shall be 6 inches thick where passing across an existing or proposed residential driveway and 8 inches thick at commercial or industrial driveways.
At locations where sidewalk crosses utility trenches of any kind the sidewalk shall be reinforced with two, 20 foot long, No. 4 reinforcing bars centered on the utility trench.

1. Material
   All materials shall conform to IDOT standards.

2. Excavation
   If organic material is present at the proposed subgrade, same shall be removed and replaced with compacted crushed aggregate.

   Excavation shall include trimming or removal of all trees, roots, and brush that interfere with the installation of the sidewalk.

3. Embankment

When necessary to construct sidewalk on fill, the fill shall be placed in 6-inch lifts and mechanically compacted. A level shoulder shall extend 1 foot beyond each edge of the walk. Side slopes shall not be steeper than 4:1 except as approved by the Village Engineer.

4. Subgrade and Base Preparation

If material has been excavated below the subgrade it shall be replaced with crushed gravel or crushed stone. The subgrade shall be mechanically compacted prior to placing the aggregate base course.

When the base has been prepared, and no sooner than 24 hours prior to placing concrete, the developer shall notify the Village Engineer that the base is ready for inspection. No concrete shall be placed until the base has been inspected and approved by the Village Engineer.

5. Grades

Public sidewalks or pedestrian pathways shall not exceed 8 percent grade nor 1.5 percent cross slope.

6. Forms and Backfill

Side forms shall be of lumber with a nominal thickness of 2 inches and a minimum height of 6 inches or of steel of equal rigidity. Forms shall be held securely in place by stakes or braces with the top edges true to grade. The forms shall be lightly coated with oil prior to placing concrete.

The forms shall remain undisturbed for at least 24 hours after the concrete has been placed. Upon removal of the forms, the developer shall backfill to the required elevation between the side of the sidewalk and the ground using topsoil as approved by the Village Engineer. The material shall then be compacted until firm and the surface evenly graded. Side slopes outside the level 1 foot shoulder limits shall be graded so that a cut slope does not exceed 2:1 and a fill slope does not exceed 4:1.

7. Placing and Finishing

The aggregate base course shall be adequately moistened and compacted before concrete is placed. Concrete shall be placed, consolidated, and finished in accordance with the Standard Specifications for Road and Bridge Construction. Contraction joints shall be tooled at 5 foot intervals.

8. Expansion Joints

Expansion joints shall consist of preformed joint filler. The top of the joint shall be placed ¼ inch below the surface of the sidewalk.

Expansion joints ½ inch thick shall be placed between the sidewalk and all structures such as light standards, traffic light standards, and traffic poles which extend into the sidewalk.

Expansion joints shall be placed at intervals of not more than 50 feet in the sidewalk. Where the sidewalk is constructed adjacent to pavement or curbs having expansion joints, the expansion joints in the sidewalk shall be placed opposite the existing expansion joints as nearly as practicable. Expansion joints shall also be placed where the sidewalk abuts existing sidewalks, between driveway pavement and sidewalk, and between sidewalk and curbs where the sidewalk abuts a curb.

9. Accessible Ramps

All sidewalks at street intersections shall conform to IDOT standard for curb ramps for sidewalks.

10. Disposal of Surplus Material

Surplus or waste material resulting from the sidewalk installation shall be legally disposed of by the developer.

11. Control of Materials

The developer shall, at their expense, have a soil and material consultant or commercial testing laboratory prepare and test samples of delivered concrete. One set of test cylinders shall be taken for the first 25 cubic yards, or fraction thereof, and one set of tests shall be taken for each additional 50 cubic yards. A set of tests shall consist of: 4 standard cylinders of which two shall be broken at 7 days and two shall be broken at 14 days, 1 slump test and 1 air content test. The laboratory shall perform tests in accordance with recognized ASTM standards and shall submit written reports of such tests to the Village Engineer.

I. DRIVEWAYS & DRIVEWAY APRONS

1. Driveways

In developments, driveways meeting these requirements shall be provided at all locations approved by the Village Engineer where vehicular traffic is intended to leave the roadway and move onto private property.

(a) Residential:

Driveways for residential development shall conform to the Village's Standard Detail. The grade or pitch of driveways shall provide for positive drainage away from the residence. HMA driveways shall consist of a minimum of 2 inches HMA surface course over 6 inches of aggregate base course. Concrete driveways shall consist of 6 inches portland cement concrete over 6 inches of aggregate base course. Concrete on private property shall be reinforced with 6 x 6, #6 wire reinforcing mesh. Wire mesh shall not be installed in the Village right-of-way.

Brick pavers or decorative concrete in the right-of-way are only allowed with a recorded covenant that states the property owner is responsible for added cost above normal concrete should the Village need to remove any of it for utility or street repairs.

(b) Commercial/Industrial/Institutional Driveways:

Driveways for commercial or industrial buildings shall conform to the Village's Standard Detail and shall be constructed of 8 inches of portland cement concrete over 6 inches of aggregate base course. Concrete on private property shall be reinforced with 6 x 6, #6 wire reinforcing mesh. Wire mesh shall not be installed in the Village right-of-way.

The Village Engineer shall approve all driveway locations and may seek to consolidate or otherwise encourage shared driveways with adjoining properties. Standard "Shared Driveway Easement Agreement" forms are on file in the Village Engineering Department.

Where property has frontage on a County, State or Federal highway, the spacing and design of the points of ingress and egress to the major street shall be subject to the authority having jurisdiction. This approval must be obtained prior to the signature of the Village Engineer on the final plat.

Driveways serving commercial, industrial, and high-density residential developments represent an important element in the efficiency and safety of the street onto which the traffic enters and exists. To properly handle traffic from such entrances, the anticipated traffic volumes must be accurately estimated and the size and location of driveways be established in accordance with the Guidelines for Driveway Design and Location as published by the Institute of Traffic Engineers. This information may be requested by the Village Engineer for review as well as other critical factors as follows:

- Peak hour flow
- Number of entrances
- Internal circulation pattern
- Parking area size
- Storage lane length
- Traffic signal timing
- Pedestrian counts

(c) Driveway aprons on county or state routes shall meet the minimum required pavement cross-section established by the respective agency.

(d) Permeable paver pavements used for stormwater purposes shall be constructed in accordance with Section IV.

2. Materials

All materials shall conform to IDOT standards.

3. Placing and Finishing Concrete

A request for inspection shall be made 24 hours prior to the scheduled placing of concrete. No concrete shall be placed until the base has been inspected and approved by the Village Engineer.

The aggregate base course shall be adequately moistened and compacted before concrete is placed. Concrete shall be placed, consolidated, and finished in accordance with IDOT standards.

Control joints shall be tooled or saw cut to divide the driveway apron into sections, which are approximately square, and having no side longer than 15 feet.

J. PARKING LOT

1. General

All parking lots shall conform to both the “Zoning Code” and these Standards.

2. Design

The design, material, and layout of all parking lots shall be subject to the approval of the Village Engineer and the Director of Development.

Parking lots with detention shall be designed to allow for a 2-inch overlay without reducing detention volume or increasing depth of ponding above 1 foot maximum.

The minimum pavement cross-section for parking areas shall be designed for a minimum structural number of 2.8 and consist of a minimum of 2 inches of hot-mix asphalt surface, 3 inches hot-mix asphalt binder, and 6 inches of aggregate base course.

All main or aisle circulation areas shall be designed for a minimum structural number of 3.2 and consist of a minimum 2 inches of hot-mix asphalt surface, 4 inches hot-mix asphalt binder, and 6 inches of aggregate base course.

Loading areas, truck docks, and fire lane pavement areas shall be 8-inch thick portland cement concrete reinforce with 6 x 6, #6 wire reinforcing mesh over a 4-inch thick aggregate base course or 2 inches hot-mix asphalt surface course over 5 inches hot-mix asphalt binder course over 8 inches of aggregate base course.

Permeable pavers used for stormwater purposes shall be constructed in accordance with Section IV. Standard and decorative paving blocks (interlock concrete, granite, cobblestone, etc.) may be used with an engineered cross-sectional design if approved by the Village Engineer.

3. Striping and Signs

Signs and striping of the pavement surface to define each parking space, aisle, direction of traffic flow, and cross walks are required and shall be a minimum of 4 inches in width for the length of each space and directional arrow.

4. Curbs and Gutters

Concrete curbs are required around the perimeter of all parking lots and around all landscaped islands. Fire hydrants shall be protected by a minimum 4-foot setback from the back of curb. If Islands or parking lots are depressed, provisions for drainage shall be provided.

5. Slope

No area of any parking lot or garage, excluding access ramps, shall have a slope exceeding 5 percent. No ramp shall have a slope exceeding 8 percent.

6. Lighting

Fixed lighting shall be provided for all parking lots and garages accommodating more than 10 vehicles. Such lighting shall be engineered to prevent direct glare onto or visible from any public or private property or streets. All lighting shall be reduced to security levels at all times of non-use.

7. Island and Tree Pits

Landscape islands shall be bordered by a 6 inch high concrete curb designed to protect the landscape feature and backfilled with clean clay or trench backfill for a width of 2 feet adjoining the curb. Islands shall be located and constructed in accordance with accepted engineering standards. Trees located in paved areas shall be provided with adequate tree pits and drain tile bedded in washed stone to permit proper watering, drainage, and growth.

The central portion of the island where trees and shrubs are to be planted shall be filled with a mixture of 1/3 sand, 1/3 compost and 1/3 topsoil to a minimum depth of 3 feet.

8. Car Stops

Every parking lot and garage, except parking lots and garages accessory to a single-family dwelling, shall be bordered by curbs, car wheel stops, guard rails, barrier fences, or other suitable devices designed and located to protect required screening devices, landscaping, structure, and other vehicles from damage by vehicles using such lot or garage. This provision shall not be construed to require car wheel stops for every parking space, but only in those cases where the Village Engineer determines that such stops are necessary or desirable.

9. Circulation Aisles

All parking lots shall be designed in accordance with the Village's Zoning Ordinance.

Parking Angle	**One-Way Aisle Width**	**Two-Way Aisle Width**
Parallel	14	24
45 degrees	14	24
60 degrees	16	24
75 degrees	20	24
90 degrees	24	24

K. BICYCLE FACILITIES

Bicycle facilities shall be constructed in locations designated by the Village of Northbrook Master Bicycle and Pedestrian Plan.
Bicycle path signs, street name signs, and other signs shall be provided where required or warranted pursuant to the Manual on Uniform Traffic Control Devices. These signs and their installation shall be provided through purchase from the Village as necessary.

1. Bicycle Facility Design and Construction Standards

Three classifications of bicycle facilities are permitted. These classifications are defined in the Master Bicycle and Pedestrian Plan. Design dimensions for each classification are as follows:

Class	Width of Pavement	Width of Right-of-Way or Public Easement
Sidepath, off street, 2-way	8 feet	10 feet
Sidepath, off-street, 1-way	4 feet	6 feet
Separated Bicycle Lane , on street, 2-way	8 feet	8.5 feet
Separated Bicycle Lane , on street, 1-way	4 feet	4.5 feet
Signed and Marked Roadway, on street unprotected; 1-way or 2-way	Bike lane shared with street	Bike lane shared with street

2. Minimum Bikeway Pavement Requirements

Developers may choose between two pavement types:

Type A

3-inch HMA surface with 6-inch aggregate base course.

Type B

4-inch thick portland cement concrete with 6-inch aggregate base course.

3. Bikeway Signs

Appropriate bikeway signs must be installed with all bikeways by the developer of the bikeway at locations approved by the Village Engineer.

L. MAINTENANCE AND RESPONSIBILITY

The maintenance and responsibility for private roadways shall be the responsibility of the developer until the time of final Maintenance Bond release, when the property owner association shall accept the responsibility for maintenance.

M. CONSTRUCTION TRAFFIC CONTROL

All sidewalk closures, lane closures, and construction work within public rights-of-way shall conform to the requirements of the "Manual on Uniform Traffic Control Devices for Streets and Highways" (MUTCD) and an approved traffic control plan approved by the Village Engineer. The provisions of the MUTCD will be enforced when:

- An opening is made into the existing pavement.
- Construction takes place adjacent to the edge of the existing pavement.
- A utility crossing is made beneath the existing pavement.
- It is necessary to close a lane of traffic due to construction operations.

A full lane closure on Village roads will be required whenever construction impacts a lane normally used for through traffic. Permission for such a lane closure must be obtained from the Village Engineer prior to commencing construction. No construction operation is to commence until such time that the traffic control plan has been installed and approved by the Village Engineer.

All openings in any pavement or traveled way shall be backfilled prior to the end of the working day. All roadway-crossing excavations shall be temporarily backfilled with crushed stone and a temporary asphalt patch of at least 2 inches in thickness. In lieu of a pavement patch, a bolted down steel plate with a minimum thickness of 1 inch, may be installed over the excavation. Permanent pavement restoration shall be accomplished with flowable fill backfill to the bottom of the pavement section.

N. STREET SIGNS

Upon completion of the public improvement, the Village Engineer shall request the Department of Public Works to install regulatory, warning, and guide signs in accordance with the MUTCD. This cost shall be borne by the developer.

O. MATERIAL TESTING AND EVALUATIONS

Concurrent with the construction of any public improvement, the developer shall furnish the Village Engineer with material testing results from qualified professionals as requested. Costs associated with third party testing shall be borne by the developer.

Test Item	Test
Subgrade	Soil borings
	Proof roll
	Density
	Bearing capacity
Base Course	Proof roll
	Density
Concrete	Placement temperature
	Air content
	Slump
	Compressive strength
Hot-mix asphalt	Plant inspection
	Placement temperature
	Density

P. PAVEMENT MARKING

Arterial and collector streets street channelization and intersection retroreflective markings shall be installed at the locations required by the Village Engineer. All pavement markings shall be in accordance with the standards in the MUTCD.
New hot mix asphalt, or asphalt placed within the last 180 days, shall be marked with thermoplastic, inlaid preformed plastic, or modified urethane in accordance with IDOT standards.

New concrete pavement shall be marked with modified urethane in accordance with IDOT standards.

Existing hot mix asphalt or concrete pavement shall have all existing pavement markings removed and replaced with modified urethane in accordance with IDOT standards.

Q. SUB-STANDARD STREETS

1. Definition

A sub-standard street is defined as a Village maintained roadway which currently has one or more of the following deficiencies:

1) a surface and base width of less than 20 feet

2) lack of curb/gutter

3) an exaggerated crown

4) poor roadway drainage

5) poor or weak base strength

6) poor cross section and surface conditions

2. Design Considerations

The following improvements shall be considered where complete replacement of a sub-standard street is determined by the Village Engineer to be impractical.

1) base correction of obvious failures

2) widening of the roadway to a minimal width of 20 feet

3) provision of a crown sufficient for positive drainage

4) correction of cross section deficiencies

5) strengthening of roadway edges or shoulder work

6) application of HMA surface at least 2 inches in thickness

7) driveway culvert replacement and ditch enclosure

8) detention provisions

9) sump pump connections

10) structure adjustment

11) parkway restoration

12) property owner providing a restrictive covenant committing to a future Special Assessment or Special Service Area for a full standard street improvement

3. Financial Participation

The developer or homeowners, upon the recommendation of the Village Engineer, shall be requested to contribute toward the upgrading and improvement of the existing pavement or drainage system. The developer shall participate in a percentage to be negotiated with and approved by the Village Board of Trustees.

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SECTION VI

ROADWAY AND PARKING LOT LIGHTING

PART I - ROADWAY LIGHTING

A. PURPOSE

The principal purpose for fixed lighting of public and private roadways for vehicles and pedestrians is to create a nighttime environment conducive to quick, accurate, and comfortable visibility. It is the intent of these Standards to improve traffic safety, pedestrian safety, achieve efficient traffic movement, and promote nighttime use under a wide variety of weather conditions.

B. GENERAL

All development under the jurisdiction of the Village shall include provisions for the construction of roadway and parking lot lighting facilities. Design of these lighting facilities shall be in accordance with this Section and as approved by the Village Engineer.

C. PUBLIC EASEMENTS AND UTILITIES

The roadway lighting system is to be constructed within the right-of-way or utility easements for public improvements in locations shown on the approved plans and accepted by the Village.

All public conduit, cables, or controllers on private lots shall be confined to public utility easements now in existence or to be procured by the developer. A minimum easement of 10 feet centered on the facility shall be provided for all underground roadway lighting supply conduits or cable to be laid across private property. Such easements shall be properly documented by deed or plat, accepted by the Village and recorded. All documents required to properly establish such easements shall be provided by the developer.

D. SUBMITTAL REQUIREMENTS AND APPROVAL

Two sets of complete lighting system plans and photometrics shall be submitted by a registered professional engineer of the State of Illinois along with the catalog cuts to the Village Engineer for approval. The Village Engineer may require lighting systems to exceed minimum standards for public benefit.

E. PERMITS

The Developer shall obtain all Village permits, development permits, highway department permits, certificates of insurance, and licenses required for the work at their expense.

F. LIGHT DISTRIBUTION CLASSIFICATION

Proper distribution of the light flow from luminaires is one of the essential factors in efficient roadway lighting. The light emanating from the luminaires shall be directionally controlled and proportioned in accordance with this Section and meeting the requirements for seeing and visibility.

Light distributions are to be designed for the specific roadway and area classification with a minimum mounting height (MH), overhang, pole spacing, and roadway width to be effectively lighted.

All luminaires can be classified Type I through V according to their lateral and vertical distribution patterns. Different lateral distributions are available for different street width-to-mounting height ratios. Different vertical distributions are available for different spacing-to-mounting height ratios.

Guide for Luminaire Lateral Light Type and Placement

Side of the Roadway Mounting			Center of the Roadway Mounting		
One side or Staggered	Staggered or Opposite	Grade Intersection	Single Roadway	Twin Roadways (median mounting)	Grade Intersections
Width up to 1.5 MH	Width beyond 1.5 MH	Width up to 1.5 MH	Width up to 2.0 MH	Width up to 1.5 MH (each pavement)	Width up to 2.0 MH
Types II-III--IV	Types III and IV	Type II 4-way	Type I	Types II and III	Types I 4-way and V

Note: In all cases suggested maximum longitudinal spacings and associated vertical distribution classifications are: Short distribution = 4.5 MH, Medium distribution = 7.5 MH, and Long distribution = 12.0 MH.

G. LIGHTING DESIGN

The design process and calculations should follow these major steps:

1. Determination of roadway geometrics, adjacent land use and traffic accident experience to obtain quantity of horizontal light required.

2. Formulation of a tentative concept as to luminaire location and mounting height.

3. Selection of a luminaire light distribution type.

4. Detailed photometric calculations (manual or computer generated).

5. Comparative calculations determining maximum-to-minimum uniformity ratios.

6. Selection of final design upon Village Engineer approval.

H. ILLUMINANCE REQUIREMENTS

The recommended illuminance values are specified below:

Roadway/Walk/Bikeway Average Maintained Illuminance on the Horizontal

Vehicular Roadway Classification	Commercial		Intermediate		Residential	
	Lux	Foot-candles	Lux	Foot-candles	Lux	Foot-candles
Expressway +	15	1.4	13	1.2	11	1.0
Major	22	2.0	15	1.4	11	1.0
Collector	13	1.2	10	0.9	6	0.6
Local	10	0.9	6	0.6	4	0.4

Sidewalk/Bikeway Average Maintained Illuminance On the Horizontal

Walkway and Bikeway Classification	Minimum Average Levels	
	Lux	Footcandles
Sidewalks (roadside) and bikeways:		
Commercial areas	10	0.9
Intermediate areas	6	0.6
Residential areas	2	0.2
Walkways (distant from roadways) and bikeways:		
Park walkways and bikeways	5	0.5

I. UNIFORMITY

The average level to minimum point method and maximum level to minimum point method should not exceed the 4 to 1 and 8 to 1 limits respectively for local residential streets.

J. LUMINAIRE MOUNTING HEIGHT AND LOCATION

Use or Roadway Classification	Mounting Height (Feet)	Pole Height (Feet)	Maximum Spacing (Feet)	Bracket Length (Feet)
Arterial Roadways	33'-43'	30'-40'	175'	8'-15'
Collector Streets	31'	28'	200'	8'-15'
Residential Subdivision	14'	14'	300'	N/A
Commercial Subdivision	31'	28'	175'	8'-15'
Industrial Subdivision	35'	32'	200'	8'-15'

K. LUMINAIRE SPACING

The spacing of poles and luminaires is influenced by the location of utility poles, fire hydrants, buried utilities, block lengths, property lines, roadway geometrics, and driveway locations.

The desired luminance at any point on the pavement to the average illuminance should be maintained to prevent loss of object visibility between luminaires.

L. POLE LOCATION

Roadway lights shall be located on one side of the street unless, in the judgement of the Village Engineer, it is impractical to do so. All light poles shall be set two feet back from the curb line. At intersections with only one standard, the bracket shall be pointed toward the center of the intersection. Where two or four standards are located at a major intersection, the bracket of each shall be perpendicular to a street as determined by the Village Engineer.

Other factors to consider in selecting locations are:

1. Access for maintenance
2. Visibility
3. Vehicular - pole collision probabilities
4. Trees
5. Aesthetic appearance
6. Combination traffic signal mast arm poles

At a minimum, residential roadway lights are to be located at all intersections, pronounced street curvatures, cul-de-sac terminations, and at midblock intervals.

Types II, III and IV luminaires are intended to be mounted over or near the edge of the roadway.

Types I and V are generally designed to be mounted over or near the center of the area to be lighted.

M. TRAFFIC CONFLICT AREA LIGHTING

Intersecting, converging or diverging roadway areas require higher illuminances. Very high-volume driveway connections to public streets and midblock pedestrian crosswalks should be illuminated at least 50 percent higher than average. Landscaped border areas, median strips and adjacent school or park grounds require higher than average illuminance.

N. TRANSITIONAL LIGHTING SECTIONS

Roadway lighting systems shall be designed to decrease the driver's blindness when emerging from a lighted section of roadway. Using the design speed of the road, the reduced lighting level zone shall allow for a 10 second eye exposure adjustment.

Heavily traveled roadway intersections and converging and diverging traffic lanes shall have illuminance levels of the summation of each roadway traditionally obtained by using combination traffic signal and lighting poles on both corner approaches.

Special lighting design shall be considered at railroad grade crossings and roadway under and overpasses. Railroad grade crossings must be adequately lighted to permit identification of the crossing, trains, and unlighted vehicles or pedestrians at the crossing. Illuminance levels over and within 100 feet should be increased to twice that of the adjacent roadway.

O. DETAILED MATERIAL AND EQUIPMENT SPECIFICATIONS

1. Trench and Backfill

The conduit trench shall be located 2 feet behind the back of the curb or as otherwise approved by the Village Engineer. Under existing pavement, all excavations shall be backfilled with controlled low strength material to the bottom of the pavement. Under proposed pavement, granular backfill material shall be deposited in the trench in layers, not to exceed 6 inches in depth and shall be mechanically compacted before the next layer is deposited in the trench.

Trenching shall be conducted to avoid disturbing existing trees, utilities, pavement, and equipment. Excavation shall be deeper than minimum as required to avoid existing piping or other obstructions.

All disturbed areas shall be protected and restored in kind as prior to work commencing.

2. Handholes

Handholes are required at the ends of all isolated conduit and at intermediate locations between light poles to facilitate pulling cable. Cables runs shall not exceed 400 feet without a junction. Handholes shall be precast concrete or cast-in-place as approved by the Village Engineer.

3. Ground Wire

In addition to the power circuit, ground wire shall be provided interconnecting all poles, luminaires, controllers, and appurtenances to the electrical system. Ground rods shall be provided at the controller or disconnect location. Ground rods shall be 3/4 inch in diameter and 8 feet long with steel core and heavy exterior layer of pure copper driven into the ground.

4. Light Pole Foundations

Pole foundations shall be designed to support the proposed lighting installation given the geotechnical conditions at the installation location. Foundations may be engineered cast in place concrete in accordance with the Standard Specifications for Road and Bridge Construction or engineered helical foundations as approve by the Village Engineer.

5. Conductors

Conductors shall be USE rated stranded copper rated for direct bury and sized for the proposed lighting system. All conductors shall be #6 AWG stranded copper wire and continuous from point to point without splices. Each conductor shall be colored for identification and colored tape is not acceptable.

6. Conduit

All conductors shall be installed in rated polyethylene conduit installed 18 to 27 inches deep and sized for the conductors being carried.

When conduit is to be installed under existing pavement it shall be directionally drilled where possible and open cut excavation and patching avoided.

7. Pole Conductors

Conductors within the pole, from the handhole to the luminaire at a minimum, shall be single conductor, #10 AWG stranded copper wire copper rated for 600 volts. Each conductor shall be color coded for identification and colored tape is not acceptable. Two feet of conductor slack shall be provided in each handhole.

8. Connection Pedestal

Conduit shall be terminated 18 inches from Commonwealth Edison Company pedestal and 27 inches below grade. Eight feet of cable with ends sealed shall be left for connection by Commonwealth Edison Company.

9. Electrical Connection and Power Supply

The developer shall contact the Commonwealth Edison Company to obtain service connection locations. The developer shall be responsible for all service connection charges.

Connection to the power supply shall be made as near to the secondary supply of the distribution transformer as is practical. Such connection shall be made in accordance with Commonwealth Edison Company regulations.

10. Fuses

A weather-proof fusetron HEB-AA holder with a suitably rated fuse shall be placed in the handhole of each light pole and shall be connected in series with the underground conductors feeding each luminaire. Sufficient slack cable shall be provided in each handhole so that socket splices may be removed for inspection and maintenance.

11. Circuitry

No circuit shall be greater than 2,000 feet from power source to the most distant luminaire. Line voltage drop must not exceed 10 percent through such distance. All cable shall be No. 6 in size or larger. Luminaires in the circuit shall be photoelectrically controlled at the pole. Grouped units shall be limited to 4 units unless a relay is used with the group control being mounted on the luminaire closest to the power source. The photoelectric device shall, in all cases, be mounted on the top of the luminaire closest to the power source.

12. Control and Connection

Power for street lighting may be either metered or nonmetered as required by the Village Engineer and Commonwealth Edison Company. Complete wiring schematics shall be provided as part of the plans submitted for approval.

(a) Nonmetered Power

A light pole, designed as the service pole, shall be provided, equipped as follows:

- A circuit disconnect breaker box, 8 inch x 6 inch x 4 inch or larger, of cast aluminum with tamper proof, screwed cover; 1.5 inch back hub; thermal magnetic breaker; back mounted screw hub for ground lug and stainless steel mounting hardware shall be mounted on the pole approximately 10 feet above the ground or approved equal shall be installed next to Commonwealth Edison box as directed by the Village Engineer.

(b) Metered Power

When power is to be metered, a control center shall be provided near the energy source from Commonwealth Edison. The control center shop drawings shall be approved by the Village Engineer and include the following features:

1. Meter socket shall be installed on the side of the control center.
2. Constructed of sheet aluminum with a locking door mounted four to five feet above grade.
3. The cabinet shall be vented and weather tight.
4. Foundation shall be cast in place concrete finished a minimum of two inches above finished grade.
5. A main circuit breaker sized for the proposed lighting system.
6. A photocell-controlled contactor shall be installed prior to individual circuit breakers for each circuit.
7. A single pole, 20 ampere rated toggle switch shall be installed to by-pass the photoelectric control.
8. A duplex receptacle convenience outlet shall be installed on a dedicated circuit within the cabinet.
9. A convenience light shall be installed in the cabinet.
10. A photoelectric cell shall be installed on the bottom side of the cabinet or, shall be installed, complete with pole tap adapter and receptacle on the light post nearest to the control center, interconnected with the control center with a 3 wire, No. 12 color coded circuit.

13. Luminaires

(a) Post Top Luminaires
Luminaires shall be General Electric Company Evolve LED Post Top Town and Country or an approved equal. Light distribution shall be specified by the designer.

Refractor type: Acrylic
Light Color: 3000K
Control: As designed
Color: Black

(b) Mast Arm Luminaires

Luminaires shall be General Electric Company Evolve ERL series or an approved equal. Light intensity and distribution shall be as specified by the designer and approved by the Village Engineer. Shields shall be installed as directed by the Village Engineer

Voltage: As approved
Light Color: 4000K or as approved by the Village Engineer.
Control: As approved
Color: White

(c) Luminaires shall be controlled by one of the following methods:

(1) Individual (6 standards or less) Each luminaire shall be controlled by an individual photoelectric control unit at each luminaire.

(2) Group (more than 6 standards) The control unit controlling more than one luminaire shall consist of a contactor actuated by a photoelectric control unit approved by the Village Engineer.

14. Light Standards

(a) Light Standards

Residential light standards are to be direct bury poles as approved by the Village Engineer.

Residential light standards to be accepted by the Village for maintenance may be manufactured of concrete, centrifugally cast, pre-stressed and steel reinforced. The standards shall have smooth ground and polished surfaces with a sky gray finish. The cross section of the standard shall contain a raceway extending throughout the length of the standard and dual cable entrances below grade. The raceway shall have a minimum opening of 1-1/2 inches and shall not exceed 2 inches at the top of the standard. A handhole shall be provided on the opposite side from the luminaire and shall be covered with a heat-treated cast aluminum door, fastened to nonferrous inserts in the standard with stainless steel bolts 18 inches above finished grade.

All standards shall be provided with an aluminum mast cap held to the top of the standard by stainless steel screws and nonferrous inserts.

Roadway lighting standards shall not be less than 8 inches in diameter with a butt base below final grade level. It shall be equipped with mast arm brackets securely attached to the standard.

Poles shall be set vertical in tamped wet screenings, at proper grade, and shall be straight to within one degree of vertical, straightened and maintained throughout the duration of the guarantee period.

(b) Pre-Approved Summary

The following standards and appurtenance, or approved equals, may be used for lighting systems.

Concrete Pole Specifications

Manufacturer	Height (Feet)	Finish
Centrecon	14-28	Gray

Brackets (variable)

Single	Double	Length (Feet)
AD	ADD	8, 10, 12, 14

Power Cap - AP-490 or an approved equal

Aluminum Pole Specifications

Manufacturer	Height (Feet)	Arm Length (Feet)
Hapco	30-45	12-15

(c) Materials and Equipment:

1. Equipment Standardization

In the interest of encouraging uniform appearance, standardization of replacement parts and familiarization of maintenance personnel with the equipment, the Village has selected certain equipment which is to be incorporated.

2. Materials

All materials comprising the lighting systems shall be the product of a firm or firms regularly engaged in the manufacture of such materials and shall be covered by the manufacturer's or installing contractor's warranty or guarantee. The materials shall be new, of current manufacture, and of standard design free from all defects.

3. Other Equipment

All other components of the street lighting system not covered or detailed by these specifications shall be designed and provided in conformance with currently accepted practices of good engineering

and in full compliance with the requirements of the Commonwealth Edison Company.

4. Substitute Material or Equipment

If the general requirements, law, ordinance or applicable rules or regulations permit the developer to furnish or use an approved substitute that is equal to any material or equipment specified, and if the developer wishes to furnish or use a proposed substitute, they shall make written application to the Village Engineer for approval of such a substitute certifying in writing that the proposed substitute will perform adequately the function called for by the general design, be similar and of equal substance to that specified and be suited to the same use and capable of performing the same function as that specified; stating whether or not its incorporation in or use in connection with the project is subject to the payment of any license fee or royalty; and identifying all variations of the proposed substitute from that specified and indicating available maintenance service. No substitute shall be ordered or installed without the written approval of the Village Engineer who will be the judge of equality and may require the developer to furnish such other data about the proposed substitute as he considers pertinent.

P. SUPERVISION AND SAFETY

A licensed electrical contractor shall supervise and direct the work efficiently and with the upmost skill and attention.

The developer shall be responsible for coordinating the improvement work, correcting faulty work, and consulting with the design engineer and Village Engineer in the settlement of any disputes, plan changes, or plan adjustments.

Q. INSPECTION AND TESTING

After the installation is complete and at a time convenient to the Village, all equipment shall be demonstrated to operate in accordance with the drawings and specifications. Record drawings shall be provided to the Village Engineer for approval prior to scheduling testing.

Each standard, controller, and all appurtenances shall be visually inspected to verify proper installation. Photoelectric cell controls shall be inspected with an after dark inspection performed initially and again after a minimum of 30 days to ensure proper operation.

R. RECORD DRAWINGS

Prior to acceptance of the lighting system, Record Drawings shall be submitted to the Village in electronic and hard copy formats as approved by the Village Engineer. The Record Drawings shall indicate the roadway lighting system demonstrating the location of all conduits, controls, standards, and handholes. It shall be certified as to accuracy by an Illinois licensed Professional Engineer or Illinois licensed Professional Land Surveyor. See As-Built Checklist for required format of As-Built submittals.

S. GUARANTEE PERIOD AND WORKMANSHIP

All work shall be performed in a neat and workmanlike manner and shall be guaranteed by the developer and their surety against defects in workmanship and materials, of whatever nature, for a period of 12 months from the date of final acceptance of the work. Any defective

material or workmanship shall be repaired or replaced to the satisfaction of the Village without cost to the Village.

PART II - PARKING LOT LIGHTING

A. ILLUMINANCE

1. Uniformity/Intensity

The horizontal illuminance method shall be utilized on an average-to-minimum ratio and maximum-to-minimum ratio as designated below:

Horizontal Illuminance Table

General Parking and Pedestrian Area

Level of Activity	Lux (Minimum on pavement)	Footcandles (Minimum on pavement)	Uniformity Ratio (Average/Minimum)	(Max./Min.)
High	10	0.9	4:1	9:1
Medium	6	0.6	4:1	9:1
Low	2	0.2	4:1	9:1

2. Glare

Efforts must be made to use luminaires that control the view of the light source from drivers and pedestrians. Both disability and discomfort glare must be avoided.

B. LIGHT SOURCE

1. Atmospheric Conditions

All exterior fixtures shall be totally enclosed and gasketed for protection from the elements.

2. Lamp Position

Each lamp shall be positioned to achieve the maximum light output for even distribution within the parking lot.

C. LIGHTING EQUIPMENT

A variety of luminaires are used for lighting parking facilities such as area lighting, architectural, post top, wall mounted, and roadway lighting. “Shoe box” style shall be used with sharp cut off designed to confine light to specific designated areas.

Floodlight luminaires, adjustable wall packs, and high-mast aerial lighting greater than 60 feet in height shall not be acceptable.

The luminaire types that are suited for a specific application can be determined by comparing luminaire and lamp combinations to basic considerations, such as:

1. Size and shape of area.
2. Mounting height of luminaire.
3. Location requirements of poles and luminaires:

When perimeter poles are used a light cut off design or lens shall be considered capable of producing a rectangular pattern.

4. Illuminance requirements.
5. Quality of uniformity requirements (maximum to minimum).
6. Energy requirements (lamp source and ballast). PF-90 CWA energy efficient constant wattage auto factor type ballasts shall be used.
7. Code restrictions.
8. Effects of spill light, street and house side light must be controlled by optics, reflectors or visors to minimize unwanted light. If visors are used the structural integrity of the pole and lamp combination must be safely determined as acceptable for local wind conditions.

D. ARCHITECTURAL LUMINAIRES

These varied types of luminaires are designed to blend with the total architectural environment and shall be capable of producing efficient, uniform illumination while offering control of undesirable light or glare.

E. POST TOP LUMINAIRES

The mounting height for this type of luminaire shall not exceed 15 feet when adjoining residential uses. Mounting heights up to 25 feet may be permitted adjoining other uses as approved by the Village Engineer.

F. WALL MOUNTED LUMINAIRES

The cutoff type shall be used with a maximum mounting height of 25 feet and maximum spacing of 4 times the mounting height and maximum lamp of 400 watts or equivalent.

G. SPECIAL LIGHTING

Should closed circuit television monitoring equipment be necessary, special considerations will be given to the lighting level, type of light source, and distribution pattern to ensure effective results.

H. ENERGY MANAGEMENT

Developers are encouraged to include provisions for reducing the lighting levels for area security only during reduced activity periods.

I. DESIGN AND SUBMITTAL PROCEDURES

Private parking lot and area lighting will be reviewed on an individual basis for meeting the intent of these provisions. Catalog cuts and photometrics must be submitted for approval by the Village Engineer.

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SECTION VII

GRADING AND LANDSCAPING

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A. GENERAL

All vegetation removal, excavation, or grading work within the public right-of-way or other public places shall require a permit and be regulated in accordance with this Standard and applicable Village codes and ordinances. Vegetation removal or grading work on other lands shall comply with this Standard and applicable Village codes and ordinances.

B. ADDITIONAL RESOURCES

To protect existing utilities all underground work shall be performed in accordance with the Illinois Underground Utility Facilities Damage Prevention Act and JULIE Excavator Handbook.

Chapter 25 of the Municipal Code - Tree Protection and Preservation, Vegetation

Chapter 6 of the Municipal Code – Article XI, Site Grading, Drainage and Soil Erosion/Sedimentation Control

C. PROPERTY PROTECTION

Trees, shrubbery, irrigation and sprinkler systems, fences, poles and all other property and surface structures shall be protected during construction operations. All fences, poles or other man-made surface improvements which are moved or disturbed shall be restored to their original condition after construction is completed. Any trees, shrubbery or other vegetation, which are approved for removal shall be removed completely, including stumps and roots. Responsibility for any damage or claims for damage caused by construction operations to shrubbery or other landscape improvements, which were not authorized for removal or trimming, shall be assumed by the developer.

Restoration of Existing Improvement Surfaces
The developer shall restore all pavements, sidewalks, driveways, curbs, gutters, trees, shrubbery, lawns, fences, poles, public utilities, and other property and surface structures removed or disturbed during or as a result of construction operations to a condition which is equal in appearance and quality to that which existed before the work began. The surface of all improvements shall be constructed of the same material and match in appearance the surface of the improvements which were removed.

Cultivated Lawns
When cultivated lawns are damaged as the result of construction activities the disturbed areas shall be restored by furnishing and placing topsoil and sod with a guarantee period.

D. SOIL EROSION AND SEDIMENT CONTROL

Final Engineering Plans, specifications, and the Engineer Estimate of Probable Cost shall include soil erosion and sediment control measures during the construction stage and until permanent stabilization is established. Measures may include storm water runoff diversions, inlet filter baskets, barrier fence, sediment basins, ditch checks, seeding and mulch, and watering to control dust. The Practice Standards of the Illinois Urban Manual shall be followed.

Soil erosion and sediment control plans shall be approved by the Village Engineer and installed by the developer prior to earth disturbing activities commencing on the site. Following installation, the developer shall provide a minimum 48 hours' notice for inspection to the Village Engineer to verify and approve the measures installed.

The subject property is considered stabilized with 75% established turf growth, or the installation of sod. This use of sediment/erosion control as a temporary stabilization measure will only by accepted during seasons where grass growth/sod installation cannot occur; this will apply only to the following

months; November–April. No exceptions will be made. Sediment control measures are required to remain in place until 90 percent of the disturbed area is permanently stabilized with turf. Sodding must be sufficiently "knit" with the soil to prevent removal by hand or flotation.

E. TREE AND VEGETATION PROTECTION

Protection of Existing Trees and Shrubs

1. Code Compliance

   The developer shall comply with the requirements of Chapter 25 of the Municipal Code in connection with all work in the vicinity of, or affecting, existing trees and shrubs in any way, whether such trees and shrubs are located on or off the site being developed.

2. Village Review

   The developer's proposed methodology for protecting existing trees shall be reviewed by the Village Forester and work shall only be in accordance with an approved tree construction activity plan. If, in the opinion of the Village Forester, the developer has not taken the necessary precautions to preserve the tree asset, the Village may issue a stop order on all site development work in progress.

3. Tree Plan Approval

   The criteria for approving a tree plan shall include all applicable requirements of Village codes and ordinances, as well as the following:

   a. General design.

   b. Planting specifications.

   c. General environmental considerations.

   d. Preservation in a natural state of forested land.

   e. Extent of existing tree coverage.

   f. Techniques for the preservation and protection of existing trees during construction.

F. GRADING

1. Permits Required

   No entity shall alter, cause or permit the alteration of any existing land grade, contour or drainage pattern in any manner, whether or not pursuant to building, grading or other permits, without first complying with all applicable regulatory requirements and the provisions of these Standards and obtaining a grade alteration permit or approval. Copies of permits from regulatory agencies shall be provided to Village Engineer.

2. Lot Grading

   With the exception of water features, ponds, and detention facilities, grading of parking lots and rear, front, or side yards within the Village shall be performed to prevent minor ponding of water exceeding 12 inches in the event of complete failure of the storm sewer system.

Overland flow routes for storm water runoff shall be adequately identified, sized and located within public drainage and utility easements for the 24-hour, 100-year storm event.

Turf area grading shall be between 1.0 percent and 30 percent slope. Slopes over 20 percent shall be sodded and staked. Slopes over 30 percent with engineered stabilization measures may be approved by the Village Engineer at their discretion.

Residential driveway grades on all lots, as measured from the top of curb to the finished garage floor, shall be between 1.5 percent and 8 percent. Slopes between 8 percent and 10 percent may be approved by the Village Engineer at their discretion.

3. Drainage

All grading activity shall maintain positive and controlled drainage patterns that will not unreasonably block flow from nor divert flow to, adjoining property.

4. Lot Grading Certification

At the time of final occupancy, and after landscaping, the developer's licensed engineer shall furnish to the Village Engineer a 95 percent certification statement and as-built topographic plans. The statement shall indicate the finished lot grades around all structures conform to the approved grading plan and that each lot drains properly. The as-built topographic plans shall have the results of an elevation survey of the completed work demonstrating as-built grades adjacent to the approved proposed elevations.

G. STREAM PRESERVATION

1. Purpose and Need

The developer of a parcel adjacent or tributary to an existing drain, reach or tributary of a river or stream shall remove and dispose of obstructions, overgrown vegetation, trash, debris, construction materials, and shall improve the existing channel's ability to carry floodwater, and clean out blockages of a channel caused by overgrowth, debris, and sediment deposits.

2. Design Considerations

Bank stabilization activities required by the Village Engineer shall be undertaken by the developer to discourage illegal dumping, improve the aesthetic value, and reduce future maintenance costs. The developer shall permanently permit vehicular access for maintenance work through recorded easements.

3. Inspection and Maintenance

The Village Engineer and Director of Public Works shall jointly review improvements and routinely inspect the adjacent stream to reduce the possibility of storm water conveyance and nuisance problems.

H. INSPECTION REQUIRED BEFORE PLANTING

A 48-hour advance notification to the Department of Public Works is required prior to planting to allow sufficient time for inspection of any trees, shrubs or landscaping required by any applicable code, ordinance, agreement or approved plan.

I. TURF PLANTING

All pervious areas within dedicated public right-of-way shall be graded and seeded or sodded in accordance with the Illinois Department of Transportation Standard Specifications for Road and

Bridge Construction, latest edition. Restoration work shall be performed to the satisfaction of the Village Engineer.

1. Topsoil Placement

   Topsoil shall be furnished and placed to a depth of 6 inches. The work to be done includes preparing the subgrade, removal of surplus earth, filling all irregularities or depressions in the planting area due to settlement, weathering or other causes, furnishing, placing, raking, and rolling topsoil, and removal of debris. The topsoil furnished shall be pulverized and screened consisting of loose, friable, loamy, non-acid soil, rich in organic matter and free from clay and other objectionable matter.

   Before topsoil is placed, the subgrade shall be shaped, trimmed, and finished to accommodate the desired amount of topsoil to bring the area to the proper finished grade. The subgrade shall be tilled to a depth of 2 inches to provide a suitable bond with the topsoil. The topsoil shall be deposited and spread over the planting surface and firmed by rolling to leave a smooth surface.

2. Sodding

   Furnishing and placing sod shall include preparing the ground surface and furnishing, transporting, and placing the sod and other materials required in the sodding operation. Sod shall be a well-rooted mixture of Kentucky Bluegrass and conform to the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction.

   Sod which has been cut more than 36 hours prior to being placed shall not be used without the approval of the Village Engineer. All sod in stacks shall be kept moist and protected from exposure to the sun, wind, and from burning. Agricultural ground limestone and nutrients shall be included as required. Initial and additional waterings shall be performed in accordance with the Standard Specifications for Road and Bridge Construction. Supplemental watering may be required due to weather conditions.

   The guarantee period for sodding shall extend to April 15th of the year following installation. Any defective, dead or dying sod shall be removed and replaced within that period.

3. Seeding

   Seeding may be approved at the discretion of the Village Engineer. Developer shall furnish and spread an approved seed mixture and apply mulch via an approved method.

4. Growth Required

   An established growth of live turf at a height of not less than two inches shall be required prior to issuance of a final certificate of occupancy for buildings on the project site.

J. NATIVE PLANTING

These standards detail the procedures required to successfully establish native plant communities. Upon successful establishment, native vegetation can provide water quality benefits by filtering sediments and pollutants from stormwater runoff. Additionally, the floral diversity created by these plantings will provide a valuable habitat for wildlife, as well as a unique and aesthetically pleasing landscape.

Native plants shall be selected based on the land use for which they are proposed. Plants mixes shall conform to the plant mixes identified in the Appendix.

- Emergent Mix shall be used in areas designed to have perennial standing water.

- Wet to Mesic Mix shall be used between the normal water level and high-water level associated with stormwater management facilities.
- Low Profile Prairie shall be used in all other areas.

1. Contractor Qualifications

   Contractors chosen for the establishment and enhancement of natural areas shall be experienced in the restoration, installation, and management of said areas. Qualified personnel shall be available, at all times, to identify non-native and native plants by genus and species. The goal of installing successful native plant communities is a long-term process. It is imperative that a qualified contractor perform the initial installation and maintenance.

2. Quality and Condition
   a. Native seed shall be obtained from sources east of the Mississippi River, within the same EPA Level III Ecoregion as the project site (Central Corn Belt Plains).
   b. Native seeds shall be blended by the vendor, and the mixture and ratio shall be guaranteed in writing to be as specified. The amount of seed indicated on the design specifications shall mean the total amount of pure live seed (PLS) per acre for all species listed. It is the sole responsibility of the contractor to provide approved seed that meets industry-standard PLS requirements.
   c. Contractor shall provide the Village Engineer with the name and location of the seed supplier, origin of the various kinds of plants, and a statement of the purity of the seed.
   d. Seed shall conform to applicable State and Federal regulations as in effect on the date of approval. Unless otherwise specified, seed shall not contain in excess of 1 percent weed seeds; 0 percent is desirable.
   e. All storage requirements, stratification, and scarification considerations shall be the sole responsibility of the contractor.
   f. Mycorrhizal inoculants shall be palletized and mixed at 1 lb. per acre with the fine seeds before installation. The inoculants shall contain a diverse mixture of Glomales fungal species (Glomus spp.) in palletized form.
   g. Under no circumstances shall Wheat (Triticum aestivum), Cereal Rye (Secale cereale), Perennial Rye (Lolium perenne), or Barley (Hordeum vulgare) be used as a temporary cover crop or otherwise be incorporated into the approved seed mix.

3. Handling
   a. The contractor shall be solely responsible for the proper handling and storage of the seed according to the best seed handling and storage practices, including fungicide treatments and stratification considerations.
   b. All native seeds shall be packed and covered in such a manner as to ensure adequate protection against damage and maintain dormancy while in transit, storage, or during planting operations.
   c. Seed shall be kept dry and unopened until needed for use. Seed shall not be stored or temporarily stored in locations or vehicles where the temperature will be in excess of 90 degrees F.

4. Site Preparation
   a. The contractor shall be responsible for performing all work necessary to achieve and maintain an acceptable seedbed prior to seeding. All areas shall be properly prepared before seeding begins. Underground utility location maps and plans should be reviewed prior to work.

Equipment having low unit pressure ground contact shall be utilized within the planting areas.

b. The seedbed shall be prepared by working the topsoil to a depth of 3 inches. Site preparation equipment shall be of a design that can be utilized efficiently by the contractor to meet the requirements for the work specified.
c. Prior to seeding, at least 6 inches of topsoil shall be present and free of all clods, stones, roots, sticks, rivulets, gullies, crusting, and cracking. The soil aggregate size will be no greater than 2 inches in the largest diameter.
d. If present, compacted soils shall be disked or raked prior to seeding. Remedial measures for the access area may include ripping from 12 to 18 inches of the soil horizon prior to disking. If compaction is not a concern, and the seedbed needs to be loosened prior to seeding to ensure good seed-soil contact, disking or raking shall be performed using appropriate equipment.
e. If needed, cultivation shall occur within 24 hours prior to seeding. Seeding should occur immediately after the last cultivation and preferably before rain.

5. Seed Installation
   a. Seeding shall be performed using a Truax drill, Truax Trillion seeder, or comparable equipment designed specifically for installation of native seed. For areas where site conditions preclude the use of specialized equipment, seed may be installed through hand broadcasting and lightly raking in the seed. Hand broadcast seed shall be spread at twice the specified rate.
   b. Prior to starting work, all seeding equipment shall be calibrated and adjusted to sow seeds at the proper seeding rate. In general, the optimum seeding depth is 0.25 inch below the soil surface.
   c. Equipment shall be operated in a manner to ensure complete, uniform coverage of the entire area to be seeded and to avoid damage to existing woody plants.
   d. Seeding and soil firming shall not be done during periods of rain, severe drought, high winds, excessive moisture, frozen ground, or other conditions that preclude satisfactory results.
   e. To achieve best results, seed boxes should be kept more than one-quarter full at all times and ground speed should be no more than 2 to 3 mph.
   f. Seeding operations must occur when soil moisture is appropriate for seeding operation.
   g. Native plant seed shall not receive fertilizer
   h. Native plant seed shall not receive fertilizer.
   i. Wet seed that is moldy or otherwise damaged in transit or storage shall not be used.
   j. After seeding operation is completed, install erosion control blanket per manufacturer's specifications as necessary.

   Seasonal Considerations

   (1) November 1 through February 28: Seed must be protected from displacement due to water and wind erosion. Seeding on bare, graded surfaces must be protected with double netted erosion control blankets on slopes. Seed drilled into existing vegetation or on flat ground not subject to erosion may need only minimal erosion protection. Less cover crop will be observed during the following spring due to frost damage.

   (2) March 1 through June 29: Seeding during this period is appropriate but germination of a portion of the seed may not occur until the following season due to lack of cold

stratification to break seed dormancy. Cover crop generally germinates within 2-3 weeks of seeding operation.

(3) June 30 through September 15: Installation of native seed should be suspended unless irrigation can be provided, or unseasonably cool conditions persist. Annual forbs planted with the mix during this time period may germinate but not have sufficient time to flower before fall senescence.

(4) September 15 through October 31: Seeding on bare, graded surfaces must be protected with double netted erosion control blankets on slopes. Seed drilled into existing vegetation or on flat ground not subject to erosion may need only minimal erosion protection. Less cover crop will be observed during the following spring due to frost damage,

6. Plugging Implementation
   1. Plugs shall be installed in the spring or other date guaranteed by the contractor.
   2. Plugs shall be planted in a hole dug with a trowel, spade, planting bar, or suitable instrument such that the hole is of a minimum diameter and depth to accommodate the plug, with its roots, without damage.
   3. The soil excavated from the planting hole should be used to backfill around the plant and lightly packed to secure the roots in the soil.
   4. If planting is delayed more than six hours after delivery, store plugs in the shade, protect from the weather and mechanical damage, and keep them moist and cool. All plugs should be planted within 24 hours of delivery.
   5. Plugs shall be obtained from a reputable nursery or grown from seed. Plugs shall not be collected from wild populations of plants.
   6. Waterfowl exclusion shall be constructed around plug areas in a manner to protect new plantings from depredation. Fencing shall be constructed of 1 inch wire mesh or comparable material two feet in width. Posts shall be metal T-posts or 2”x 2” wood stakes. Posts shall be 4 to 6 feet in length dependent on soil structure within the emergent planting area. String shall be strung across the tops of the exclusion structures to prevent aerial entry by waterfowl.

7. Erosion Control Blanket

   All native planting areas shall be covered with erosion control blanket suitable for site conditions including slope and expected submergence. Erosion control blanket shall be installed within 24 hours after an area is seeded.

8. Signage

   "No Mowing and/or Dumping" or other signage should be installed along the perimeter of native planting areas or as indicated on the plan to define the boundary of the naturalized area.

9. Native Management Plan

   The developer shall be required to submit a management plan for native planting areas to guide establishment, monitoring, and maintenance of these areas. Additional information can be found within Appendix. At a minimum the management plans shall include the following:

   1. Identification of responsible parties for monitoring and maintenance activities both short term and long term
   2. Identification of funding sources and levels for monitoring and maintenance activities

3. Acceptance standards
4. Annual reporting requirements to the Village on progress of vegetation development relative to the acceptance standards.
5. Annual inspection and monitoring activities
6. Annual maintenance activities

K. GUARANTEES

Trees and plantings shall be guaranteed for a period of two years from the date of final approval or acceptance.

Sodding and turf shall be guaranteed through April 15th of the year following final approval or acceptance.

L. MAINTENANCE AND MANAGEMENT

Shrubbery or bushes existing in the dedicated right-of-way of any street shall not exceed 30 inches in height and shall not obstruct sight distances or otherwise be detrimental to public health, safety or welfare.

APPENDIX
PLAN REVIEW CHECKLIST

***General Plan Requirements**:*

- □ Digital copy in PDF provided.
- □ Drawings sealed by a Professional Engineer.
- □ NAVD 1988 datum benchmark and location provided.
- □ Name, address, and telephone number of plan preparer shown on drawings.
- □ Project Location Map and Street Address provided.
- □ Scale no less than 1" = 10' and no greater than 1" = 50'.
- □ North arrow and scale bar on all appropriate plan sheets.
- □ Title block information is complete including Project Name, Revision Date, Page Number.
- □ Appropriate Northbrook Standard Details incorporated.
- □ Easements, agreements, plats, legal document review.

***Permitting**:*

- □ Cook County Department of Transportation and Highways
- □ Illinois Department of Transportation
- □ IEPA Water Supply Construction (public water main)
- □ IEPA Sanitary Sewer (public sanitary sewer or population equivalency of 15 or greater)
- □ IEPA Storm Water ILR10
- □ Metropolitan Water Reclamation District of Greater Chicago Watershed Management Permit
- □ North Cook County Soil & Water Conservation District

Water System:

- □ Fire protection flow evaluation if necessary.
- □ Water main protection in accordance with IEPA.
- □ Dead legs not permitted.
- □ Minimum 12-inch clearance from other utilities.
- □ Water main material specification per approved Standard.

- □ Tracer wire with locating points.
- □ Fire hydrants within 150 feet of residential property.
- □ Fire hydrants within 100 feet of commercial fire department connection.
- □ Fire hydrant spacing does not exceed 300 feet.
- □ Locations and elevations for fire hydrants, valve vaults, and valve boxes.
- □ All mainline valves in vaults.
- □ Valve spacing not to exceed 1,200 feet.

Sanitary Sewer:

- □ Available capacity of existing sewer confirmed.
- □ Sanitary sewer shown with diameter, material, lineal footage, and slope.
- □ Sewer pipe shall be SDR26 PVC with minimum 4-foot cover.
- □ Sanitary manholes shown with rim elevations and pipe inverts.
- □ Sanitary manhole spacing not to exceed 400 feet for pipe 15 inches or less diameter.
- □ Drop manholes to conform to Standard Detail.
- □ Inspection manholes as required and approved by MWRDGC.
- □ Connection detail to existing public sanitary sewer shown.
- □ Sanitary sewer lateral shown with diameter, material, lineal footage, slope, and clean-outs.

Stormwater Drainage Systems:

- □ Stormwater report including complete hydrologic and hydraulic analysis all sewer and detention facilities.
- □ Storm sewer shown with diameter, material, lineal footage, and pipe slope.
- □ Sewer pipe shall conform to IDOT SSRB requirements - CMP and VCP shall not be allowed.
- □ Storm inlets and manholes shown with rim elevations and pipe inverts.
- □ Downspouts and sump discharge locations shown. Sewer connections in SDR26 PVC.
- □ Location of drainage courses, cross sections, and flow-line profile slope provided.
- □ Channels a minimum 30 feet from residential structures, measure from top of bank.
- □ Driveway culverts only permitted with no storm sewer system.
- □ Culverts sized for 25-year rain event, minimum 12-inch diameter, reinforced concrete pipe material.
- □ Detention basin location, required volume, side slopes, normal and high-water marks, release rates, and overflow routes.

- □ Protective guard rail or fencing required at dropoff locations.
- □ Willow tree removal required within 75 feet of storm facilities.
- □ Long term operation and maintenance plan provided.

Pavement:

- □ Street classification, pavement width, crown, structural number, and curb and gutter verified.
- □ Plan, profile, and cross sections checked at connection to existing pavement.
- □ Pavement section checked against minimum requirements for HMA or PCC.
- □ Sidewalk required both side of streets, 5 feet wide, and cross section per Standard Detail.
- □ Bicycle facilities per Master Plan.

Roadway Lighting:

- □ 2 sets of complete plans required for review and approval.
- □ Luminaire mounting height and light distribution type verified.
- □ Illuminance values verified.
- □ Conduit location, size, and conductor plan provided.
- □ Conduit installed 2 feet behind curb.
- □ Ground wire required in all conduit.
- □ Cable runs shall not exceed 400 feet without a handhole.
- □ Handholes shall be precast or cast in place concrete.
- □ Ground rods provided at controllers or disconnect locations.
- □ Light pole foundation details provided.

Parking Lot Lighting:

- □ Illuminance values verified.
- □ Glare shields as required.
- □ Post top not to exceed 15 feet in height adjoining residential.
- □ Wall mounted not to exceed 25 feet in height and maximum spacing of 4 times mounting height.

Grading and Landscaping:

- □ Tree and shrub removal and protection plan provided.
- □ Complete grading and landscape restoration plans provided.
- □ Turf areas shall not exceed 30 percent grade.
- □ Sod required in area over 20 percent grade.
- □ Stream preservation and maintenance plan required when applicable.
- □ 6 inches topsoil required.
- □ Long term operation and maintenance plan required for native planting areas.

CERTIFICATE BY APPLICANT: I have read and understand the checklist and requirements of the guidelines provided, and agree to conform to the Permit conditions and other applicable requirements of the Village.

X _____

Design Engineer

APPENDIX

AS-BUILT CHECKLIST

As-built drawings of all infrastructure improvements shall be furnished to the Village prior to the Village's final inspection and acceptance of the improvements. The following items shall be included on all as-built plans and must be signed and sealed by the engineer of record as being correct and complete.

General Submittal Requirements:

- □ One Electronic ASCII Point File(s).
- □ The ASCII Point File should be as a point number followed by the point's raw data: Northing, Easting, Elevation, and Point name (Raw Point Description) Code format – comma delimited, on CD. Example:

Point Number	Northing	Easting	Elevation	Description

- □ Two (2) complete sets of paper (blueline or blackline) drawings (24"x36")
- □ All electronics drawings in disc format shall be provided in state plane coordinates as approved by the Village Engineer.
- □ All surface features for the site and underground utilities shall be located in the state plane coordinate system using electronic surveying techniques. Elevations shall be based on the NAVD 1988 datum.
- □ The datum source for all horizontal and vertical control shall be provided with the as-built submittal.
- □ Developer shall submit paper and electronic copies, in a format approved by the Village Engineer, for review and verification of as-built information.
- □ Any required revisions shall be performed at the expense of the developer and complete revised drawings shall be resubmitted for approval by the Village Engineer.

Sanitary and Storm Sewer Improvements:

- □ All structures shall include rim elevations, invert elevation of the structure and all pipes, structure diameter, and all pipe diameters.
- □ Pipe information shall include lineal footage from center to center of structures, diameter of pipe, pipe material, and as-built slope.
- □ Service pipe shall be depicted using the best available information including contractor field notes, as-built field measurements, televising information, service stub witness post locations, and service stub markers. Pipe material and size shall be provided.
- □ All force mains shall include lineal footage, pipe diameter, pipe material, discharge elevations, and as-built routing.

Water Distribution Improvements:

- □ All valve vaults, valve boxes, hydrants, and buffalo boxes shall include rim or bottom flange elevations.
- □ Top of pipe elevation shall be provided for water main pipe in valve vaults.
- □ Top of valve elevations shall be provided for all valves in boxes including at hydrants.

- □ Water main pipe shall be identified by pipe diameter and material type.
- □ Water services shall be identified by pipe diameter and pipe material from field notes or as-built drawings.

Grading and Stormwater Management Facility Improvements:

- □ Detention basin locations shall include elevations of the normal and high-water levels and shall include calculations of the required versus as-built volumes for review.
- □ As-built side slopes of detention basins shall be provided at intervals required by the Village Engineer
- □ The installation of restriction features on the outlet system shall be verified for proper installation and sizing in accordance with the approved plans.
- □ Deviations from the approved design of stormwater detention systems shall require revised stage-storage-discharge tables for as-built conditions as required by the Village Engineer.
- □ Overflow routes shall be clearly identified including location, size, and elevations.
- □ As-built grades shall be provided along all constructed drainage ways. Cross sections shall be provided as required by the Village Engineer.
- □ As-built Landscaping to be provided on the final approved Landscaping Plan.

CERTIFICATE BY APPLICANT: I have read and understand the checklist and requirements of the guidelines provided, and agree to conform to the Permit conditions and other applicable requirements of the Village.

X _____

Design Engineer

APPENDIX
NATIVE LANDSCAPING

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A. GENERAL

These specifications detail the standards and procedures required to establish native plant communities. Upon successful establishment, the native vegetation will provide water quality benefits to the surrounding area by filtering sediments and pollutants from stormwater runoff generated on-site. The floral diversity created by these plantings will provide a valuable habitat for wildlife, as well as a unique and aesthetically pleasing landscape.

The Village Engineer may issue an updated listing with approval of the Village Manager should information for either the Illinois Department of Natural Resources and/or the University of Illinois Extension Service Cook County update information related to native plate material information.

B. PLANT MATERIAL

Table 1. Emergent Mix

Scientific Name	Common Name	Amount/acre
Permanent Matrix		**Plugs**
Acorus calamus	Sweet Flag	300
Juncus effusus	Soft Rush	900
Eleocharis erythorpoda	Red Rooted Spike Rush	200
Iris virginica shrevei	Blue Flag	200
Scirpus pungens	Common Three Square	500
Scirpus validus	Great Bulrush	500
Sparganium eurycarpum	Common Bur Reed	900
	Total	**3500 Plugs**

Table 2. Wet to Mesic Seed Mix

Scientific Name	Common Name	Amount/acre
Temporary Matrix		**Seed (lbs.)**
Avena sativa	Seed Oats	32.0
Elymus virginicus	Virginia Wild Rye	4.0
Lolium multiflorum	Annual Rye	4.0
	Total	**40.0 lbs.**
Permanent Matrix		**Seed (lbs.)**
Andropogon gerardii	Big Bluestem Grass	.25
Asclepias spp.	Milkweed species	0.063
Aster laevis	Smooth Blue Aster	0.016
Aster novae-angliae	New England Aster	0.031
Aster praealtus	Willow Aster	0.031
Calamagrostis canadensis	Blue Joint Grass	0.063
Carex annectens xanthocarpa	Small Yellow Fox Sedge	0.063
Carex bebbii	Bebb's Oval Sedge	0.063
Carex normalis	Spreading Oval Sedge	0.063
Carex vulpinoidea	Brown Fox Sedge	0.125
Cassia fasciculata	Partridge Pea	0.250
Elymus canadensis	Canada Wild Rye	1.000
Epilobium coloratum	Cinnamon Willow Herb	0.015
Eupatorium perfoliatum	Common Boneset	0.015
Hypericum pyramidatum	Great St. John's Wort	0.063
Iris virginica shrevei	Blue Flag	0.125
Leersia oryzoides	Rice Cut Grass	0.375
Liatris spicata	Marsh Blazing Star	0.188
Lobelia siphilitica	Great Blue Lobelia	0.031
Mimulus ringens	Monkey Flower	0.031
Monarda fistulosa	Wild Bergamot	0.063
Panicum virgatum	Switch Grass	0.250
Parthenium integrifolium	Wild Quinine	0.125
Petalostemum purpureum	Purple Prairie Clover	0.250
Physostegia virginiana	Obedient Plant	0.063
Pycnanthemum virginianum	Common Mountain Mint	0.063
Ratibida pinnata	Yellow Coneflower	0.250
Rudbeckia hirta	Black-eyed Susan	0.250
Scirpus atrovirens	Dark Green Rush	0.500
Silphium laciniatum	Compass Plant	0.188
Silphium perfoliatum	Cup Plant	0.250
Solidago riddellii	Riddell's Goldenrod	0.063
Solidago rigida	Stiff Goldenrod	0.125
Sorghastrum nutans	Indian Grass	.25
Spartina pectinata	Prairie Cord Grass	0.188
Vernonia fasciculata	Common lronweed	0.031
Veronicastrum virginicum	Culver's Root	0.063
Zizia aurea	Golden Alexanders	0.031
	Total	**5.489 lbs.**

Table 3. Low Profile Prairie

Scientific Name	Common Name	Amount/acre
Temporary Matrix		**Seed (lbs.)**
Avena sativa	Seed Oats	32.0
Lolium multiflorum	Annual Rye	4.0
	Total	**36.0 lbs.**
Permanent Matrix		**Seed (lbs.)**
Allium cernuum	Nodding Wild Onion	0.13
Amorpha canescens	Lead Plant	0.13
Andropogon scoparius	Little Bluestem Grass	4.0
Anemone spp.	Anemone species	0.09
Asclepias sullivantii	Prairie Milkweed	0.03
Asclepias syriaca	Common Milkweed	0.03
Aster azureus	Sky-blue Aster	0.09
Aster ericoides	Heath Aster	0.03
Aster laevis	Smooth Blue Aster	0.13
Aster oblongifolius	Aromatic Aster	0.06
Bouteloua curtipendula	Side-Oats Grama	5.0
Cassia fasciculata	Partridge Pea	0.25
Coreopsis l anceolata	Sand Coreopsis	0.5
Coreopsis palmata	Prairie Coreopsis	0.02
Echinacea pallida	Purple Coneflower	0.03
Echinacea purpurea	Broad-Leaved Purple Coneflower	0.5
Elymus canadensis	Canada Wild Rye	4.0
Eryngium yuccifolium	Rattlesnake Master	0.13
Koeleria cristata	June Grass	.5
Lespedeza capitata	Round-Headed Bush Clover	0.13
Liatris aspera	Rough Blazing Star	0.03
Pannicum viratum	Switch Grass	.5
Parthenium integrifolium	Wild Quinine	0.13
Penstemon digitalis	Foxglove Beard Tongue	0.125
Petalostemum candidum	White Prairie Clover	0.02
Petalostemum purpureum	Purple Prairie Clover	0.5
Potentilla arguta	Prairie Cinquefoil	0.03
Pycnanthemum spp.	Mountain Mint species	0.03
Rosa carolina	Pasture Rose	0.13
Rudbeckia hirta	Black-eyed Susan	0.5
Rudbeckia subtomentosa	Sweet Black-eyed Susan	0.02
Silphium laciniatum	Compass Plant	0.03
Silphium terebinthinaceum	Prairie Dock	0.03
Solidago graminifolia	Grass-leaved Goldenrod	0.02
Solidago juncea	Early Goldenrod	0.01
Solidago nemoralis	Old-Field Goldenrod	0.13
Sporabolus heterolepsis	Prairie Dropseed	.25
Tradescantia ohiensis	Common Spiderwort	0.06
Verbena stricta	Hoary Vervain	0.13
Zizia aurea	Golden Alexanders	0.06
	Total	**15.506 lbs.**

C. EROSION CONTROL

1. The developer shall be fully responsible for implementing erosion control measures within prescribed planting areas.

2. North American Green (NAG) C125 or approved equivalent shall be installed 3 feet above and below the normal water level. This shall include the safety shelf before it is submerged. NAG S150 or approved equivalent shall be installed on all slopes greater than or equal to 3:1 and covering all fall or winter plantings. NAG S75 or approved equivalent shall be used to cover all other planted areas.

Table 4. Erosion Control Blanket Details

Blanket Type	Location
NAG C125	3 feet above and below NWL including safety shelf if not submerged
NAG S150	Slopes >= 3:1 and fall or winter plantings
NAG S75	All remaining planted areas

D. CLEAN-UP AND PROTECTION

1. Equipment and materials shall be stored in a location approved by the Village Engineer. Keep pavements clean and work areas and adjoining areas in an orderly condition.

2. Protect landscape work and materials from damage due to landscape operations or operations by other trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work.

E. INSPECTION

1. The Village reserves the right to inspect all seeds and plants either at place of growth or on site before planting for compliance with requirements for name, variety, size, quantity, quality or mix proportion.
2. The developer is to keep records of the certificates of composition or invoices of seed mixtures and integrity of plant materials with respect to species, variety, and source after purchase.
3. The developer is to notify the Village within 5 days after completing plantings in each area.

F. MANAGEMENT PLANS

The developer shall submit for review and approval a long-term operation and maintenance plan and a 5-year monitoring and maintenance program for all naturally landscaped areas. To facilitate implementation and compliance, the landscape plans should include the outline of the monitoring program and anticipated management for the 5-year period. The monitoring program should include:

- proposed acceptance standards
- annual monitoring of vegetation development
- a proposed process for mid-course corrections
- annual reporting requirements to the Village on progress of vegetation development relative to the acceptance standards.

G. REPORTING

1. Following substantial completion, the developer shall submit documentation that natural area landscape revegetation has been completed. Nursery packing lists indicating the species and quantities of materials installed shall accompany this notice.
2. Annual reports shall include a location map, a summary of annual monitoring observations, a description of management performed during the year, a tabular summary of annual progress relative to acceptance standards, representative photographs, and a list of recommendations for management during the upcoming year.

H. NATURALIZED LANDSCAPE ACCEPTANCE CRITERIA

1. Within 3 months of seed installation, or 3 months after the start of the growing season following dormant seeding, at least 90 percent of the seeded area, as measured by aerial cover, shall be vegetated or otherwise stabilized against erosion.
2. Naturalized landscapes shall have no areas devoid of vegetation greater than 3 square feet of aerial coverage.
3. Seeded areas shall have no rills or gullies greater than four inches wide by four inches deep, and basin shorelines shall not have more than six inches of cut as a result of erosion.
4. Emergent areas shall have a minimum of 35 percent ground cover with an average cover of 50 percent and other wetland and prairie areas shall have a minimum of 35 percent ground cover with an average of 60 percent by perennial species in the approved plant list or native species with native coefficient of conservation (C-) values of at least 2 (per Plants of the Chicago Region (Indiana Natural Science) by Swink and Wilhelm, current edition).
5. Naturalized landscapes shall have a minimum of 30 percent presence by perennial species seeded or planted for the permanent matrix or native species with C-value of at least 2 (per Plants of the Chicago Region (Indiana Natural Science) by Swink and Wilhelm, current edition).
6. Installed woody materials shall be alive, in healthy condition, and representative of the species.
7. No more than 25 percent cover in any specific plant community (e.g., emergent zone, prairie slope zone) shall be individually or collectively dominated by non- native or weedy species.
8. None of the three-most dominant species may be non-native or weedy, including but not limited to Canada thistle (Cirsium arvense), common reed (Phragmites australis), reed canarygrass (Phalaris arundinacea), sweet clover (Melilotus spp.), Kentucky bluegrass (Poa pratensis), purple loosestrife (Lythrum salicaria), barnyard grass (Echinochloa crus-galli) or sandbar willow (Salix interior) unless otherwise indicated on the approved planting plan.
9. Cattails (Typha spp.) do not count towards the 25 percent weed criterion provided they represent no more than 20 percent cover.

I. RESPONSILBE PARTIES

1. The developer shall be responsible for ensuring vegetation establishment is progressing and for funding and implementing the 5-year management and maintenance plan for establishing a naturalized landscape associated with the proposed project. The developer may elect to contract management and maintenance services to a third party to ensure proper implementation.
2. Following Village verification that the site has achieved the landscape acceptance criteria, management of the naturalized landscape in the long-term will be performed by the property owner.

J. MONITORING METHODOLOGY

1. Monitoring shall be performed for a minimum of 5 years after planting is substantially complete, and until acceptance standards are met, as verified by the Village.
2. Annual vegetation monitoring will occur in August, September, or early October. Meander survey methodology will involve taking 5 to 10 representative site photographs and a review of at least 20 percent of each vegetative community to identify the following:
    a. the limits of all vegetation areas by general community type and dominant species within each planting zone (e.g., wetland and prairie zones),
    b. all plant species (native and non-native) in each planting zone,
    c. the 5 most dominant species within each planting zone,
    d. the percent survival of planted species,
    e. the approximate percent ground cover by perennial species (with C-value of 2 or higher) within each planting zone,
    f. erosion and sedimentation problems
    g. water level or drainage problems,
    h. areas of bare soil larger than 3 square feet, and
    i. observations on specific management strategies necessary to achieve acceptance requirements.

K. NEAR-TERM MANAGEMENT

1. Undesirable Plant Control—various means of weed control shall be employed, as appropriate, and may include mechanical control, chemical control, and/or biological control.
    a. Mechanical Control: Mechanical control of nuisance plant species typically includes cutting, mowing or the digging up individual plants by hand. In many cases, cutting or mowing a plant before its seeds mature will minimize further spread. For general mowing of swaths of vegetation, mowers should be set to a height of 12+ inches above the ground surface or to a height that treats weedy species yet minimizes impacts on desirable plants.
    b. Chemical Control: For aggressive weeds, an appropriate herbicide shall be applied. Because of the potential for damage to native plant communities the use of preventative herbicides will be limited to problem areas and problem species for which manual control is ineffective. Aquatic herbicides will not be used to treat algal blooms. Herbicide use will be in strict compliance with all application rates, procedures, warning labels, applicable codes, standards, and best management practices.
    c. Biological Control: An alternative to chemical treatment, use of biological controls for purple loosestrife will be considered provided site conditions are appropriate to support and maintain the insect population.
2. Wildlife Management
    a. Pesticides shall not be used broadly or routinely at the mitigation site other than mosquito abatement. Pesticides shall be used only for specific and localized problem areas as determined by a Village-approved landscape restoration specialist with experience in installation and development of native plant communities, should such areas occur. Standard application procedures and precautions for chemical application in wetland areas will be followed.
    b. Control of nuisance species such as geese and ducks may be performed if monitoring indicates such species are responsible for poor plant establishment and performance.

The method will be determined by a Village-approved landscape restoration specialist.

3. Manmade debris such as paper, plastic, metal, and concrete shall be removed from the developed area every other month between March and November. Debris will be disposed of at an appropriate off-site trash receptacle or hauled to an approved dumpsite.
4. Turf management chemicals shall not be used within areas of naturalized plantings unless specifically prescribed by and per the direction of a Village-approved landscape restoration specialist. If used, special care shall be taken to not apply fertilizers when inclement weather is forecast.

L. 5-YEAR MANAGEMENT SCHEDULE

The following provides a general schedule of management and maintenance tasks for installation and establishment of naturalized landscapes. The actual schedule and tasks performed in any given year may differ based on specific recommendations from a Village- approved landscape restoration specialist.

1. Year 1 Management Actions
    a. Mowing to a height of 6 to 8 inches may be performed when vegetation reaches a height of 12 inches. (Note: Weekly mowing at turf lawn height will NOT be performed.) If clippings shade the ground or smother the remaining plants, they will be bagged for off-site disposal or otherwise dispersed. The last mow will be timed so that vegetation can grow to a height of 8 to 10 inches before winter.
    b. Weeding will avoid damaging the native plantings and be timed to prevent development of weed seeds. For aggressive biennial and perennial weeds, herbicide will be selectively applied. Turf management chemicals will not be used on native plantings except as directed by a Village-approved landscape restoration specialist.
    c. Debris and litter shall be removed every other month between 1st of March to the 31st of October to prevent floating materials from clogging the outlet. Debris will be disposed of at an appropriate off-site trash receptacle.
    d. Other potential responsibilities may include, but are not limited to, access restriction enforcement, insect or pest control, erosion repairs, and wildlife management. The need for other management actions will be determined on a quarterly basis when performing general maintenance visits for dam embankments and control structures.
2. Year 2 Management Actions
    a. Seeded area will be mowed close to the ground as possible in early spring and the cuttings uniformly raked over the area or bagged. If raking method is used clippings shall not overly shade the ground or smother remaining plants. If annual weeds remain a problem, an additional mow will be performed during mid to late June, with the mow height set to 12 inches.
    b. Weed management will emphasize control of biennial and perennial weeds. Biennial weeds targeted for control include sweet clovers (Melilotus spp), Queen Anne's lace (Daucus carota), and teasel (Dipsacus spp.). Proper weed control may require multiple treatments and will be performed at times that will provide maximum treatment effectiveness.
    c. Other management practices will include debris and litter removal, access restriction enforcement, and erosion control and repairs as needed. Additional management tasks may include insect or pest control, reseeding or replanting in targeted areas, wildlife management as determined on a quarterly basis when performing general maintenance visits for dam embankments and control structures.

d. If there is sufficient fuel, a prescribed burn may be attempted at the end of the second growing season, provided proper permits from the local authorities.

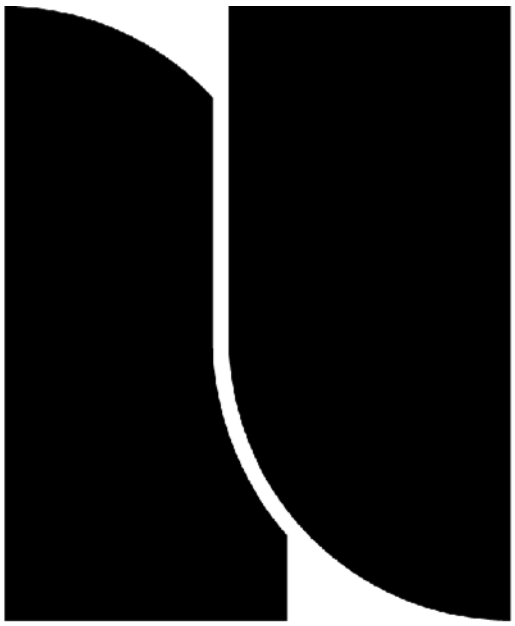
3. Year 3-5 Management Actions
   a. Typical management beginning in the third growing season involves the use of prescribed fire in combination with mechanical and chemical methods for controlling aggressive biennial and perennial weeds.
   b. Prescribed burns for naturalized landscapes require a permit from the local authorities and are typically conducted between mid-October and April as weather and site conditions permit. If prescribed burning is not practical, mowing in late fall or very early spring will be substituted for burning. The burn-replacement mow will occur at a height of two inches, with cut material bagged for off-site disposal.
   c. Management of aggressive weeds will continue. Other management practices will include debris and litter removal, access restriction enforcement, and erosion control and repairs as needed. Additional management tasks may include insect or pest control and reseeding or replanting in targeted areas, wildlife management as determined on a quarterly basis when performing general maintenance visits.
   d. Reseed any bare unvegetated areas to attain a minimal 90% site coverage.

M. LONG-TERM OPERATION AND MAINTENANCE PLAN

A maintenance plan for the ongoing maintenance of all native landscaped areas is required prior to plan approval. The plan shall include:

1. Maintenance tasks and the type and frequency of maintenance of all components of the planting areas.
2. The party responsible for performing the maintenance tasks.
3. A description of dedicated sources of funding for the required maintenance.
4. Measures to prohibit mowing, littering, and illegal dumping in these areas.

Northbrook
Standard Details



northbrook

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APPENDIX
STANDARD DETAILS

WATER DISTRIBUTION SYSTEMS & APPURTENANCES

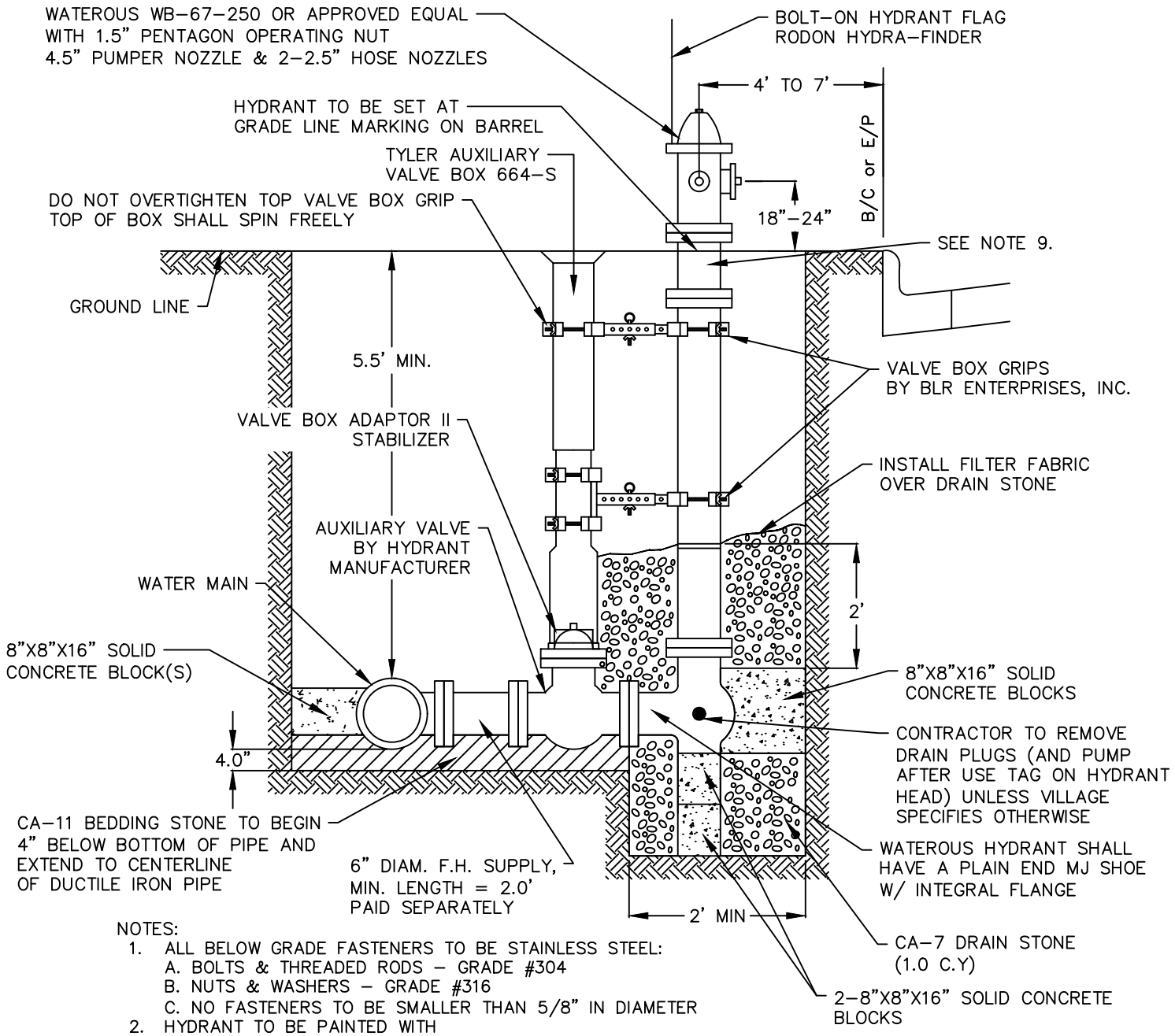
SANITARY SEWER COLLECTION SYSTEM & APPURTENANCES

STORM WATER DRAINAGE SYSTEMS & APPURTENANCES

PAVEMENT

ROADWAY & PARKING LOT LIGHTING

FORESTRY



NOTES:

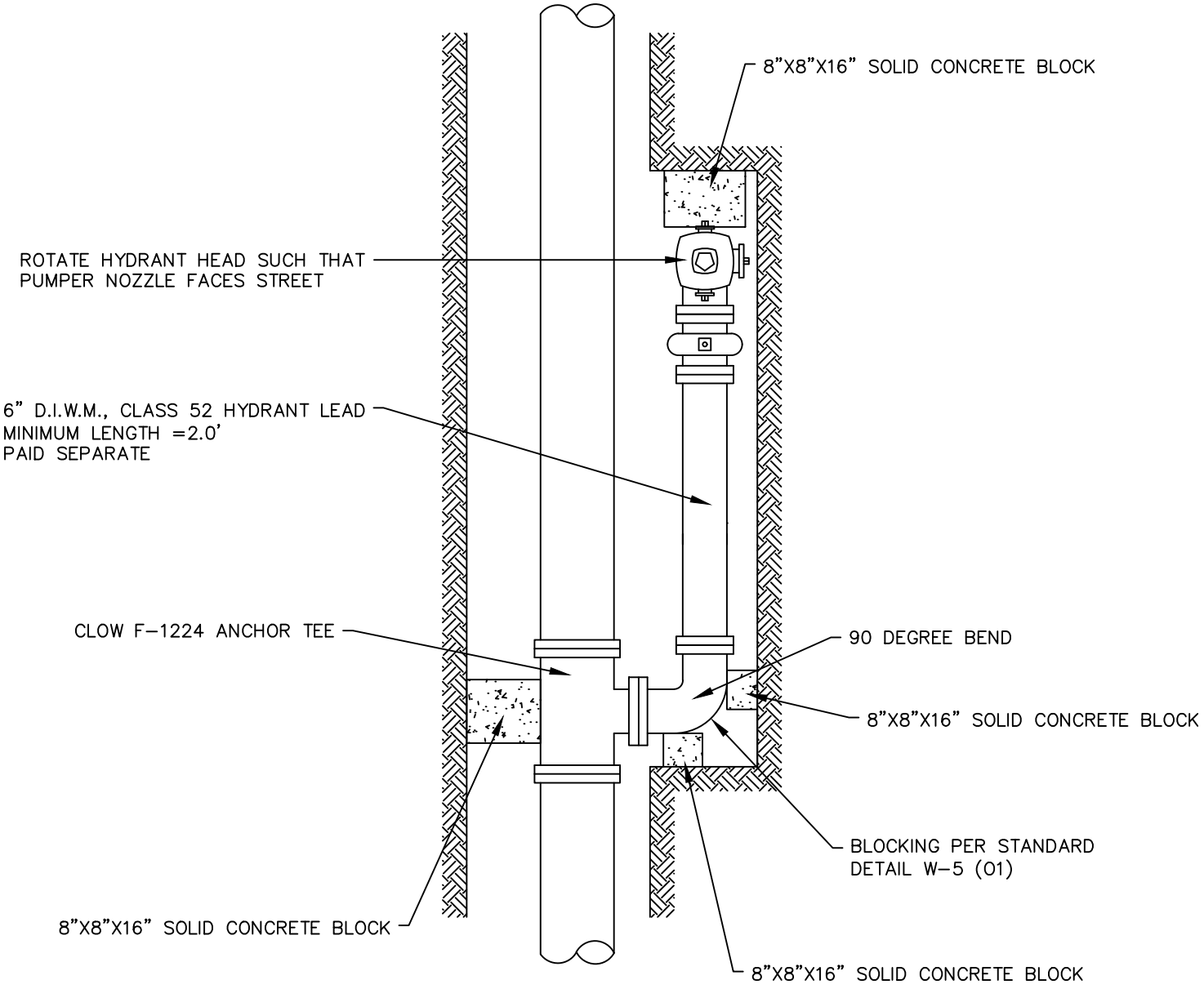
1. ALL BELOW GRADE FASTENERS TO BE STAINLESS STEEL:
   A. BOLTS & THREADED RODS – GRADE #304
   B. NUTS & WASHERS – GRADE #316
   C. NO FASTENERS TO BE SMALLER THAN 5/8" IN DIAMETER
2. HYDRANT TO BE PAINTED WITH
   A.PRIMER: SHERWIN WILLIAMS EXTREME BOND HIGH-SOLID PRIMER
   B.PAINT: HIGH GLOSS SAFETY RED FIXED RUSTOLEUM HIGH PERFORMANCE V7400
3. ALL DRAIN HOLES TO BE EQUIPPED WITH BRASS BUSHING.
4. VENT CAP REQUIRED ON 2.5" HOSE NOZZLES.
5. ALL HYDRANTS TO BE TRAFFIC MODELS WITH BREAK-AWAY FLANGES.
6. HYDRANTS WILL ONLY BE SET WITH 8"X8"X16" CONCRETE BLOCKS. NO SUBSTITUTIONS WILL BE ALLOWED.
7. HYDRANT MUST BE DATED NO MORE THAN ONE YEAR PRIOR TO DATE OF INSTALLATION.
8. HYDRANT MUST BE COVERED WITH A PLASTIC GARBAGE BIN WHILE BACKFILLING AROUND HYDRANT. CHIPPED/DAMAGED HYDRANTS TO BE REPAIRED PER MANUFACTURERS SPECIFICATIONS AND TO THE VILLAGE'S SATISFACTION.
9. MAX 36" ADJUSTMENT KIT; ONE (1) KIT ONLY. PRIOR TO INSTALLATION OF ADJUSTMENT KIT, NOTIFY RESIDENT ENGINEER OF WORK.
10. SECURITY CHAINS ARE NOT PERMITTED ON NOZZLE CAPS.
11. VALVE BOX ADAPTOR II IS TO BE USED AS THE VALVE BOX STABILIZER
12. ENCASE FIRE HYDRANT STANDPIPE, AUXILIARY VALVE AND LEAD PIPE WITH POLYETHYLENE V-BIO WRAP PER STANDARD DETAIL W-13.

NORTHBROOK FIRE HYDRANT DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Revised Notes
4-1-21	Revised Notes
5-1-23	Revised Callouts

STANDARD DETAIL
W-1 (03)



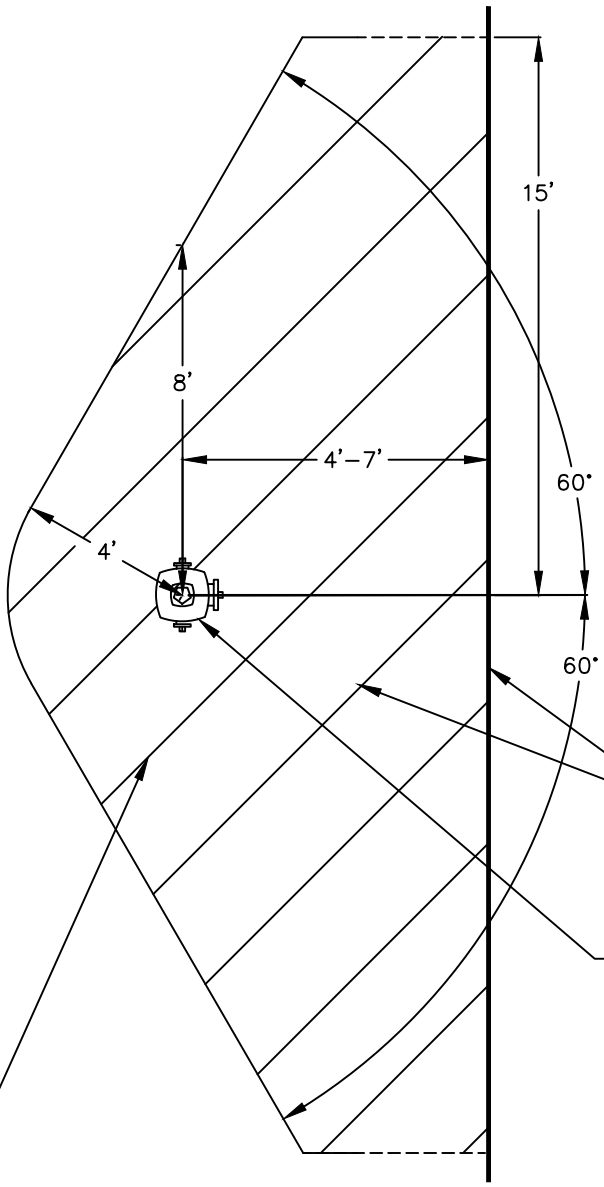
PLAN VIEW FOR INSTALLATION METHOD WHEN PROPOSED HYDRANT LOCATION DOES NOT ALLOW FOR THE INSTALLATION OF A MINIMUM 2' LONG HYDRANT LEAD PERPENDICULAR TO THE WATER MAIN. INSTALLATION METHOD SHALL BE AT THE DISCRETION OF THE ENGINEER.

NORTHBROOK FIRE HYDRANT DETAIL

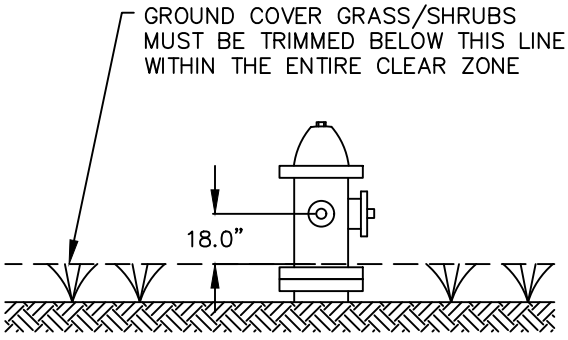
northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Revised Notes
4-1-21	Revised Notes

STANDARD DETAIL
W-1 (02)



NOTE:
DESIRABLE LOCATION OF FIRE HYDRANT SHALL BE AT COMMON PROPERTY LINE, 8 FEET AWAY FROM DRIVEWAYS, A MINIMUM OF 2 FEET FROM SIDEWALKS, OR APPROVED BY THE VILLAGE ENGINEER.
THE AUXILIARY VALVE SHALL NOT BE LOCATED WITHIN THE SIDEWALK

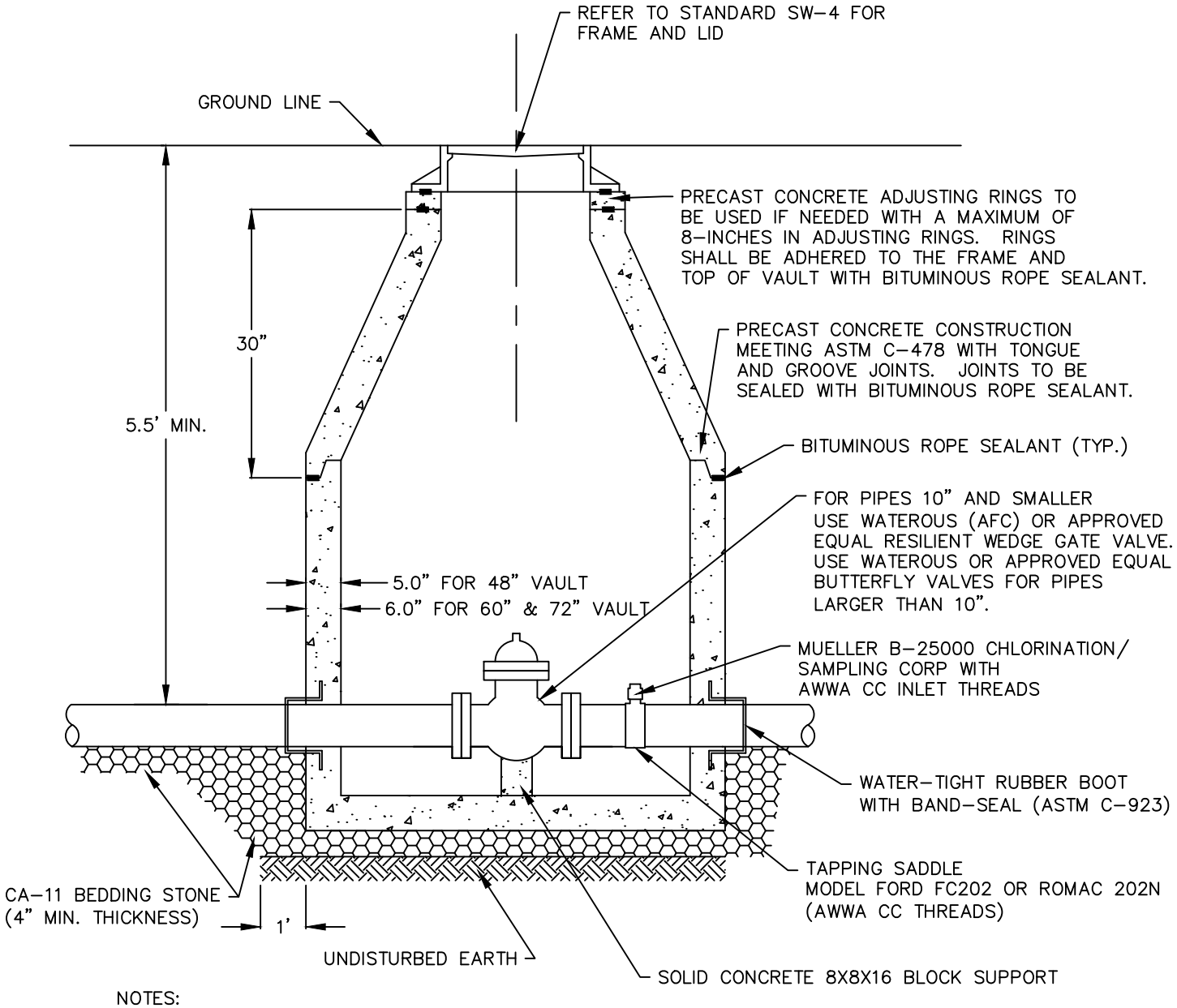


FIRE HYDRANT CLEARANCE DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Revised Notes
4-1-21	Revised Notes

STANDARD DETAIL
W-2 (02)



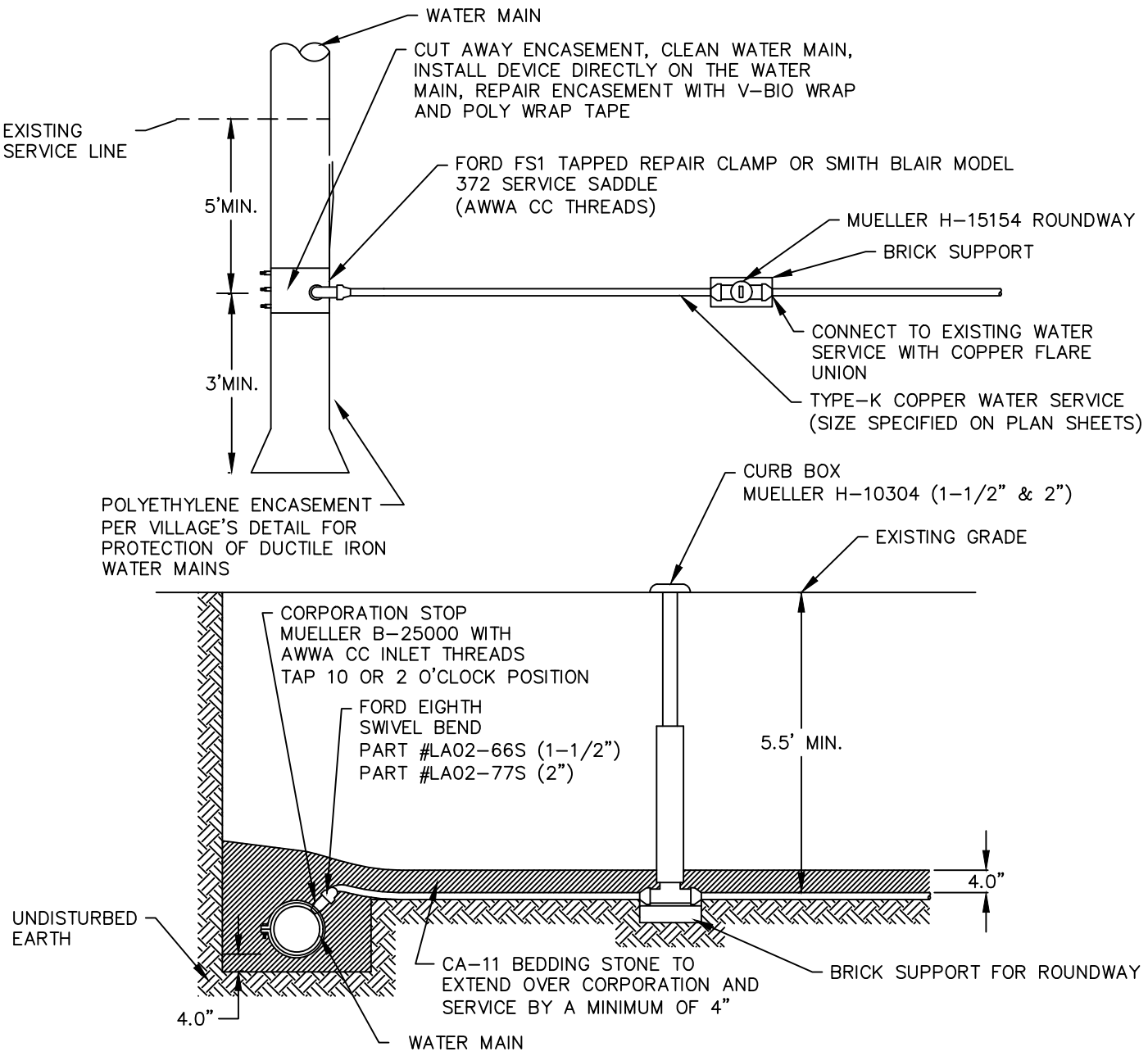
NOTES:
1. ALL BELOW GRADE FASTENERS TO BE STAINLESS STEEL:
   A. BOLTS & THREADED RODS – GRADE #304
   B. NUTS & WASHERS – GRADE #316
2. VALVES 12" OR LARGER MAY REQUIRE OFFSET CONES.
3. ALL WATER SHALL BE REMOVED FROM VAULT PRIOR TO FINAL PROJECT INSPECTION
4. VALVE VAULT SIZE SHALL CORRESPOND TO THE TYPE AND SIZE OF VALVE AS FOLLOWS:
   A. 8" VALVE OR SMALLER = 48" VALVE VAULT
   B. 10"-16" VALVE & PRESSURE CONNECTIONS = 60" DIA. VALVE VAULT
   C. 18" VALVE OR LARGER & VALVES W/AIR RELEASE = 72" DIA. VALVE VAULT

WATER MAIN VALVE VAULT DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Revised Notes
5-1-23	Revised Callouts

STANDARD DETAIL
W-3 (02)



NOTES:

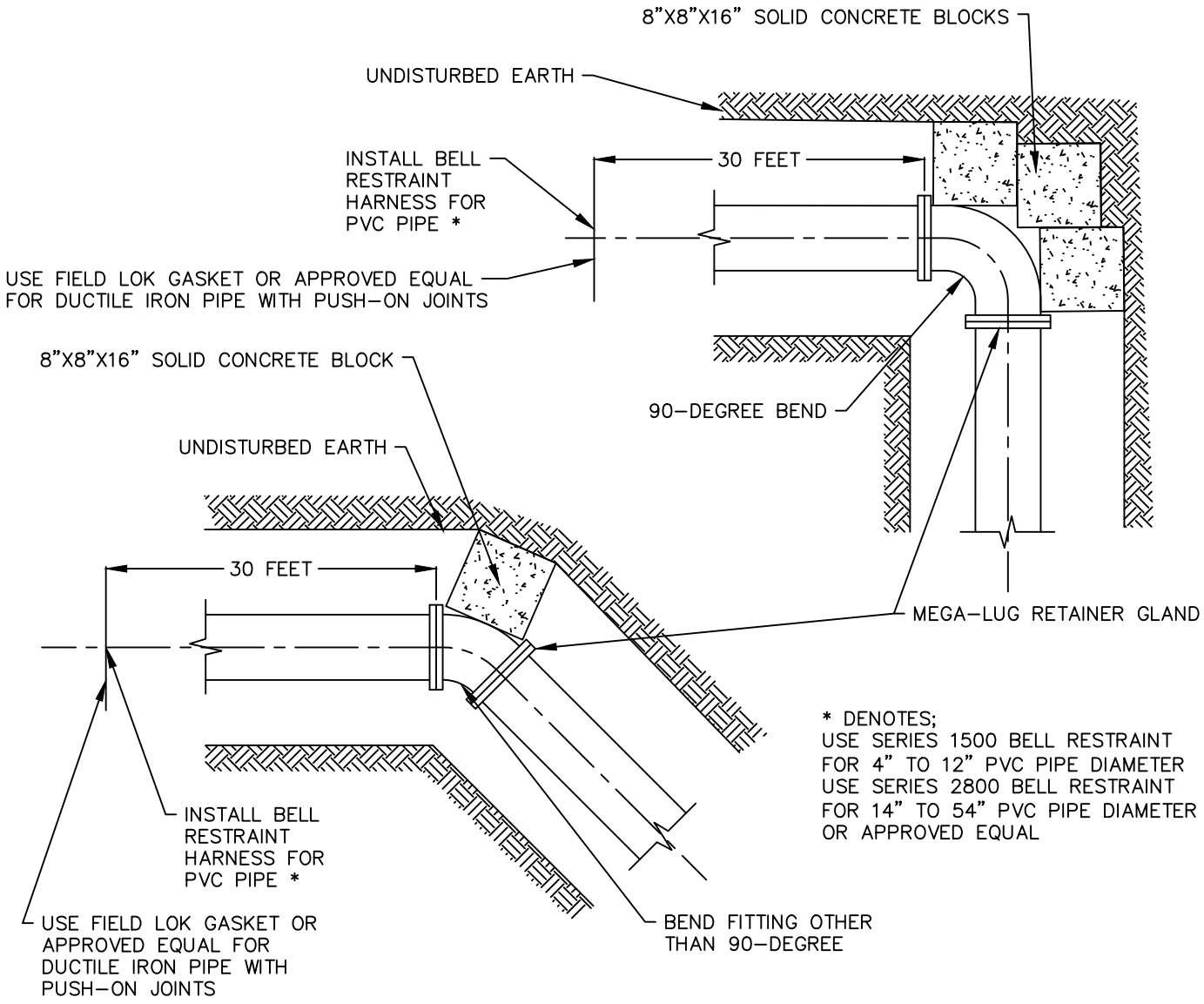
1. WATER SERVICE TAPS ON VILLAGE OWNED WATER MAIN MUST BE MADE THROUGH A TAPPING DEVICE AS SPECIFIED ABOVE UNLESS OTHERWISE DIRECTED BY VILLAGE STAFF.
2. ALL TREE ROOTS CONFLICTING WITH THE PROPOSED WATER SERVICE INSTALLATION MUST BE ROOT PRUNED WITH A VERMEER V2050, OR APPROVED EQUAL "WALK BEHIND" ROOT PRUNING MACHINE TO A MINIMUM DEPTH OF 16 INCHES PRIOR TO ANY EXCAVATION. THE WATER SERVICE MUST BE RELOCATED ACCORDINGLY IF STAFF DETERMINES THAT EXCAVATION WILL THREATEN THE HEALTH OF EXISTING TREES.
3. REFER TO STANDARD W-15 FOR TRACER WIRE DETAIL FOR PVC WATER MAIN
4. CONTRACTOR IS TO SCHEDULE AN INSPECTION FOR EACH SERVICE CONNECTION WITH RESIDENT ENGINEER PRIOR TO BACKFILLING
5. BACKFILL TO BE PLACED IN 8" LOOSE LIFTS AND COMPACTED WITH A MECHANICAL COMPACTOR AND IS SUBJECT TO THE APPROVAL OF THE VILLAGE ENGINEER
6. IF BUFFALO BOX IS LOCATED WITHIN DRIVEWAY OR APRON, AN AUXILIARY VALVE BOX TOP WITH "WATER" LID IS REQUIRED

WATER SERVICE DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Revised Notes
4-1-21	Revised Notes. Edited Picture
5-1-23	Revised Notes
12-1-23	Revised Notes

STANDARD DETAIL
W-4 (04)



NOTES:

1. ALL THRUST BLOCKING SHALL BE CONSTRUCTED OF 8"X8"X16" SOLID CONCRETE BLOCKS BRACED AGAINST UNDISTURBED VERTICAL FACE EARTH.

2. RESTRAINED JOINTS TO BE INSTALLED WITHIN THIRTY (30) FEET IN ALL DIRECTIONS OF ANY VERTICAL OR HORIZONTAL BEND, TEE, CROSS AND DEAD-END AND IN SITUATIONS WHERE ADEQUATE THRUST BLOCKING CANNOT BE OBTAINED AND AS DIRECTED BY THE ENGINEER.

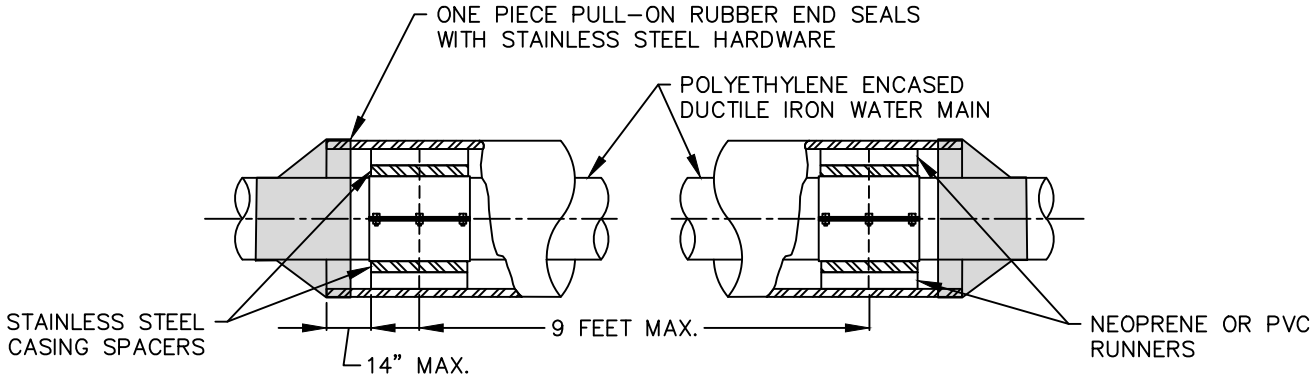
3. ALL BELOW GRADE FASTENERS TO BE STAINLESS STEEL:
   A. BOLTS & THREADED RODS – GRADE #304
   B. NUTS & WASHERS – GRADE #316

WATER MAIN/FORCE MAIN THRUST BLOCK DETAIL

northbrook
Public Works Department

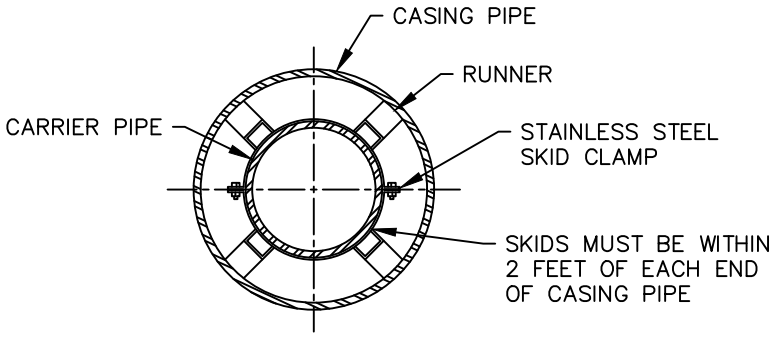
DATE	REVISIONS
1-9-19	Revised Notes

STANDARD DETAIL
W-5 (01)



PIPE CASING PROFILE

CARRIER PIPE (ID)	MIN. CASING PIPE (OD)
8"	16"
10"	20"
12"	24"
16"	30"
24"	36"
30"	42"



PIPE CASING CROSS–SECTION

CARRIER PIPE MATERIAL	CARRIER PIPE DIAMETER	CLEARANCE BETWEEN CARRIER AND CASING PIPE	SPACER LENGTH	SPACER INTERVAL
DUCTILE IRON	LESS THAN 24"	N/A	8 INCHES	9 FEET
DUCTILE IRON	GREATER OF EQUAL TO 24"	LESS THAN 5 INCHES	8 INCHES	9 FEET
DUCTILE IRON	GREATER OR EQUAL TO 24"	GREATER THAN OR EQUAL TO 5 INCHES	12 INCHES	6 FEET
PVC (C–900/905)	ALL SIZES	N/A	12 INCHES	6 FEET
OTHER	CONSULT WITH ENGINEER			

NOTES:

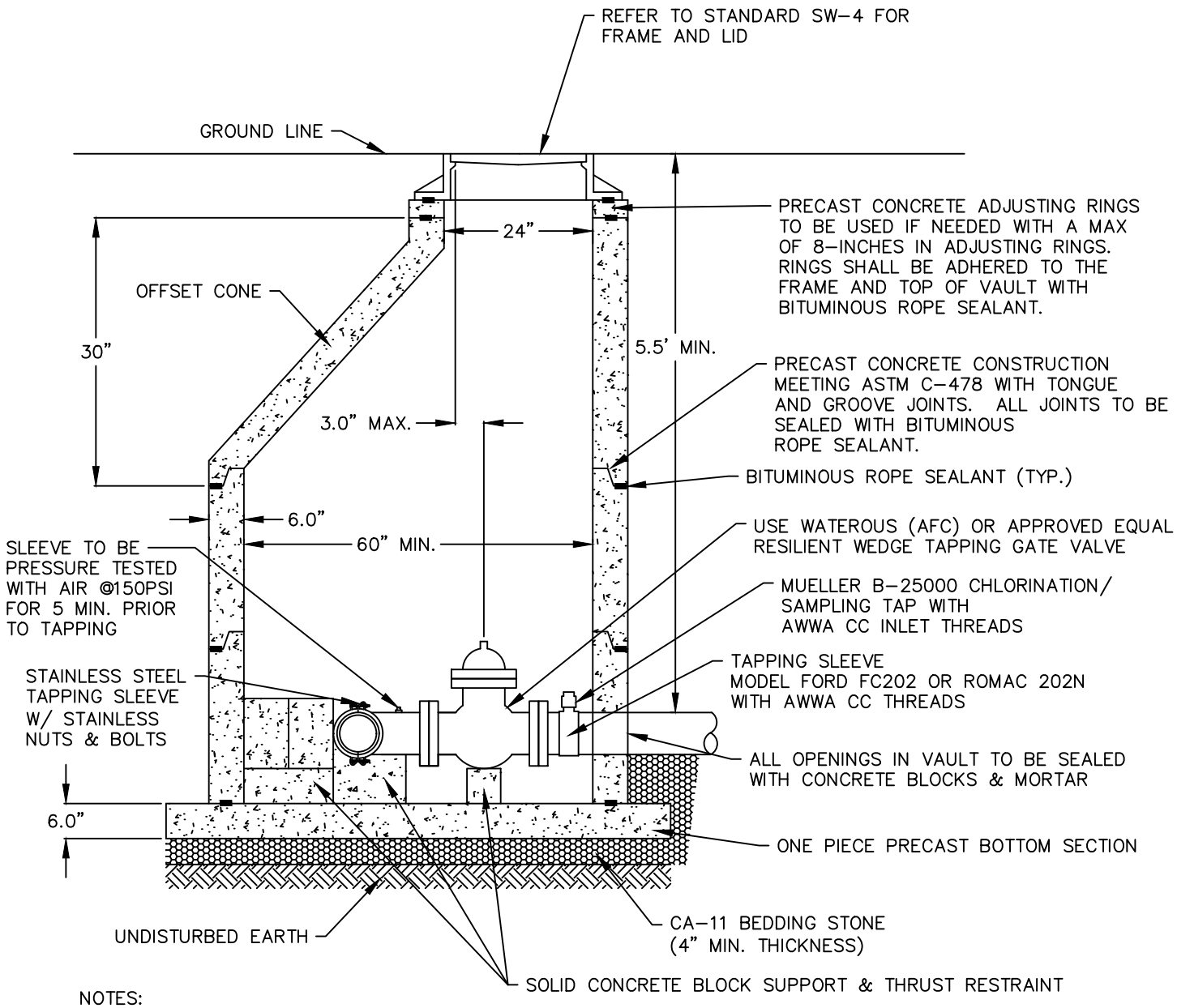
1. CASING PIPE TO BE BITUMINOUS COATED STEEL PER IDOT WALL THICKNESS GUIDE OR AS SPECIFIED ON THE PLANS.
2. CASING SPACERS SHALL BE STAINLESS STEEL BY CASCADE OR APPROVED EQUAL (INSTALLED IN INTERVALS AS SHOWN ABOVE).
3. UNLESS OTHERWISE DIRECTED BY ENGINEER, CASING SPACERS MUST BE CENTERED AND RESTRAINED.
4. JOINTS LOCATED INSIDE OF CASING PIPE MUST BE RESTRAINED SO THAT JOINT PRESSURE LIMIT IS NO LESS THAN 350 PSI FOR PIPE LESS THAN OR EQUAL TO 24" DIAMETER AND NO LESS THAN 250 PSI FOR PIPE LARGER THAN 24" DIAMETER. NO FIELD CUT JOINTS WILL BE ALLOWED WITHOUT CONSENT OF ENGINEER.
5. ALL DUCTILE IRON WATER MAIN LOCATED INSIDE OF CASING PIPE MUST BE POLYETHYLENE ENCASED IN ACCORDANCE WITH THE VILLAGE'S POLYETHYLENE ENCASEMENT DETAIL.
6. UNLESS OTHERWISE APPROVED BY ENGINEER, CASING ENDS TO BE SEALED WITH ONE PIECE PULL–ON RUBBER END SEALS WITH STAINLESS STEEL HARDWARE, MODEL ESC BY CCI PIPELINE SYSTEMS OR APPROVED EQUAL.

STEEL CASING PIPE DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Revised Notes

STANDARD DETAIL
W-6 (01)



NOTES:

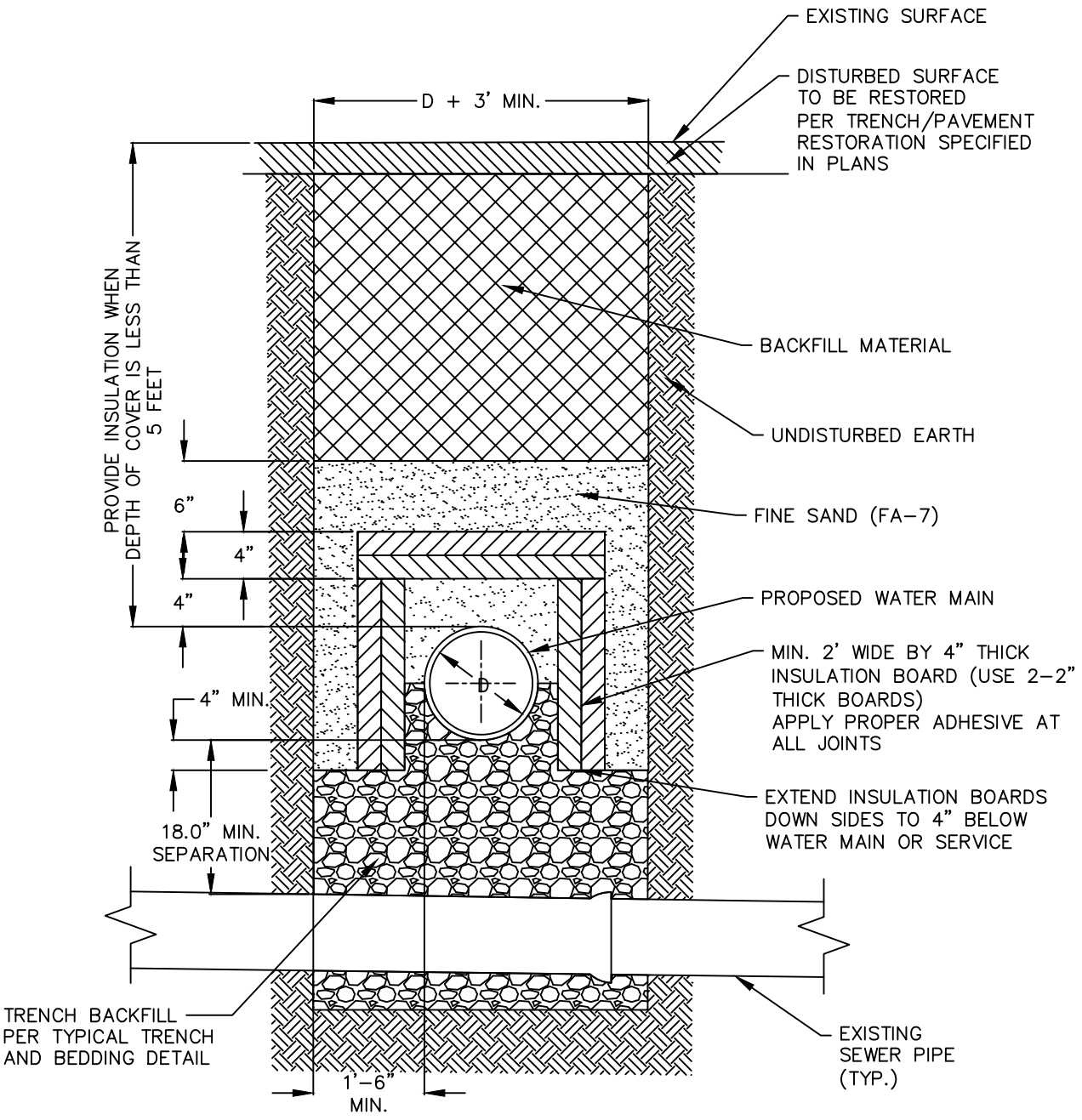
1. THE SIZE OF THE PRESSURE CONNECTION SHALL BE AT LEAST ONE SIZE SMALLER THAN THE MAIN LINE BEING TAPPED. NO SIZE-ON-SIZE PRESSURE CONNECTIONS WILL BE ALLOWED.
2. INSTALL A MINIMUM OF 4" OF CA-11 BEDDING STONE UNDER STRUCTURE BOTTOM AND FILL ENTIRE EXCAVATION AROUND STRUCTURE UP TO THE CENTERLINE OF THE WATER MAIN WITH CA-11.
3. PIPE OPENINGS SHALL BE PRECAST INTO STRUCTURE WALL.
4. FRAME, ADJUSTING RINGS, & ALL VAULT SECTION JOINTS TO BE SEALED WITH BITUMINOUS ROPE SEALANT.
5. ALL LIFTING HOLES TO BE SEALED WITH BITUMINOUS PLUGS.
6. A 3/4" SAMPLING TAP SHALL BE MADE ON THE PROPERTY SIDE OF THE TAPPING VALVE.
7. ALL BELOW GRADE FASTENERS TO BE STAINLESS STEEL:
   A. BOLTS & THREADED RODS – GRADE #304
   B. NUTS & WASHERS – GRADE #316

PRESSURE CONNECTION VAULT DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Revised Notes
4-1-21	Revised Notes
5-1-23	Revised Callouts

STANDARD DETAIL
W-7 (03)



NOTES:

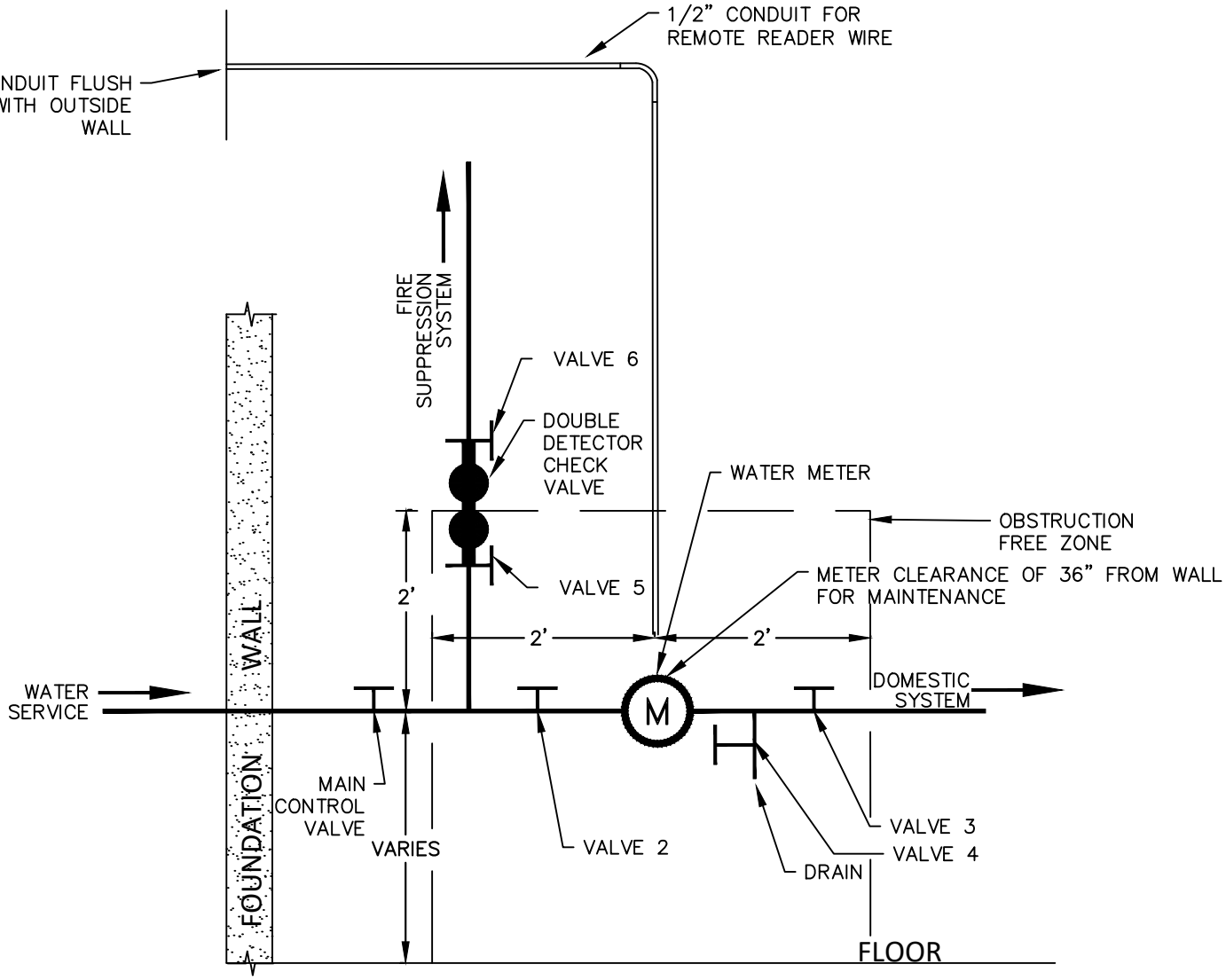
1. INSULATION BOARD TO BE CLOSED CELL, EXTRUDED POLYSTYRENE FOAM MEETING ASTM 578, TYPE VI, 40 PSI COMPRESSIVE STRENGTH (ASTM D-1621) 0.1% MAX. WATER ABSORPTION (ASTM C-272).
2. BACKFILL MATERIAL AROUND INSULATION MUST BE FINE SAND FREE FROM ROOTS, ORGANIC MATTER OR OTHER DAMAGING MATERIALS.
3. OVERLAP ALL INSULATION BOARD JOINTS.

WATER MAIN TRENCH INSULATION DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	New Detail

STANDARD DETAIL
W-8 (01)



NOTES:

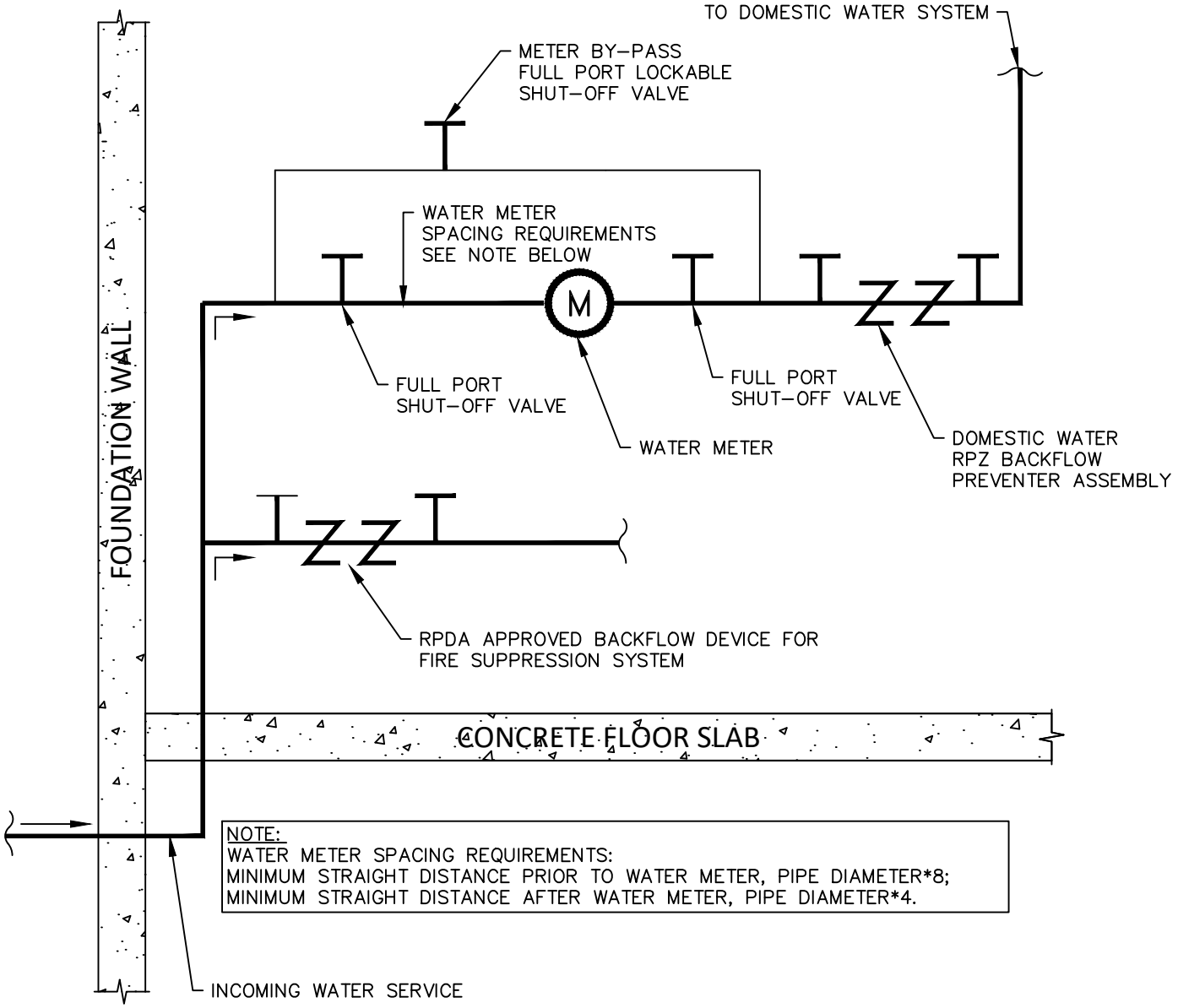
1. 1"–2" METERS SHALL BE INSTALLED HORIZONTAL WITH A MINIMUM OF 24" CLEARANCE LEFT AND RIGHT FROM OTHER STRUCTURES OR EQUIPMENT. THERE SHALL BE A MINIMUM OF 36" CLEARANCE FROM THE FOUNDATION WALL FOR INSPECTION, REPLACEMENT, OR REPAIR.
2. CRAWLSPACE AND PIT–SET METER INSTALLATION SHALL ONLY BE ALLOWED BY WRITTEN AUTHORIZATION FROM THE DIRECTOR OF PUBLIC WORKS OR DESIGNEE.
3. A STOPCOCK OR VALVE SHALL BE PLACED ON EACH SIDE OF THE METER. NO OTHER CONNECTIONS OR VALVES ARE ALLOWED BEFORE THE METER WITH THE EXCEPTION OF THE FIRE SUPPRESSION SYSTEM CONNECTION. ONLY FULL PORT BALL OR GATE VALVES SHALL BE USED. THE DRAIN SHALL BE LOCATED BETWEEN THE WATER METER AND VALVE 3.
4. ALL WATER METER INSTALLATIONS SHALL INCLUDE ½" METALLIC TUBE RACEWAY (CONDUIT) TO BE INSTALLED WITHIN 12" OF WATER METER SETTING. THIS CONDUIT SHALL RUN AND TERMINATE OUTSIDE OF THE BUILDING AT 40" ABOVE FINISHED GRADE. THE CONDUIT SHALL BE TRIMMED FLUSH WITH THE OUTSIDE WALL FOR THE PURPOSE OF THE REMOTE READING DEVICE WIRING. REMOTE READERS SHALL BE LOCATED ON THE SIDE OF ALL SERVED BUILDINGS FIVE FEET FROM THE FRONT OF THE BUILDING OR AT A LOCATION APPROVED BY THE DIRECTOR OF PUBLIC WORKS OR DESIGNEE.
5. THIS RACEWAY SHALL BE INSTALLED IN ACCORDANCE WITH THE VILLAGE OF NORTHBROOK ELECTRICAL CODES.

SINGLE FAMILY/MULTI-FAMILY WATER SUPPLY ARRANGEMENT DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Added Drain Valve
4-1-21	Added Plan Notes & Details
5-1-23	Revised Detail

STANDARD DETAIL
W-9 (03)



NOTES:

1. 1"–8" METERS SHALL BE INSTALLED HORIZONTAL WITH A MINIMUM OF 24" CLEARANCE LEFT AND RIGHT FROM OTHER STRUCTURES OR EQUIPMENT. THERE SHALL BE A MINIMUM OF 36" CLEARANCE FROM THE FOUNDATION WALL FOR INSPECTION, REPLACEMENT, OR REPAIR.
2. ALL WATER METER INSTALLATIONS SHALL INCLUDE $\frac{1}{2}$" METALLIC TUBE RACEWAY (CONDUIT) TO BE INSTALLED WITHIN 12" OF WATER METER SETTING. THIS CONDUIT SHALL RUN AND TERMINATE OUTSIDE OF THE BUILDING AT 40" ABOVE FINISHED GRADE. THE CONDUIT SHALL BE TRIMMED FLUSH WITH THE OUTSIDE WALL FOR THE PURPOSE OF THE REMOTE READING DEVICE WIRING. REMOTE READERS SHALL BE LOCATED ON THE SIDE OF ALL SERVED BUILDINGS FIVE FEET FROM THE FRONT OF THE BUILDING OR AT A LOCATION APPROVED BY THE DIRECTOR OF PUBLIC WORKS OR DESIGNEE.
3. THIS RACEWAY SHALL BE INSTALLED IN ACCORDANCE WITH THE VILLAGE OF NORTHBROOK ELECTRICAL CODES.
4. SEE PLUMBING DIAGRAM FOR FLOOR DRAIN LOCATION.

COMMERCIAL/BUSINESS
WATER SUPPLY ARRANGEMENT DETAIL

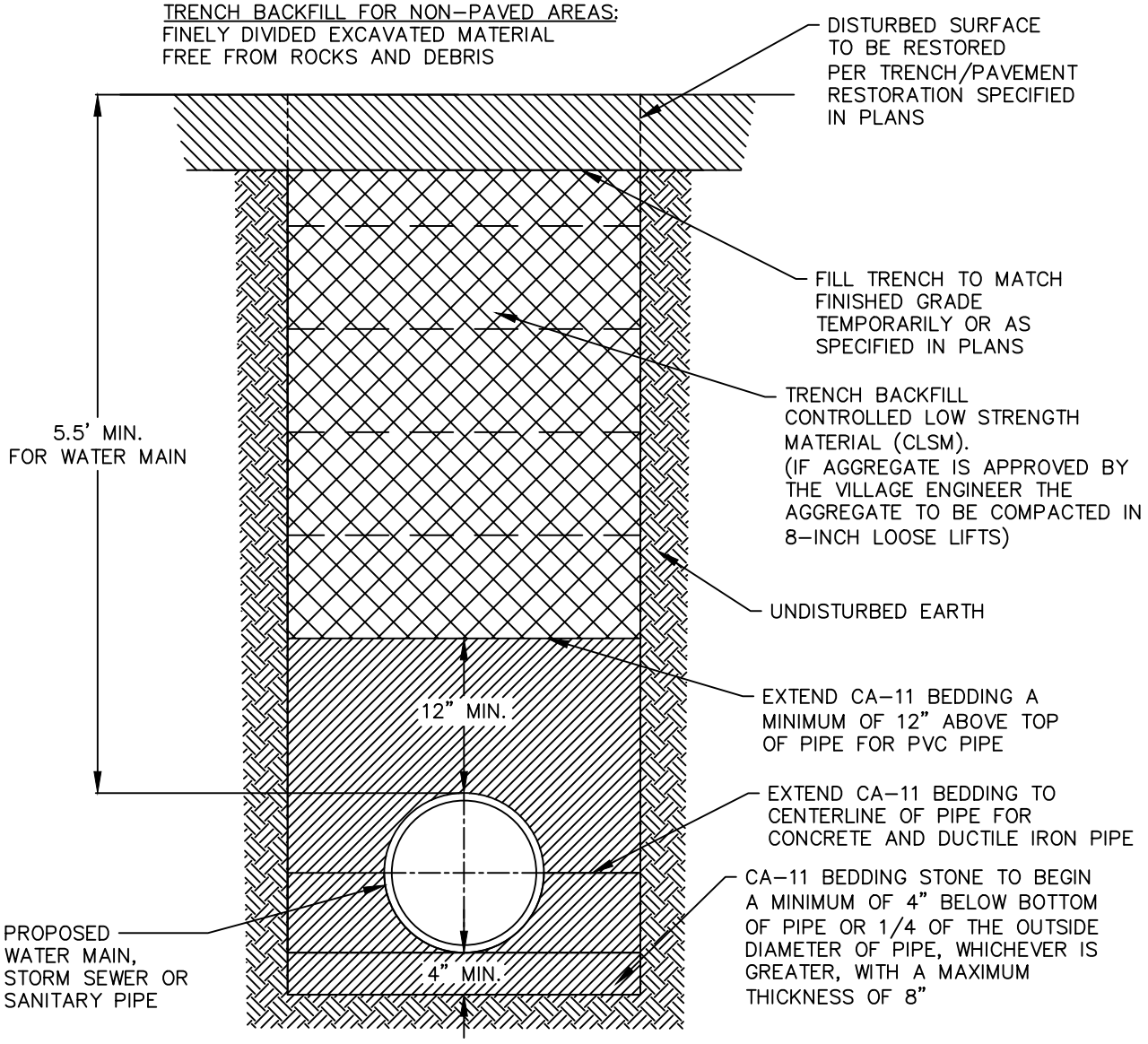
northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Moved Fire Suppression
4-1-21	Added Plan Notes & Details
5-1-23	Added Note

STANDARD DETAIL
W-10 (03)

TRENCH BACKFILL FOR PAVED AREAS, INCLUDING ROAD, CURB AND SIDEWALK:
CONTROLLED LOW STRENGTH MATERIAL (CLSM).
(CA–6 OR APPROVED EQUAL MAY BE USED ONLY WHEN APPROVED BY THE VILLAGE ENGINEER)
TBF REQUIRED 2 FEET BEYOND ANY PAVED SURFACE

TRENCH BACKFILL FOR NON–PAVED AREAS:
FINELY DIVIDED EXCAVATED MATERIAL
FREE FROM ROCKS AND DEBRIS



MIX I	
PORTLAND CEMENT	50 LB (30 KG)
FLY ASH – CLASS C or F	125 LB (74 KG)
FINE AGGREGATE – SATURATED SURFACE DRY	2900 LB (1720 KG)
WATER	50–65 GAL (248–322 L)
AIR CONTENT	NO AIR IS ENTRAINED

TYPICAL TRENCH AND BEDDING DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Consolidated Trench Details
5-12-22	Controlled Low Strength Material

STANDARD DETAIL
W-11 (02)

SAMPLE

CERTIFIED MAIL

{Date}

{Name}
{Address}
{City}

Dear_____,

This letter serves as an initial NOTICE to you that in order for us to make a service connection for (LOCATION OF PROJECT), we will need to disturb the public right-of-way and/or easement (list only one) at your address. As the project schedule develops, we will provide you with a reminder notice (a minimum of five (5) calendar days) prior to the commencement of the service connection work. Upon the completion of the service connection, the trench shall be immediately backfilled. The final restoration of this disturbed area shall be completed within five (5) calendar days, weather permitting.

Should you have any questions or concerns, we have provide below a list of contacts for your use.

Owner of project location: {Name}
{Address}
{Phone Number}

General Contractor for Project: {Name}
{Address}
{Phone Number}

Thank you for your understanding and cooperation.

Sincerely,

_____

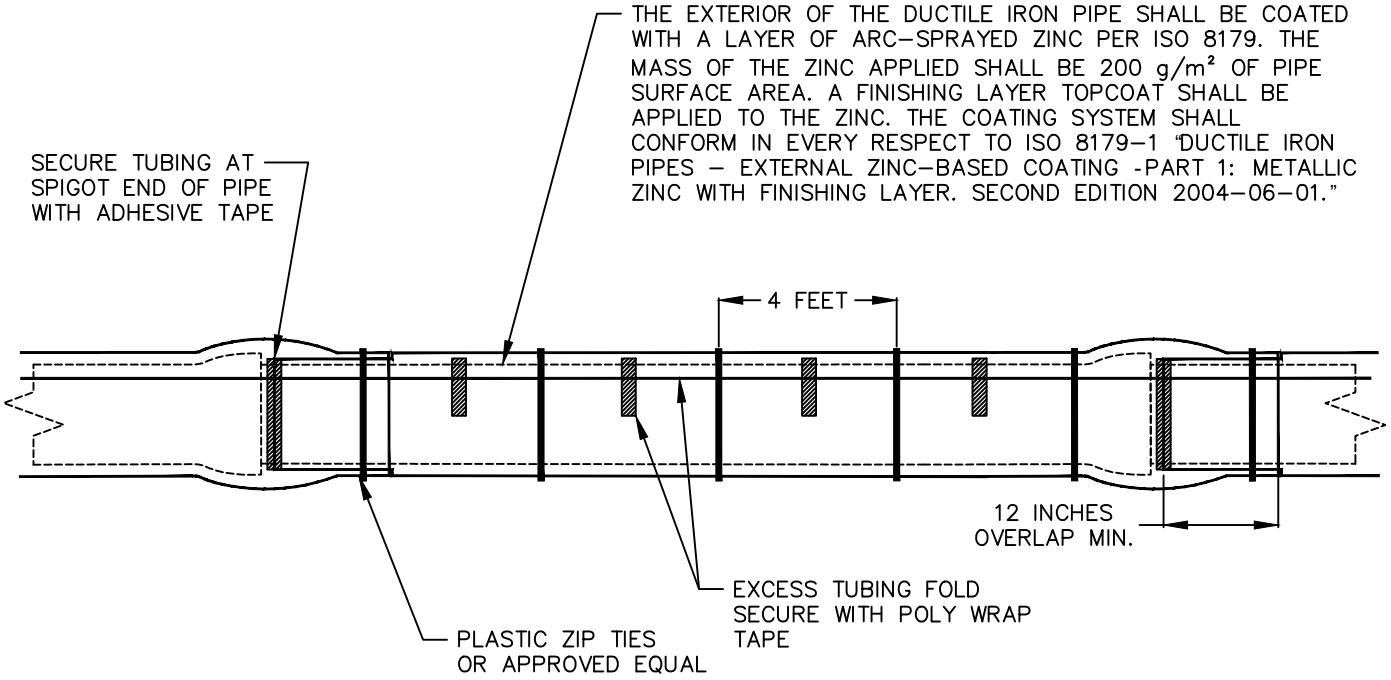
cc: Engineering Division – Village of Northbrook

SAMPLE OF PRIVATE UTILITY SERVICE NOTIFICATION

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Added sheet
5-1-23	Revised notes

STANDARD DETAIL
W-12 (02)



NOTES:

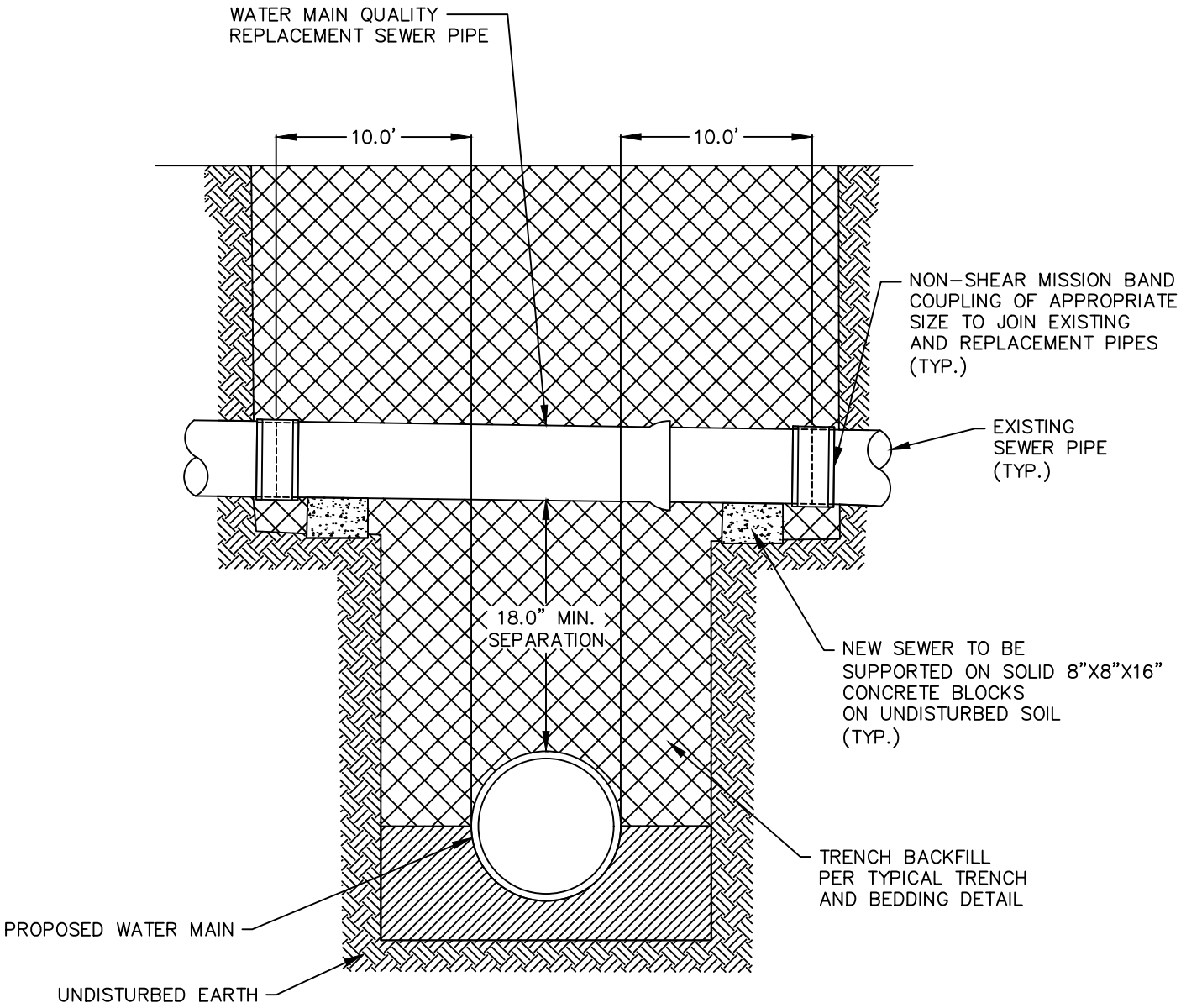
1. DUCTILE IRON PIPE SHALL BE ENCASED BY POLYETHYLENE TUBING.
2. THE TUBE MUST BE VIRGIN MATERIAL, V–BIO, CONSISTING OF THREE (3) CO–EXTRUDED LAMINATIONS OF LINEAR LOW DENSITY POLYETHYLENE (LLDPE), FUSED INTO A SINGLE THICKNESS NOT LESS THAN EIGHT (8) MILS. THE INSIDE SURFACE OF THE V–BIO WRAP IN CONTACT WITH THE PIPE EXTERIOR SHALL BE INFUSED WITH A BLEND OF AN ANTIMICROBIAL BIOCIDE TO MITIGATE MICROBIOLOGICALLY INFLUENCED CORROSION AND A VOLATILE CORROSION INHIBITOR TO CONTROL GALVANIC CORROSION. THE MIDDLE LAMINATION SHALL BE OF A THICK IMPERMEABLE MATERIAL DESIGNED TO PROTECT AND ENHANCE THE INNER LAMINATION. THE OUTER LAMINATION SHALL BE OF A LIGHT COLOR.
3. THE POLYETHYLENE ENCASEMENT MUST MEET ALL THE REQUIREMENTS OF ANSI A21.5 (AWWA C105).
4. CIRCUMFERENTIAL WRAPS OF PLASTIC ZIP TIES OR APPROVED EQUAL BY ENGINEER ARE TO BE PLACED AT FOUR (4) FOOT INTERVALS ALONG THE BARREL OF THE PIPE TO MINIMIZE THE SPACE BETWEEN THE POLYETHYLENE WRAPPING AND THE PIPE.
5. COMPLETE THE INSTALLATION BY OVERLAPPING THE POLYETHYLENE TUBE WRAP AT EACH END AT LEAST TWELVE (12) INCHES AND SEAL THE ENDS WITH PLASTIC ZIP TIES OR APPROVED EQUAL.
6. ALL BAGS MUST BE A MINIMUM OF TWENTY–TWO (22) FEET IN LENGTH AND OVERSIZED IN DIAMETER TO FIT OVER FITTINGS.
7. INSTALLATION OF TUBING SHALL BE PER DIPRA – MODIFIED METHOD A.
8. THIS STANDARD APPLIES TO ALL DUCTILE IRON PIPE INSTALLATION METHODS INCLUDING OPEN CUT, DIRECTIONAL DRILLING AND PLACEMENT IN A CASING.

POLYETHYLENE TUBE WRAPPING DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Revised Notes
5-1-23	Revised Callouts

STANDARD DETAIL
W-13 (02)

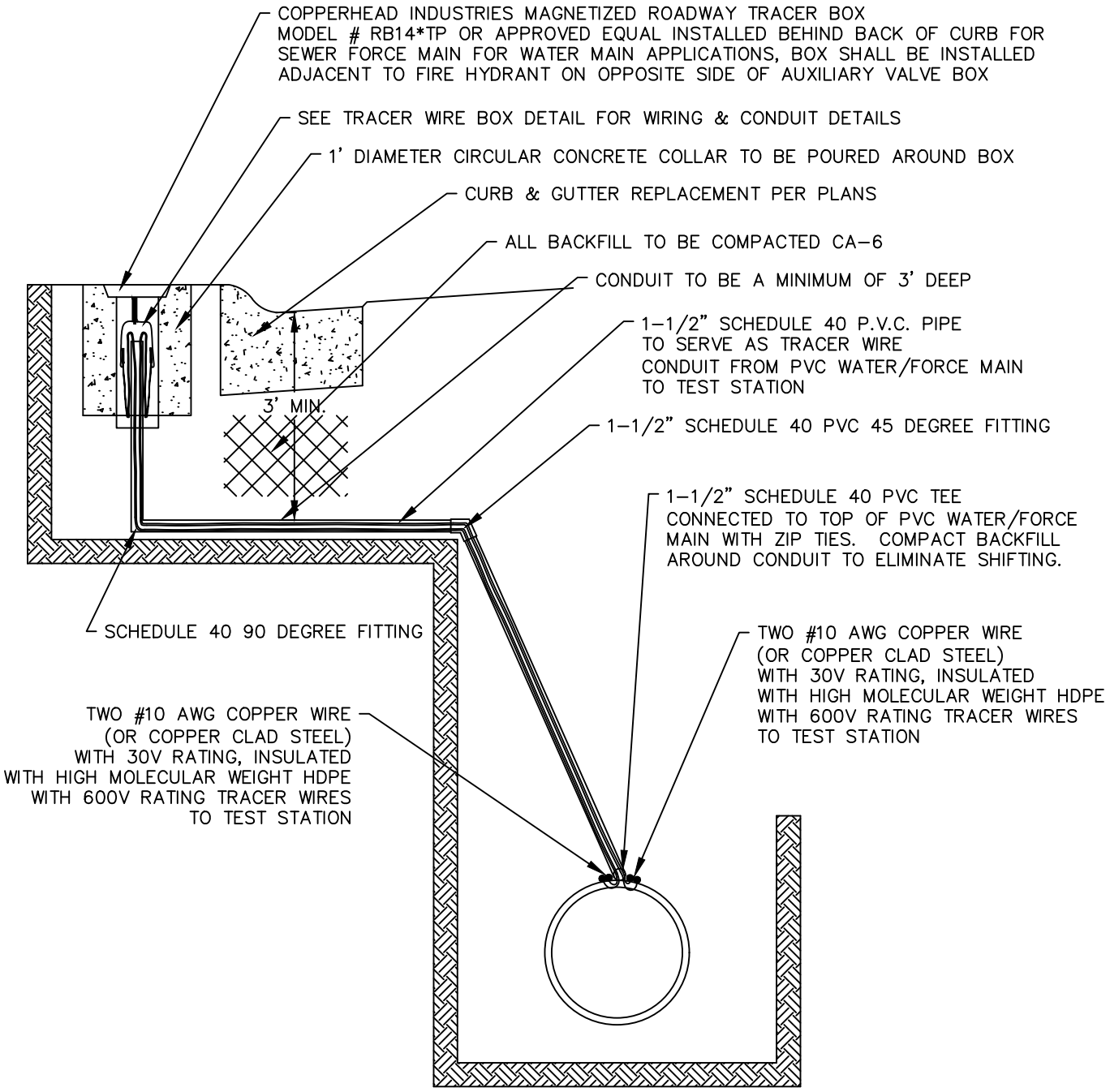


SEWER REPLACEMENT OVER WATER MAIN DETAIL

northbrook
Public Works Department

DATE	REVISIONS
1-9-19	Revised Notes

STANDARD DETAIL
W-14 (01)

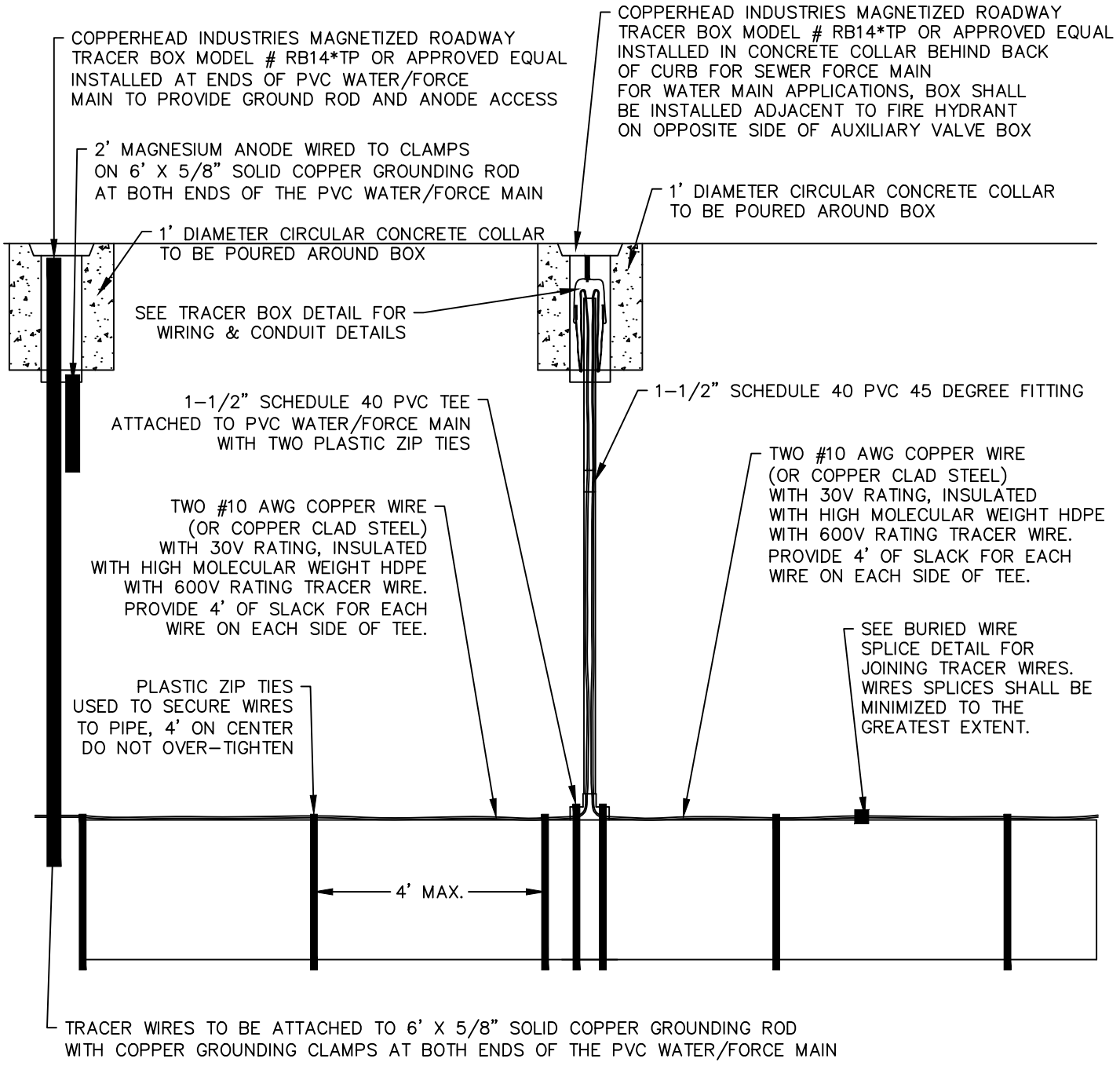


TRACER WIRE/TRACER WIRE STATION FOR PVC WATER AND FORCE MAIN DETAIL #1

northbrook
Public Works Department

DATE	REVISIONS
5-1-23	New Detail

STANDARD DETAIL
W-15 (01)

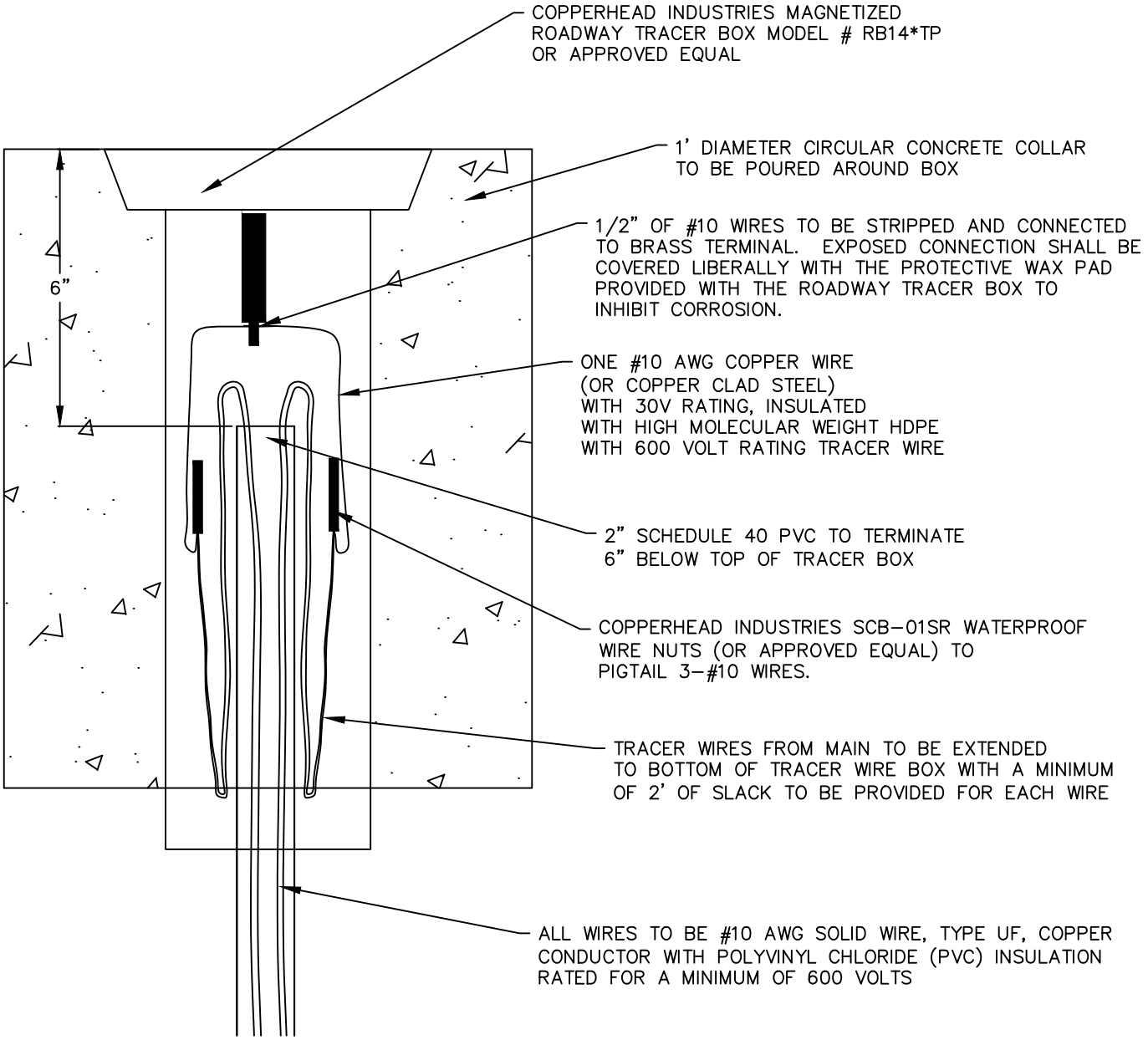


TRACER WIRE/TRACER WIRE STATION FOR PVC WATER AND FORCE MAIN DETAIL #2

northbrook
Public Works Department

DATE	REVISIONS
5-1-23	New Detail

STANDARD DETAIL
W-15 (01)

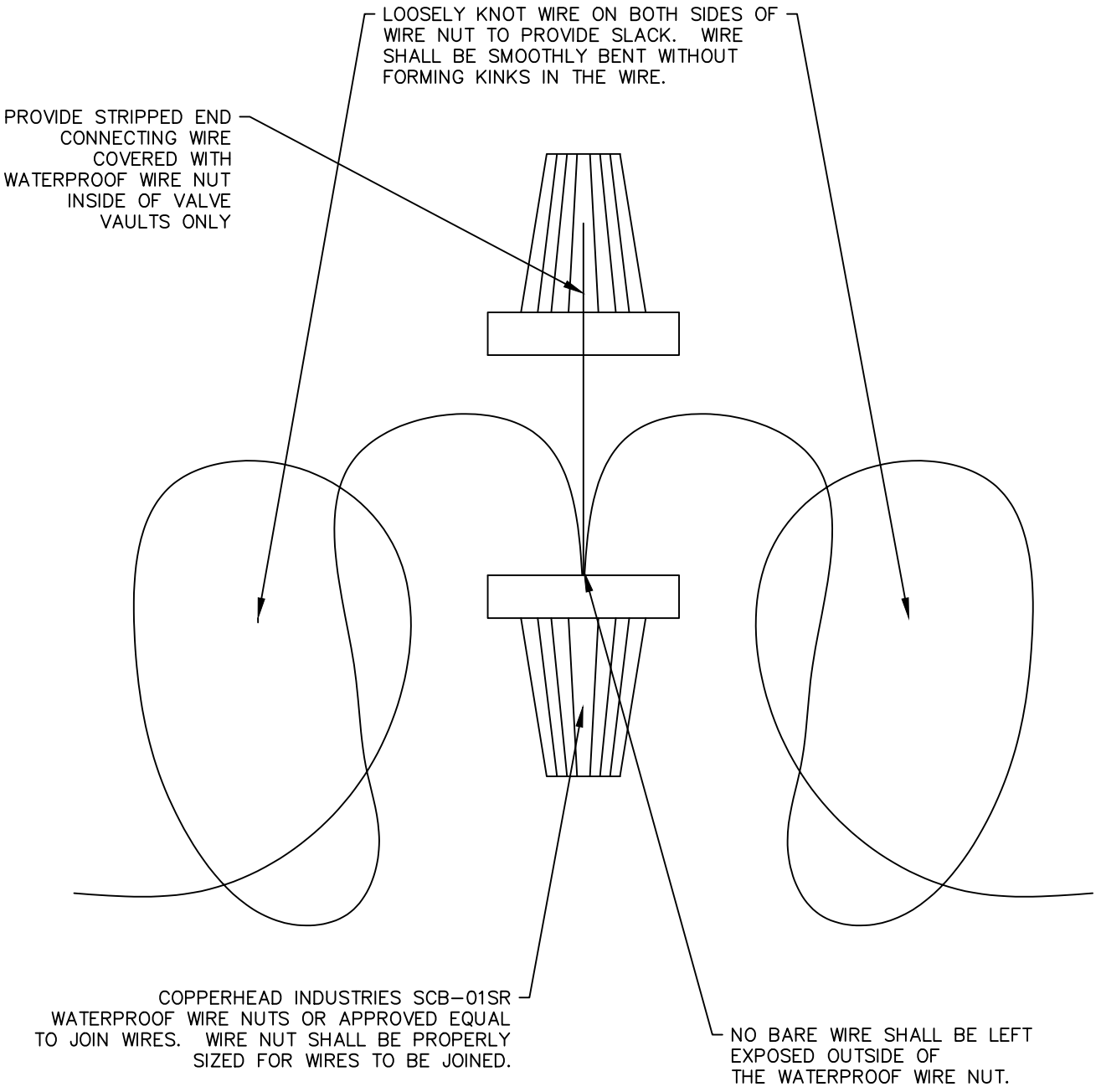


TRACER WIRE BOX DETAIL

northbrook
Public Works Department

DATE	REVISIONS
5-1-23	New Detail

STANDARD DETAIL
W-15 (01)

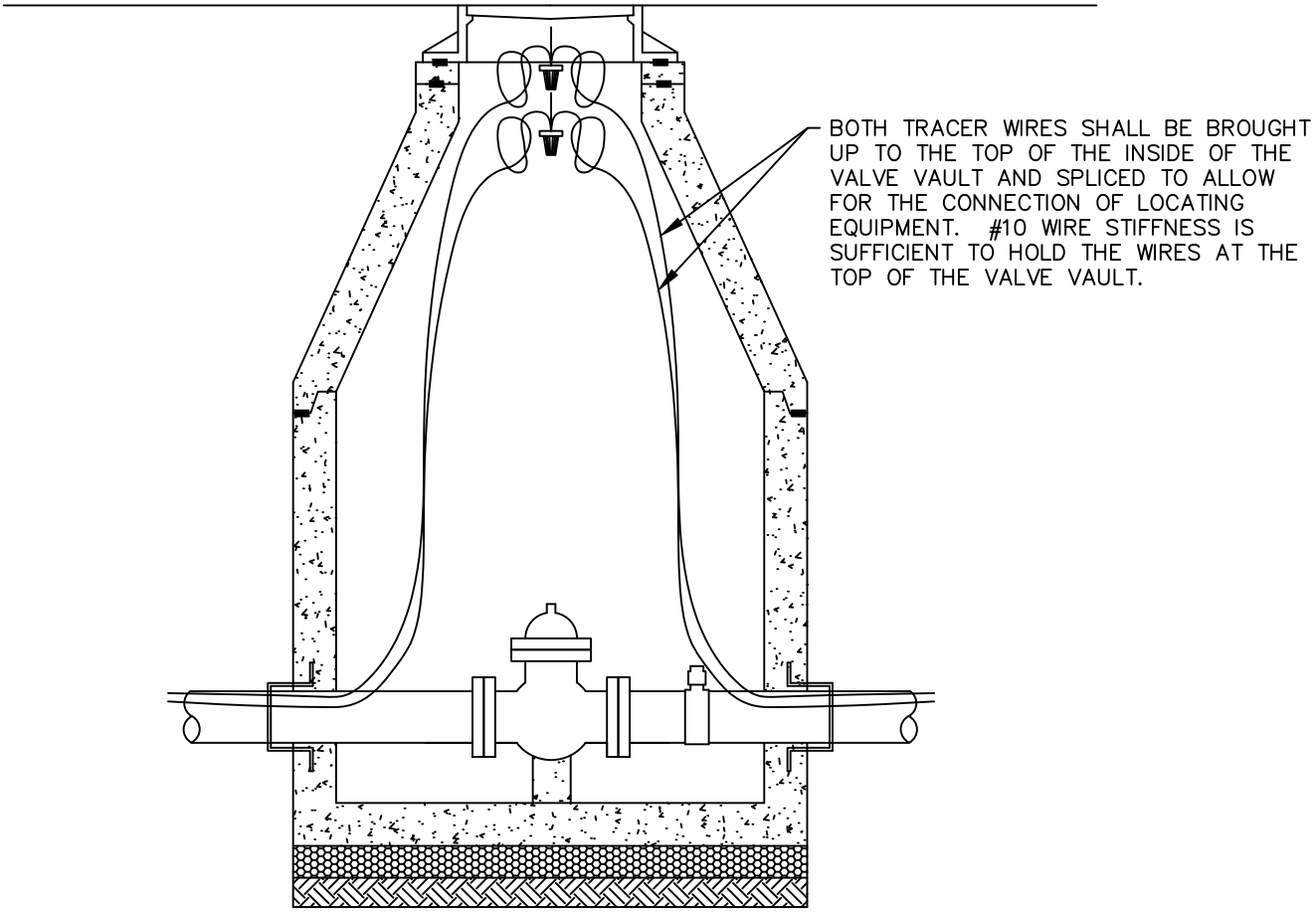


TRACER WIRE SPLICE DETAIL

northbrook
Public Works Department

DATE	REVISIONS
5-1-23	New Detail

STANDARD DETAIL
W-15 (01)

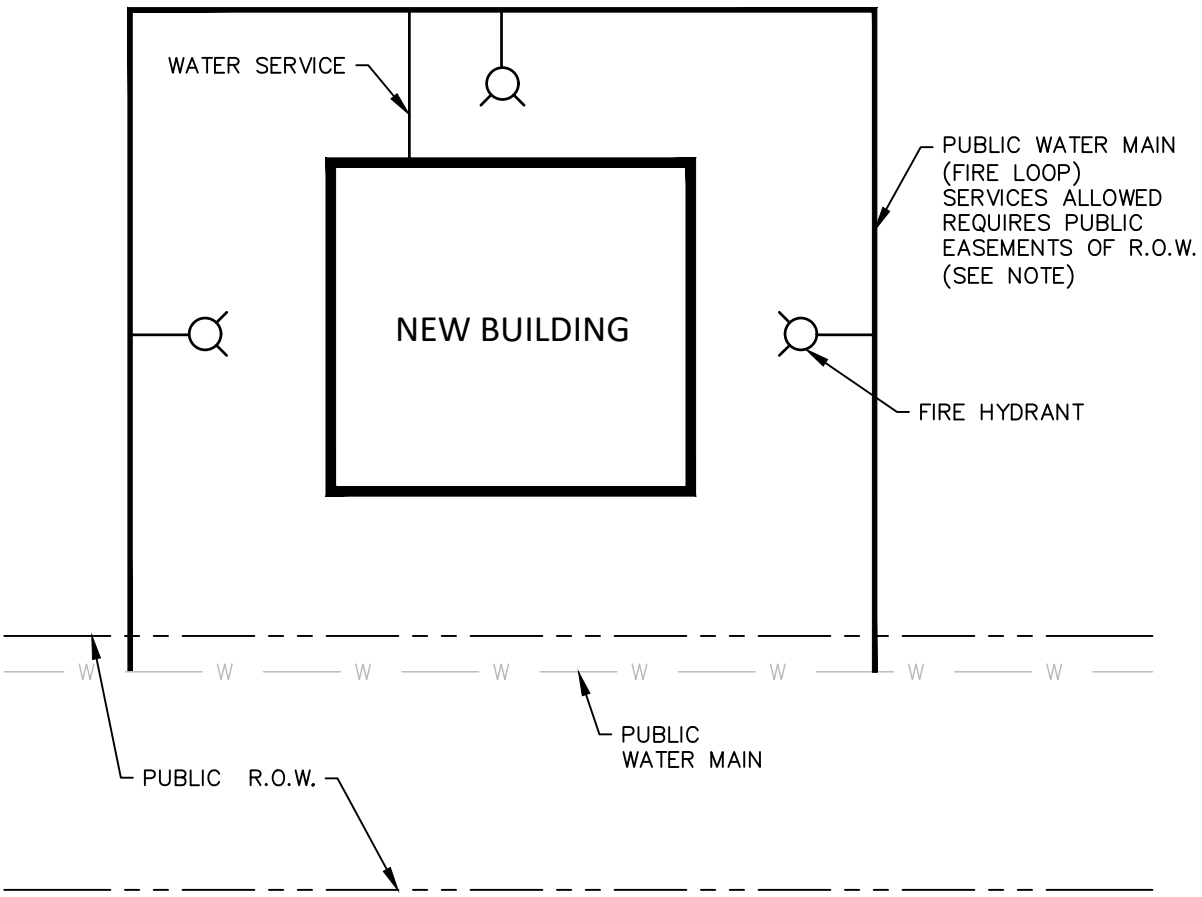


TRACER WIRE ROUTING THROUGH VALVE VAULT DETAIL

northbrook
Public Works Department

DATE	REVISIONS
5-1-23	New Detail

STANDARD DETAIL
W-15 (01)



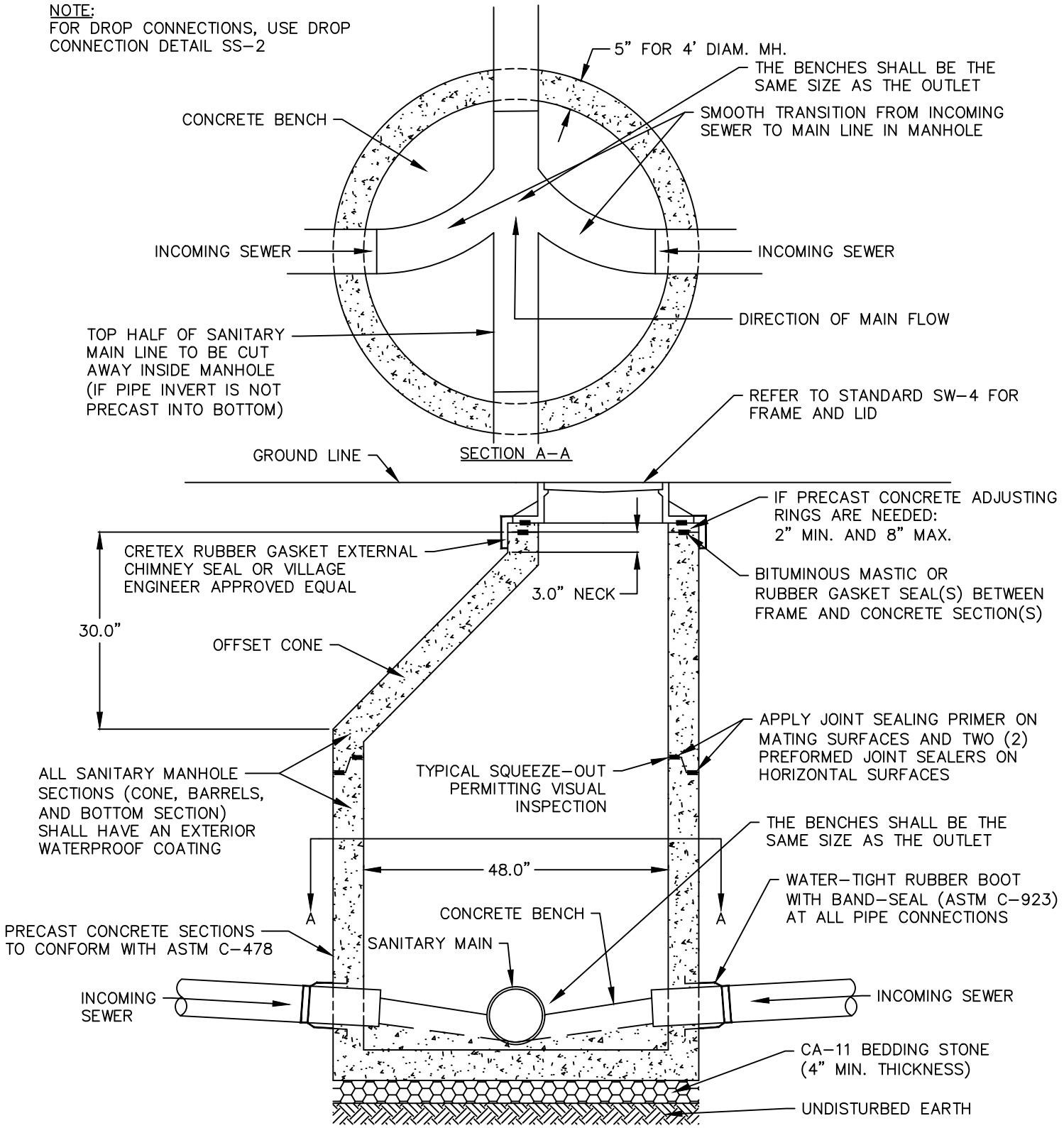
NOTE:
ENGINEER MUST DEMONSTRATE BY CALCULATION THAT PROPOSED DESIGN WILL PROVIDE SUFFICIENT FLOW TO EXCHANGE THE VOLUME OF THE WATER MAIN (FIRE LOOP) EVERY SEVENTY TWO (72) HOURS OR CAN DEMONSTRATE VIA CHLORINE RESIDULE IS MAINTAINED WITH THE DESIGN FLOW.

PUBLIC WATER MAIN - (FIRE LOOP)

northbrook
Public Works Department

DATE	REVISIONS
5-19-23	New Detail

STANDARD DETAIL
W-16 (01)



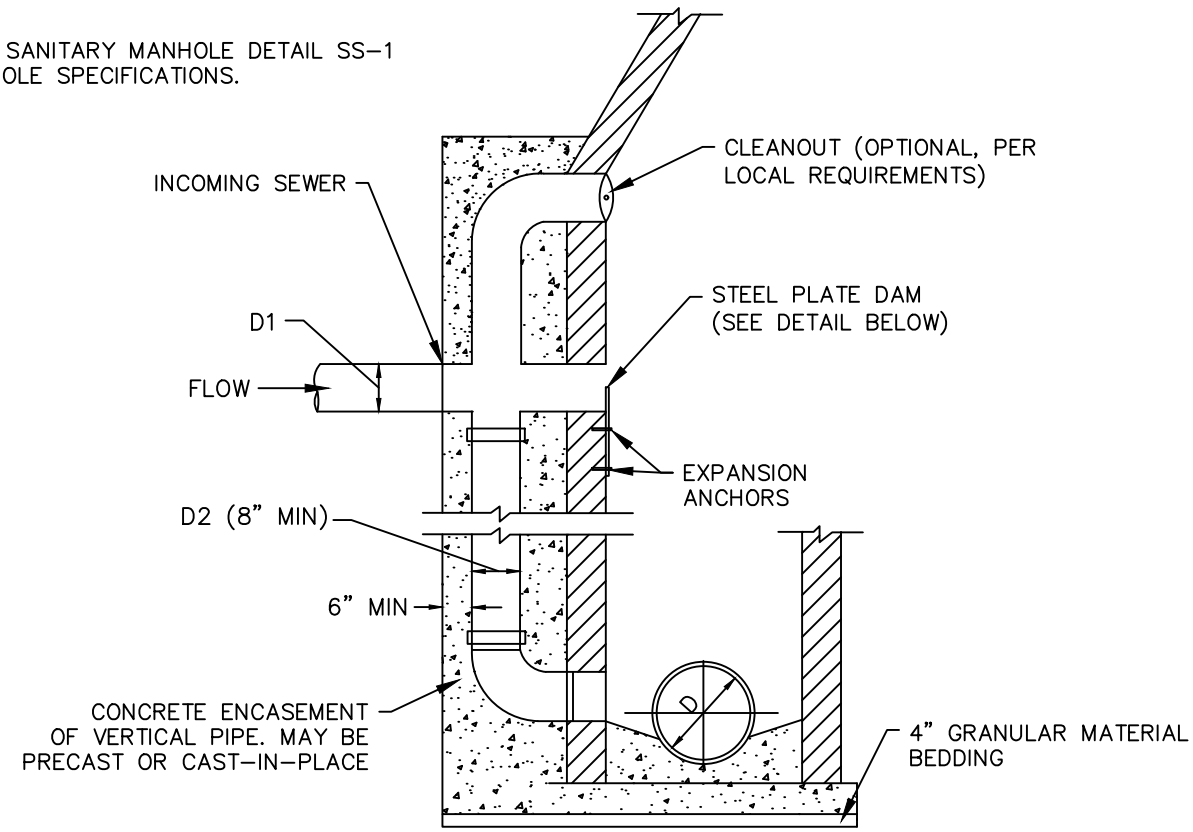
SANITARY MANHOLE DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes
5-1-23	Revised Detail

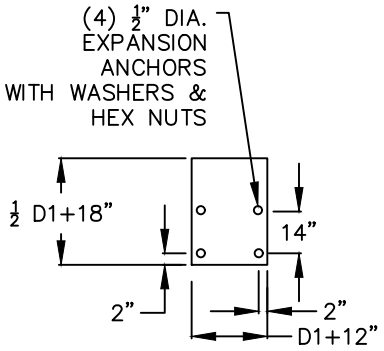
STANDARD DETAIL
SS-1 (02)

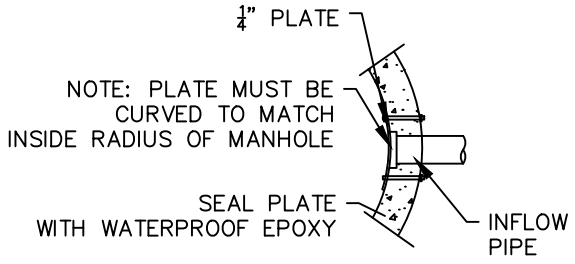
NOTE:
REFER TO SANITARY MANHOLE DETAIL SS–1
FOR MANHOLE SPECIFICATIONS.



NOTES:
1. REQUIRED FOR 2FT. OR GREATER DROP TO SANITARY OR COMBINED SEWER.
2. MINIMUM WALL THICKNESS IS 6" FOR CAST IN PLACE CONCRETE STRUCTURES AND 1/12 MANHOLE DIAMETER FOR PRECAST CONCRETE STRUCTURES.
3. CONCRETE FOR ENCASEMENT SHALL BE 4,000 PSI @ 28 DAYS.
4. FORCEMAIN FLOW NOT ALLOWED AS INCOMING SEWER, SEE FORCEMAIN DISCHARGE DETAIL.

DIAMETER (INCHES)	
D1	D2
6	8
8	8
10	8
12	8
15	10
18	12
21	15
24	18





STEEL PLATE DAM

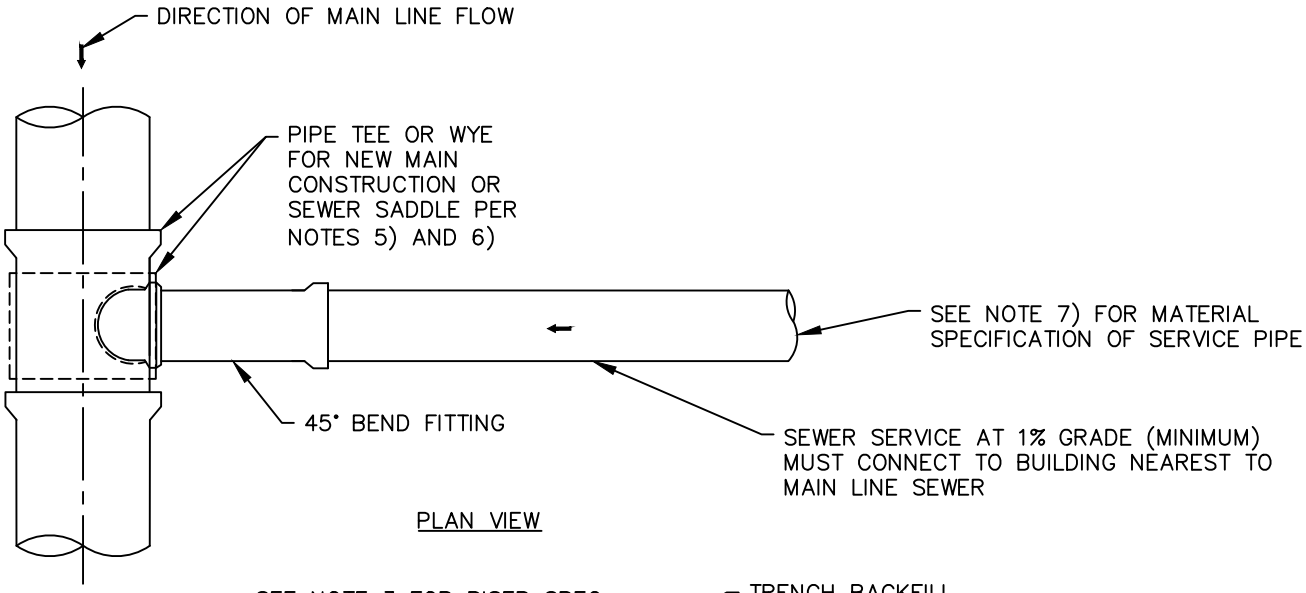
NOTES:
1. PLATE AND FASTENERS MUST BE FABRICATED IN STAINLESS STEEL, DUCTILE IRON, OR EQUIVALENT WATERPROOF/WEATHER PROOF MATERIALS.
2. BOLTS TACK WELDED TO PLATE.
3. ANCHOR EMBEDMENT: 3" MIN.
4. REFER TO SANITARY MANHOLE DETAIL (SS–1) FOR MANHOLE SPECIFICATIONS.

SANITARY MANHOLE DROP CONNECTION DETAIL

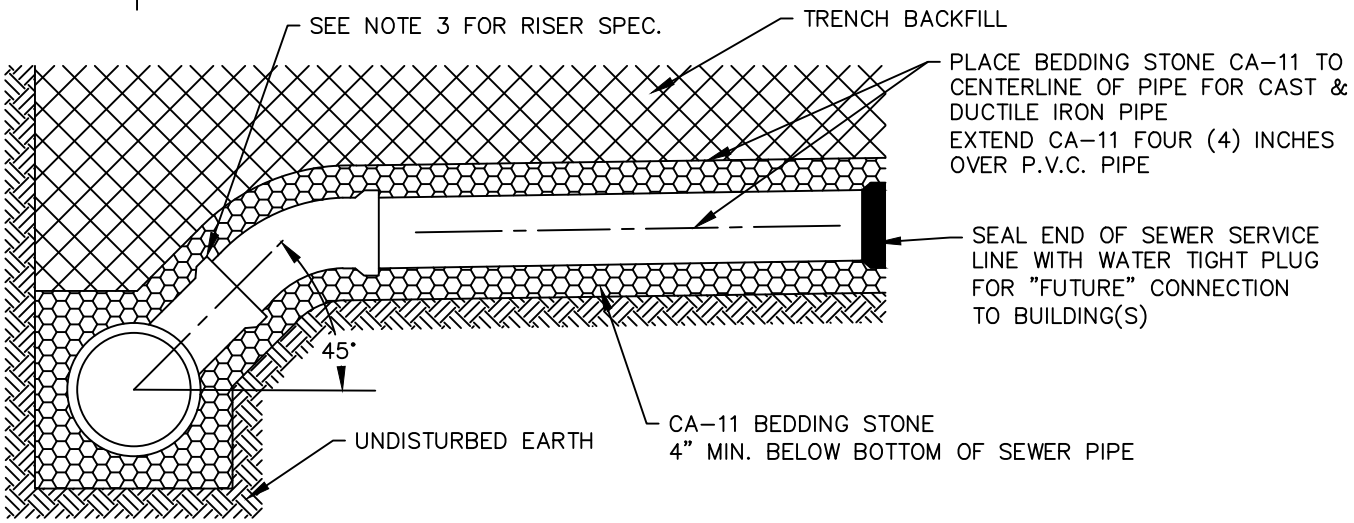
northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Deleted Redundancies, Revised Notes
5-1-23	Revised Detail and Notes

STANDARD DETAIL
SS-2 (02)



PLAN VIEW



ELEVATION VIEW

NOTES:

1) TRENCH BACKFILL FOR PAVED AREAS, INCLUDING ROAD, CURB AND SIDEWALK:
   CONTROLLED LOW STRENGTH MATERIAL (CLSM).
   (CA–6 OR APPROVED EQUAL MAY BE USED ONLY WHEN APPROVED BY THE VILLAGE ENGINEER)
   TBF REQUIRED 2 FEET BEYOND ANY PAVED SURFACE
2) TRENCH BACKFILL FOR NON–PAVED AREAS:
   FINELY DIVIDED EXCAVATED MATERIAL
   FREE FROM ROCKS AND DEBRIS
3) RISER REQUIRED WHEN SEWER DEPTH EXCEEDS NINE (9) FEET. MAXIMUM SLOPE OF 1:1 ON RISERS
4) INSTALL DIP SERVICE LINE FROM FOUNDATION WALL TO THE OUTSIDE OF BUILDING OVERDIG, OR 10 L.F. MIN.AND INSTALL CLEAN–OUT AT THIS LOCATION
5) NEW CONNECTIONS TO MAIN SHALL BE INSTALLED WITH ROMAC CB OR FORD FSS SEWER SADDLE OR VILLAGE ENGINEER APPROVED EQUAL
6) USE LMT(tm) STYLE SADDLE SYSTEM INSTALLATION OR PRE–APPROVED EQUIVALENT WHEN TAPPING LINED SANITARY MAIN. REMOVE HOST CLAY PIPE AS NECESSARY
7) P.V.C., SDR26 SHALL BE USED EXCEPT FOR WHEN WATER MAIN QUALITY PIPE IS REQUIRED. IN THAT CASE USE GREEN C–900 P.V.C PIPE
8) SANITARY SERVICES ARE NOT PERMITTED IN RESIDENTIAL SIDE YARDS

SEWER SERVICE DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes
5-12-22	Controlled Low Strength Material

STANDARD DETAIL
SS-3 (02)

Illinois Department of Transportation

STANDARD	DESCRIPTION	TOTAL PAGES	CHECK APPLICABILITY 'X'
602401	MANHOLE TYPE A, 4' DIAMETER	2	
602402	MANHOLE TYPE A, 5' DIAMETER	2	
602406	MANHOLE TYPE A, 6' DIAMETER	3	
602411	MANHOLE TYPE A, 7' DIAMETER	3	
602416	MANHOLE TYPE A, 8' DIAMETER	3	
602421	MANHOLE TYPE A, 9' DIAMETER	3	
602426	MANHOLE TYPE A, 10' DIAMETER	3	
602601	PRECAST REINFORCED CONCRETE FLAT SLAB TOP	2	

NOTES:
1. USE LATEST REVISION OF STANDARD
2. STANDARD CHECKED SHALL BE INCLUDED IN THE PLAN SET
3. CONCRETE FILL SHALL NOT BE INSTALLED UNTIL AFTER THE STORM SEWER PIPES HAVE BEEN INSTALLED

STORM MANHOLE STANDARD

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Adapted To IDOT Standards
4-1-21	Added Plan Notes

STANDARD
SW-1 (02)

Illinois Department of Transportation

STANDARD	DESCRIPTION	TOTAL PAGES	CHECK APPLICABILITY 'X'
602001	CATCH BASIN TYPE A	1	
602011	CATCH BASIN TYPE C	1	
602601	PRECAST REINFORCED CONCRETE FLAT SLAB TOP	2	

NOTES:
1. USE LATEST REVISION OF STANDARD
2. STANDARD CHECKED SHALL BE INCLUDED IN THE PLAN SET

CATCH BASIN STANDARD

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Adapted To IDOT Standards
4-1-21	Edited Standard Detail Section

STANDARD
SW-2 (02)

Illinois Department of Transportation

STANDARD	DESCRIPTION	TOTAL PAGES	CHECK APPLICABILITY 'X'
602301	INLET – TYPE A	1	
602601	PRECAST REINFORCED CONCRETE FLAT SLAB TOP	2	

NOTES:
1. USE LATEST REVISION OF STANDARD
2. STANDARD CHECKED SHALL BE INCLUDED IN THE PLAN SET

STORM INLET STANDARD

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Adapted To IDOT Standards

STANDARD
SW-3 (01)

#	FRAME AND GRATE (OR PRE-APPROVED EQUAL)	COMPARABLE IDOT TYPE	DESCRIPTION	OPTIONS	CHECK APPLICABILITY 'X'
1	NEENAH R-1713	1	FLAT, ROUND, CLOSED LID	"SANITARY" LETTERING IMPRINTED ON UNBOLTED COVER. LID SHALL HAVE WATERTIGHT GASKET AND CONCEALED PICKHOLE.	
				"STORM" LETTERING IMPRINTED ON COVER	
				"WATER" LETTERING IMPRINTED ON COVER. LID SHALL HAVE CONCEALED PICKHOLE	
2	NEENAH R-1713	1	FLAT, ROUND, OPEN TYPE D GRATE	N/A	
3	NEENAH R-1713	1	FLAT, ROUND, OPEN TYPE D GRATE, FOR DEPRESSED CURB	"STORM" LETTERING IMPRINTED ON COVER	
4	NEENAH R-3278-A	3	INLET FRAME AND CURB BOX FOR BARRIER CURB, RECTANGULAR, OPEN GRATE	STANDARD GRATE	
5	NEENAH R-3278-AL	3V	INLET FRAME AND CURB BOX FOR BARRIER CURB, RECTANGULAR, OPEN GRATE WITH VANES	TYPE L VANE GRATE	
6	NEENAH R-3501-P	N/A	INLET FRAME FOR ROLL-TYPE CURB, RECTANGULAR, OPEN GRATE	N/A	
7	NEENAH R-4340-B	8	BEEHIVE TYPE INLET, ROUND, OPEN GRATE FOR LAWN AREAS	N/A	
8	EJIW 6212M	N/A	FLAT, ROUND, OPEN GRATE FOR YARD DRAIN	N/A	

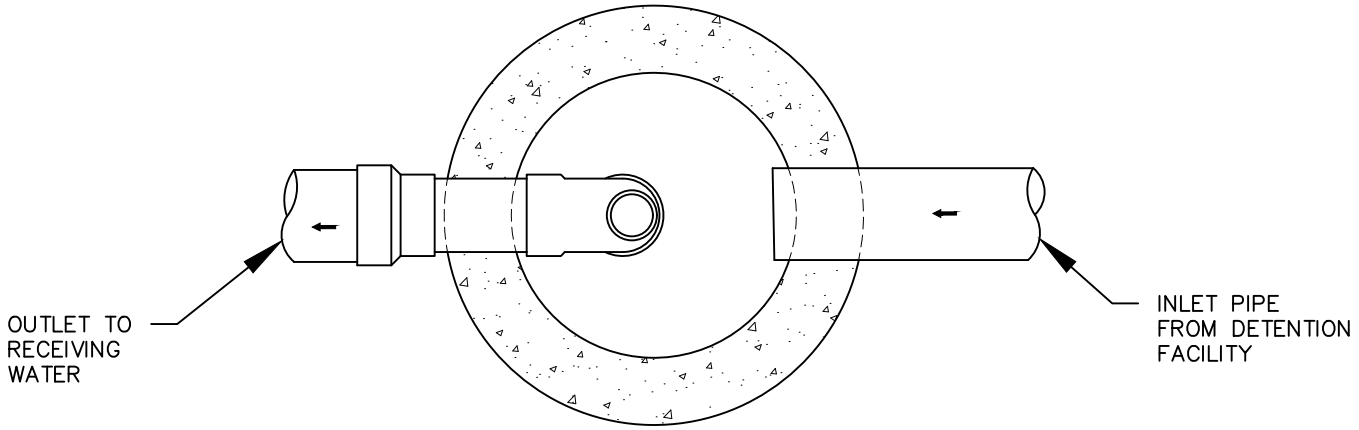
NOTE: FRAMES #2 THROUGH #8 SHALL HAVE "DUMP NO WASTE" AND "DRAINS TO WATERWAYS" LETTERING AND/OR FISH SYMBOL.

FRAME AND GRATE STANDARD

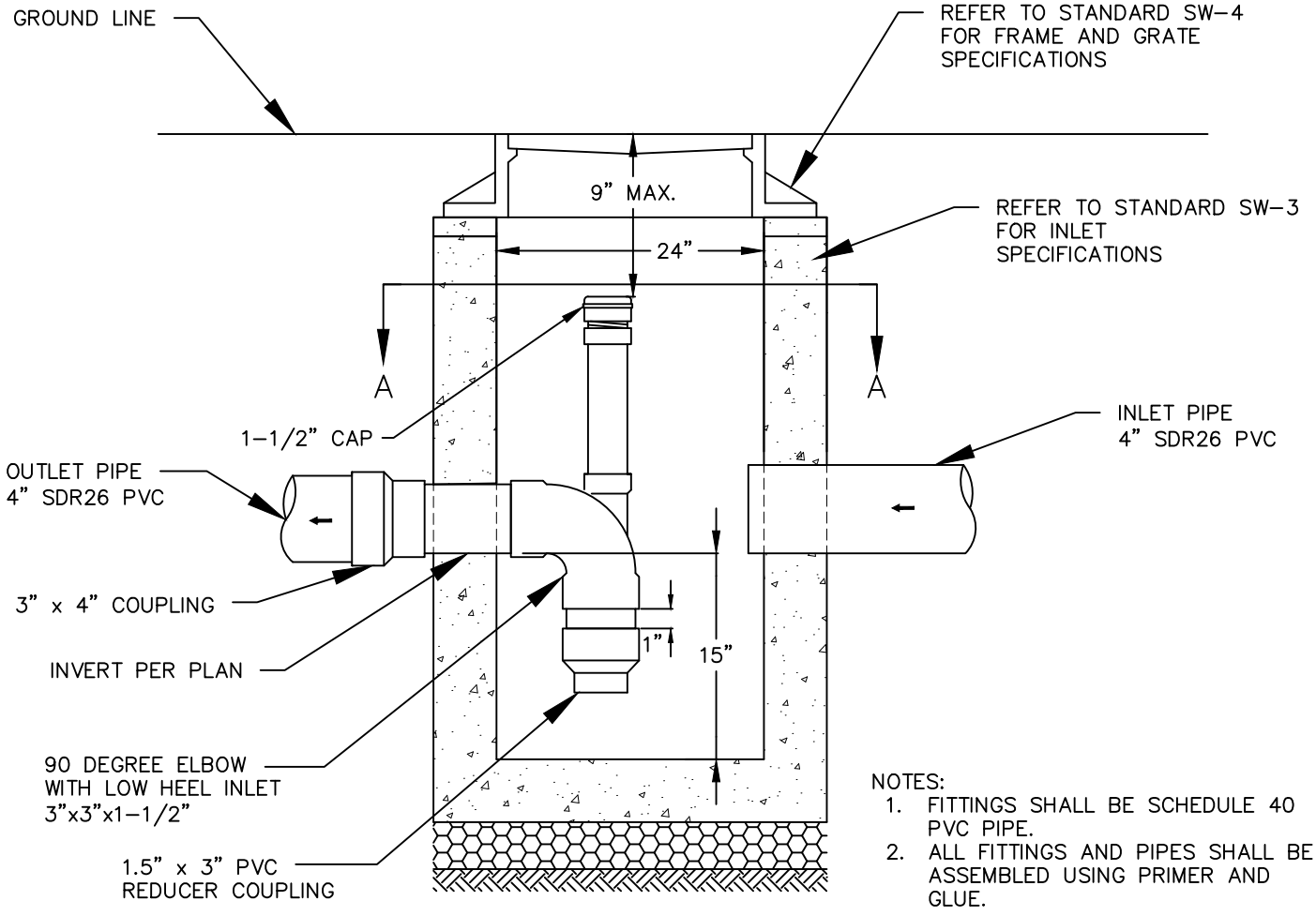
northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Restructured Frame Specification Standard
4-1-21	Added Plan Notes

STANDARD
SW-4 (02)



SECTION A–A



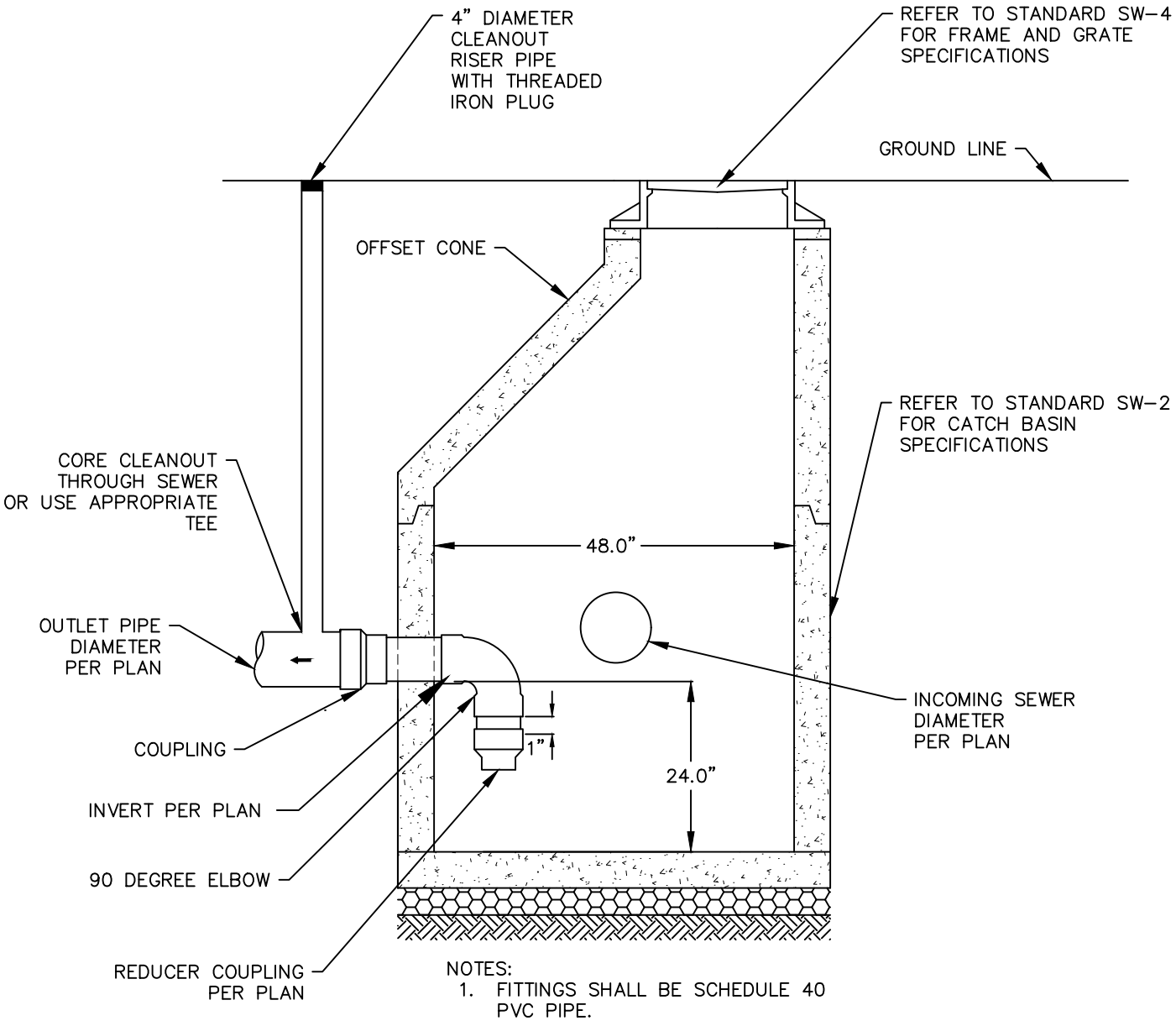
NOTES:
1. FITTINGS SHALL BE SCHEDULE 40 PVC PIPE.
2. ALL FITTINGS AND PIPES SHALL BE ASSEMBLED USING PRIMER AND GLUE.

CATCH BASIN WITH FLOW REDUCER FOR SMALL SINGLE RESIDENTIAL LOTS

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	New Standard
4-1-21	Changed Reducer Coupling Size

STANDARD DETAIL
SW-5 (02)



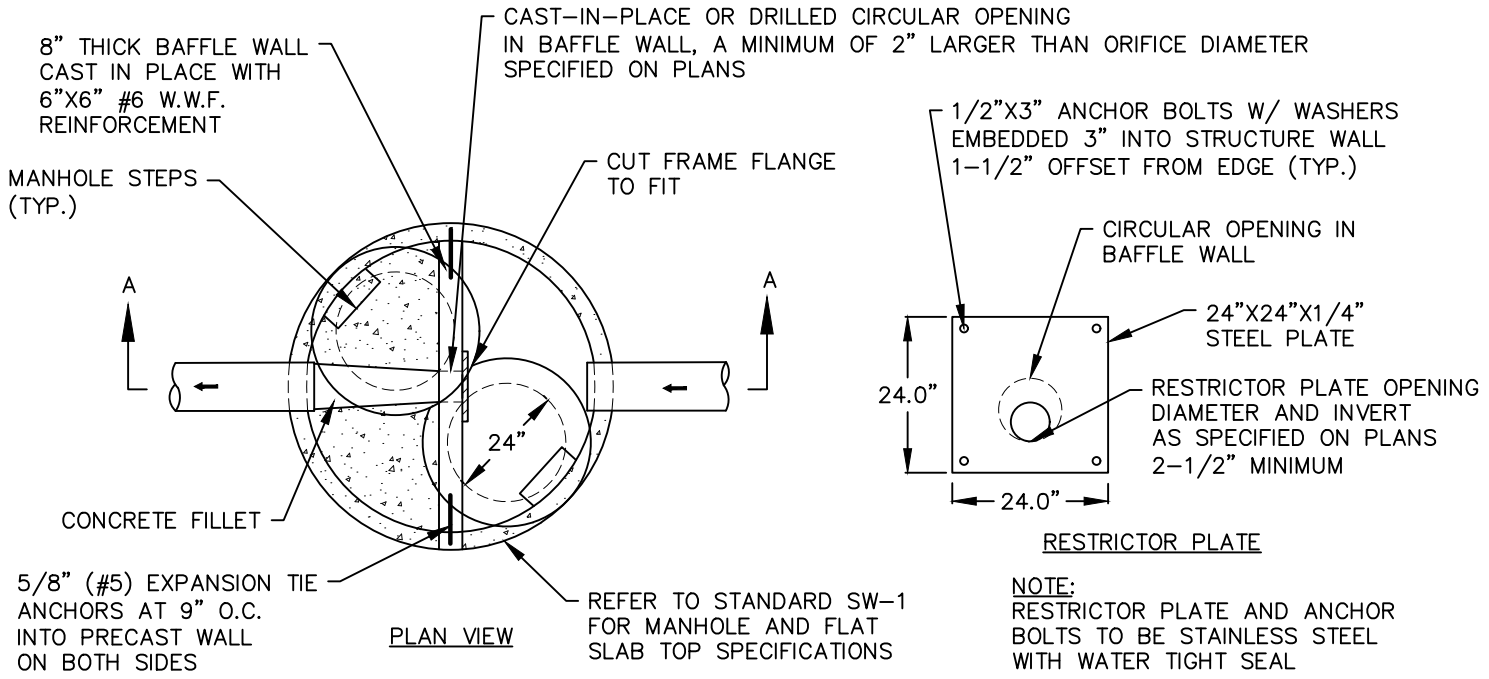
NOTES:
1. FITTINGS SHALL BE SCHEDULE 40 PVC PIPE.
2. ALL FITTINGS AND PIPES SHALL BE ASSEMBLED USING PRIMER AND GLUE.

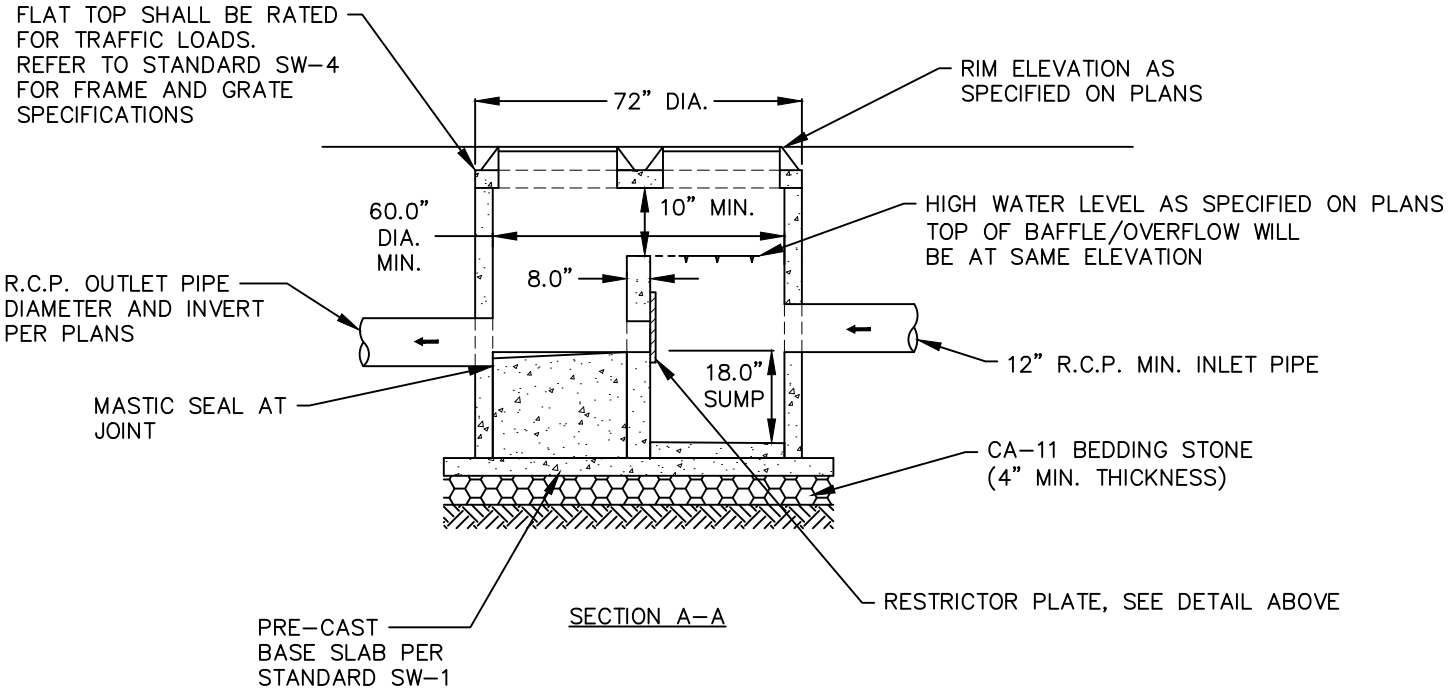
CATCH BASIN WITH FLOW REDUCER FOR LARGE SINGLE RESIDENTIAL LOTS

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	New Standard
5-1-23	Revised Callout

STANDARD DETAIL
SW-6 (02)



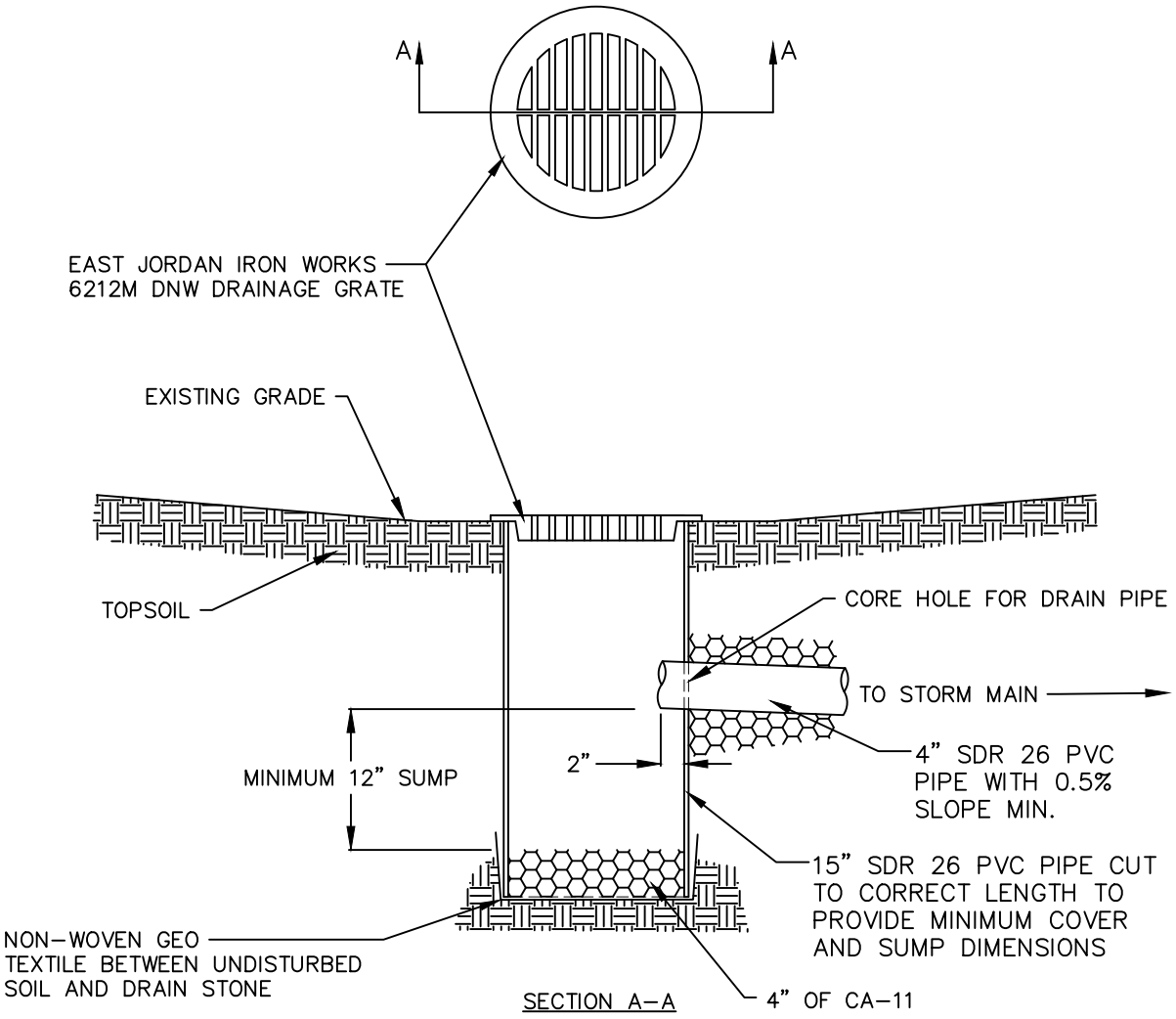


MANHOLE WITH FLOW REDUCER FOR COMMERCIAL DEVELOPMENTS AND RESIDENTIAL SUBDIVISIONS

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes
4-1-21	Revised Notes

STANDARD DETAIL
SW-7 (02)

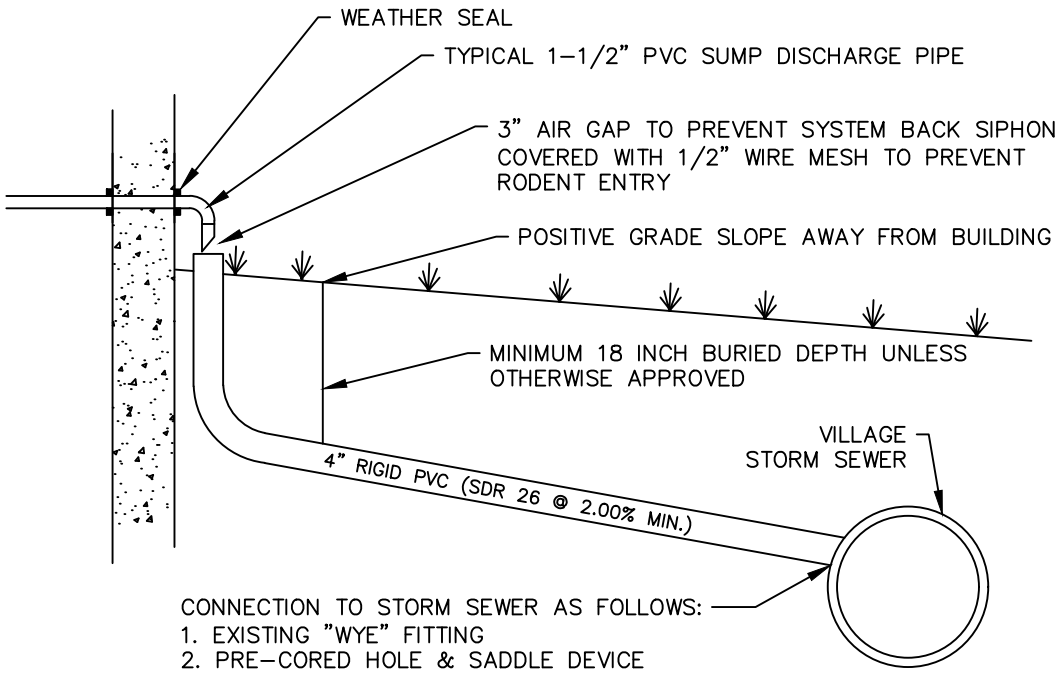


PVC YARD DRAIN DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes

STANDARD DETAIL
SW-8 (01)



NOTES:
1. CONTRACTOR ASSUMES FULL RESPONSIBILITY AND LIABILITY FOR ANY DAMAGE TO UTILITIES.
2. IN NO EVENT SHALL THE SUMP PUMP DISCHARGE INTO THE SANITARY SEWER SYSTEM.
3. A PLUMBING PERMIT IS REQUIRED PRIOR TO ANY SEWER CONNECTION.

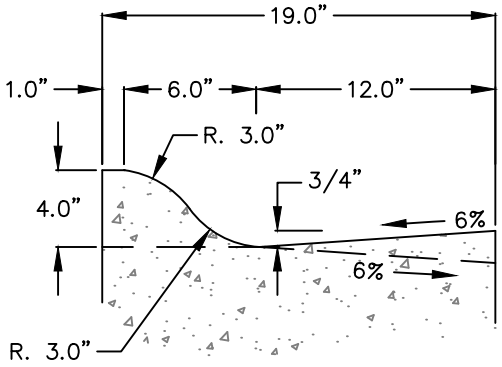
SUMP PUMP CONNECTION DETAIL

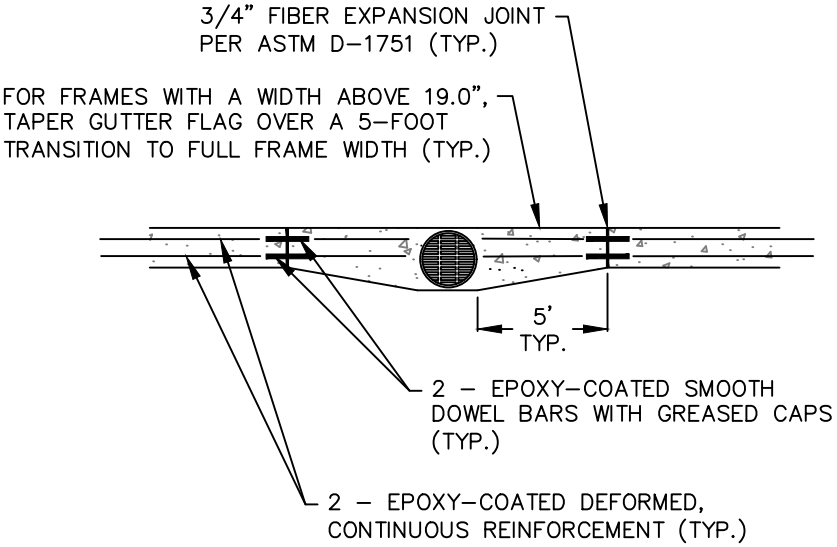
northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes And Graphics
4-1-21	Added Plan Note
5-1-23	Revised Callouts

STANDARD DETAIL
SW-9 (03)

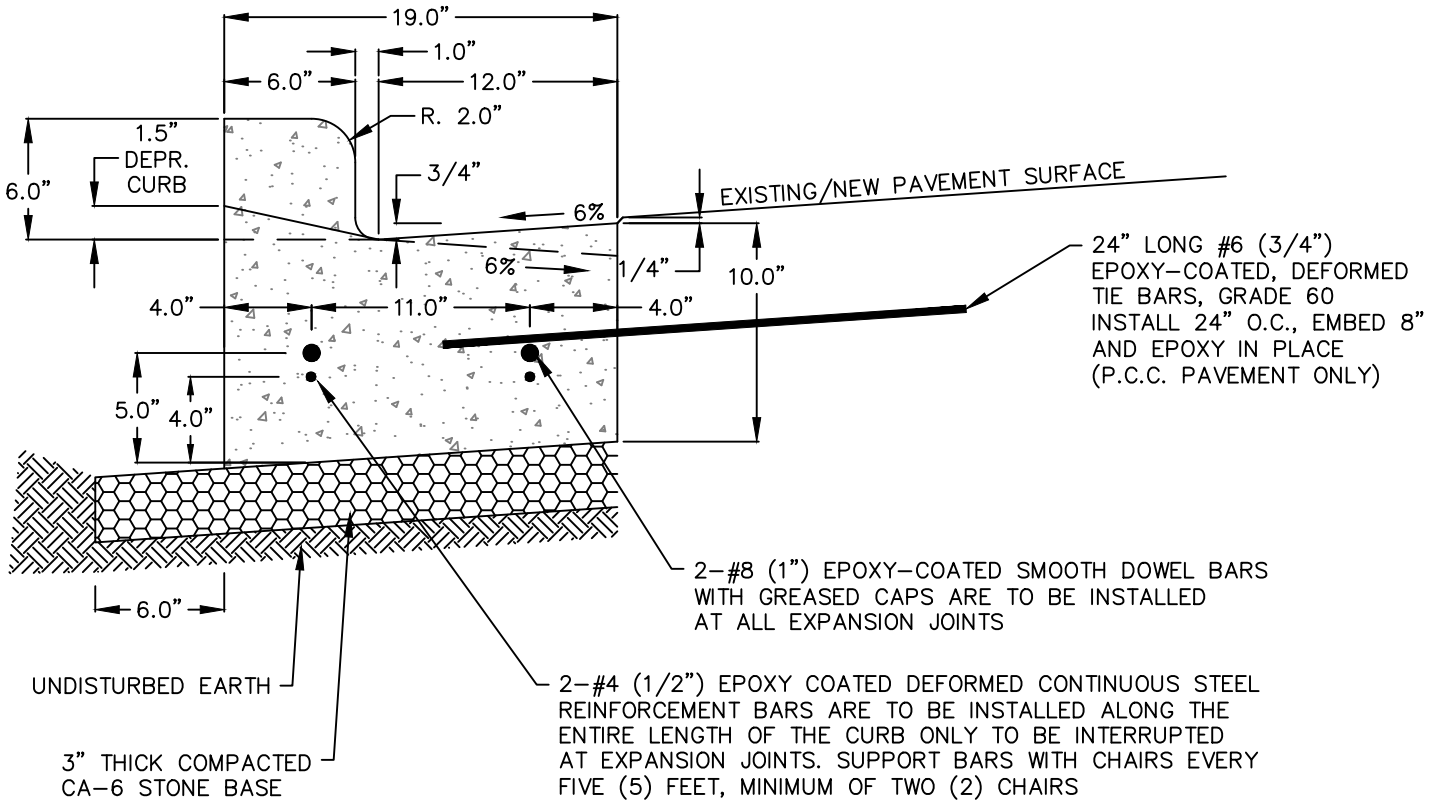
TYPE M-4.12





PLAN VIEW

TYPE B-6.12 & DEPRESSED CURB



NOTES:

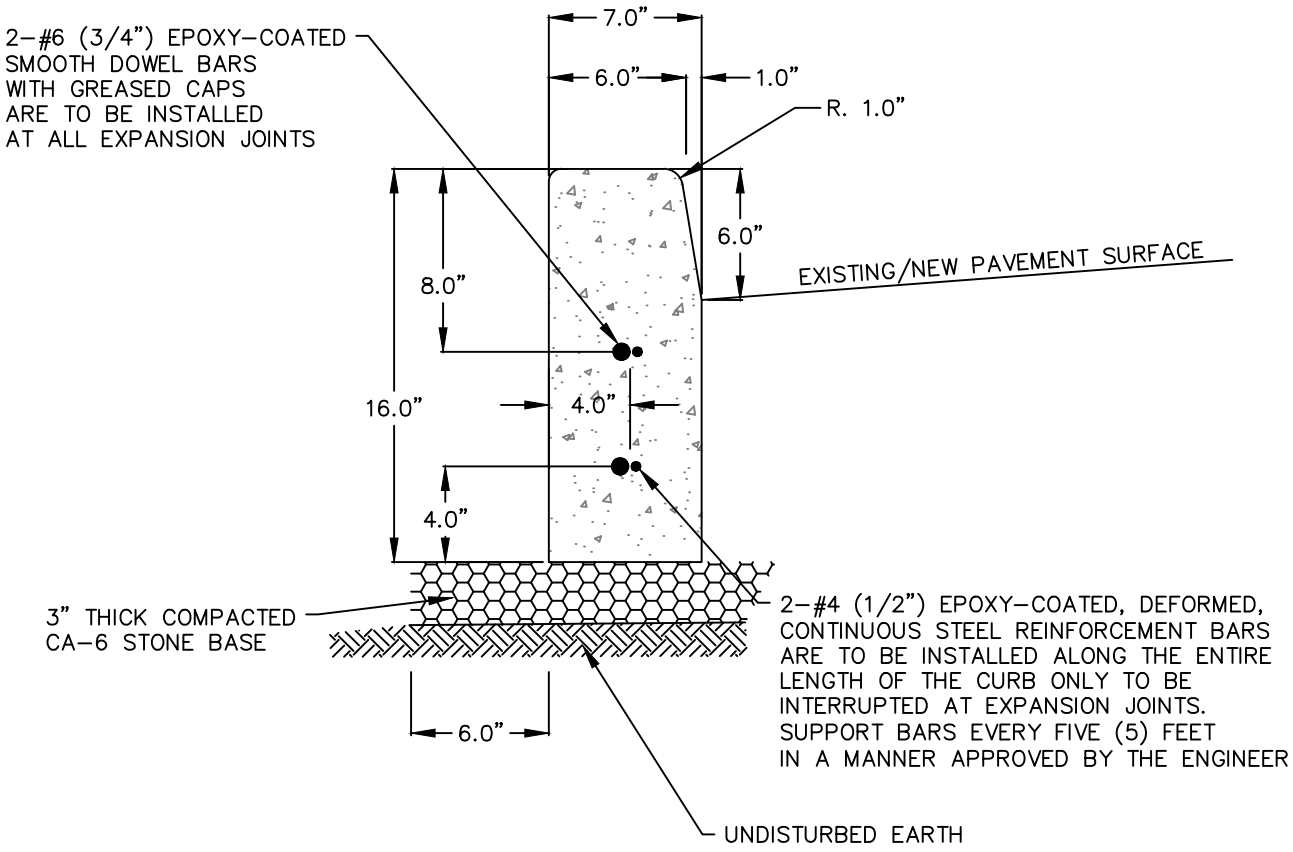
1. EXPANSION JOINTS ARE TO BE CONSTRUCTED AT 60' INTERVALS AND AT ADDITIONAL LOCATIONS AS SPECIFIED BY THE ENGINEER.
2. CONTRACTION JOINTS ARE TO BE CONSTRUCTED AT 15' INTERVALS AND AT ADDITIONAL LOCATIONS AS SPECIFIED BY THE ENGINEER
3. WITH NEW CURB REPLACEMENT NEXT TO HMA, CONTRACTOR IS REQUIRED TO PLACE 2' OF HMA FULL DEPTH PAID SEPARATELY TO MATCH EXISTING
4. REVERSE PITCH CURB WILL REQUIRE A 6% GUTTER FLAG DROPPING AWAY FROM CURB

COMBINATION CURB & GUTTER

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Consolidated Details, Revised Notes
4-1-21	Added Plan Note
5-1-23	Revised detail Added Note

STANDARD DETAIL
P-1 (03)



NOTES:

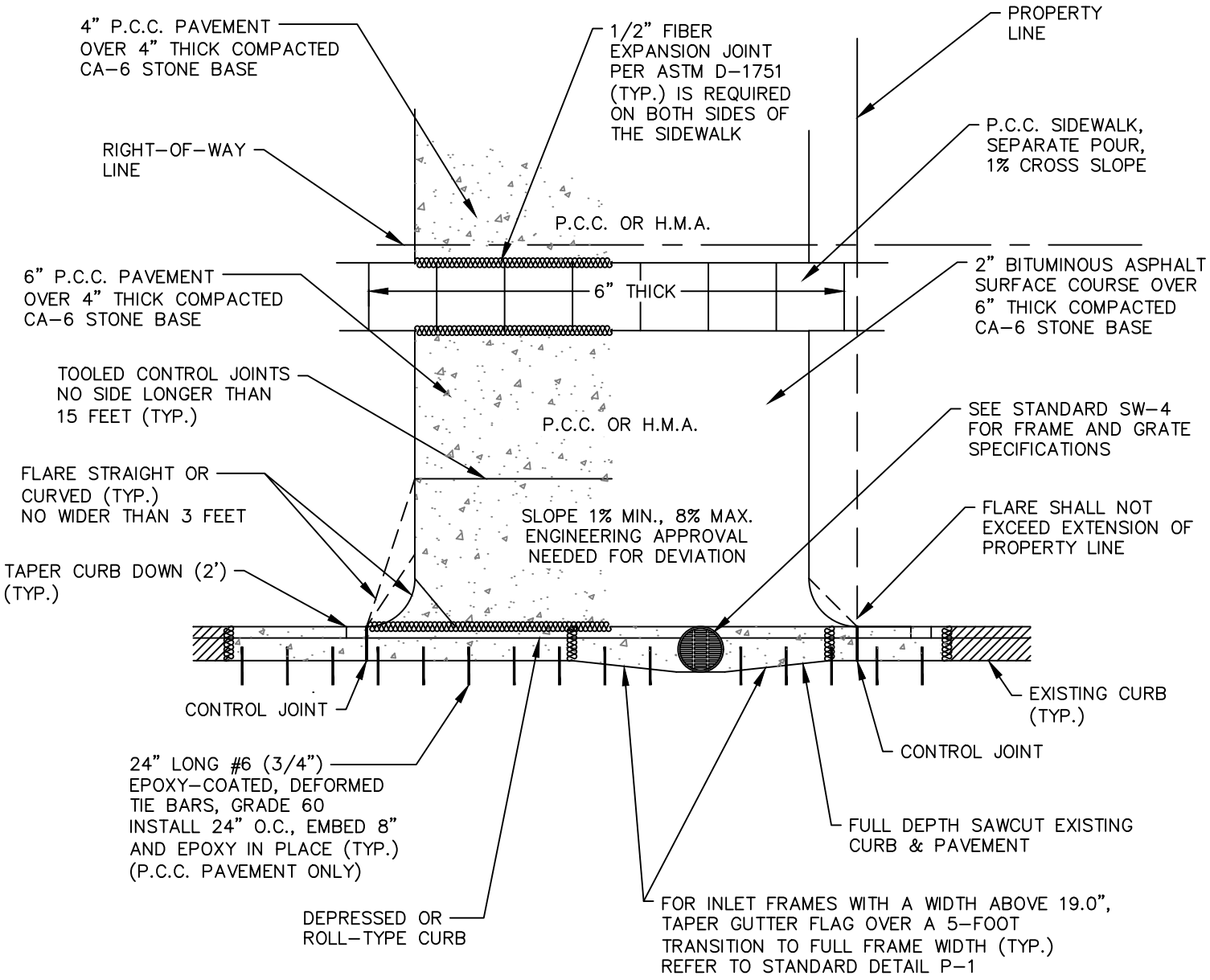
1. EXPANSION JOINTS ARE TO BE CONSTRUCTED AT 60' INTERVALS WITH 3/4" FIBER EXPANSION JOINT PER ASTM D–1751, AND AT ADDITIONAL LOCATIONS AS SPECIFIED BY THE ENGINEER.
2. CONTRACTION JOINTS ARE TO BE CONSTRUCTED AT 15' INTERVALS AND AT ADDITIONAL LOCATIONS AS SPECIFIED BY THE ENGINEER

TYPE B CURB DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes
4-1-21	Changed Dowel Bar Size Required

STANDARD DETAIL
P-2 (02)



NOTES FOR CONCRETE DRIVEWAYS:

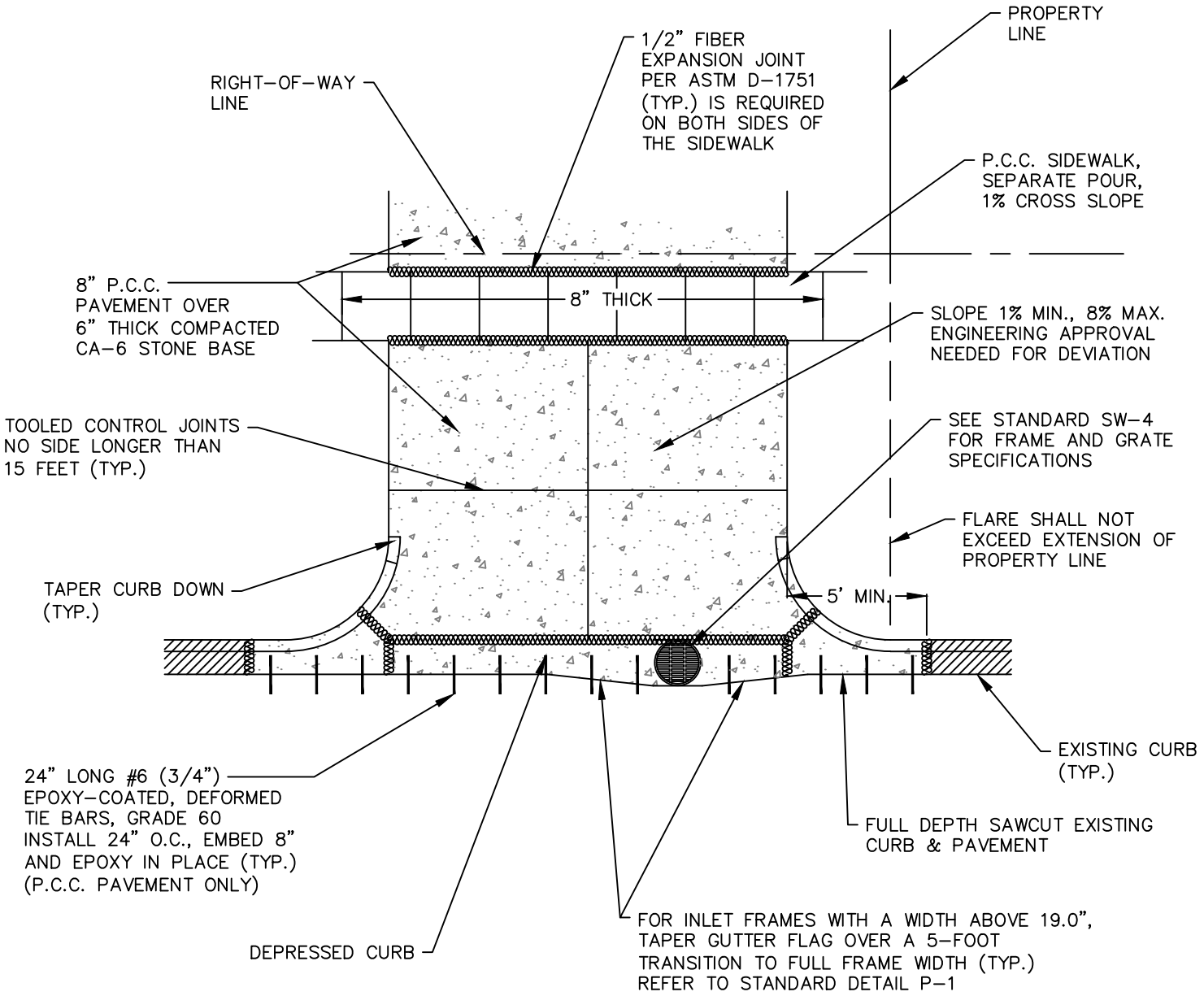
1. ALL EXISTING ABUTTING EXPANSION JOINT MATERIAL SHALL BE REMOVED AND REPLACED.
2. IF THE EXISTING CURB/PAVEMENT HAS REINFORCEMENT BARS, THEY SHALL NOT BE CUT OFF, UNLESS THEY ARE DEEMED UNUSABLE PER ENGINEER.
3. CONCRETE FOR APRON AND SIDEWALK SHALL BE IDOT CLASS SI OR PP-1.
4. ALL CONCRETE SHALL BE IN PLACE NO MORE THAN 1-1/2 HOURS AFTER TRUCK IS LOADED.
5. THE CONTRACTOR IS RESPONSIBLE FOR VIBRATING THE CONCRETE DURING PLACEMENT.
6. WHITE CURING COMPOUND, PER IDOT SECTION 1022.01(C), SHALL BE APPLIED TO THE CONCRETE IMMEDIATELY AFTER IT HAS BEEN FINISHED OR PER MANUFACTURER'S RECOMMENDATION.
7. IF BUFFALO BOX IS LOCATED WITHIN DRIVEWAY OR APRON, AN AUXILIARY VALVE BOX TOP WITH "WATER" LID IS REQUIRED.

STANDARD RESIDENTIAL DRIVEWAY DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	New Detail
4-1-21	Added Plan Note
5-1-23	Revised Callouts
12-1-23	Revised Notes

STANDARD DETAIL
P-3 (04)



NOTES:

1. ALL EXISTING ABUTTING EXPANSION JOINT MATERIAL SHALL BE REMOVED AND REPLACED.
2. IF THE EXISTING CURB/PAVEMENT HAS REINFORCEMENT BARS, THEY SHALL NOT BE CUT OFF, UNLESS THEY ARE DEEMED UNUSABLE PER ENGINEER.
3. CONCRETE FOR APRON AND SIDEWALK SHALL BE IDOT CLASS SI OR PP-1.
4. ALL CONCRETE SHALL BE IN PLACE NO MORE THAN 1-1/2 HOURS AFTER TRUCK IS LOADED.
5. THE CONTRACTOR IS RESPONSIBLE FOR VIBRATING THE CONCRETE DURING PLACEMENT.
6. WHITE CURING COMPOUND, PER IDOT SECTION 1022.01(C), SHALL BE APPLIED TO THE CONCRETE IMMEDIATELY AFTER IT HAS BEEN FINISHED OR PER MANUFACTURER'S RECOMMENDATION.

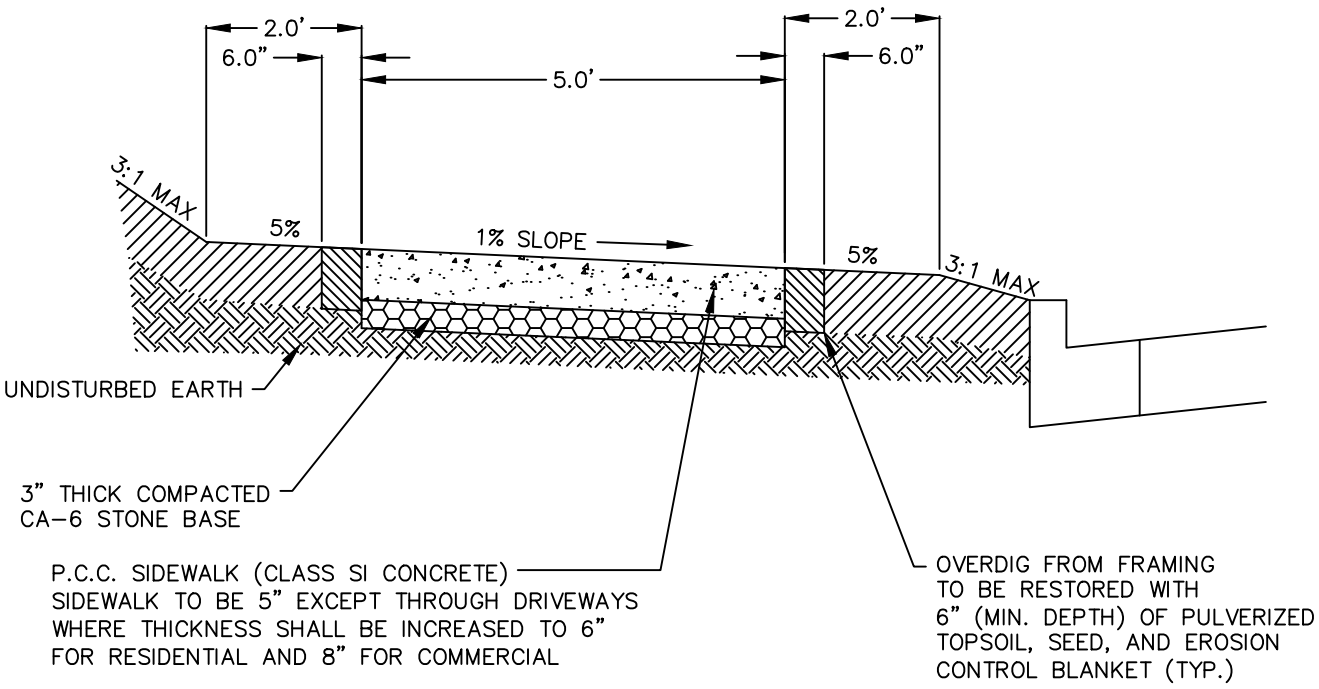
STANDARD COMMERCIAL DRIVEWAY ENTRANCE DETAIL

northbrook
Public Works Department

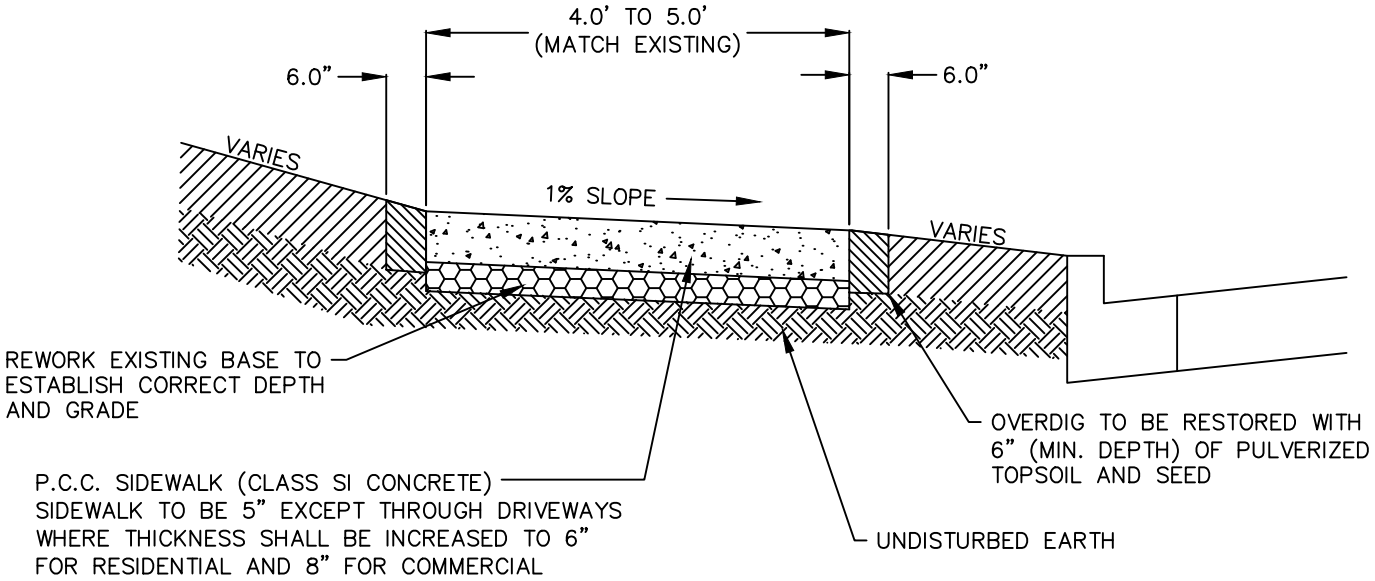
DATE	REVISIONS
4-30-20	Added and Revised Notes
4-1-21	Added Plan Note
5-1-23	Revised Callouts

STANDARD DETAIL
P-4 (03)

NEW P.C.C. SIDEWALK



P.C.C. SIDEWALK PATCHING



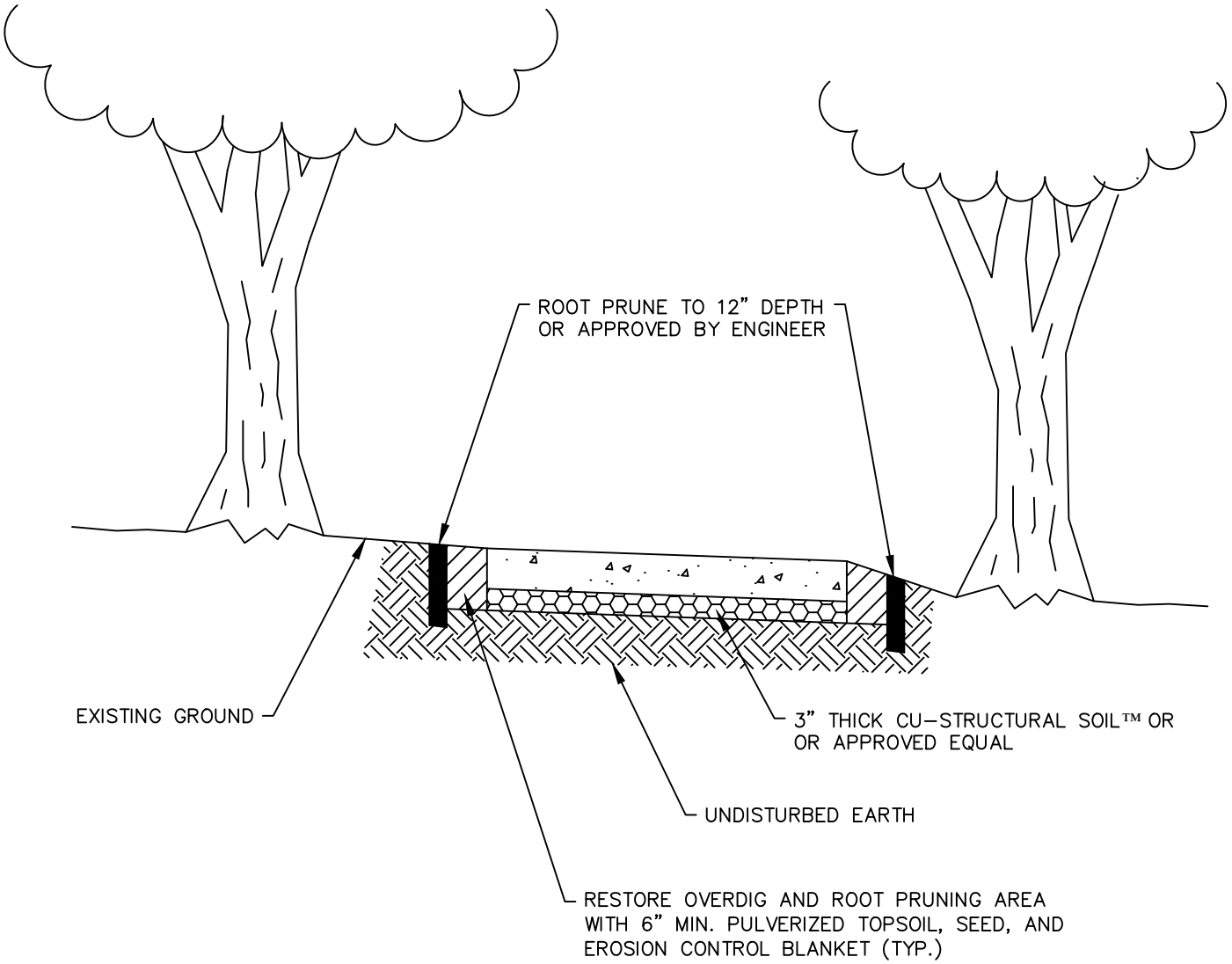
NOTES:
1. WHEN CONSTRUCTING SIDEWALK WITHIN THE DRIPLINE OF A TREE, FOLLOW STANDARD DETAIL FOR "P.C.C. SIDEWALK IN DRIPLINE DETAIL" P-6
2. PROVIDE 1/2" THICK FIBER EXPANSION JOINT PER ASTM D-1751 EVERY 50 FEET

P.C.C. SIDEWALK DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Consolidated Sidewalk Details
5-1-23	Revised Callouts

STANDARD DETAIL
P-5 (02)

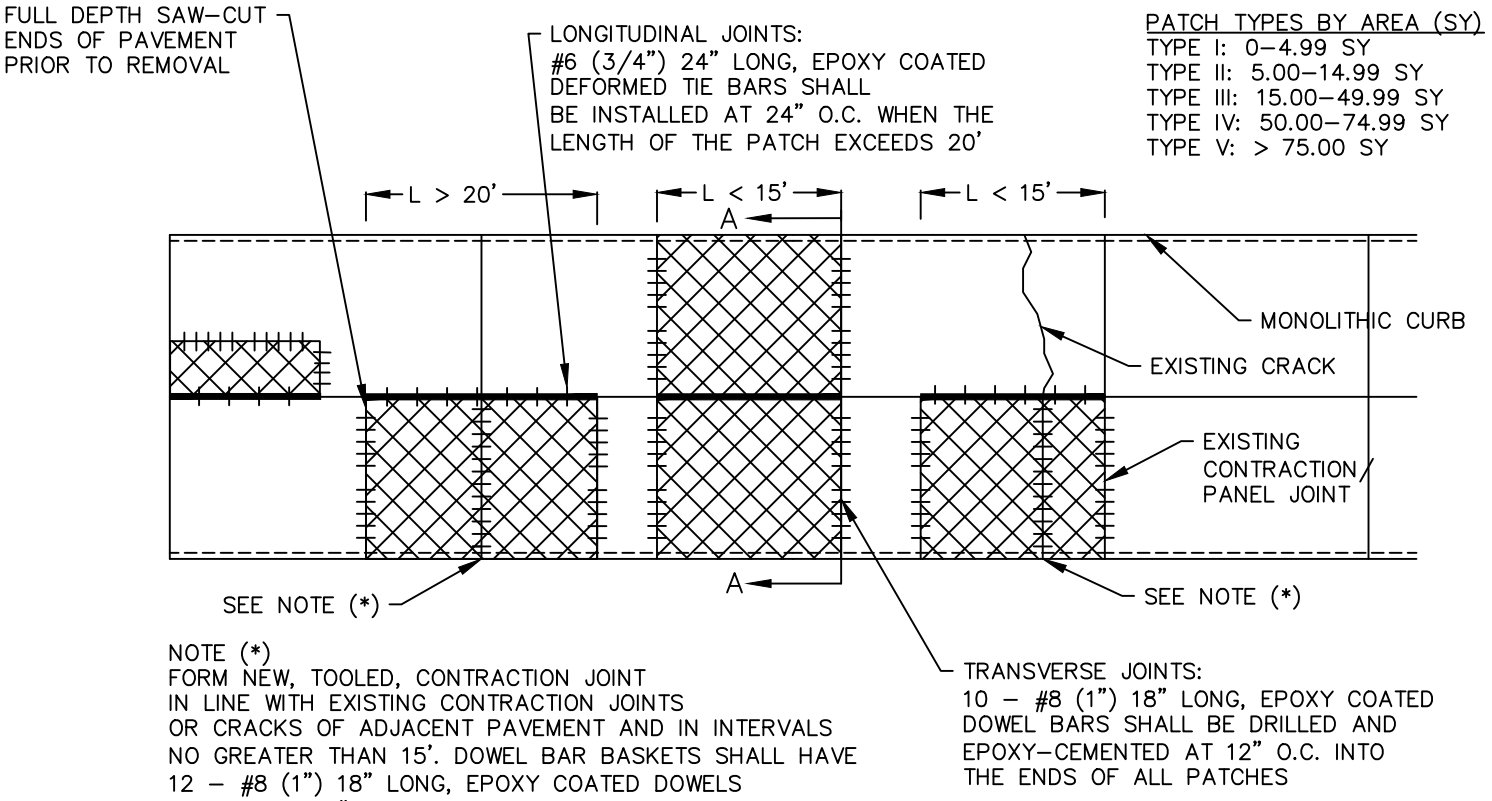


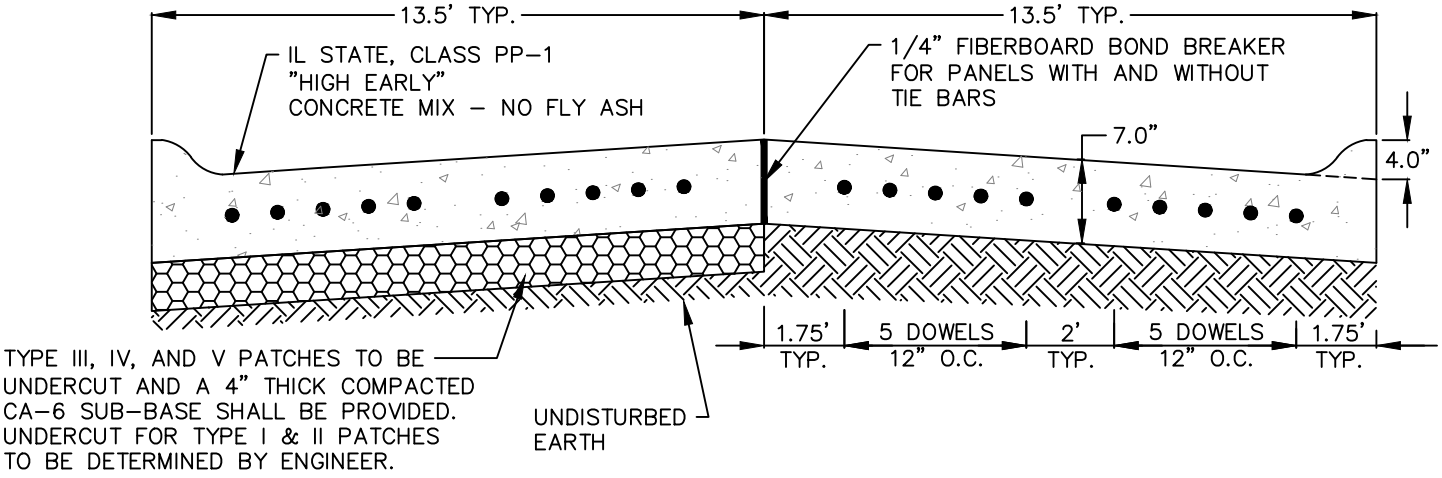
P.C.C. SIDEWALK IN DRIPLINE DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes
5-1-23	Revised Callouts

STANDARD DETAIL
P-6 (02)





CROSS SECTION A-A

NOTES:
1. ALL CONTRACTION JOINTS SHALL BE SAW-CUT TO A DEPTH OF 2" AT THE END OF EACH WORKING DAY OR SOONER IF PERMISSIBLE.
2. CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF PANELS THAT DEVELOP SHRINKAGE CRACKS THAT ARE NOT LOCATED AT THE SAWED CONTRACTION JOINT.
3. ALL JOINTS AND THE PERIMETER OF THE PATCH SHALL BE PREPARED, CLEANED AND SEALED WITH HOT MIX RUBBER ASPHALT JOINT SEALER.
4. WHITE CURING COMPOUND, PER IDOT SECTION 1022.01(C), SHALL BE APPLIED TO THE CONCRETE IMMEDIATELY AFTER IT HAS BEEN FINISHED OR PER MANUFACTURER'S RECOMMENDATION.

CONCRETE STREET PATCHING DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes & Specifications
4-1-21	Added Plan Note & Revised Picture

STANDARD DETAIL
P-7 (02)

Illinois Department of Transportation

STANDARD	DESCRIPTION	CHECK APPLICABILITY 'X'
424001	PERPENDICULAR RAMPS FOR SIDEWALKS	
424006	DIAGONAL CURB RAMPS FOR SIDEWALKS	
424011	CORNER PARALLEL CURB RAMPS FOR SIDEWALKS	
424016	MID-BLOCK CURB RAMPS FOR SIDEWALKS	
424021	DEPRESSED CORNER FOR SIDEWALKS	
424026	ENTRANCE/ALLEY PEDESTRIAN CROSSINGS	
424031	MEDIAN PEDESTRIAN CROSSINGS	

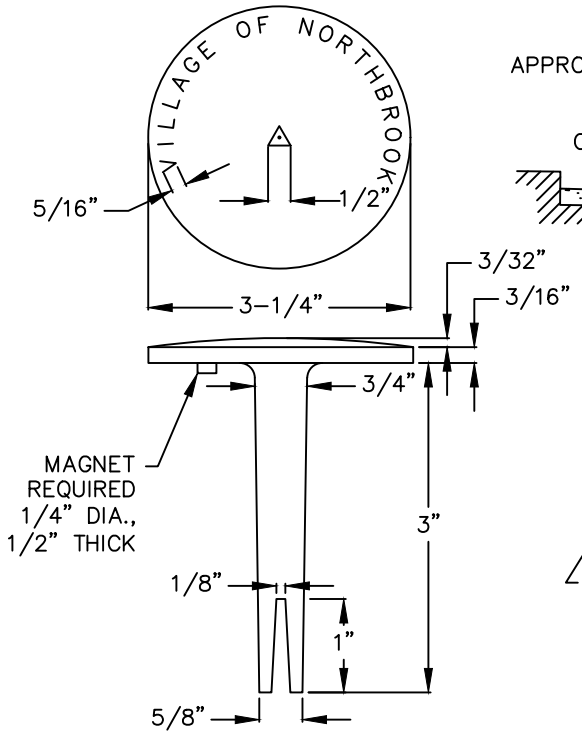
NOTES:
1. USE LATEST REVISION OF STANDARD
2. STANDARD CHECKED SHALL BE INCLUDED IN THE PLAN SET

CURB RAMPS FOR SIDEWALKS STANDARD

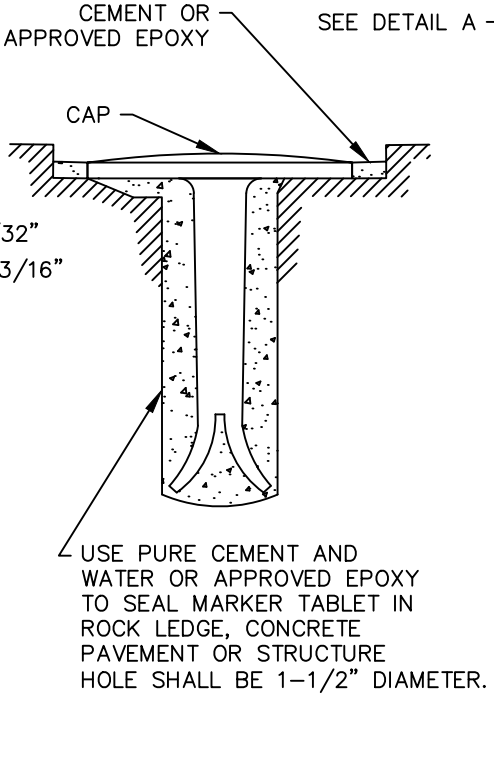
northbrook
Public Works Department

DATE	REVISIONS
7-25-19	Adapted To IDOT Standards
4-30-20	Added Notes
4-1-21	Edited Table

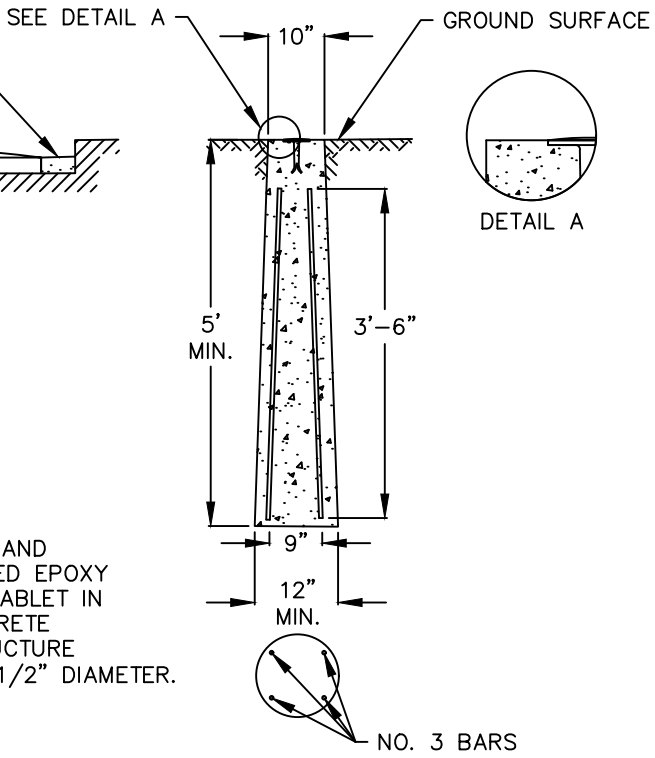
STANDARD
P-8 (03)



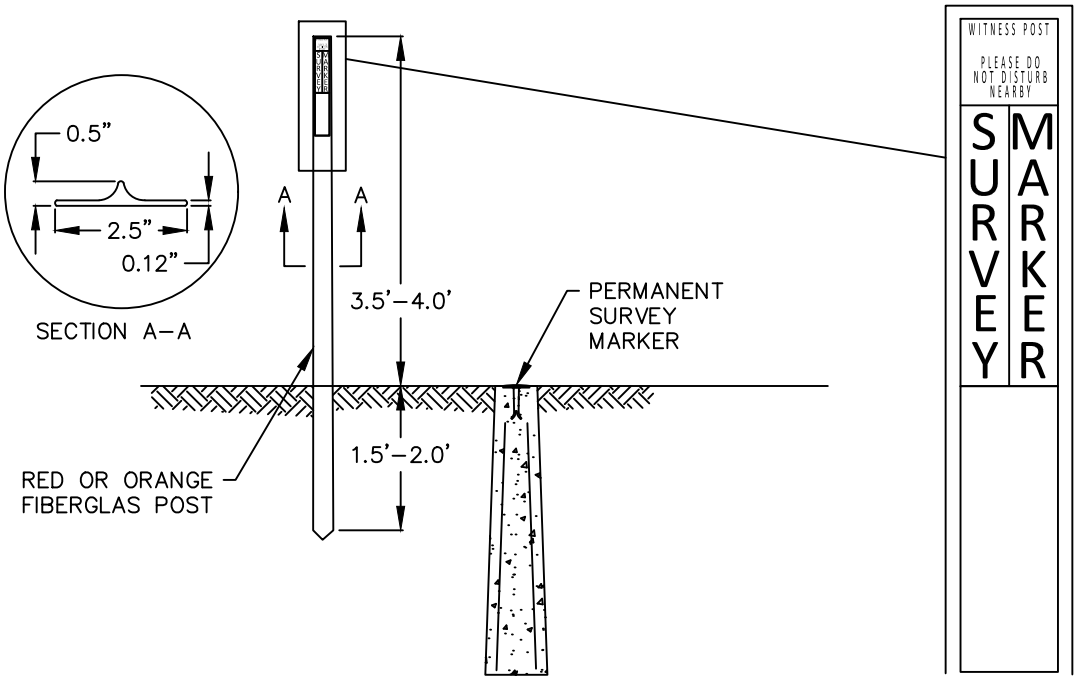
BRASS OR ALUMINUM TABLET



TABLET CONSTRUCTED IN ROCK LEDGE OR CONCRETE



CAST-IN-PLACE MARKER



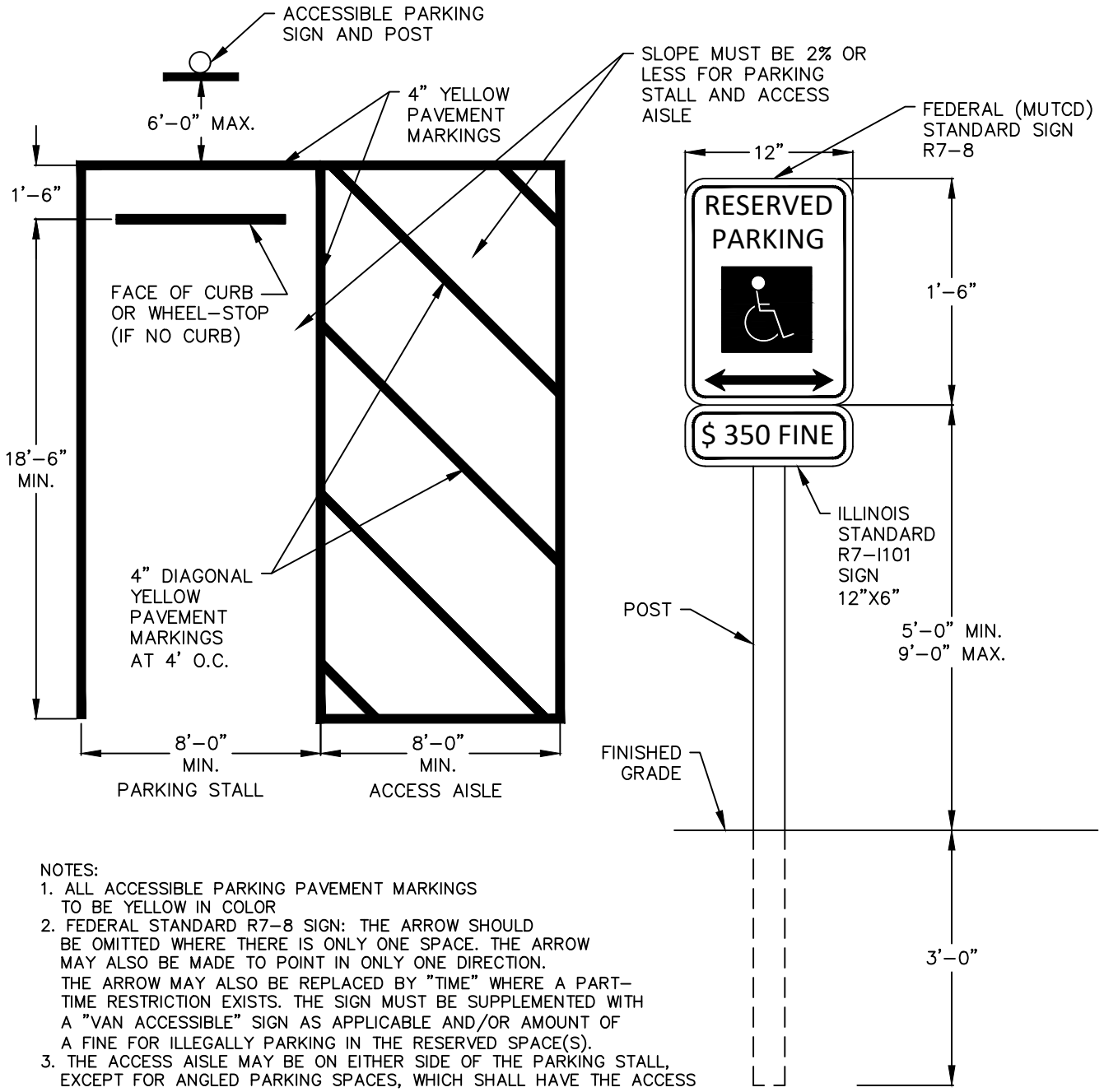
A WITNESS MARKER SHALL BE INSTALLED WITHIN 1' OF ALL PERMANENT SURVEY MARKERS EXCEPT IN AREAS WHERE THE MARKER IS IN THE SIDEWALK. THIS WORK WILL BE INCLUDED TO THE CONTRACT UNIT PRICE PER EACH FOR PERMANENT SURVEY MARKERS.

PERMANENT SURVEY MARKERS

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	New Detail

STANDARD DETAIL
P-9 (01)



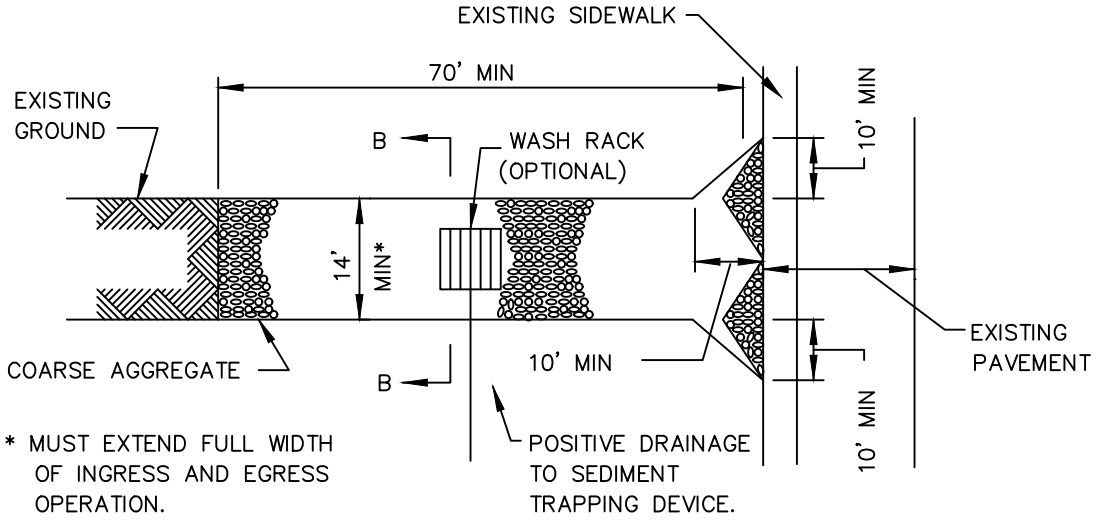
NOTES:
1. ALL ACCESSIBLE PARKING PAVEMENT MARKINGS TO BE YELLOW IN COLOR
2. FEDERAL STANDARD R7–8 SIGN: THE ARROW SHOULD BE OMITTED WHERE THERE IS ONLY ONE SPACE. THE ARROW MAY ALSO BE MADE TO POINT IN ONLY ONE DIRECTION. THE ARROW MAY ALSO BE REPLACED BY "TIME" WHERE A PART–TIME RESTRICTION EXISTS. THE SIGN MUST BE SUPPLEMENTED WITH A "VAN ACCESSIBLE" SIGN AS APPLICABLE AND/OR AMOUNT OF A FINE FOR ILLEGALLY PARKING IN THE RESERVED SPACE(S).
3. THE ACCESS AISLE MAY BE ON EITHER SIDE OF THE PARKING STALL, EXCEPT FOR ANGLED PARKING SPACES, WHICH SHALL HAVE THE ACCESS AISLE LOCATED ON THE PASSENGER SIDE OF THE PARKING STALL.
4. THE NORTHBROOK ZONING CODE HAS VARYING PARKING STALL DIMENSIONS DEPENDING UPON THE ZONING DISTRICT. THIS DETAIL SHOWS THE MOST COMMON SIZE.

ACCESSIBLE PARKING DETAIL

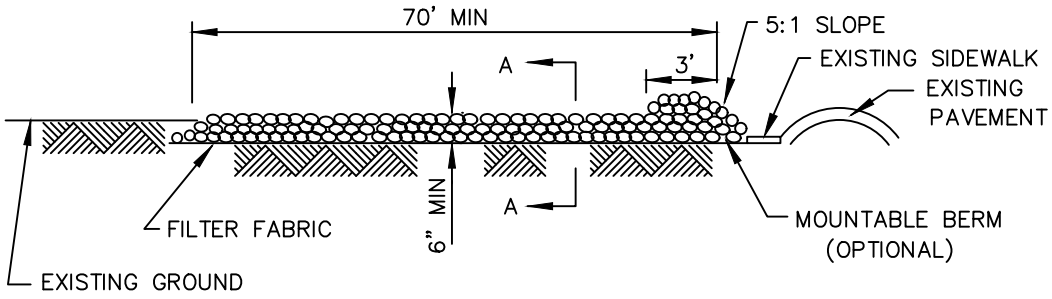
northbrook
Public Works Department

DATE	REVISIONS
7-25-19	Dimensions, Notes
4-1-21	Added Plan Note
5-1-23	Updated Detail

STANDARD DETAIL
P-10 (03)



PLAN VIEW



SIDE ELEVATION

NOTES:

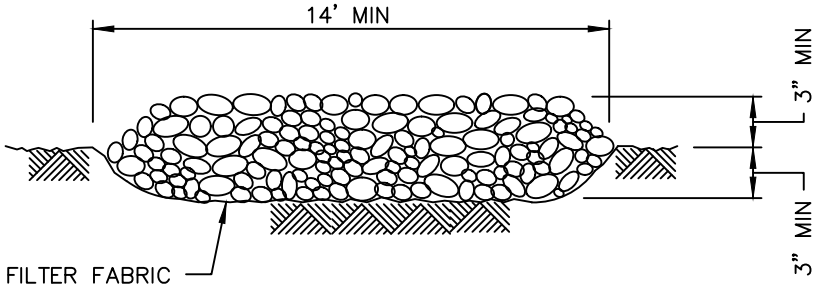
1. FILTER FABRIC SHALL MEET THE REQUIREMENTS OF MATERIAL SPECIFICATION 592 GEOTEXTILE, TABLE I OR 2, CLASS I , II OR IV AND SHALL BE PLACED OVER THE CLEARED AREA PRIOR TO THE PLACING OF ROCK.
2. ROCK SHALL MEET ONE OF THE FOLLOWING GRADATIONS: AHTD AGGREGATE BASE COURSE CLASS 1,2 OR 3, OR ASTM C33 COARSE AGGREGATE SIZE 1, 2, 3, 357, 4 OR 467, AND BE PLACED ACCORDING TO CONSTRUCTION SPECIFICATION 25 ROCKFILL USING PLACEMENT METHOD 1 AND CLASS III COMPACTION.
3. ANY DRAINAGE FACILITIES REQUIRED BECAUSE OF WASHING SHALL BE CONSTRUCTED ACCORDING TO MANUFACTURERS SPECIFICATIONS.
4. IF WASH RACKS ARE USED THEY SHALL BE INSTALLED ACCORDING TO THE MANUFACTURES SPECIFICATIONS.

STABILIZED CONSTRUCTION ENTRANCE DETAIL

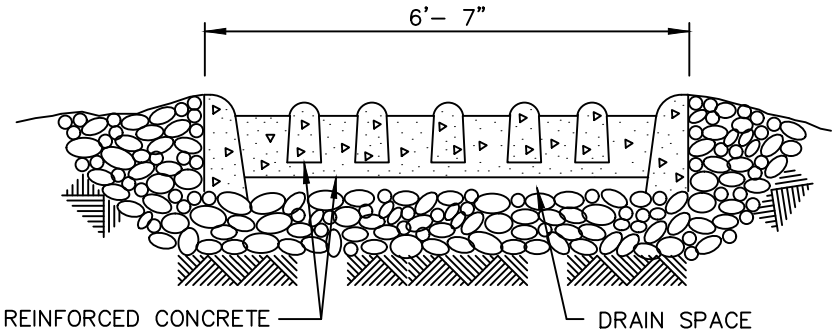
northbrook
Public Works Department

DATE	REVISIONS
5-1-23	New Detail

STANDARD DETAIL
P-11 (01)



SECTION A–A



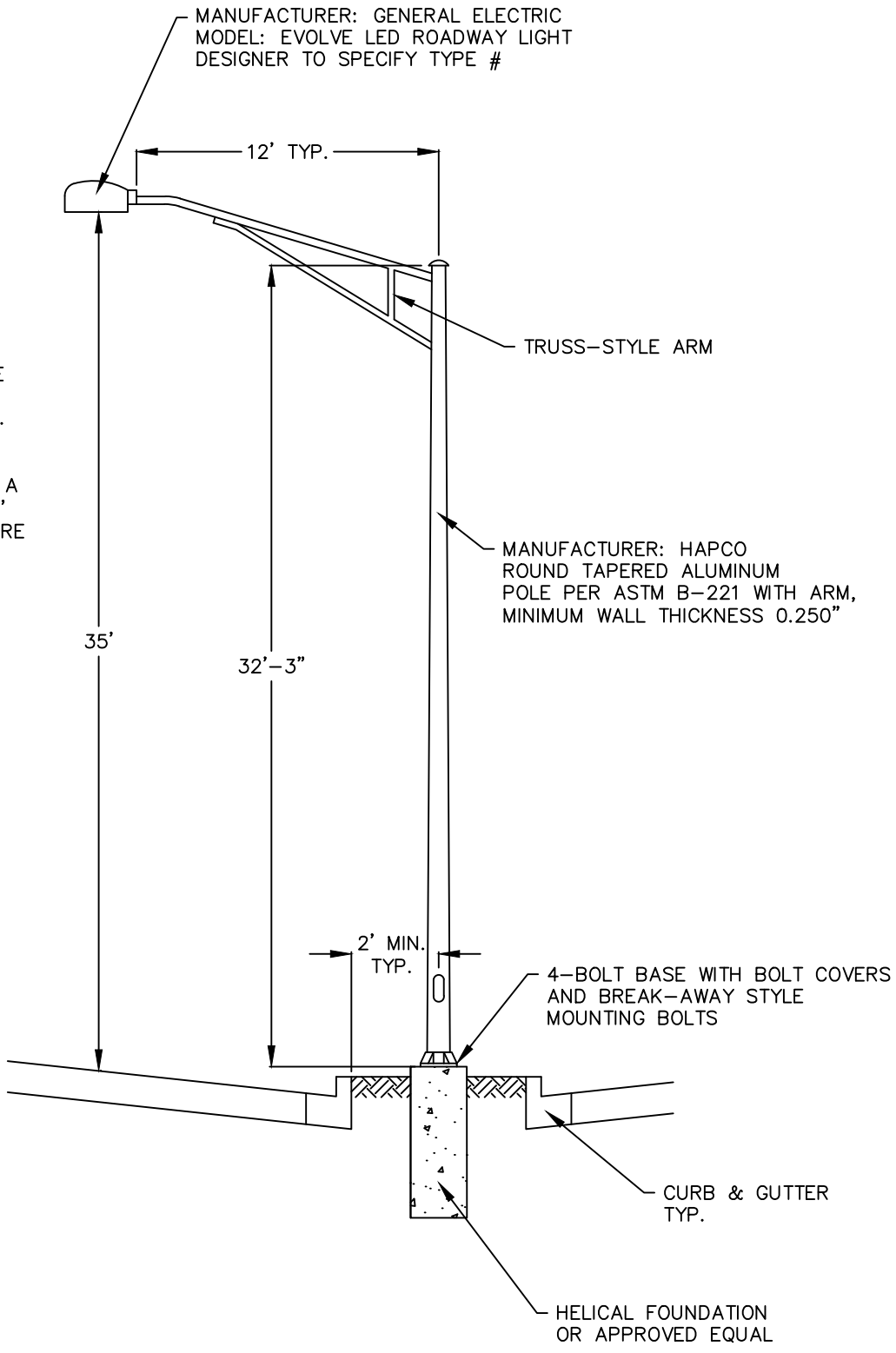
SECTION B–B

STABILIZED CONSTRUCTION ENTRANCE DETAIL

northbrook
Public Works Department

DATE	REVISIONS
5-1-23	New Detail

STANDARD DETAIL
P-11 (01)



NOTES:
1. VERIFY FIXTURE AND POLE SPECIFICATIONS WITH THE VILLAGE PRIOR TO ORDERING.

2. SETBACK SHALL BE 2' FROM EDGE OF ROADWAY IF A CURB, SETBACK SHALL BE 4' FROM EDGE OF ROAD IF THERE IS NO CURB.

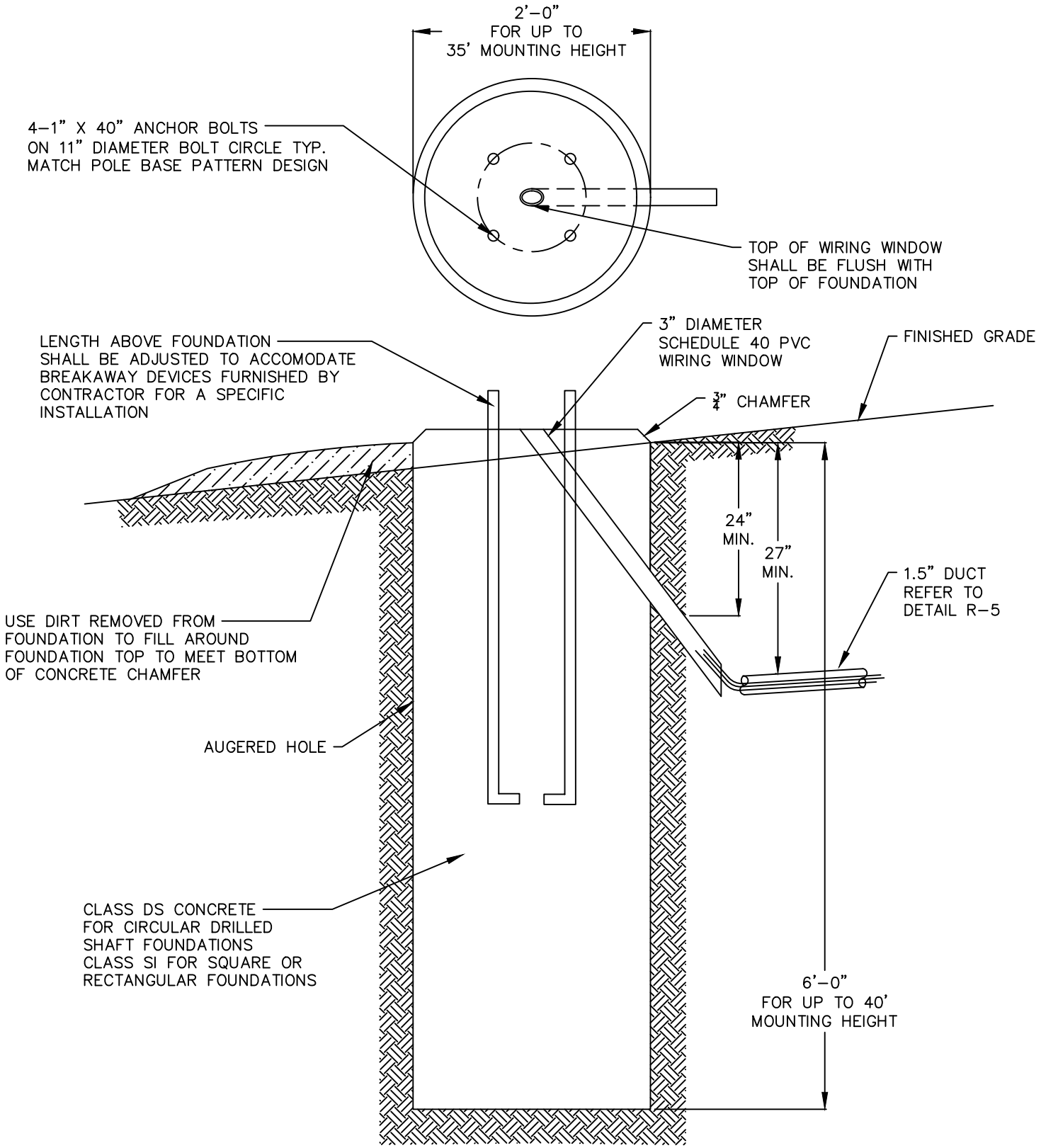
3. AT ROADWAY INTERSECTIONS WITH SIGNS, LIGHT POLES SHALL BE SET BACK AS TO NOT OBSTRUCT STOP SIGNS, ETC.

STREET LIGHT POLE DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes & Specifications
5-1-23	Revised Callouts

STANDARD DETAIL
R-1 (02)

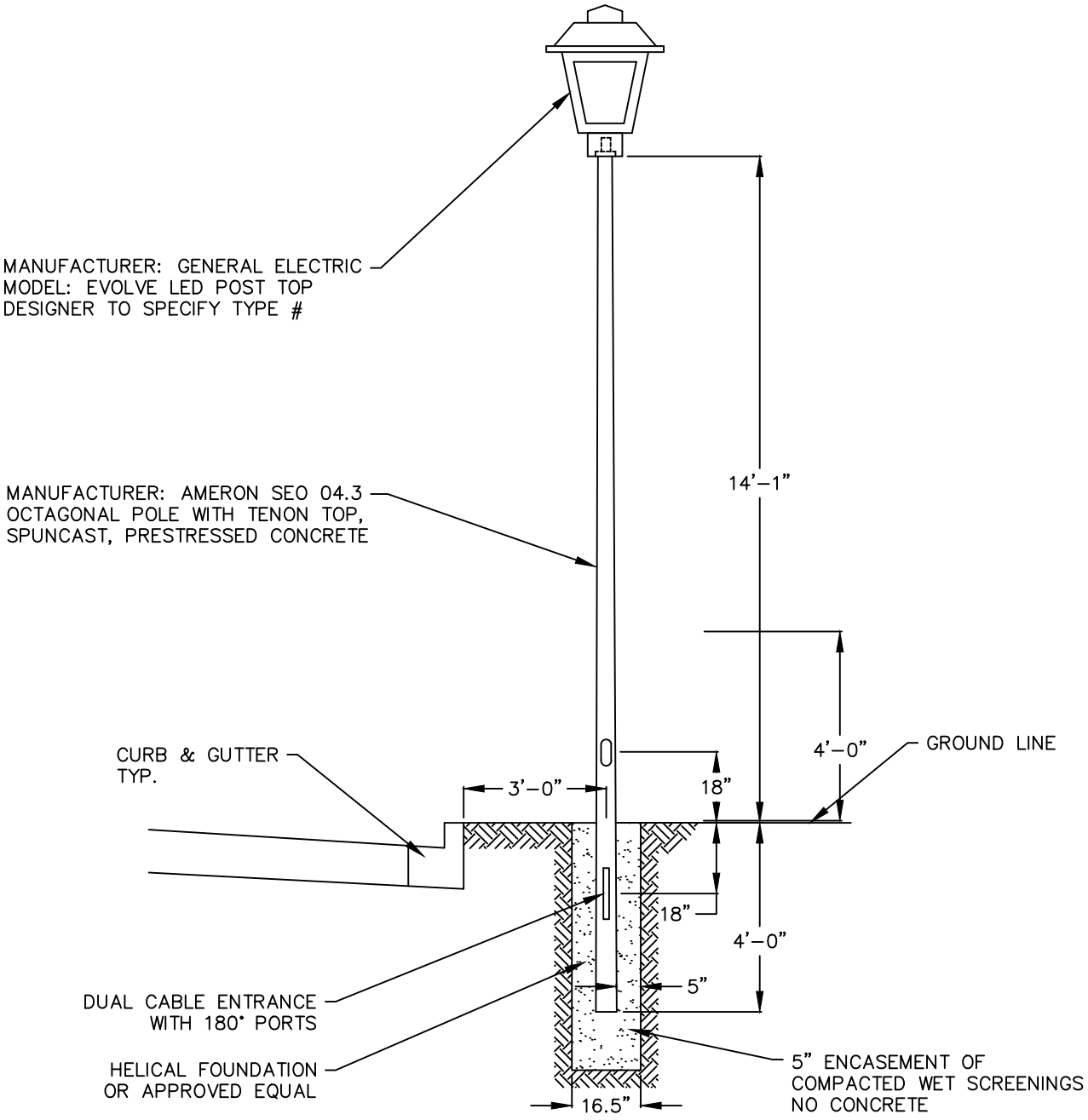


STREET LIGHT POLE FOUNDATION DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes & Specifications
5-1-23	Revised Callouts

STANDARD DETAIL
R-2 (02)



NOTES:
1. THE POLE SHALL HAVE GRAY NATURAL LIGHT POLISH FINISH AMERSHIELD COATING MODBH.
2. TENON TOP SHALL BE ALUMINUM 2.875" O.D. DIA. WITH 2.5" LG.
3. VERIFY FIXTURE AND POLE SPECIFICATIONS WITH THE VILLAGE PRIOR TO ORDERING.
4. SETBACK SHALL BE 3' FROM EDGE OF ROADWAY IF A CURB, SETBACK SHALL BE 4' FROM EDGE OF ROAD IF THERE IS NO CURB.

STREET LIGHT STANDARD DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes & Specifications
5-1-23	Revised Callout

STANDARD DETAIL
R-3 (02)

Illinois Department of Transportation

STANDARD	DESCRIPTION	TOTAL PAGES	CHECK APPLICABILITY 'X'
814001	HANDHOLES	1	

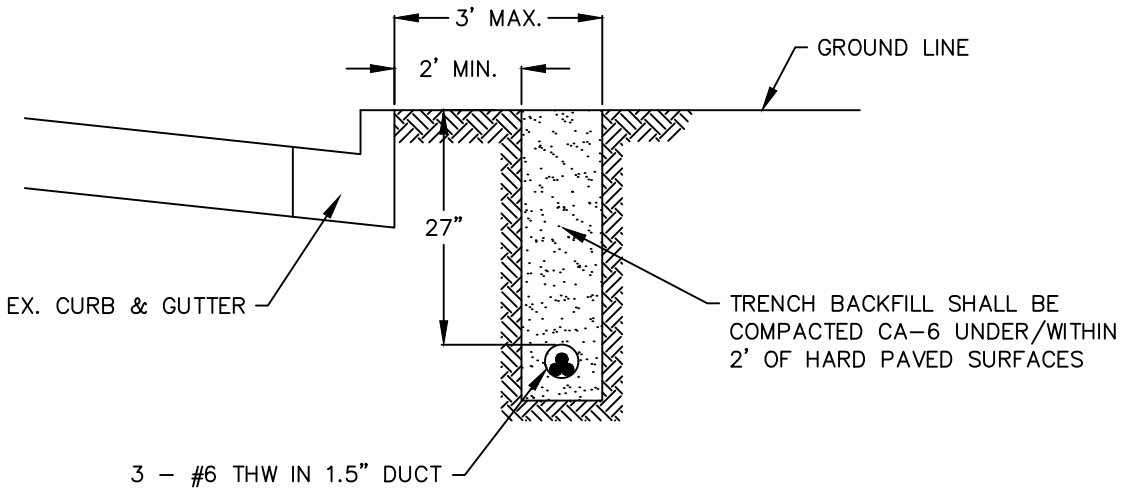
NOTES:
1. USE LATEST REVISION OF STANDARD.
2. STANDARD SHALL BE INCLUDED IN THE PLAN SET.
3. THE FOLLOWING MODIFICATION SHALL BE MADE TO IDOT STD. 814001:
   A. PORTLAND CEMENT CONCRETE HANDHOLES SHALL BE USED IN SIDEWALKS, DRIVEWAY AND ALL OTHER LIGHT DUTY PAVEMENTS.
   B. PORTLAND CEMTENT HEAVY DUTY HANDHOLES SHALL BE USED IN ROADWAY PAVEMENTS.
   C. COMPOSITE CONCRETE HANDHOLES SHALL BE USED IN PARKWAYS, NON-LOAD AREAS.
4. LID SHALL BE NEENAH R-6685-D
5. LID IMPRINT SHALL READ "TRAFFIC SIGNAL" OR "STREET LIGHT" DEPENDING ON APPLICATION.

HANDHOLES

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Adapted To IDOT Standard

STANDARD DETAIL
R-4 (01)



NOTES:

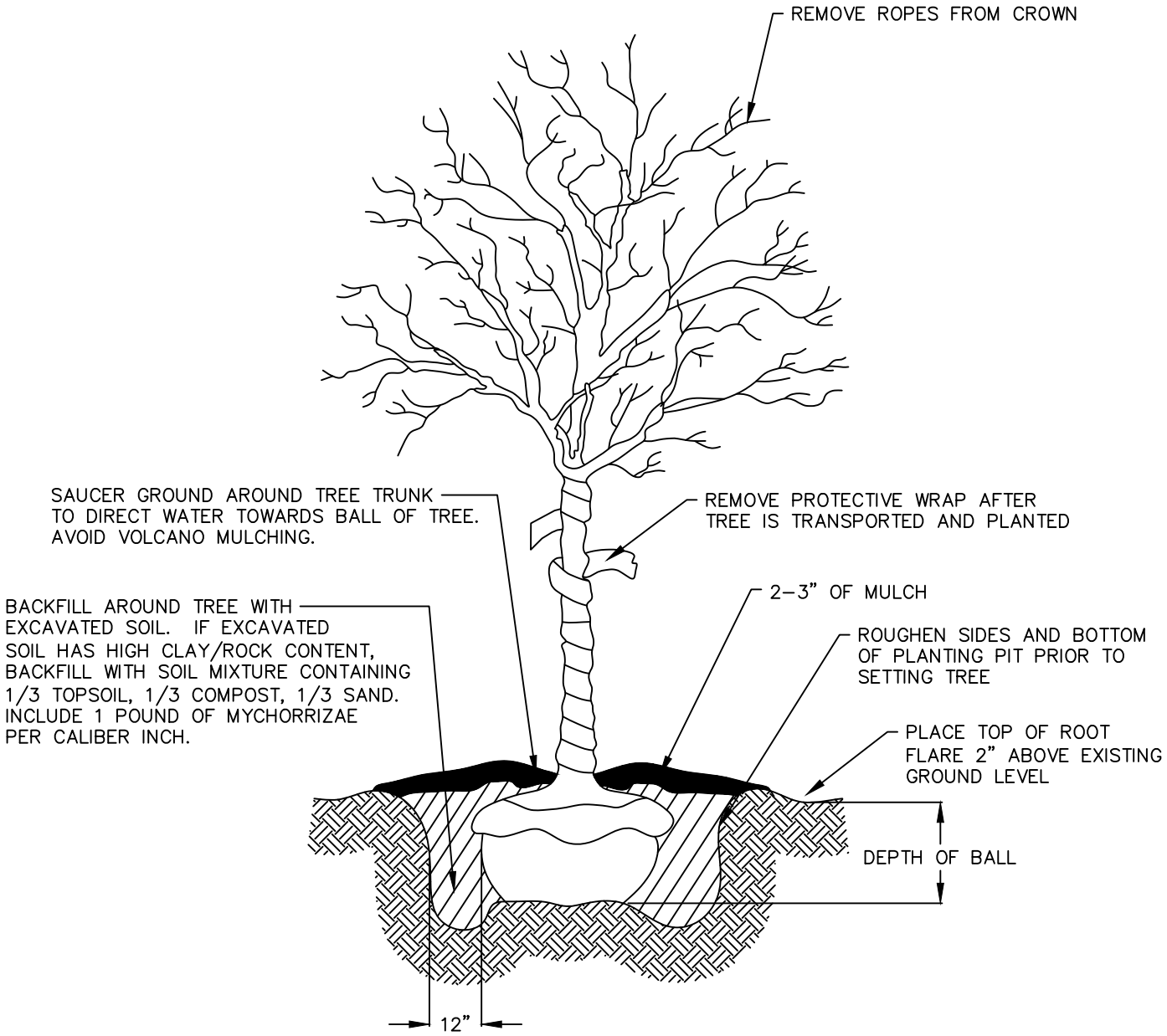
1. CABLE DUCT SHALL BE A MINIMUM OF 2' TO A MAXIMUM OF 3' BEHIND THE BACK OF CURB.
2. ALL SURFACES MUST BE RESTORED TO THEIR ORIGINAL CONDITION.
3. WIRING SHALL BE THERMOPLASTIC, HIGH HEAT AND WATER RESISTANT TYPE (THW) AS LISTED IN THE NEC CURRENTLY ADOPTED BY V.O.N.
4. DUCT TO BE 1.5" SCHEDULE 40 OR 80:
   SCHEDULE 40 WITHIN PARKING LOT
   SCHEDULE 80 EXTERIOR OF PARKING LOT

BURIED CABLE TRENCH DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes & Specifications
5-1-23	Revised Notes

STANDARD DETAIL
R-5 (02)



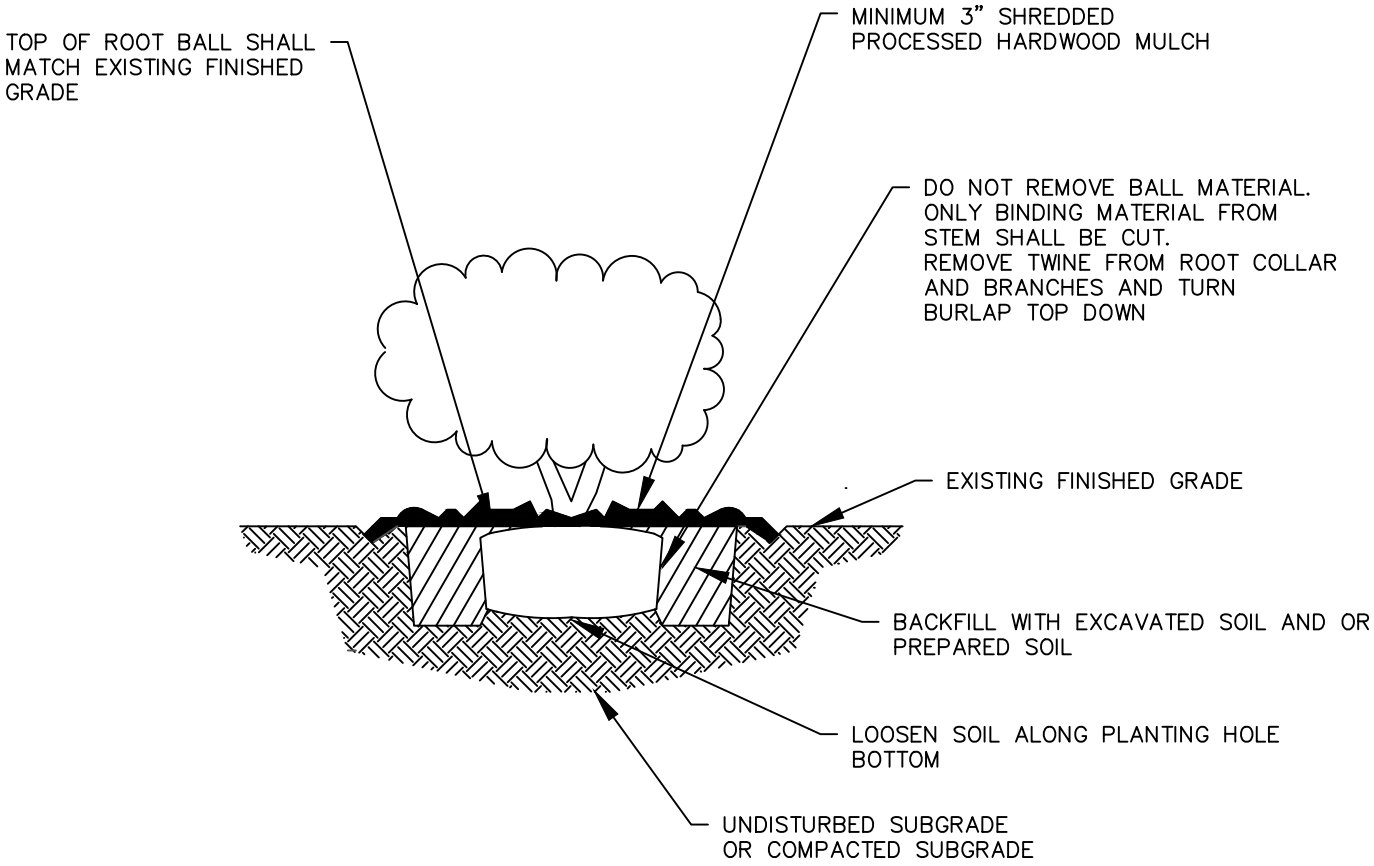
NOTES:
1. CUT TWINE AT BASE OF TREE UPON PLANTING AND REMOVE ALL WIRES A MINIMUM OF 8" BELOW GRADE.
2. LOW PROFILE BASKETS ARE PREFERRED.
3. NYLON ROPE AND PLASTIC BURLAP ARE NOT PERMITTED.
4. NOT TO BE PLANTED IN SWALES OR OVERLAND DRAINAGE ROUTES

TREE PLANTING DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes
4-1-21	Added Plan Note

STANDARD DETAIL
G-1 (02)



NOTES:
1. FINAL BALL ELEVATION AND PLANTER BED GRADING AS DIRECTED BY PLAN.
2. WHEN SOIL CONDITIONS WITH POOR DRAINAGE ARE DISCOVERED, NOTIFY VILLAGE REPRESENTATIVE.
3. LANDSCAPE CONTRACTOR SHALL SUGGEST SOLUTION FOR DRAINAGE IMPROVEMENTS

SHRUB PLANTING DETAIL

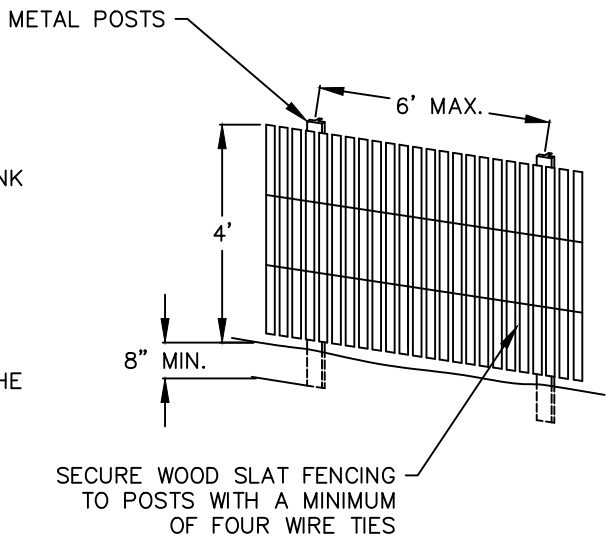
northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes
4-1-21	Added Plan Note

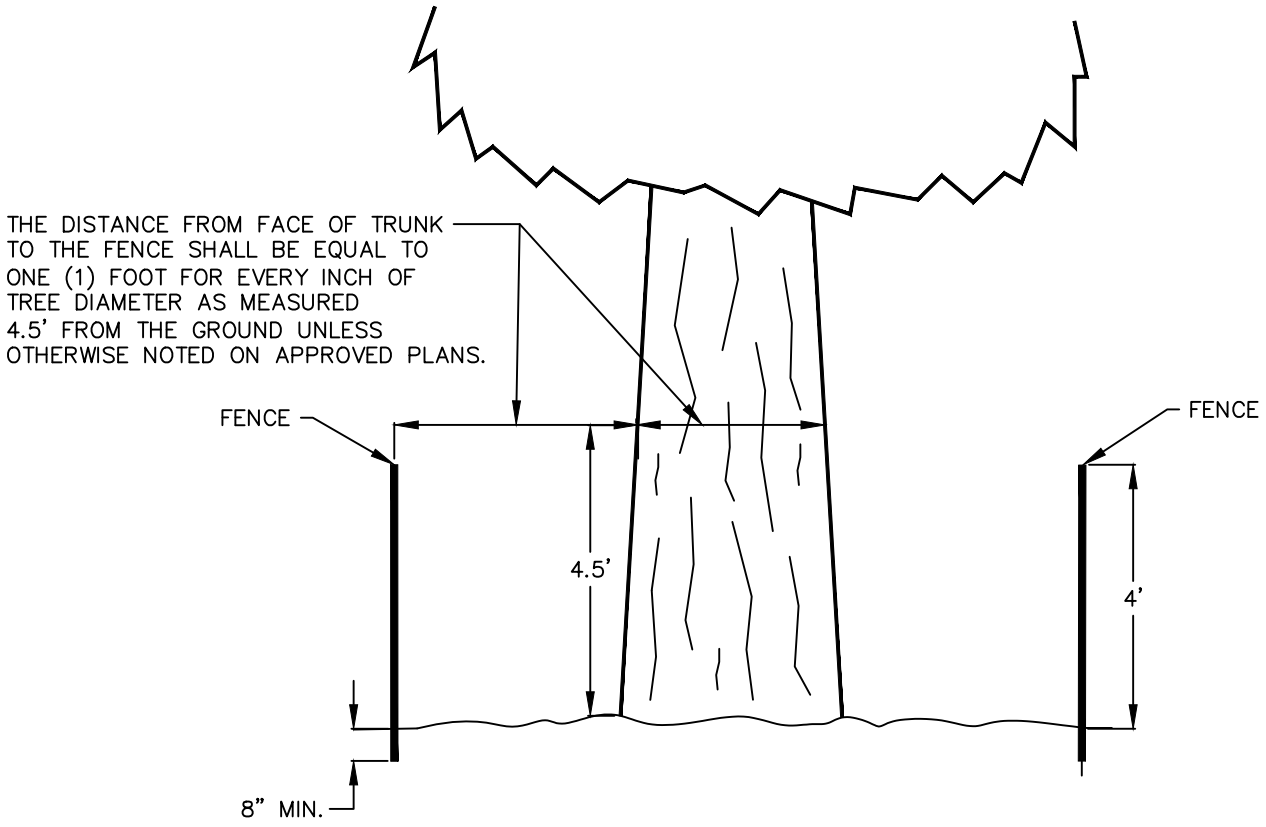
STANDARD DETAIL
G-2 (02)

NOTES:

1. INSTALL & MAINTAIN 4' TALL WOODEN SLAT OR CHAIN LINK METAL FENCE SECURED TO METAL POSTS SPACED A MAXIMUM DISTANCE OF 6' APART.
2. CHAIN LINK FENCE TO HAVE POSTS SECURED AT EACH SECTION TO MAINTAIN AN UPRIGHT AND STATIONARY POSITION THROUGHOUT CONSTRUCTION.
3. FAILURE TO INSTALL AND MAINTAIN PROTECTIVE TREE FENCING IN ACCORDANCE WITH VILLAGE STANDARDS WILL RESULT IN THE ISSUANCE OF A STOP WORK ORDER ON THE PROJECT.



WOOD SLAT FENCE DETAIL



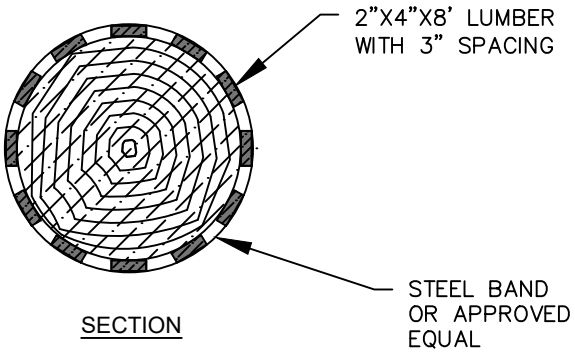
WOODEN SLAT OR CHAIN LINK TREE PROTECTION DETAIL

northbrook
Public Works Department

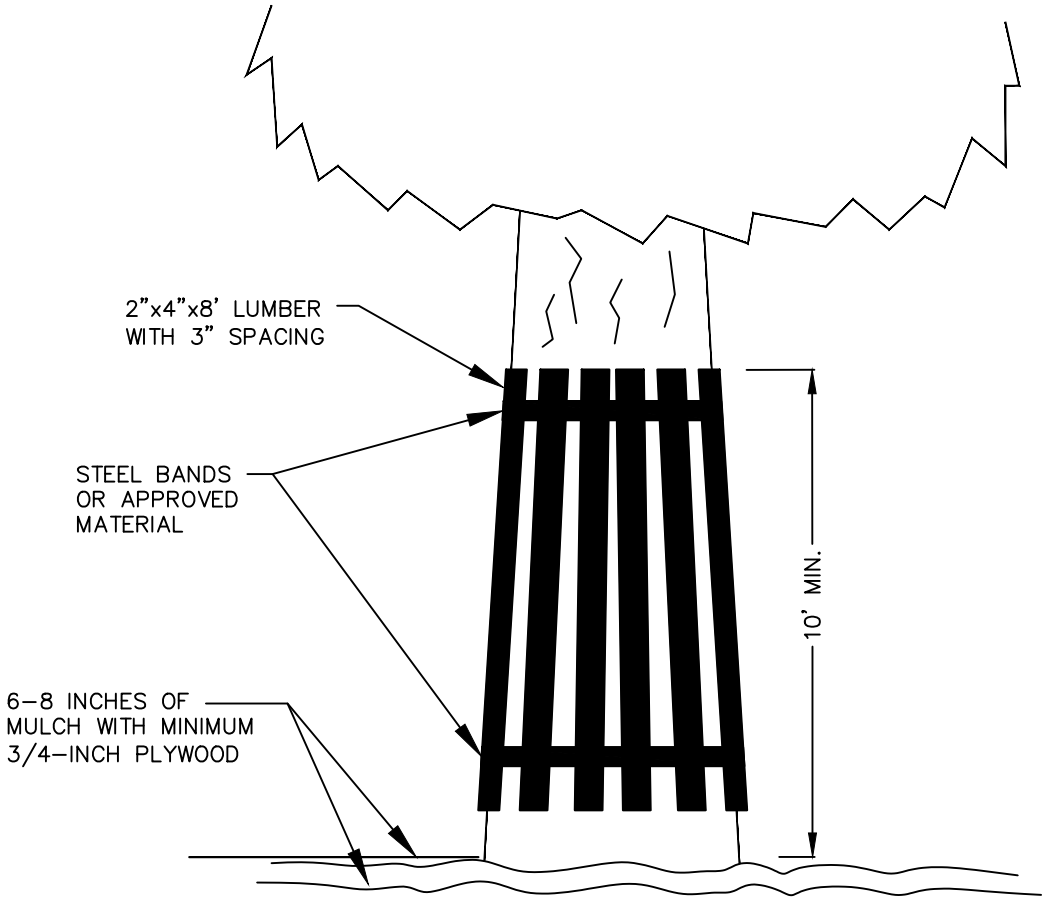
DATE	REVISIONS
4-30-20	Revised Notes
4-1-21	Added Plan Note

STANDARD DETAIL
G-3 (02)

NOTE:
TREE PROTECTION MUST INCLUDE INSTALLATION OF SNOW FENCE AS SHOWN ON APPROVED PLANS



SECTION

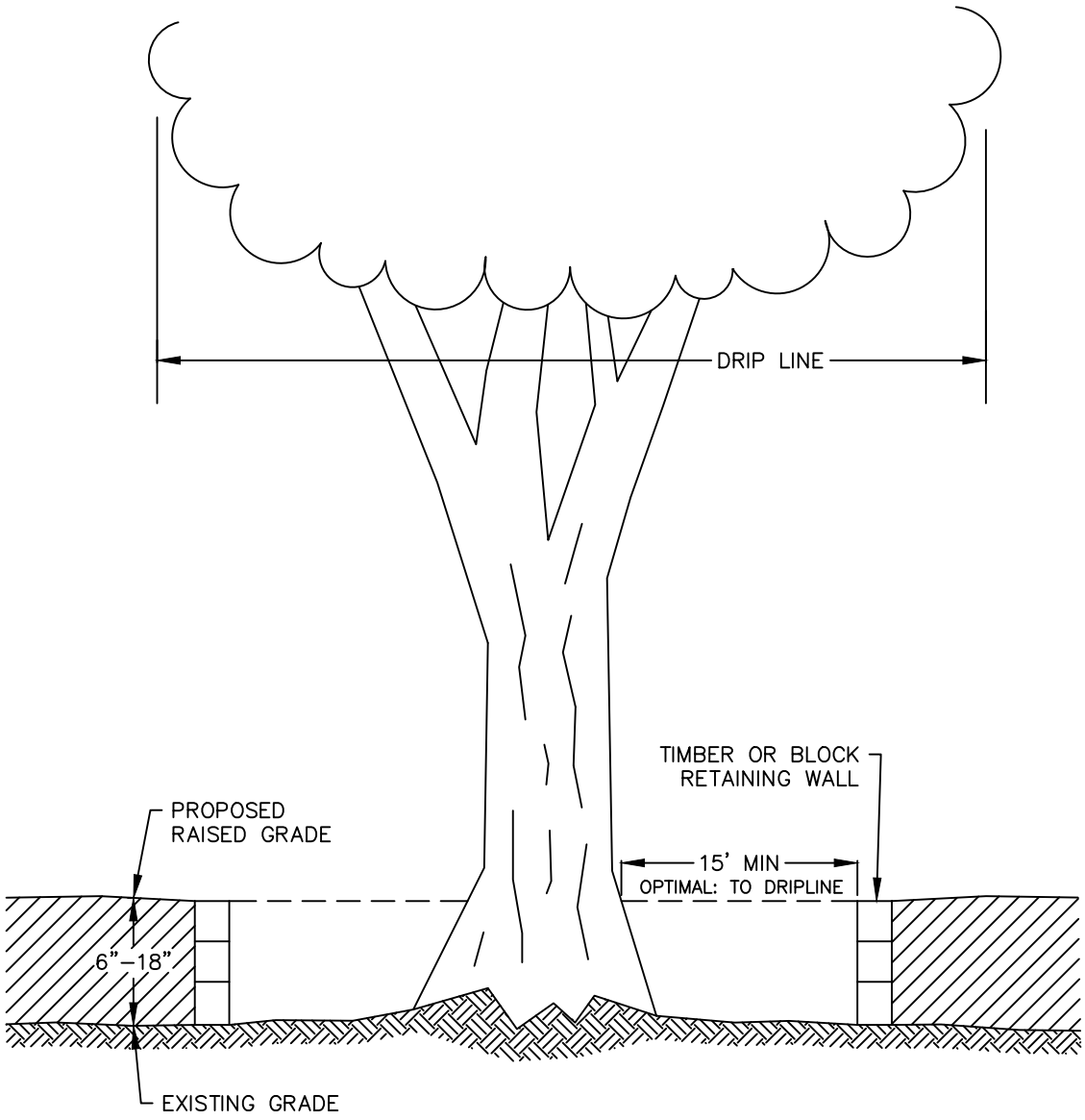


WOOD PLANK
TREE PROTECTION DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes
4-1-21	Revised Notes

STANDARD DETAIL
G-4 (02)

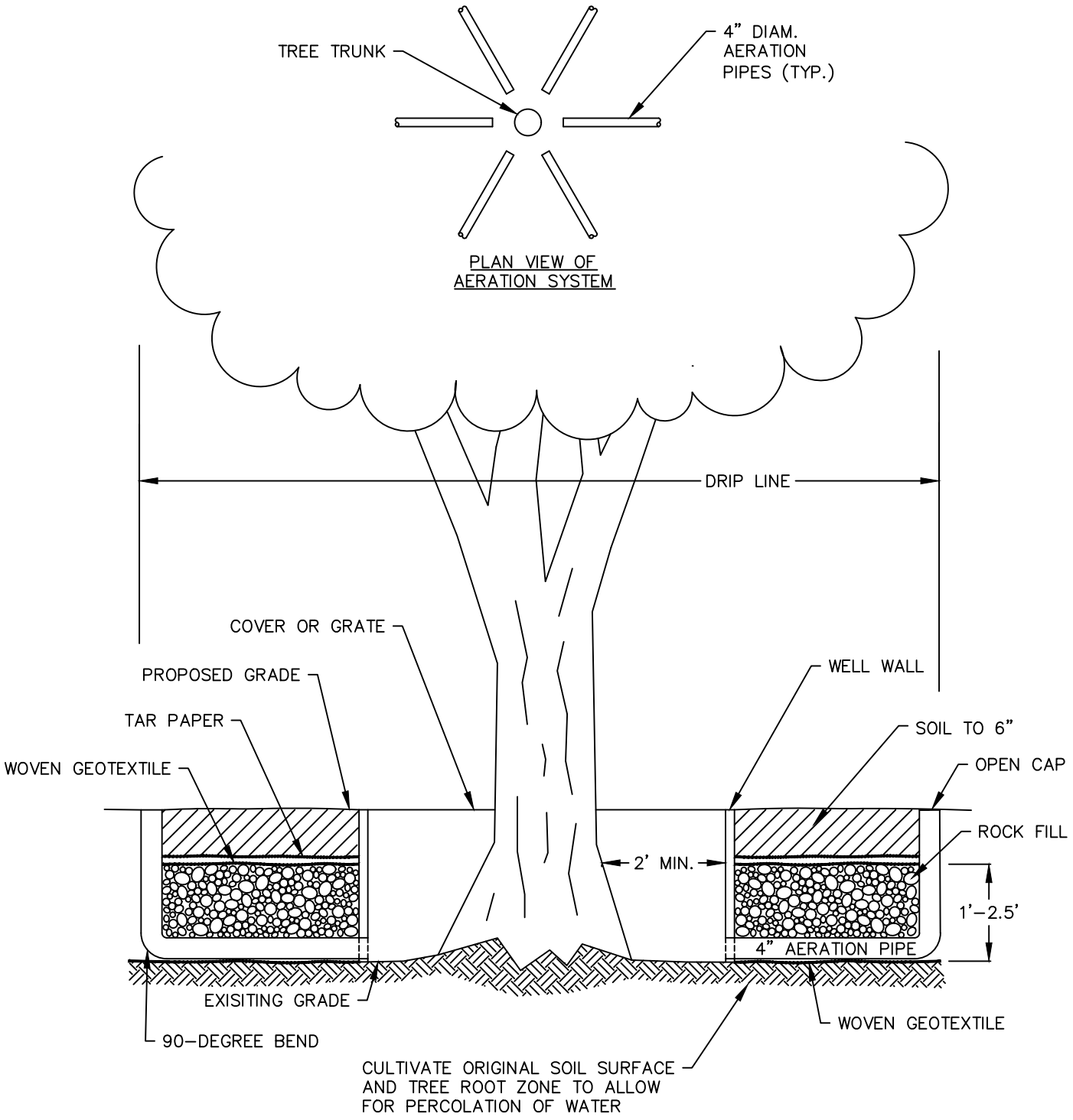


TREE WELL DETAIL
(6"-18" GRADE INCREASE)

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes

STANDARD DETAIL
G-5 (01)

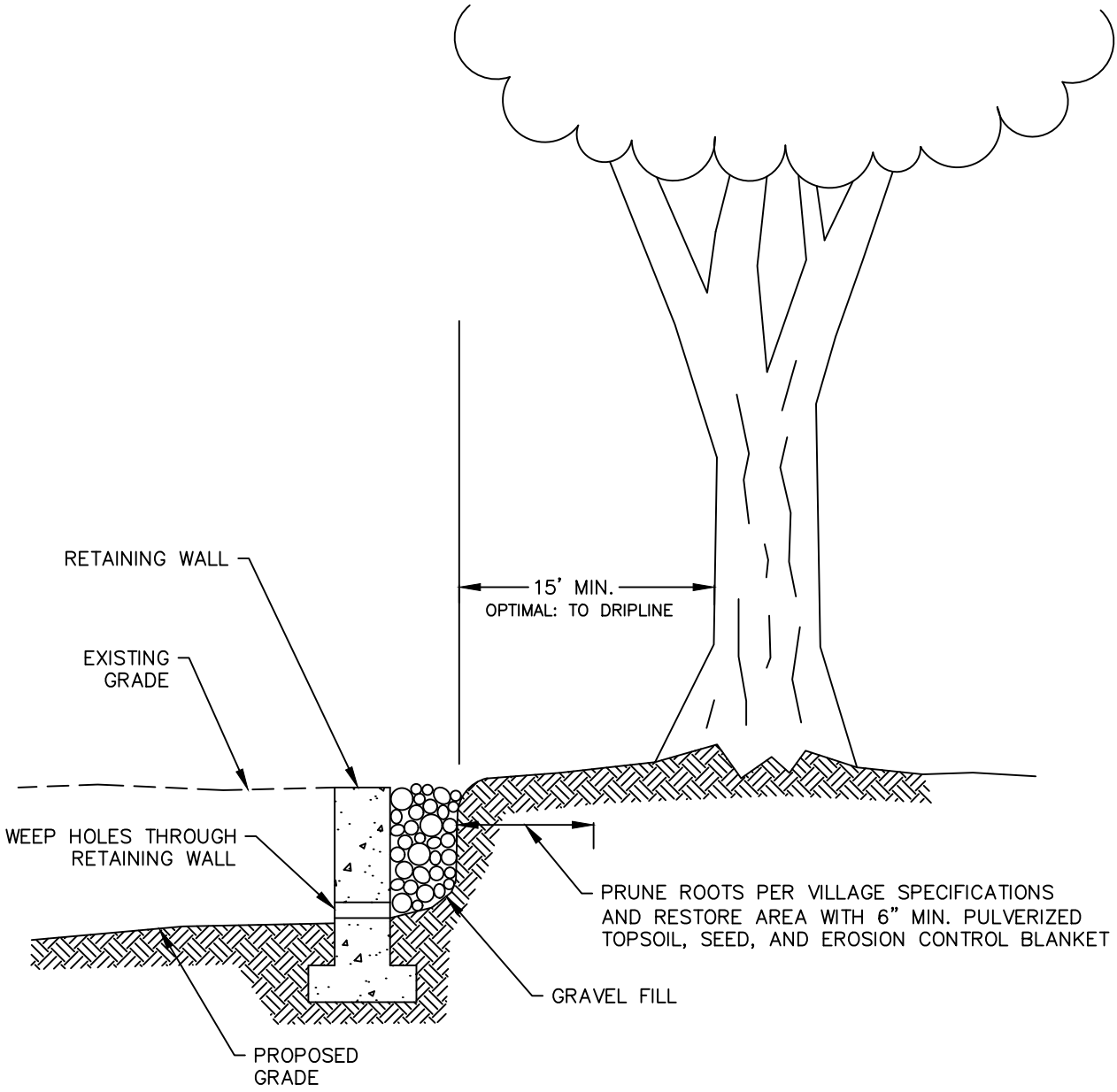


TREE WELL DETAIL
(18"-36" GRADE INCREASE)

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes

STANDARD DETAIL
G-6 (01)

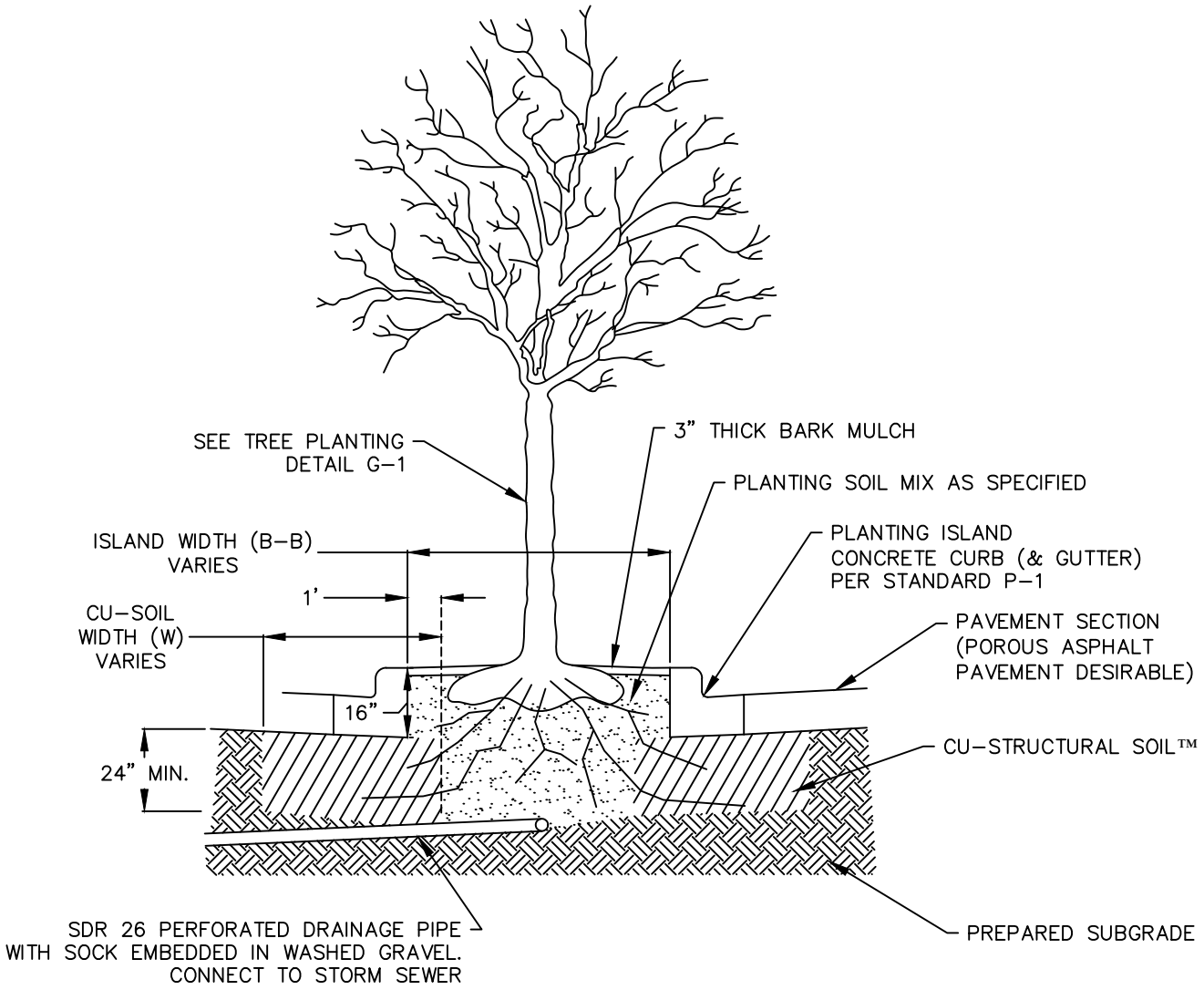


TREE WELL DETAIL
(LOWERING GRADE 6" OR MORE)

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes

STANDARD DETAIL
G-7 (01)



SECTION A-A

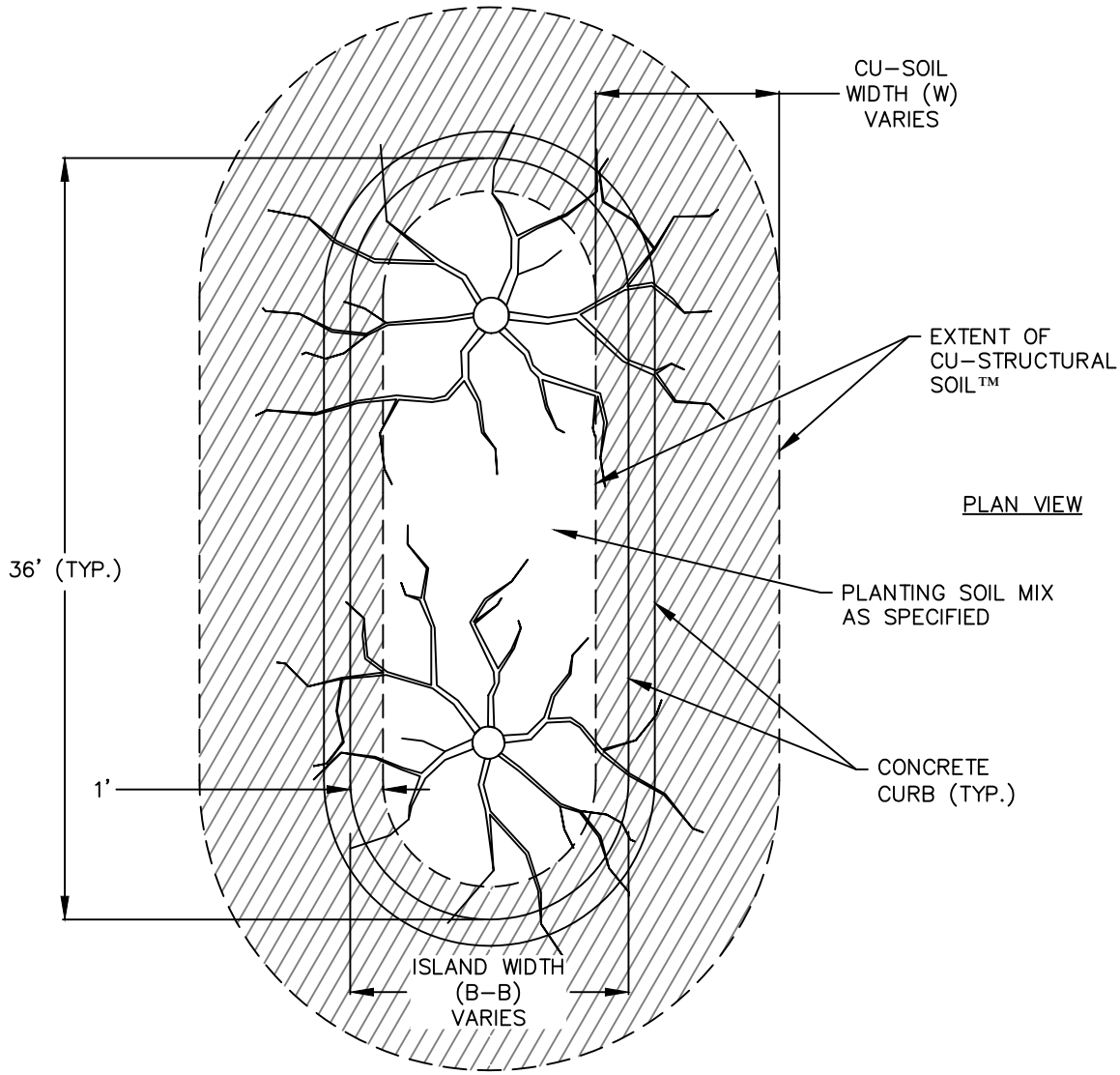
NOTES:
1. ALLOWABLE TREE SIZE AT MATURITY IS 30 FEET IN HEIGHT
2. STRUCTURAL SOIL MAY BE CU-STRUCTURAL SOIL™ OR STALITE (FOR SANDY SOILS). TRADITIONAL CRUSHED LIMESTONE IS NOT PERMITTED FOR USE IN PARKING LOT ISLANDS THAT HAVE TREES PLANTED.
3. CU-STRUCTURAL SOIL SHALL BE OBTAINED FROM A LICENSED PRODUCER SUCH AS MIDWEST TRADING.
4. TREE SPECIES SHOULD BE CHOSEN THAT PREFER WELL DRAINED SOIL AND BE SUITABLE FOR THE EXPECTED pH OF THE CU-SOIL PROVIDED.
5. INITIAL WATERING SHOULD BE AT A RATE OF 20 GALLONS PER TREE, EVERY 5-7 DAYS.
6. SEE SHEET 2 FOR PLAN VIEW AND QUANTITIES.

PARKING ISLAND TREE PLANTING DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	New Detail
5-1-23	Revised Callouts

STANDARD DETAIL
G-8 (02)



GENERAL

APPROXIMATE SOIL VOLUMES NEEDED:

2 CUBIC-FEET OF PLANTING SOIL FOR EVERY SQUARE-FOOT OF AREA ENCOMPASSED BY THE EXPECTED DRIP LINE AT TREE'S MATURITY (CROWN PROJECTION)

EXAMPLE

GIVEN TWO MATURE TREES WITH A HEIGHT OF LESS THAN 30 FT. AND A CROWN PROJECTION OF 20 FT IN A 5 FT. WIDE, 36 FT. LONG ISLAND:

CALCULATED AREA FOR TREE = 628 S.F.

SOIL VOLUME NEEDED AT 24" DEPTH	=	1260 C.F.
OF WHICH PLANTING SOIL MIX VOLUME NEEDED	=	300 C.F.
AND CU-SOIL™ NEEDED	=	960 C.F.

IF ISLAND IS WIDER THAN EXAMPLE ABOVE:

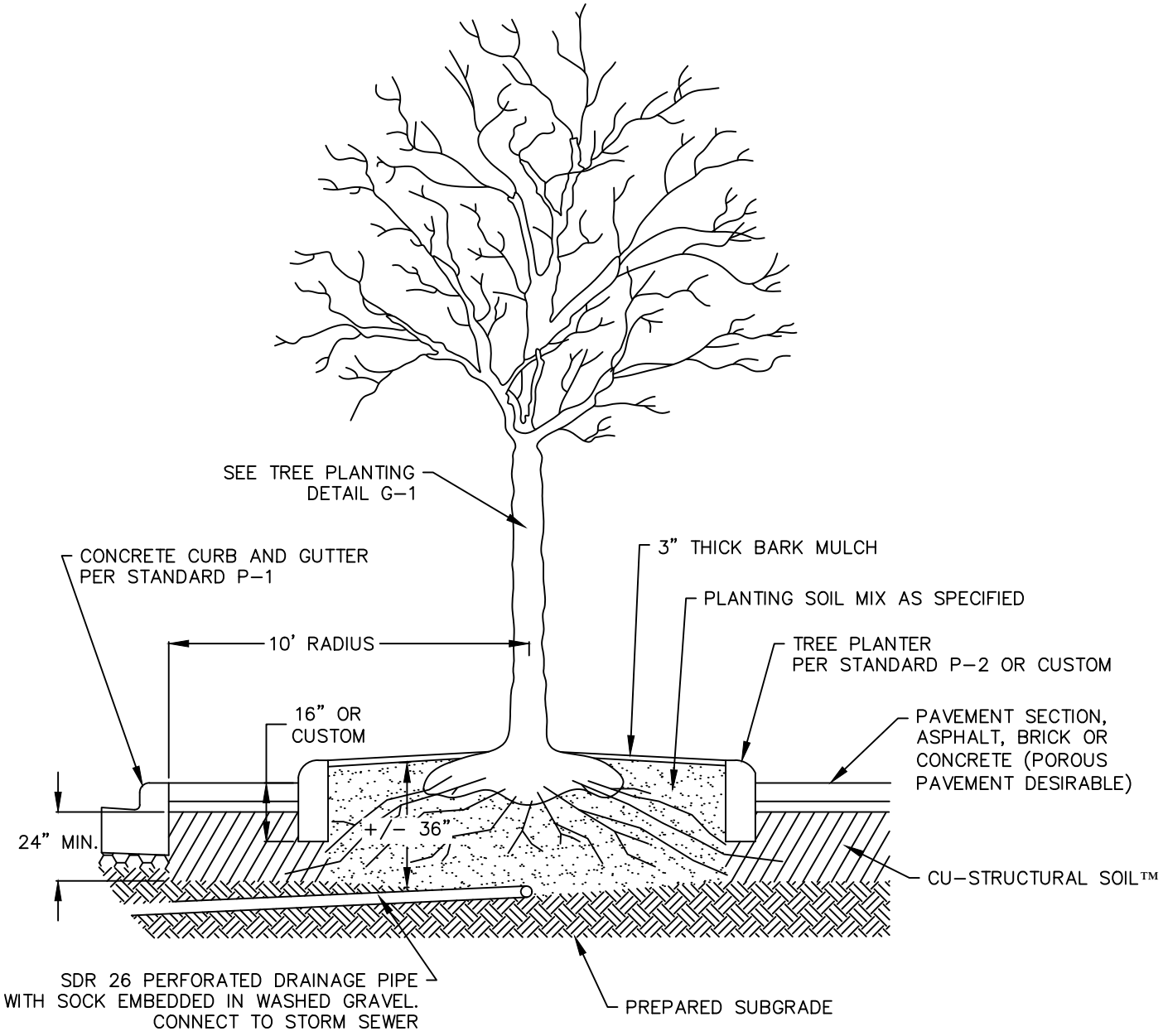
B-B	TOTAL SOIL VOLUME	PLANTING SOIL MIX VOLUME	CU-SOIL™ VOLUME	CU-SOIL™ WIDTH (W)
7.5 FT.	1260 C.F.	560 C.F.	700 C.F.	3.5 FT.
10.0 FT.	1260 C.F.	820 C.F.	440 C.F.	2 FT.

PARKING ISLAND TREE PLANTING DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	New Detail

STANDARD DETAIL
G-8 (01)



SECTION A–A

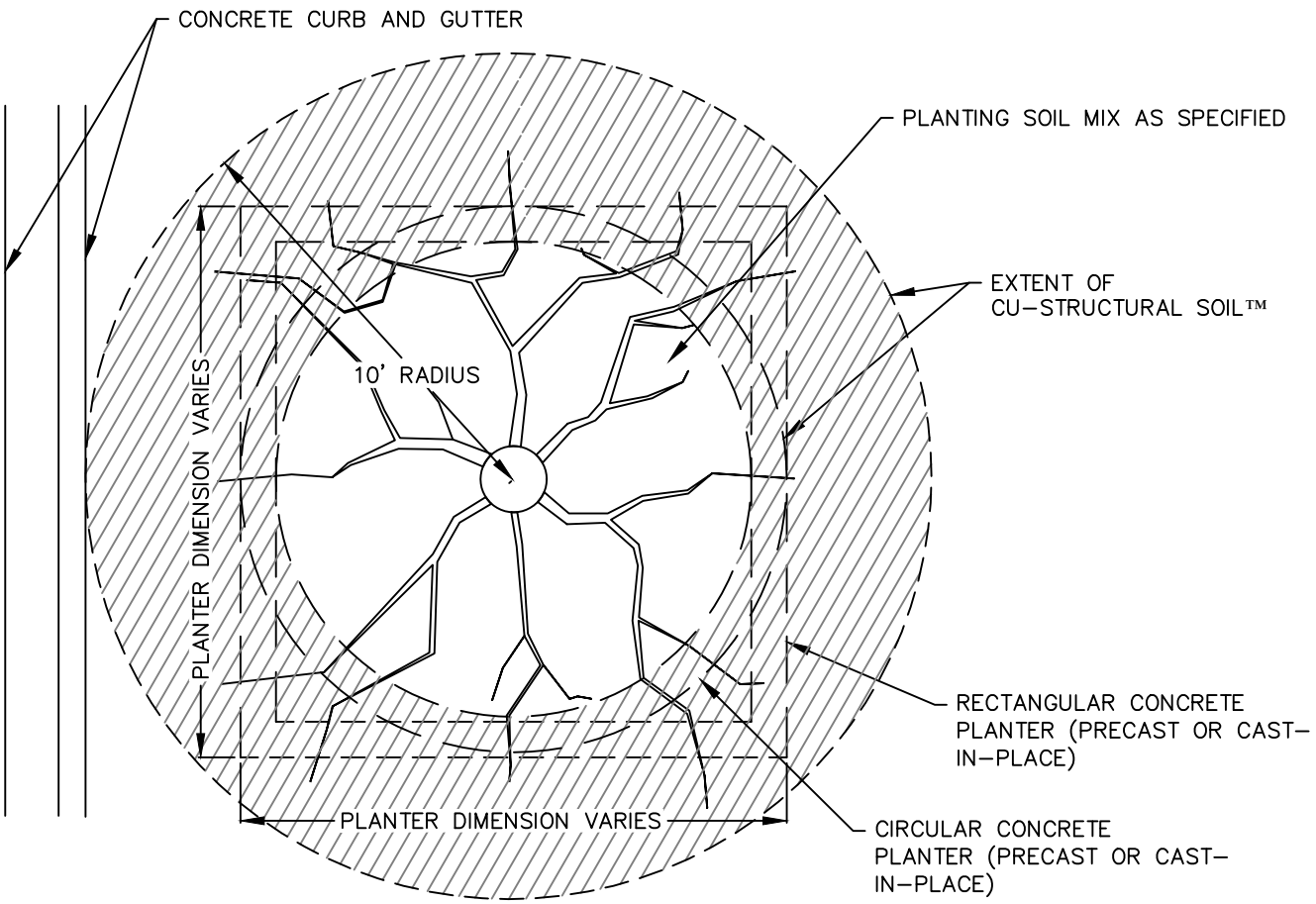
NOTES:
1. ALLOWABLE TREE SIZE AT MATURITY IS 30 FEET IN HEIGHT
2. STRUCTURAL SOIL MAY BE CU–STRUCTURAL SOIL™ OR STALITE (FOR SANDY SOILS). TRADITIONAL CRUSHED LIMESTONE IS NOT PERMITTED FOR USE IN TREE PLANTERS.
3. CU–STRUCTURAL SOIL SHALL BE OBTAINED FROM A LICENSED PRODUCER SUCH AS MIDWEST TRADING.
4. TREE SPECIES SHOULD BE CHOSEN THAT PREFER WELL DRAINED SOIL AND BE SUITABLE FOR THE EXPECTED pH OF THE CU–SOIL PROVIDED.
5. INITIAL WATERING SHOULD BE AT A RATE OF 20 GALLONS PER TREE, EVERY 5–7 DAYS.
6. SEE SHEET 2 FOR PLAN VIEW AND QUANTITIES.

TREE PLANTER AND LIMITED SPACE TREE PLANTING DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	New Detail
5-1-23	Revised Callouts

STANDARD DETAIL
G-9 (02)



GENERAL

APPROXIMATE SOIL VOLUMES NEEDED:

2 CUBIC–FEET OF PLANTING SOIL FOR EVERY SQUARE–FOOT OF AREA ENCOMPASSED BY THE EXPECTED DRIP LINE AT TREE'S MATURITY (CROWN PROJECTION)

EXAMPLE

GIVEN ONE MATURE TREE WITH A HEIGHT OF LESS THAN 30 FT. AND A CROWN PROJECTION OF 20 FT IN A 5 FT. BY 5 FT. PLANTER.

CALCULATED CIRCULAR AREA FOR TREE = 314 S.F. (RADIUS = 10 FT.)

SOIL VOLUME NEEDED AT 24" DEPTH	=	630 C.F.
OF WHICH PLANTING SOIL MIX VOLUME NEEDED	=	80 C.F.
AND CU–SOIL™ NEEDED	=	550 C.F.

IF PLANTER IS LARGER THAN EXAMPLE ABOVE:

PLANTER DIMENSIONS	TOTAL SOIL VOLUME	PLANTING SOIL MIX VOLUME	CU–SOIL™ VOLUME
5 FT.X10 FT.	670 C.F.	150 C.F.	520 C.F.
10 FT.X10 FT.	710 C.F.	300 C.F.	410 C.F.

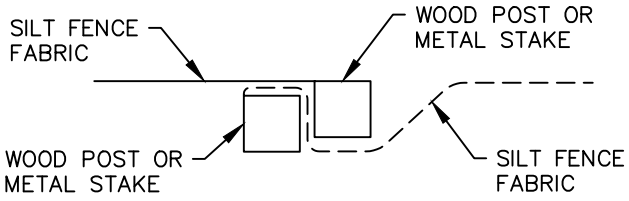
TREE PLANTER AND LIMITED SPACE TREE PLANTING DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	New Detail

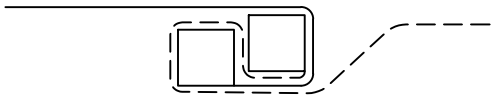
STANDARD DETAIL
G-9 (01)

ATTACHING TWO SILT FILTER FENCES
(NOT APPLICABLE FOR J–HOOKS)



PLACE END–POST (STAKE) OF FIRST SILT FENCE ADJACENT TO END–POST (STAKE) OF SECOND SILT FENCE WITH FABRIC POSITIONED AS SHOWN

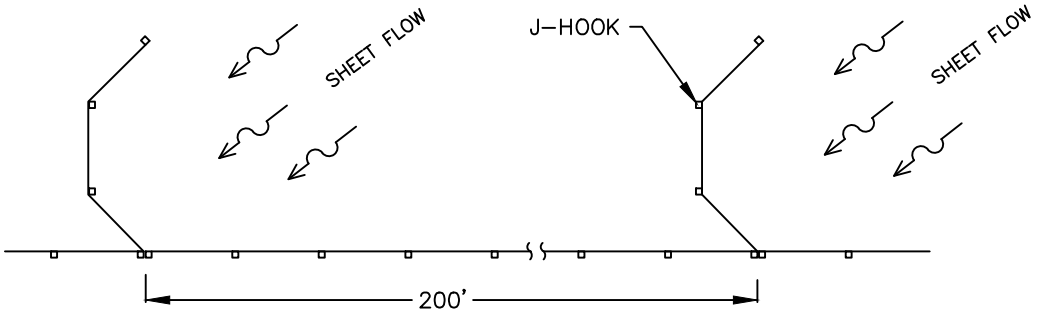
STEP 1



ROTATE POSTS (STAKES) TOGETHER 180 DEG. CLOCKWISE AND DRIVE BOTH POSTS (STAKES) 18" INTO GROUND

STEP 2

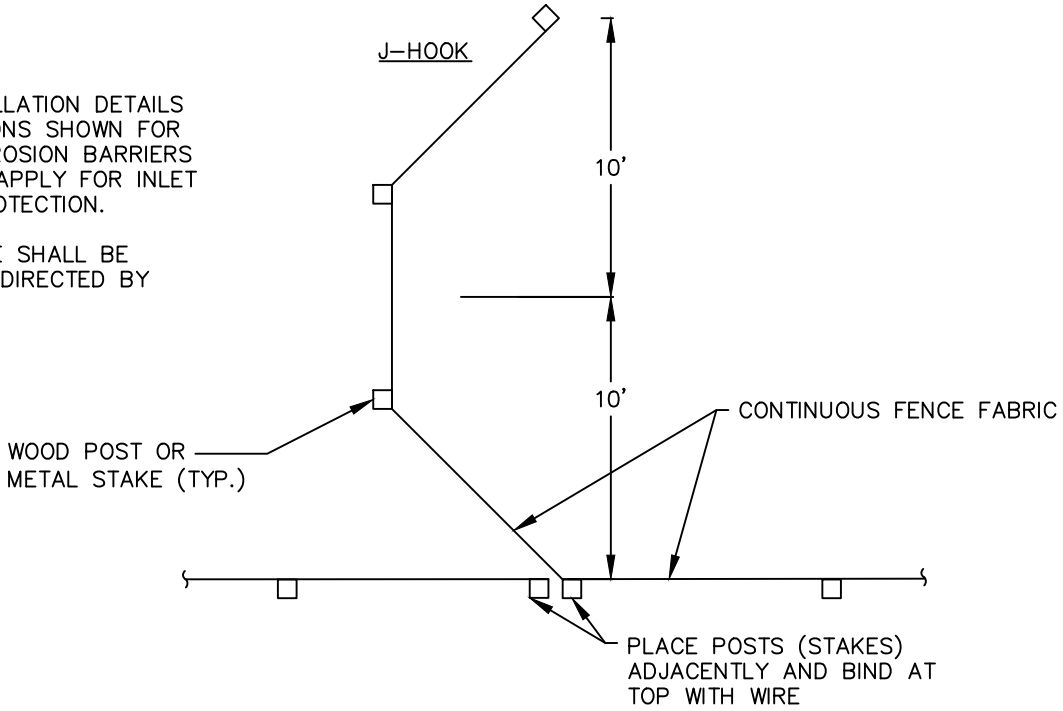
SILT FILTER J–HOOK PLACEMENT



NOTES:

1. THE INSTALLATION DETAILS AND DIMENSIONS SHOWN FOR PERIMETER EROSION BARRIERS SHALL ALSO APPLY FOR INLET AND PIPE PROTECTION.

2. SILT FENCE SHALL BE REMOVED AS DIRECTED BY ENGINEER.



SILT FENCE DETAIL

DATE	REVISIONS
4-30-20	Revised Notes & Specifications

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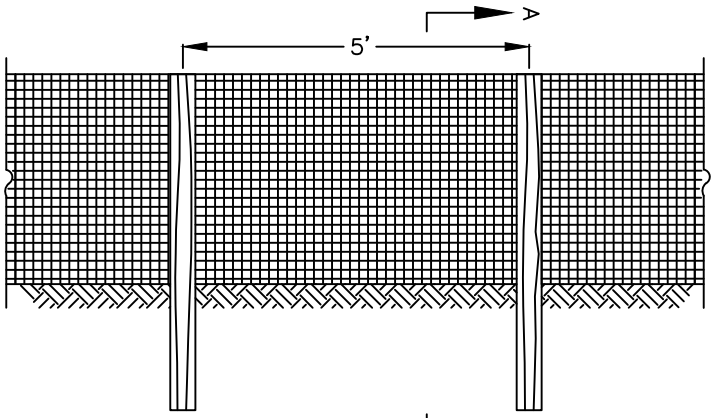
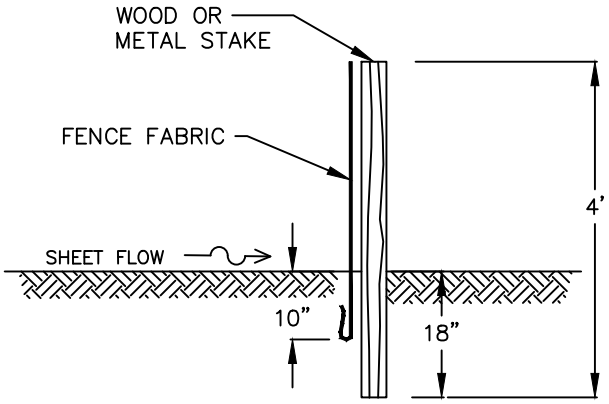
STANDARD DETAIL
G-10 (01)

SILT FILTER FENCE AS A
PERIMETER EROSION BARRIER



ELEVATION



SLICE METHOD

SECTION A–A

SILT FENCE DETAIL

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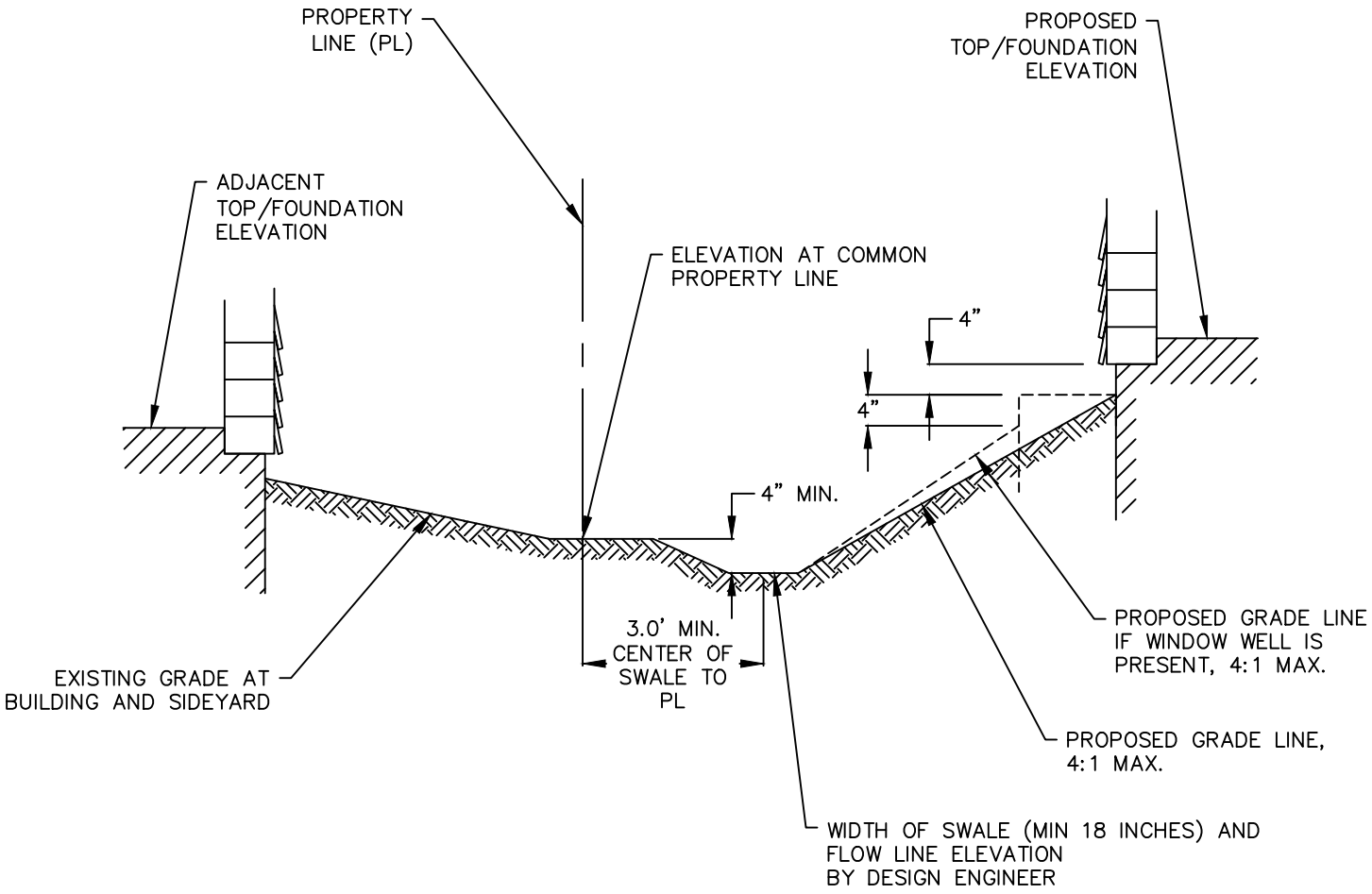
DATE	REVISIONS
4-30-20	Revised Notes & Specifications

STANDARD DETAIL
G-10 (01)



NOTE:
1. STORMWATER RUNOFF CANNOT ADVERSELY IMPACT NEIGHBORING PROPERTIES.
2. FOUNDATIONS SHOWN HAVE A BRICK LEDGE OR DROPPED SIDING. USE ACTUAL TOP OF FOUNDATION ELEVATION FOR ALL OTHER CASES
3. RUNNING SLOPE OF SWALE SHALL BE 1 % MINIMUM

TYPICAL SIDE YARD SWALE DETAIL

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	Revised Notes
4-1-21	Added Plan Note

STANDARD DETAIL
G-11 (02)

To be incorporated into all construction documents for right-of-way improvements

The following specifications are guidelines to ensure that the parkway trees are not damaged during the proposed construction.

As with all guidelines, it will be in the contractor's best interest, to schedule a meeting prior to construction to ensure that all questions regarding proposed work and tree impacts are discussed and agreement reached with the Village Forester.

PROXIMITY TO TREES

- Any new sidewalk or street excavation to be made will require prior approval by the Village Forester.
- Site markings indicating proximity of proposed work shall be marked by each tree with paint prior to scheduling an inspection by the Village Forester.
- The permitted distance from the trunk of a tree to any proposed excavation is 6 feet or more.
- If the proposed improvement is within 6 feet or less of the tree, the tree may be required to be removed. (See Tree Removal).

TREE PRESERVATION FENCING

- Wooden slat snow fence will need to be erected from drip line to drip line of each tree within the construction zone.
- Enclosed Tree Protection Detail will be part of the construction documents.

TREE ROOT PRUNING

- Root pruning shall be performed on any tree that is more than 6 feet from the proposed construction zone.
- Root pruning will **not be permitted** on any tree that is less than 6 feet away from proposed construction zone.
- Root pruning equipment must be approved by the Village Forester prior to use.
- Hand root pruning will not be permitted unless approved by the Village Forester. All hand root pruning will require a Certified Arborist's supervision.

TREE REMOVAL

- Tree removal is recommended for trees closer than 6 feet to a construction zone.
- The use of structural soil and barrier fabric will be considered as an alternative to tree removal.
- All tree removals require a written permit from the Village Forester **prior** to removal.

TREE CANOPY PRUNING

- Tree branches hanging into the construction zone may be pruned by a Certified Tree Worker.
- All pruning cuts must meet ANSI A300-2001 Standards.
- No American Elms or Oaks may be pruned without written permission and instructions to Certified Arborist from the Village Forester between April 1st and October 31st.

DAMAGE TO TREES

- Failure to follow these specifications will result in the contractor requiring to post a cash bond, equivalent to the value of each damaged tree, for a period not to exceed 3 years.
- Bond value will be determined by the Village Forester.
- The Village Forester reserves the right to stop the job for unsupervised work that is determined to cause irreparable damage to any right-of-way tree. Stop work order will be enforced until the cash bond is paid as determined.

CONSTRUCTION AND TREE PRESERVATION SPECIFICATIONS FOR PARKWAY TREES

northbrook
Public Works Department

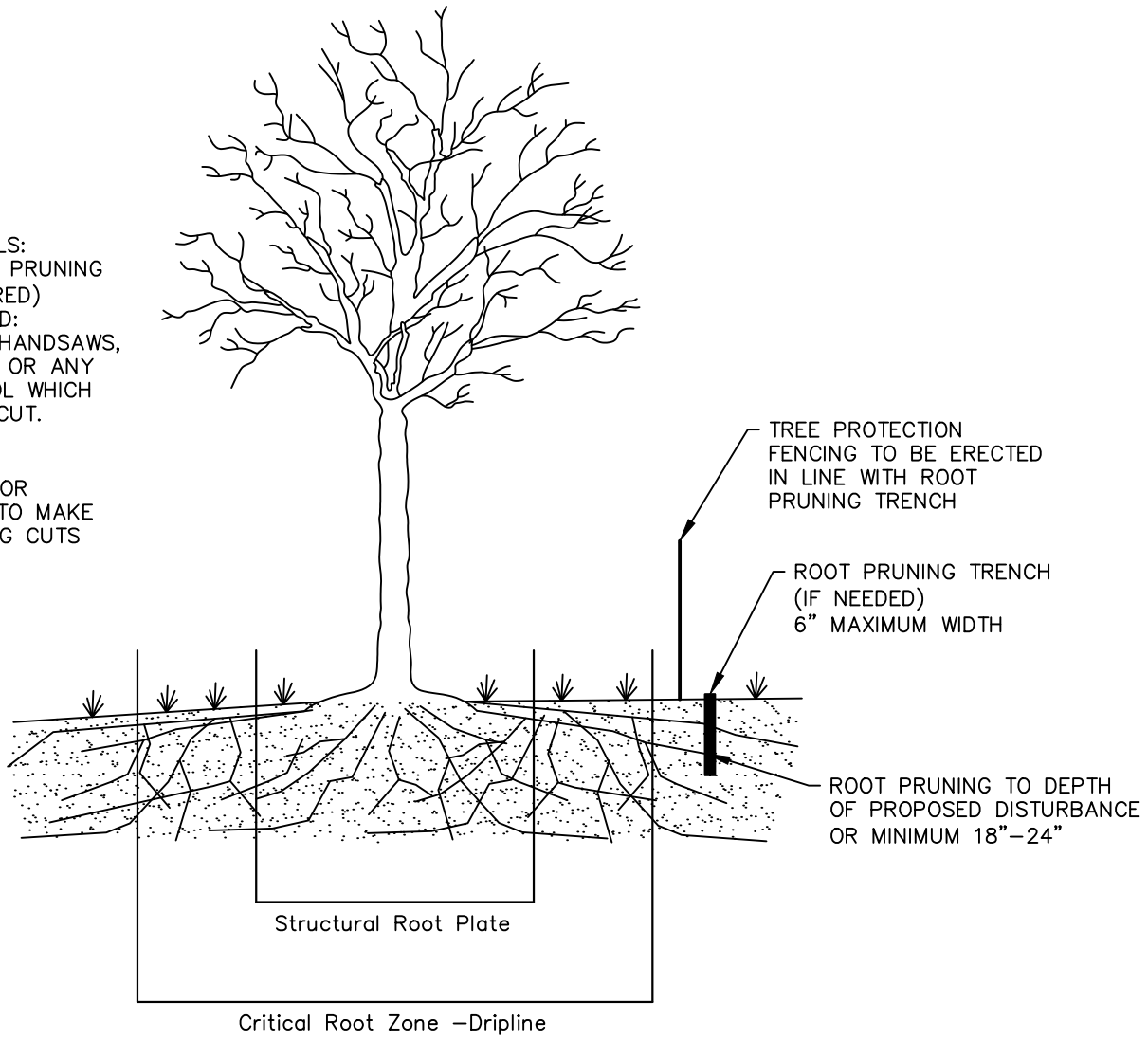
DATE	REVISIONS
4-30-20	No Changes
4-1-21	Changed Page Format

STANDARD DETAIL
G-12 (02)

APPROPRIATE TOOLS:
MECHANICAL ROOT PRUNING MACHINE (PREFERRED)
ALTERNATE METHOD:
LOPPING SHEERS, HANDSAWS, SHARPENED AXES, OR ANY OTHER SHARP TOOL WHICH LEAVES A CLEAN CUT.

DO NOT

USE A CHAINSAW OR CHAIN TRENCHER TO MAKE THE FINAL PRUNING CUTS



MINIMUM "NO WORK" ZONE DISTANCES FOR OF TREES OF DIFFERENT SIZES:

DIAMETER AT BREAST HEIGHT (IN)	CRZ (radius in ft)	STRUCTURAL ROOT PLATE (FT)*
8 OR LESS	DIAMETER OF TREE	1–6
9–24	DIAMETER OF TREE	6–9
24 OR GREATER	DIAMETER OF TREE	9–12

*STRUCTURAL ROOT PLATE MEASUREMENTS ARE APPROXIMATE

ROOT PRUNING STANDARD

northbrook
Public Works Department

DATE	REVISIONS
4-30-20	New Detail

STANDARD DETAIL
G-13 (01)

ROOT PRUNING STANDARD

Root Pruning Specifications

1. Root pruning should be performed by a qualified tree care expert using an approved mechanical root pruning machine whenever an excavation is to be performed within the critical root zone or dripline of a tree. Roots are to be cleanly severed from the tree in order to prevent ripping and tearing damage that would be caused by a backhoe or trenching machine.
2. No more than one side of a tree shall be pruned in any given year, nor more than 1/3 of the tree's root system be removed.
3. Root control barriers may be used where appropriate in the root pruning trench after pruning but prior to backfilling with soil to prevent future root growth past the barrier.
4. All root pruning must be inspected and approved by Northbrook Forestry Department prior to work beginning and upon pruning completion.
5. NO work shall be performed within the structural root plate of any tree. Root pruning in this designated area could sever very important structural roots, possibly de–stabilizing the tree. Utilities proposed in this area will need to directionally bored under the tree.

How to Root Prune:

The preferred method for root pruning is with a machine designed for the specific task of pruning roots.

Exposing and Pruning Roots (if a machine cannot be used)

1. The soil is removed by hand or utilizing an air knife to expose the roots before pruning. This is called making a root pruning trench. Do Not use an excavator to open the root pruning trench.
2. Once exposed, use a SHARP tool to cleanly cut all roots which are 1–2″ diameter to the depth of the proposed disturbance or to a depth of 18″–24″.
3. Appropriate hand tools are sharp lopping shears, handsaws, sharpened axes, a reciprocating saw (sawzall) and any other sharp tool which leaves a clean cut. Do Not use a chainsaw or chain trencher to make the final pruning cuts.
4. For roots larger than 2 diameter inches that are exposed between the structural root plate and critical root zone, call a qualified Certified Arborist or Forestry Department to discuss whether cutting that root may de–stabilize the tree.
5. All roots shall be left with a clean, smooth end and no ragged edges.
6. After pruning, soil from the same area is put into the root pruning trench to encourage root regrowth in that area. Water root pruning trench.

Post Root Pruning Care

1. Tree roots must be kept moist. If pruned root ends will be left exposed for more than 8 hours, cover the hole with moist burlap.
2. Fill the hole with soil from the same area and mulch the area with shredded hardwood mulch to a depth of 3″.
3. Water the trench to settle the backfill and ensure the area around the tree is sufficiently moist.
4. If major roots are required to be removed or more than 1/3 of the tree's roots pruned, the tree may require different care or the project specifications may need to be modified to preserve the tree. For mature trees, no more than 30% of roots may be pruned.

Arrange for an appointment with Northbrook's Forestry Department to discuss the root pruning requirements set forth in your approved permit at least 1 to 2 weeks prior to root excavation and/or pruning.