



THE CITY OF LAKE FOREST

ENGINEERING & CONSTRUCTION STANDARDS

JANUARY 2011

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SECTION 1.00 - GENERAL ENGINEERING CONSTRUCTION REQUIREMENTS

The following are mandated general requirements for construction related work within The City of Lake Forest, The City shall not be liable, nor provide compensation for any delays, inconvenience, special construction requirements, or damage sustained by owners, developers, or contractors due to these requirements and the requirements referenced herein.

A. Work Day Construction

A work day shall be from 7:00 A.M. to 7:00 P.M., Monday through Friday. The contractor may work on Saturdays and legal holidays with the written permission of the City Surveyor and Engineer. Approved Saturday work shall be from 8:00 AM to 6:00 PM. A request for Saturday and holiday work shall be made a minimum of Forty-eight (48) hours prior to the day requested.

B. Notification of Work

1. The contractor shall notify the City Surveyor and Engineer's office a minimum of 48 hours prior to the start of any work.
2. All required tree protection and safety fences as well as all required soil erosion control methods shall be in place and approved by the City prior to the start of any demolition or construction
3. The contractor shall notify the North Shore Sanitary District a minimum of 24 hours prior to the start of any work related to sanitary sewers.
4. The contractor shall notify The Lake County Stormwater Management Commission, The Army Corps of Engineers and/or any other government agency which issued permits for work within a designated wetland.

C. DECI Requirements

A Designated Erosion Control Inspector, hired or employed by the applicant, is required for all development that exceeds 10 acres of hydrologic disturbance or exceeds 1 acre of hydrologic disturbance and has a Regulatory Floodplain, Isolated Waters of Lake County or Waters of the United States on-site or on adjoining property

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D. Standards

The finished work shall conform to all City of Lake Forest construction standards, codes and requirements and all non-conflicting provisions of the current "Standard Specifications for Road and Bridge Construction" adopted by the Department of Transportation of the State of Illinois, as subsequently amended to the last date of the accompanying plans. In addition, construction of the sanitary sewerage, storm sewerage, and water distribution improvements shall conform to all non-conflicting provisions of the standard specifications entitled "Standard Specifications for Water and Sewer Main Construction in Illinois," Fifth Edition, dated May of 1996.

E. Work Safety

1. The contractor shall comply with State and Federal Safety regulations as outlined in the latest revision of the Federal Construction Safety Standards (29 CFR PART 1926) and with applicable provisions and regulations of Occupational Safety and Health Administration (OSHA) Standards of the Williams-Steiger Occupational Health and Safety Act of 1970 (rev.).
2. The Contractor, Engineer and Owner shall each be responsible for his own respective agents and employees. The contractor shall be responsible for providing a Competent Person as defined by OSHA, on site during all trenching operations.
3. The City of Lake Forest has not been retained or compensated to provide design and construction review services relating to the Contractor's safety precautions or to means, methods, techniques, sequences, or procedures required for the Contractor to perform his work. Omitted services include but are not limited to shoring, scaffolding, underpinning, temporary retainment of excavations and any erection methods and temporary bracing.

F. Public Convenience and Safety

1. The contractor shall notify the City at least 5 days in advance of the starting of any work which might in any way inconvenience or endanger traffic, so that arrangements may be made, if necessary, for closing the road and providing suitable detours. The contractor shall at all times conduct all work in such a manner as to insure the least obstruction to vehicular and pedestrian traffic.

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2. When any section of road is closed to traffic, as approved by the city, the contractor shall provide, erect, and maintain barricades, flags, signs and lights at each end of the closed section and at all intersecting roads, in accordance with the "Illinois Manual of Uniform Traffic Control Devices". Additionally, the contractor is responsible for providing an adequate number of certified flagger personnel.
3. Fire hydrants shall be accessible at all times to the Fire Department. No material, equipment, vehicles, or other obstructions shall be placed within 10 feet of a fire hydrant.
4. The city reserves the right to limit or stop operations if the traffic controls and safety personnel on site are not deemed adequate by the City Surveyor and Engineer's Office.

G. Use of City Water

The use of city water from fill points in prosecution of the work shall be prearranged and approved by Public Works. The contractor shall comply with all city requirements for use of facilities, documentation of quantities, and payment for water used. Fire hydrants shall not be used.

H. Use of Traveled Surfaces

1. Where the contractor's equipment is operated on any portion of the traveled surface or structures used by traffic on or adjacent to the construction, the contractor shall clean the traveled surface of all dirt and debris at the end of each day's operations, or more frequently at the direction of the city.
2. The traveled surface and structures on or adjacent to the work shall be protected, in a manner satisfactory to the City, from damage by lugs or cleats on treads or wheels of equipment.
3. All equipment used shall comply with the legal loading limits established by the statutes of the state of Illinois or local regulations when moved over or operated on any traveled surface or structure. Before using any equipment which may exceed the legal loading, the contractor shall secure a permit, allowing ample time for making an analysis of stresses to determine whether or not the proposed loading would be within safe limits.

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SECTION 1.00 - GENERAL ENGINEERING CONSTRUCTION REQUIREMENTS

I. Street Openings

Open cutting across city-maintained pavement is prohibited without prior written approval from the City Surveyor and Engineer's Office. A bond shall be required to ensure the opening is restored in a timely manner in accordance with city standards.

J. Protection and Restoration of Property

1. When government, corporate, or private property interferes with the work, the contractor shall notify the owners in writing at least 48 hours in advance, advising them of the nature or disposition of the property. The contractor shall furnish the city with copies of the notifications and any agreements with the property owners concerning protection and disposition prior to work taking place. The contractor shall immediately notify the City Surveyor and Engineer's office when inadvertent damage is done to any structures, utilities, landscaping, or facilities on government, corporate or private property.
2. Any traffic sign within the limits of construction which interferes with the work may only be removed after authorization from the owner. The contractor shall be responsible for removal, storage or installation in a temporary location, maintaining a record of permanent sign locations, and reinstallation of the signs as soon as operations permit unless directed otherwise by the owner.

K. Defective Materials

1. All materials not conforming to these Construction Standards shall be considered as defective and shall be removed from the work; if in place, they shall be removed by the contractor at his expense and replaced with acceptable material.
2. Fittings, valves, castings, hydrants, pipe, masonry blocks, bricks, manhole sections, or other miscellaneous manufactured material used in water and sewer construction shall be furnished with the implied guarantee that such materials conform with the requirements of this Construction Standard. The City reserves the right to require a certified statement from the manufacturer of such materials that the specific materials have been tested and inspected and conform to this standard.

**SECTION 1.00 - GENERAL ENGINEERING CONSTRUCTION
REQUIREMENTS**

3. The contractor shall carefully inspect all material before installation and reject any materials which have been damaged, have visible flaws, or don't meet this standard. The City also reserves the right to make such an inspection, but failure to detect irregularities does not relieve the contractor of the responsibility to remove and replace materials which are found to be defective after installation.

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SECTION 1.01 - SUBDIVISION, COMMERCIAL, AND CITY PROJECTS

The following sections are in addition to the above requirements and pertain to all construction excluding private residential work.

A. Street Signs and Regulatory Signs

Public Street signs and regulatory signs within new subdivision developments will be fabricated and installed by The City of Lake Forest. The developer will be responsible for all material and labor costs.

B. Insurance Requirements

The contractor shall not commence any work, deliver or cause to be delivered any materials or equipment to the site until all required certificates of insurance are received by the City. Minimum required insurance amounts shall be determined by the City. The City of Lake Forest shall be listed as Additional Insured on all certificates.

C. Project Closeout As-Built Drawings

1. Owner shall, not later than the time it gives the notice of completion and request for approval provide to the City three sets of “as-built” or “record” drawings for all of the Improvements, including one set on a reproducible mylar and one in digital format (see item 5.). The City must receive, review and approve "as-built" plans for the project, certified by an Illinois Licensed Professional Engineer, which shall indicate, all geometric changes to roadways, parking lots, entrances, all alignment changes to new or adjusted utilities, outlet structures, special structures, overflow structures, normal water surface elevation, high water surface elevation, verification of right-of-way markers/property corners, changes in benchmarks or control points, all valves and buffalo boxes, depth and location of water mains, as well as all sewer wye locations, culverts, pipes, tanks, field tile (abandoned or not), manholes, catch basins, inlets, stubs, sidewalks, driveways, aprons, curbs, berms, channels, swales, utility poles/boxes, mailboxes, etc.
2. Lot services shall have two (2) measurements from the end of the service to fixed objects such as manholes, fire hydrants, catch basins, etc., all design plan elevations, size, length, width, locations and materials shall be field verified and revised to show actual conditions.
3. City will review the “as-built” drawings and compare them with the approved final engineering drawings. In addition, the City will

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SECTION 1.01 - SUBDIVISION, COMMERCIAL, AND CITY PROJECTS

conduct any field inspections necessary to ensure the validity of the “as-built” plans. If in the opinion of the City Surveyor & Engineer there are unacceptable differences in these two drawings, the developer will correct these differences. The approval of the “as-built” plans shall occur prior to release of the Letter of Credit, or other securities. The "as-built" plans shall show revised 100-year flood limits due to as-built conditions. Due to as-built conditions, the City may require revised drainage calculations prior to final acceptance and approval of the City. This may include but not be limited to storm sewers, overflow routes, weir locations, detention, and other critical locations to establish their compliance with Subdivision Agreement and all Requirements of Law.

4. Any revisions to previous submitted engineering plans, either before or after City approval, shall be duly noted on the plans with revision dates, revision numbers and highlighting the change. All revisions must also be itemized in a letter to accompany the revised engineering plans.
5. Upon acceptance of hard copy of the As- Built drawings, these drawings should be submitted in digital format as well as on reproducible mylar and submitted to the City Engineer in .dgn or .dwg file format on a DVD. The As-Built drawings shall be submitted with final improvements shown, noting changes from the original construction plans.

D. Project Closeout GASB Requirements

The Owner shall submit the final quantities and actual costs, certified by an Illinois Licensed Professional Engineer, for each of the following publicly or privately maintained items:

1. Storm sewers by pipe type, size (inches) and length (feet)
2. Storm structures by type and size (inches) (includes frames and grates)
3. Sanitary sewers by pipe type, size (inches) and length (feet)
4. Sanitary structures by type and size (inches) (includes frame and grates)
5. Water mains by pipe type, size (inches) and length (feet)

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SECTION 1.01 - SUBDIVISION, COMMERCIAL, AND CITY PROJECTS

6. Water structures by type and size (inches) (includes frames and grates where applicable)
7. Sidewalk and bike path by material type and area (square feet) (includes base course)
8. Curb and gutter by size (inches) and length (feet) (includes base course)
9. Street and parking lots by material type and area (square yards) (includes base course)
10. R.O.W. by area (acres to nearest hundredth)
11. Other items as requested by City Surveyor & Engineer

E. Survey Monuments – See Section 1.05

F. Specifications (for City Projects Only)

Each plan must be accompanied by a complete set of indexed, written specifications, covering all items and phases of required work. The documents shall follow the EJCDC format, latest edition. The Lake Forest Engineering and Construction Standards are not to be considered a substitute for complete specifications. The specifications shall take into account the specific project scope and special job conditions.

G. Bid Tabulation(for City Projects Only)

A bid tabulation shall be submitted to the office of the City Surveyor and Engineer prior to the beginning of construction.

1.02 ENGINEERING PLAN REQUIREMENTS

(See Section 6 for private single lot grading plans)

I. Scope

The purpose of this section is to provide a positive form of communication that will expedite the review process, facilitate construction and provide uniform high quality. The following criteria are for use in preparing plans and drawings submitted to The City of Lake Forest for public or private developments or improvements. **Variations from these standards must be approved by the City Engineer prior to submittal.**

II. General Requirements

A. Plan Symbols and Abbreviations

All symbols and abbreviations used for engineering drawings shall reflect commonly accepted industry standards and be shown in a legend.

B. Plan Scales

1. Plan and profile sheets for street, sewer, watermain, or other improvements involving lengthy right-of-way.
 - a. Horizontal
 - 1" = 10'
 - 1" = 20' - Recommended
 - 1" = 30'
 - 1" = 40'
 - b. Vertical
 - 1" = 5'
 - 1" = 4'
 - 1" = 2'
 - 1" = 1'
2. Street cross sections.
 - a. Horizontal
 - 1" = 5'
 - 1" = 4'
 - b. Vertical
 - 1" = 5'
 - 1" = 4'
 - 1" = 2'
3. Key Sheet.
 - a. 1" = 100'

1.02 ENGINEERING PLAN REQUIREMENTS
(See Section 6 for private single lot grading plans)

C. Miscellaneous Requirements

1. A north arrow and scale (graphic and numeric) must be shown on each page.
2. All proposed improvements shall be shown on one set of plan and profile sheets.
3. In general, north at top or right, Station S. to N. or W. to E.
4. Horizontal centerline curve data must be tabulated on the sheet containing the curve using abbreviations.
5. Frame and invert elevations must be noted on both the plan and profile.
6. Finished top of curb and centerline elevations shall be placed on each cross section sheet at 50 foot stations for street and highway improvements.
7. Benchmarks used to control construction shall be noted on plans near the correct location with an accurate description.
8. The plans shall contain a cover sheet with a location map, summary of quantities, legend, and index to sheets.
9. The description of watermains or sewers shall include the type, class, length of run, and grade placed adjacent to the structure in the plans and profile.
10. Elevations for sewers and watermains shall be placed each 50 foot station on the profile.
11. Elevations for centerline of street and highways shall be given for 50 foot station (or less as requested) and at 10 foot station for vertical curves and around intersection radii.
12. If a proposed improvement is within the State of Illinois regulatory floodplain, the boundary of this area must be shown on the plans and elevations shown on profiles.

1.02 ENGINEERING PLAN REQUIREMENTS

(See Section 6 for private single lot grading plans)

13. The plans shall contain a key sheet showing the scope of the project at 1" = 100' scale.
14. Plan and profile must be on the same sheet. Each sheet shall contain a key map delineating where that portion of work is relative to the overall project.
15. All public and private utility easements and Right of Ways shall be shown on the plans.

D. Cover Page

The cover page shall include the title of the project, location of the site, Drainage Statement, Engineering Certification, BM reference and contact information for all parties involved in this project.

1.03 ENGINEERING SECTION FEES

- A. The current Fee Schedule may be obtained on The City of Lake Forest website or at the customer service counter at Municipal Services. The latest adopted Fee Schedule applies.
- B. Engineering Fees include:
 - 1. Plan Review and Construction Inspection Fees
 - a. Final Plan Review
 - b. Inspection Fee
 - c. Site Grading Fee
 - 2. Watershed Development Permit Fee
 - a. General
 - b. Wetland Fees
 - 3. General Fees
 - a. Single Family Detached Residential Developments
 - b. Multi-Family, Non-residential and other Developments
 - 4. Floodplain Fees
 - 5. Wetland Fees
 - 6. Resubmittal Fees
 - 7. Variation Fee
 - 8. Appeals
 - 9. Pavement Testing

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1.04 PRIVATE UTILITY COMPANY PERMIT APPLICATION AND REQUIREMENTS

1. Permits shall be required for all work performed within The City of Lake Forest.
2. Three (3) copies of the permit will be sent to the City Engineer, 110 E. Laurel Avenue, Lake Forest, IL. 60045, with the following information:
 - a. Details of work to be performed (route location, method of installation, all physical features and public utilities in the immediate area, off-set distance from street edge, ROW lines, or property lines.). **NOTE:** Any new underground utility installed shall be a minimum of five feet (outside edge to outside edge) from any city-owned utility.
 - b. For installations within other than Lake Forest Right-of-Ways, (IDOT, railroad etc.) submit one copy of approved permit from that agency.
 - c. Reason for performing work.
 - d. Name and phone number of the utility company representative responsible for complaints or issues during construction
 - e. Name and phone number of the utility company representative responsible for restoration.
 - f. If the work is to be performed within an easement, provide recorder's office document number.
3. The utility company shall be responsible for ensuring a copy of the approved permit is on the job site.
4. Businesses must have a current license, franchise, or other agreement on file with the Office of the City Manager prior to submitting permit requests.
5. The City Engineer may require a bond be posted to guarantee all restoration is completed in an acceptable and timely manner.
6. The utility company to whom the permit was issued (not subcontractors) shall be responsible for notifying affected property owners (**by letter referencing permit number**) five (5) days prior to commencement of work, with a copy sent to the City Engineer.

1.04 PRIVATE UTILITY COMPANY PERMIT APPLICATION AND REQUIREMENTS

7. All restoration within established lawn areas will be accomplished as per license or franchise agreement.
8. The utility company **AND** any subcontractors shall be responsible for maintaining the work area in a safe condition at all times.
9. The utility company (not subcontractors) shall be responsible for ensuring restoration is completed within ten days after utility work is complete. The company shall also be responsible for ensuring all work and restoration is done in accordance with the City of Lake Forest Construction Standards.
Note: Open cutting of city maintained pavements is not permissible without advance written authorization from the City Engineer.
10. The utility company **AND** any subcontractors shall be responsible for following the policies and procedures of the City General Requirements for Tree Preservation (section 13.00). Any conflicts not addressed during the permit process shall be brought to the attention of the City Engineer and the City Forester prior to start of work.
11. Permit approval will be valid for one (1) year from the date of approval.
12. When emergency repairs are necessary, the utility company shall notify the city via telephone prior to start of work and follow-up with permit documents within 3 working days.

SECTION 1.05 - SURVEY MONUMENT REQUIREMENTS

A. Permanent Survey Monuments

1. Permanent survey monuments shall be placed at every quarter (1/4) mile interval.
2. The developer shall provide a minimum of one (1) permanent monument for each development as determined by the City Surveyor and Engineer.
3. The permanent monument shall be a brass disc set in concrete, eight (8) inches in diameter at the top by forty-eight (48) inches deep, with one (1) No. 4 vertical reinforcing rod on its center. The developer shall buy the brass disc from the City Surveyor and Engineer's office at cost. The installing surveyor shall inscribe the proper number and elevation after the disc is set. The monument number shall be designated by the City Surveyor and Engineer's office.
4. The monuments shall be set level with the finished grade.
5. The proposed monument shall be in USGS datum (NGVD 29). The USGS datum elevation and monument coordinates shall be checked against at least two (2) approved reference marks on file with the City Surveyor and Engineer. The result of the closure survey shall be reported in writing on the Monument Record form supplied with the brass disc to the City Surveyor and Engineer. The form shall be signed and sealed by a Professional Land Surveyor. Upon receiving the Monument Record Form, the City shall inspect the installation of the disc. The reference marks used for this survey and their elevations shall be denoted on the cover sheet of the development plans.
6. Iron pipe markers shall be a minimum of 3/4" in diameter and twenty-four (24) inches long with a minimum wall thickness of 1/8". Where rocky soils prevent specified length the markers shall be driven to refusal at depths where it will remain stable. These markers shall be set at all corners, angle points, and points of curvature of lots and streets by a Professional Land Surveyor.
7. The developer shall replace or verify the existence of all iron pipes after the completion of all construction and before initial acceptance of the development by The City of Lake Forest.
8. Second order control shall be required for all permanent monuments and set in concrete as described above.

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SECTION 2.00 - GENERAL ROADWAY REQUIREMENTS

A. Reference Standards

1. Standard Specifications for Road and Bridge Construction, Illinois Department of Transportation, Latest Edition.
2. Flexible pavements shall be designed in accordance with the Illinois Department of Transportation's "Flexible Pavement Design for Local Agencies", current edition, except that the pavement composition shall not be less than what is depicted on The City of Lake Forest details for the applicable street functional classification.
3. Rigid pavements shall be designed in accordance with the Illinois Department of Transportation's "Manual for Structural Design of Portland Cement Concrete Pavement," Current Edition, except that the pavement composition shall not be less than what is depicted on The City of Lake Forest details for the applicable street functional classification.

B. Handicap Accessibility

All Handicap Accessibility shall conform to Title 71 Illinois Administrative Code 1, Part 400, commonly known as the Illinois Accessibility Code.

C. Pavement Design

1. All pavement shall be designed in accordance with the previously referenced standards and manuals of the Illinois Department of Transportation. The pavement composition shall be dependent on the soil support value and the projected traffic factor, and designed to obtain at least a twenty (20) year service life, however, the pavement composition shall not be less than what is depicted on The City of Lake Forest details for the applicable street functional classification.
2. Subgrade shall consist of minimum 4" of crushed gravel or stone, Type B that meets the minimum Illinois Bearing Ratio (IBR) of 3.0. All unsuitable subgrade material, including subgrade material having an IBR less than 3.0, shall be removed and replaced with the prescribed fill material.
3. At the request of the City Surveyor and Engineer, a copy of all design assumptions and computations on which the proposed pavement design is based shall be submitted.

SECTION 2.00 - GENERAL ROADWAY REQUIREMENTS

4. Hot Mix Asphalt Surface Course, Mixture C, Modified shall be installed following applicable requirements of Section 406 of the Highway Standards to compacted thicknesses as specified. **The Hot Mix Asphalt Surface Mixture shall be modified by not allowing R.A.P. into the mixture.**

D. Pavement Testing

Prior to the installation of the Bituminous Surface Course, but after installation of the Binder Course, the developer shall notify the City Surveyor and Engineer that he intends on surfacing the street. The City Surveyor and Engineer may elect to obtain a Dynaflect Pavement Evaluation Program Report of the completed pavement improvements. The Dynaflect Pavement Evaluation Program shall be performed according to the Pavement Acceptance Program Specifications on file in the office of the City Surveyor and Engineer. The program generally embodies the following testing/pavement evaluation techniques:

- a) Environmental study (frost cycle, drainage, etc.).
- b) Pavement Surface Evaluation.
- c) Soil Borings at approximately one location per mile.
- d) Dynamic Pavement Deflection Analysis (Dynaflect machine or equal correlated with Benkelman Beam or equal).

The program shall evaluate the existing condition of the base and binder course in maximum 200 foot sections. It shall determine whether or not the pavement section with the addition of the surface course of design thickness will be projected to meet a twenty (20) year pavement life or greater.

After receipt of the Dynaflect Pavement Evaluation Program Report, the City Surveyor and Engineer shall review said report to determine whether the addition of the surface course of design thickness will be projected to meet a twenty (20) year pavement life or greater. If the pavement section is projected to meet a life expectancy of twenty (20) years or more, the developer will be allowed to apply the surface course to the street. If the pavement section is not projected to meet a life expectancy of twenty (20) years or more, then the report shall propose asphalt overlays in excess of the surface course design thickness or pavement reconstruction to bring the new pavement section to a twenty (20) year life expectancy. The City Surveyor and Engineer shall evaluate the results of the report and inform the developer of any required pavement repair for each Section. These repairs shall be

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SECTION 2.00 - GENERAL ROADWAY REQUIREMENTS

completed to the satisfaction of the City Surveyor and Engineer before the final surface course will be allowed to be applied.

The Dynaflect Pavement Evaluation Program shall not be considered valid unless the wearing service was applied during the same construction season. Any costs of additional Dynaflect Pavement Evaluation shall be paid in advance by the developer.

In the case of rigid pavements, the developer shall notify the City Surveyor and Engineer that he is ready for final inspection on the streets. The City Surveyor and Engineer will obtain a Dynaflect Pavement Evaluation Program Report of the complete improvements in accordance with the procedures as previously outlined in this Section. The program shall evaluate the existing condition of the pavement in two hundred (200) foot sections. It shall determine whether or not the pavement section will be projected to meet a twenty (20) year pavement life or greater. If the pavement section is projected to meet a life expectancy of twenty (20) years or more, then the developer will be so notified. If the pavement section is not projected to meet a life expectancy of twenty (20) years or more, then the report shall propose pavement reconstruction to bring the new pavement section to a twenty (20) year life expectancy. The City Surveyor and Engineer shall evaluate the results of the report and inform the developer of any required pavement repair for each section.

Payment for the performance of the Dynaflect Pavement Evaluation Program Report will be the responsibility of the developer to incur and will be based on the current rates of the industry as determined by the City Surveyor and Engineer.

E. Structure Adjustments

The adjustment of frames on structures within the roadway pavement will not be allowed to be made to the final elevation of the bituminous surface course if the final Hot Mix Asphalt surface course will not be placed during the same construction season (i.e. frames on structures must be made flush with the pavement throughout the winter season).

F. Work Within Existing City Owned/Maintained Pavements

1. Open-cutting of existing city pavements for utility crossings, extensions etc. must be approved in writing from the office of the City Surveyor and Engineer. See Standard Details for backfill requirements, in most cases Controlled Low Strength Material, (flowable fill) IDOT type 1 shall be required.

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SECTION 2.00 - GENERAL ROADWAY REQUIREMENTS

2. Inspections shall be required for all work within city right-of-ways including, but not limited to, drive approaches, curb cuts and replacement, sidewalks and utility installations and connections. See applicable Standard Details for minimum requirements.

SECTION 3.00 - GENERAL REQUIREMENTS FOR STORM SEWERS

A. Scope

This section shall establish the basic requirements to be used by the City and consultants in design and contractors in the construction of all storm sewers within the City.

B. Basis of Design

The methodology of analysis and criteria for drainage systems shall comply with Article IV of the Watershed Development Ordinance, as found in Section 10 of the Lake Forest Construction Standards.

C. General Design Requirements

1. Catch basins outlets shall be a minimum of 10 inches in diameter.
2. Provide two catch basins, with separate inlets, at low points with separate connections to manholes.
3. There shall be a minimum of one inlet and one catch basin on downward grades (inlet must be connected to catch basin).
4. No surface drainage shall be allowed to cross intersections.
5. Provide a maximum spacing of 300 feet between manholes. Additionally, manholes are to be constructed at each change in direction of flow, change in pipe size, change in pipe material, and change in slope. Curvilinear runs will not be allowed.
6. The storm sewer shall be extended to the limits of the development and sized to accept all existing and future tributary areas. Provide calculations to substantiate the available capacity of the existing receiving storm sewer.
7. Minimum pipe diameter for main line sewers shall be 12 inches. PVC sewer pipe shall be rated a minimum of SDR 26.
8. Granular trench backfill shall be installed under and within three (3) feet of all proposed pavements as shown on Typical Cross Section. Granular trench backfill shall conform to CA6 compacted to 95% standard density in accordance with ASTM D698-07e1. Backfill under existing pavements, where an open cut of the pavement has been approved, shall be flowable fill which meets the IDOT standards of Controlled Low Strength Material (CLSM) Mixture 1. Install 12" of

SECTION 3.00 - GENERAL REQUIREMENTS FOR STORM SEWERS

compacted granular trench backfill over sewer before placing the flowable fill.

9. Excavated trench backfill shall be mechanically compacted to a minimum of 90% standard density in accordance with ASTM D698-07e1.
10. A minimum cover of 5' shall be maintained from top of pipe to top of curb.
11. Existing field tile encountered during excavation must be repaired or connected to the newly constructed storm sewer unless the approved plans call for it to be abandoned. Open ends of tile to be abandoned shall be plugged with concrete.
12. Lift holes are not permissible on sewer pipe.
13. All storm sewer discharge pipes shall terminate at precast reinforced concrete end sections, flared end with toe block. Discharge pipes 12 inches in diameter or greater shall be provided with a galvanized steel grating.
14. Plans shall note which sewer lines are to be private and those that are to be public.
15. Adequate stabilization shall be placed at all outfall structures in accordance with the Illinois EPA *Standards and Specifications for Soil Erosion and Sediment Control* and the *Illinois Urban Manual*, latest edition. Minimum depth for rip rap shall be 12", placed over filter fabric.

D. **Conduit Materials**

The storm sewer piping specified on plans and specifications and used in construction shall conform to the standards listed below:

1. ASTM C14 – Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.
2. ASTM C76 – Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

SECTION 3.00 - GENERAL REQUIREMENTS FOR STORM SEWERS

3. ASTM C507 – Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
4. ASTM C361 - 08 Standard Specification for Reinforced Concrete Low-Head Pressure Pipe
5. ASTM C443 – Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
6. AASHTO M190 – Bituminous Coated Corrugated Steel Culvert Pipe.
7. ASTM D3034-08 – Standard Specification for Type PSM PVC Sewer Pipe and Fittings.
8. ASTM F679 - 08 Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
9. ASTM D3212-07 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
10. ASTM F 477-08 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
11. ASTM A 53-07 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless. (used for steel casing pipe, 3/8 inch minimum thickness).
12. ASTM F794 – Standard Specification for Polyvinyl Chloride (PVC) Profile Gravity Sewer Pipe and Fittings based on Controlled Inside Diameter.
13. ASTM A746-09 – Standard Specification for Ductile Iron Gravity Sewer Pipe.
14. ANSI/AWWA C151/A21.51-09 – Ductile Iron Pipe, Centrifugally Cast.

E. Bedding Materials

The pipe shall be bedded in a foundation of compacted, crushed stone conforming to a gradation of CA-6, see L.F. Std. detail 3.09.

F. Structures (Manholes, Catch Basins, Inlets)

SECTION 3.00 - GENERAL REQUIREMENTS FOR STORM SEWERS

1. Structure foundations shall be precast reinforced Class SI concrete. All riser sections shall be precast, tongue and grooved concrete conforming to ASTM C478. All joints to be sealed with two preformed flexible butyl rubber mastic sealant strips. (Press-Seal "EZ-Stik" or approved equal). See LF Std. Details 3.01, 3.06 and 3.07.
2. Manhole top sections shall be eccentric cones. Flat tops, when necessary and approved by the City Engineer, shall be precast reinforced concrete conforming to IDOT standard 2354-2.
3. All brick used for patching shall be concrete.
4. Steps shall be steel reinforced copolymer polypropylene plastic, 14" wide, installed 16" on center. Steps in MH's shall not be located over main line sewers.
5. All adjusting rings shall be precast reinforced concrete (3" minimum, 8" maximum adjustment; 3 adjusting rings maximum). Install preformed flexible butyl rubber mastic sealant strips between each ring and between ring and casting frame.
6. Pipe penetrations into existing manholes shall be properly sized and cored. Cut, shape and slope new invert channel in the existing concrete bench for smooth flow from new connection. Manhole connections shall not protrude past the interior wall. The space between connecting pipes and the interior wall on the manhole shall be completely filled with non-shrink hydraulic cement mortar.

G. House Services

1. House service wyes shall be provided for each lot fronting on the improvement or at special locations indicated on the plan. House service materials will consist of 6" ductile iron pipe, Class 52 or 6" PVC sewer pipe, SDR 26.
2. Lot service connections to existing mains shall follow one of the following methods:
 - a) Coring the existing main in the trench at the spring line or above, and installing a hub and rubber sleeve fitting with

SECTION 3.00 - GENERAL REQUIREMENTS FOR STORM SEWERS

stainless steel bands (Inserta Fittings Inc. "Inserta Tee" or approved equal) or a sewer saddle tee or wye with stainless steel bands (Mission "T-Flex" or approved equal) and 6" ductile iron or 6" PVC, SDR 26 service pipe.

- b) Using a pipe cutter, cut out required length of existing pipe for insertion of a new wye fitting, making the final connections with stainless steel, non-shear connection couplings (Mission "Flex-Seal Adjustable Repair Couplings" or approved equal.) This method shall be used for connecting to mains with a diameter less than 10 inches.
- 3. Lot service connections into existing manholes shall be properly sized and cored. Manhole connections shall not protrude past the interior wall of the manhole. The space between connecting pipes and the interior wall on the manhole shall be completely filled with non-shrink hydraulic cement mortar.
- 4. House services shall extend from the main line sewer wye branch or service riser at approximate right angles and ascend on a uniform slope of not less than 1/4 inch per foot to a point 3 feet beyond the street right-of-way line or 3 feet beyond adjacent utility easements where applicable.
- 5. House services risers shall be installed on all wyes that are deeper than 10 feet. Risers shall extend upward to an elevation that is approximately 10 feet below finished grade and be installed as shown on the detailed plan or as otherwise specified.
- 6. All wyes where risers are required shall be blocked and supported by placement of concrete to Lake Forest Standards.
- 7. The contractor shall install a 4" x 4" x 8' post or a 4" dia. x 8' post, painted green to mark the end of each storm sewer service line. Top of post shall be plumb and 3 feet above finished grade.
- 8. No horizontal bends will be allowed on lot services except at the wye connection to the main line.
- 9. The contractor shall provide the city with a tabular listing of each and every service connection and their locations relative to fixed objects such as manholes, fire hydrants, catch basins, etc. Each service

SECTION 3.00 - GENERAL REQUIREMENTS FOR STORM SEWERS

connection shall be accurately located by a series of three precise intersecting location measurements. The depth as measured from finished grade shall also be recorded. Finally, the locations of all wyes and tees shall be accurately recorded by measuring the distance to the nearest downstream structure.

H. Driveway Culverts

All required driveway culverts shall be constructed of either corrugated metal, reinforced precast concrete or ductile iron and shall be a minimum of 12 inches in diameter unless, as determined by the City Engineer, conditions require a larger size. A smaller size may be used if, in the opinion of the City Engineer, the larger size is not needed or proper cover can not be obtained.

I. Television Inspection of Completed Sewers

1. All storm sewers shall be cleaned and inspected by closed circuit television subsequent to their installation.
2. The developer will arrange for the television inspection of the storm sewers. A copy of the television inspection in DVD format shall be submitted to the City Surveyor and Engineer along with a written log of observations. Rotate the lens of the camera to view all services. The service connections must be noted in the log of observations.
3. All corrective work required as a result of the television inspection, as determined by the City Surveyor and Engineer, shall be done by the developer without delay. Upon completion of the corrective work, further inspection of the work will be made as necessary.
4. The entire cost of closed circuit television inspection shall be paid for by the developer.

J. Project Closeout As-Built Requirements

1. Owner shall, not later than the time it gives the notice of completion and request for approval provide to the City three sets of "as-built" or "record" drawings for all of the Improvements, including one set on a reproducible mylar and one in digital format (see item 5.). The City must receive, review and approve "as-built" plans for the project, certified by an Illinois Licensed Professional Engineer, which shall indicate, all geometric changes to roadways, parking lots, entrances, all alignment changes to new or adjusted utilities, outlet structures, special structures, overflow structures, normal water surface elevation,

SECTION 3.00 - GENERAL REQUIREMENTS FOR STORM SEWERS

high water surface elevation, verification of right-of-way markers/property corners, changes in benchmarks or control points, all valves and buffalo boxes, depth and location of water mains, as well as all sewer wye locations, culverts, pipes, tanks, field tile (abandoned or not), manholes, catch basins, inlets, stubs, sidewalks, driveways, aprons, curbs, berms, channels, swales, utility poles/boxes, mailboxes, etc.

2. Lot services shall have two (2) measurements from the end of the service to fixed objects such as manholes, fire hydrants, catch basins, etc., all design plan elevations, size, length, width, locations and materials shall be field verified and revised to show actual conditions.
3. City will review the “as-built” drawings and compare them with the approved final engineering drawings. In addition, the City will conduct any field inspections necessary to ensure the validity of the “as-built” plans. If in the opinion of the City Surveyor & Engineer there are unacceptable differences in these two drawings, the developer will correct these differences. The approval of the “as-built” plans shall occur prior to release of the Letter of Credit, or other securities. The "as-built" plans shall show revised 100-year flood limits due to as-built conditions. Due to as-built conditions, the City may require revised drainage calculations prior to final acceptance and approval of the City. This may include but not be limited to storm sewers, overflow routes, weir locations, detention, and other critical locations to establish their compliance with Subdivision Agreement and all Requirements of Law.
4. Any revisions to previous submitted engineering plans, either before or after City approval, shall be duly noted on the plans with revision dates, revision numbers and highlighting the change. All revisions must also be itemized in a letter to accompany the revised engineering plans.
5. Upon acceptance of hard copy of the As- Built drawings, these drawings should be submitted in digital format as well as on reproducible mylar and submitted to the City Engineer in .dgn or .dwg file format on a DVD. The As-Built drawings shall be submitted with final improvements shown, noting changes from the original construction plans.

K. Project Closeout GASB Requirements

SECTION 3.00 - GENERAL REQUIREMENTS FOR STORM SEWERS

The Owner shall submit the final quantities and actual costs, certified by an Illinois Licensed Professional Engineer, for each of the following publicly or privately maintained items. Submit the following quantities for both newly installed improvements and city owned infrastructure removed or abandoned.

1. Storm sewers by pipe type, size (inches) and length (feet)
2. Storm structures by type and size (inches) (includes frames and grates)
3. Sanitary sewers by pipe type, size (inches) and length (feet)
4. Sanitary structures by type and size (inches) (includes frame and grates)
5. Water mains by pipe type, size (inches) and length (feet)
6. Water structures by type and size (inches) (includes frame and grates)

SECTION 4.00 - GENERAL REQUIREMENTS FOR SANITARY SEWERS

A. Scope

The section shall establish the basic requirements to be used by the City and consultants in design and by contractors in the construction of all sanitary sewers within the City

B. Basis of Design

The criteria for sanitary systems shall comply with the requirements of the North Shore Sanitary District, IEPA, "Standard Specifications for Water & Sewer Main Construction in Illinois"; latest edition, and the requirements herein; the most stringent shall apply.

C. General Requirements

1. Sanitary sewers shall be extended as a minimum, to the limits of the subdivision at a minimum slope for self-cleaning velocity. Sanitary sewers shall be designed to accept all existing and future demand, based on the ultimate service area as depicted in the City's Comprehensive Plan.
2. Provide calculations to substantiate the capacity of the receiving sewer.
3. The minimum mainline pipe size shall be 8 inches in diameter. PVC sewer pipe shall be rated a minimum of SDR 26. Ductile iron shall be class 52.
4. All sanitary sewer pipes shall be installed on a straight line between manholes.
5. Provide a maximum spacing of 300 feet between manholes. Additionally, manholes shall be provided at each change in direction of flow, slope, change in pipe size, and at each intersection.
6. Sanitary sewer manholes constructed in the 100 year flood plain shall have a rim twelve inches above the Base Flood Elevation or have a water-tight, lock-type frame and cover, Neenah R-1916-C2 or approved equal.
7. Granular trench backfill shall be installed under and within three (3) feet of all proposed pavements as shown on Typical Cross Section. Granular trench backfill shall conform to CA6 compacted to 95%

SECTION 4.00 - GENERAL REQUIREMENTS FOR SANITARY SEWERS

standard density in accordance with ASTM D698. Backfill under existing pavements, where an open cut of the pavement has been approved, shall be flowable fill which meets the IDOT standards of Controlled Low Strength Material (CLSM) Mixture 1. Install 12" of compacted granular trench backfill over sewer before placing the flowable fill.

8. Excavated trench backfill shall be mechanically compacted to a minimum of 90% standard density in accordance with ASTM D698.
9. Detectable marking tape shall be installed for all new sanitary mains and services. Tape shall be green with imprint "Caution Sewer Line Below", and installed between 12" and 18" below grade and a minimum of 12" above the pipe. Tape shall be a minimum of 3" wide made of heavy duty inert plastic film with solid aluminum foil core, resistant to acids, alkalis, and water.
10. Sewer and water line separation criteria and any required special construction shall conform to the "Standard Specifications for Water & Sewer Main Construction in Illinois", May 1996. Proposed separation dimensions and any special construction requirements for crossings shall be shown on the plans.
11. Plans shall note which sewer lines are to be private and those that are to be public.

D. Conduit Materials

1. The sanitary sewer piping specified on plans and specifications and used in construction shall conform to the standards listed below.
 - a) AWWA C110 – Ductile iron and gray iron fittings.
 - b) AWWA C111/ANSI A21.11 – Rubber gasket joints for ductile iron pressure pipe and fittings.
 - c) ANSI/AWWA C151/A21.51-09 – Ductile iron pipe, centrifugally cast.

SECTION 4.00 - GENERAL REQUIREMENTS FOR SANITARY SEWERS

- d) ASTM A746-09 – Standard specification for ductile iron gravity sewer pipe.
 - e) ASTM D3034 – Standard Specification for Type PSM PVC sewer pipe and fittings.
 - f) ASTM F679 - 08 Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
 - g) ASTM D-3212-07 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals .
 - h) ASTM F 477-08 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- 2. Ductile Iron Sewer Pipe. The interior surface of iron pipe and fittings shall be lined with cement mortar, finished so that the Hazen-Williams friction factor will not be less than 140. All joint gaskets shall be manufactured utilizing neoprene as the sole polymer.
 - 3. Oakum, mortar, and solvent joints will not be allowed.

E. Bedding Material

- 1. The pipe shall be bedded in a foundation of compacted crushed stone conforming to a gradation of CA-6 (see L.F. Standard Detail 4.01).
- 2. The depth of the bedding material shall be one-eighth the outside diameter of the pipe but not less than 6 inches. The concrete required for Class A bedding shall not be less than 3000 psi strength. All pipes shall be continuously supported by the proper bedding material specified.

F. Manholes

- 1. Manhole foundations shall be precast, reinforced Class SI concrete. All riser sections shall be precast, tongue and grooved reinforced concrete, eccentric type, conforming to Standard ASTM C478. Pipe penetrations shall be sealed using cast in place, flexible, water tight synthetic rubber pipe boots connected with stainless steel internal expanding bands. Benches shall be provided in all sanitary manholes (see L.F. Std. Detail 4.02).

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2. Drop manholes shall be required where the difference between the invert elevation of the inlet and downstream pipe is greater than 24" (see L.F. Standard Detail 4.03)
3. Manhole covers shall be Neenah Foundry item R-1713-B (or approved equal) with "SANITARY" cast into top of cover (see L.F. Std. Detail 4.07).
4. .Chimney seals shall be installed on all sanitary manholes (see L.F. Std. Detail 4.07).
5. Steps shall be steel reinforced copolymer polypropylene plastic, 14" wide, installed 16" on center.. Steps shall not be located over the sanitary sewer main line.
6. All adjusting rings shall be precast reinforced concrete (3" minimum, 8" maximum adjustment; 3 adjusting rings maximum).
7. All joints between precast sections, adjusting rings, and castings shall be sealed with a preformed flexible butyl rubber mastic sealant strips, (Press-Seal "EZ-Stik" or approved equal). Two strips shall be installed on all tongue and grooved precast sections.
8. All exterior joints between sections shall be sealed with 6" butyl-rubber based tape with EDPM rubber backing, (Press-Seal "EZ-Wrap" Rubber Joint Wrap or approved equal). Prime and install as recommended by manufacturer.
9. Pipe penetrations into existing manholes shall be properly sized and cored and sealed with flexible, water tight synthetic rubber pipe boots connected with stainless steel expanding bands, (NPC "Kor-N-Seal" or approved equal). Cut, shape and slope new invert channel in the existing concrete bench for smooth flow from new connection. Manhole connections shall not protrude past the interior wall of the manhole. The space between connecting pipes and the interior wall on the manhole shall be completely filled with non-shrink hydraulic cement mortar.

G. House Services

SECTION 4.00 - GENERAL REQUIREMENTS FOR SANITARY SEWERS

1. Each single family lot shall be served with a separate sanitary service. House service wyes shall be provided for each lot fronting on the improvement or at special locations indicated on the plan. Tee's will not be allowed.
2. House services shall enter manholes where possible. See above requirements for connections into existing manholes.
3. Lot service connections to existing mains shall follow one of the following methods:
 - a) coring the existing main in the trench at the spring line or above, and installing a hub and rubber sleeve fitting with stainless steel bands (Inserta Fittings Inc. "Inserta Tee" or approved equal) or a sewer saddle tee or wye with stainless steel bands (Mission "T-Flex" or approved equal) and 6" ductile iron or 6" PVC, SDR 26 service pipe.
 - b) using a pipe cutter, cut out required length of existing pipe for insertion of a new wye fitting, making the final connections with non-shear stainless steel adjustable connection couplings (Mission "Flex-Seal Adjustable Repair Couplings" or approved equal.) This method shall be used for connecting to mains with a diameter less than 10 inches. Couplings shall conform to ASTM C 1173-06.
4. House services shall extend from the main line sewer wye branch or service riser at approximate right angles and ascend on a uniform slope of not less than 1/4 inch per foot.
5. The depth of the house service at the front lot line shall be of sufficient depth to provide gravity service to existing or future basements.
6. House service risers may be installed on all wyes that are deeper than 10 feet. Risers shall extend upward to an elevation that is approximately 10 feet below finished grade and be installed as shown on the detailed plan or as otherwise specified. See L.F. Std. Detail 4.05.
7. All wyes where risers are required shall be blocked and supported by placement of low strength concrete to Lake Forest Standards.

SECTION 4.00 - GENERAL REQUIREMENTS FOR SANITARY SEWERS

8. Each service shall terminate 3 feet beyond the property line or 3 feet beyond adjacent utility easement were applicable with a water tight plug.
9. The contractor shall install a 4" x 4" x 8' post or a 4" dia. x 8' post, painted red, to mark the end of each sanitary sewer service line. Top of post shall be plumb and 3 feet above finished grade.
10. No horizontal bends will be allowed on lot services except at the wye connection to the main line.
11. House services shall be 6 inch minimum diameter ductile iron Class 52 or PVC, SDR 26.
12. The contractor shall provide the city with a tabular listing of each and every service connection and their locations relative to fixed objects such as manholes, fire hydrants, catch basins, etc. Each service connection shall be accurately located by a series of three precise intersecting location measurements. The depth as measured from finished grade shall also be recorded. Finally, the locations of all wyes and tees shall be accurately recorded by measuring the distance to the nearest downstream structure.
13. Disconnections of existing services shall be by means of cutting out existing wye or tee fitting and replacing with a straight piece of equal size pipe and making the final connections with stainless steel, non-shear adjustable repair couplings.

H. Testing

The developer shall test and inspect all sanitary sewers and related structures installed within the improvement for deflection (PVC pipe only) and infiltration. All sewers and appurtenances shall be cleaned prior to inspection and testing.

Deflection shall be measured with a rigid fixed arm mandrel (Go/No-Go) device cylindrical in shape and labeled by the manufacturer with applicable pipe size, material, and maximum deflection. Pipe deflection shall be measured not less than thirty (30) days after backfill has been completed and shall not exceed five (5) percent.

One of three methods shall be used to test the infiltration of sanitary sewers.

SECTION 4.00 - GENERAL REQUIREMENTS FOR SANITARY SEWERS

1. Infiltration: test shall be made when the groundwater level is above the top of the sewer. The tests shall be made by measuring the infiltrated flow of water over or through a gauging device set in the invert of the sewer a known distance downstream from a temporary bulkhead or other limiting point of infiltration. If the groundwater level at the time of the test is below the top of the sewer, the sewer shall be tested for infiltration by pumping water into the ground over the length of sewer being tested so as to raise the groundwater level to at least the top of the sewer. This condition shall be maintained for the time necessary to perform the infiltration test.
2. Exfiltration: The sewer shall be tested for leakage by filling the sewer with water and measuring the amount of water that escapes. To perform this test, the sewer at the bottom of the test section shall be effectively bulkheaded so as to prevent leakage of water. The sewer shall then be filled with water until the top of the sewer pipe at the highest manhole of the test section is under 4 feet of water. Leakage will be determined by measuring the amount of water added to maintain the level above the pipe. The test shall be conducted for a minimum of four hours with make up water being added and recorded at 30 minute intervals.

The quantity of infiltration or leakage for any section of sewer shall not exceed 200 gallons per inch diameter of pipe, per 24 hours per mile of sewer. In computing the length of sewer contributing infiltration or leakage, the length of any house service stubs will not be included.

3. Exfiltration of air: The section of sewer to be tested shall have been cleaned and trench backfilled. Pneumatic plugs having a sealing length equal to or greater than the diameter of the pipe to be tested shall be placed in both ends of the pipe and inflated to twenty five (25) psig. The sealed sewer pipe shall then be pressurized to four (4) psig above the average back pressure of ground water over the pipe and the air pressure allowed to stabilize for at least two (2) minutes.

After the stabilization period the line shall be pressurized to 3.5 psig and the time in minutes measured for pressure to drop to 2.5 psig. If ground water is present, the air pressure shall be increased to 3.5psig above the level of the ground water and the drop of one (1) psig of air pressure measured in minutes.

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Air testing techniques shall be in accordance with the latest ASTM standard practice for testing sewer lines by low-pressure air test method for the appropriate pipe material.

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Length of Sewer Pipe (in feet)	Diameter of Pipe (in inches)								
	4	6	8	10	12	15	18	21	24
25	0:04	0:10	0:18	0:28	0:40	1:02	1:29	2:01	2:38
50	0:09	0:20	0:35	0:55	1:19	2:04	2:58	4:03	5:17
75	0:13	0:30	0:53	1:23	1:59	3:06	4:27	6:04	7:55
100	0:18	0:40	1:10	1:50	2:38	4:08	5:56	8:05	10:34
125	0:22	0:50	1:28	2:18	3:18	5:09	7:26	9:55	11:20
150	0:26	0:59	1:46	2:45	3:58	6:11	8:30		
175	0:31	1:09	2:03	3:13	4:37	7:05			
200	0:35	1:19	2:21	3:40	5:17				12:06
225	0:40	1:29	2:38	4:08	5:40			10:25	13:36
250	0:44	1:39	2:56	4:35			8:31	11:35	15:07
275	0:48	1:49	3:14	4:43			9:21	12:44	16:38
300	0:53	1:59	3:31				10:12	13:53	18:09
350	1:02	2:19	3:47			8:16	11:54	16:12	21:10
400	1:10	2:38			6:03	9:27	13:36	18:31	1.01
450	1:19	2:50			6:48	10:38	15:19	20:50	1.13
500	1:28			5:14	7:34	11:49	17:01	23:09	1.26

When infiltration or leakage occurs in excess of the specific amount, defects shall be located and repaired at the expense of the developer. Alignment of the sewer will be checked by directing a light beam through the sewer pipe between manholes as directed by the City Surveyor and Engineer. If the light is not visible between manholes or if an extreme bend in the line is apparent, the developer shall reconstruct the sewer or the unacceptable portion thereof as directed by the City Surveyor and Engineer.

Television Inspection of Completed Sewers

1. All sanitary sewers shall be inspected by closed circuit television subsequent to their installation.
2. The developer will arrange for the television inspection of the sanitary sewer. A copy of the television inspection in color "DVD" format will be submitted to the City Surveyor and Engineer and the North Shore Sanitary District, along with a written log of observations. The contractor must rotate the lens of the camera to view all services. The service connections must be noted in the log of observations.

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Notification must be given, not less than 24 hours in advance of televising, to the North Shore Sanitary District.

3. All corrective work required as a result of the television inspection as determined by the City Surveyor and Engineer shall be done by the developer without delay. Upon completion of the corrective work, further inspection of the work will be made as necessary.
4. The entire cost of closed circuit television inspection shall be paid for by the developer.

Project Closeout As-Built Requirements

1. Owner shall, not later than the time it gives the notice of completion and request for approval provide to the City three sets of “as-built” or “record” drawings for all of the Improvements, including one set on a reproducible mylar and one in digital format (see item 5.). The City must receive, review and approve "as-built" plans for the project, certified by an Illinois Licensed Professional Engineer, which shall indicate, all geometric changes to roadways, parking lots, entrances, all alignment changes to new or adjusted utilities, outlet structures, special structures, overflow structures, normal water surface elevation, high water surface elevation, verification of right-of-way markers/property corners, changes in benchmarks or control points, all valves and buffalo boxes, depth and location of water mains, as well as all sewer wye locations, culverts, pipes, tanks, field tile (abandoned or not), manholes, catch basins, inlets, stubs, sidewalks, driveways, aprons, curbs, berms, channels, swales, utility poles/boxes, mailboxes, etc.
2. Lot services shall have two (2) measurements from the end of the service to fixed objects such as manholes, fire hydrants, catch basins, etc., all design plan elevations, size, length, width, locations and materials shall be field verified and revised to show actual conditions.
3. City will review the “as-built” drawings and compare them with the approved final engineering drawings. In addition, the City will conduct any field inspections necessary to ensure the validity of the “as-built” plans. If in the opinion of the City Surveyor & Engineer there are unacceptable differences in these two drawings, the

SECTION 4.00 - GENERAL REQUIREMENTS FOR SANITARY SEWERS

developer will correct these differences. The approval of the “as-built” plans shall occur prior to release of the Letter of Credit, or other securities. The "as-built" plans shall show revised 100-year flood limits due to as-built conditions. Due to as-built conditions, the City may require revised drainage calculations prior to final acceptance and approval of the City. This may include but not be limited to storm sewers, overflow routes, weir locations, detention, and other critical locations to establish their compliance with Subdivision Agreement and all Requirements of Law.

4. Any revisions to previous submitted engineering plans, either before or after City approval, shall be duly noted on the plans with revision dates, revision numbers and highlighting the change. All revisions must also be itemized in a letter to accompany the revised engineering plans.
5. Upon acceptance of hard copy of the As- Built drawings, these drawings should be submitted in digital format as well as on reproducible mylar and submitted to the City Engineer in .dgn or .dwg file format on a DVD. The As-Built drawings shall be submitted with final improvements shown, noting changes from the original construction plans.

Project Closeout GASB Requirements

The Owner shall submit the final quantities and actual costs, certified by an Illinois Licensed Professional Engineer, for each of the following publicly or privately maintained items. The submittal shall include both newly installed improvements and those removed or abandoned..

1. Storm sewers by pipe type, size (inches) and length (feet)
2. Storm structures by type and size (inches) (includes frames and grates)
3. Sanitary sewers by pipe type, size (inches) and length (feet)
4. Sanitary structures by type and size (inches) (includes frame and grates)
5. Water mains by pipe type, size (inches) and length (feet)

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SECTION 4.00 - GENERAL REQUIREMENTS FOR SANITARY SEWERS

6. Water structures by type and size (inches) (includes frames and grates where applicable)
7. Sidewalk and bike path by material type and area (square feet) (includes base course)
8. Curb and gutter by size (inches) and length (feet) (includes base course)
9. Street and parking lots by material type and area (square yards) (includes base course)
10. R.O.W. by area (acres to nearest hundredth)
11. Other items as requested by City Surveyor & Engineer

SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER DISTRIBUTION SYSTEM

A. Scope

This section establishes the basic requirements to be used by the City and consultants in design, and contractors in the construction of all watermains within the City.

B. Materials

All materials shall conform to the current standards listed below:

ANSI/AWWA C104 - 08 Cement-Mortar lining for Ductile Iron Pipe and Fittings

ANSI/AWWA C111 - 08 Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings

ANSI/AWWA C502-05 Dry- Barrel Fire Hydrants

ANSI/AWWA C509-09 Resilient-Seated Gate Valves for Water Supply Services

ANSI/AWWA C515-09 Reduced-Wall Resilient-Seated Gate Valves for Water Supply Services

ANSI/AWWA C800 - 05 Underground Service Line Valves and Fittings.

ANSI/AWWA C600 - 05 Installation of Ductile Iron Water mains and their Appurtenances

ANSI/AWWA C900 - 07 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 “ – 12”, for Water Distribution. (For directional drilling applications only)

ANSI/AWWA C909 - 09 Molecular Oriented PolyVinyl Chloride (PVCO) Pressure Pipe, 4” – 12”, for Water Distribution

ANSI/AWWA C651 - 05 Standard for Disinfecting Watermains

ANSI/AWWA C115/A21.15 Flanged Cast-Iron and Ductile-Iron Pipe with Threaded Flanges

SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER DISTRIBUTION SYSTEM

ANSI/AWWA C150/A21.50 - 08 Standard for Thickness Design of Ductile Iron Pipe

ANSI/AWWA C151/A21.51 - 09 Ductile-Iron Pipe, Centrifugally Cast

ANSI/AWWA C110 - 08/C153 Standard for Ductile Iron Fittings

Water mains shall be constructed of ductile iron pipe or PVCO (C-909) as directed by the City Engineer. All ductile iron pipes shall be a minimum of Class 52 centrifugally cast pipe designed for a maximum working pressure of 150 psi and of a thickness class specified. All pipes shall be made in standard 18 or 20 foot lengths and shall have a standard thickness cement lining.

C. Trench and Bedding

1. Water main trenches shall be excavated to a depth which will provide 5 feet 6 inches minimum cover between the top of the main and the established finished grade or roadway pavement as applicable. The trench shall be excavated with vertical walls to a width at least 12 inches and not more than 18 inches wider than the external diameter of the watermain.
2. The water main shall be bedded in a foundation of crushed granular material meeting the gradation of IDOT CA-6. The bedding shall be placed to a minimum compacted depth of 4 inches below the pipe and 12 inch above the top of the pipe.
3. Granular trench backfill shall be installed under all proposed or existing pavements. Granular trench backfill shall conform to CA6 as specified, and compacted to 95% standard density in accordance with ASTM D698.
4. Backfill under existing pavements, where an open cut of the pavement has been approved, shall be flowable fill which meets the IDOT standards of Controlled Low Strength Material (CLSM), Mixture 1. Where Flowable Fill is used, granular trench backfill shall be installed and compacted to a minimum height of 12" above any water main, fittings, corporation, or service line. The flowable fill shall not come into contact with any component of the water distribution system.

SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER DISTRIBUTION SYSTEM

5. The contractor shall install a mechanical watertight plug in the end of the newly installed main at the end of each work day.

D. Hydrostatic Tests

All newly constructed watermains, fittings, valves and hydrants shall meet the testing requirements of AWWA C605-05 for PVC pipe and AWWA C600-05 for ductile iron.

After completion of the watermain, the main shall be filled with water and the air allowed to escape through hydrants, air release valves, or blow offs at the highest point. When the main is free of air, raise the water pressure to 150 pounds per square inch by means of a water force pump. The test pressure shall be maintained for a total period of 120 minutes. The amount of water required to restore the main to test pressure shall be measured. The allowable quantity of water for each 1000 feet of pipe shall not exceed the following rates:

6 inch pipe	0.50 gallon per hour
8 inch pipe	0.67 gallon per hour
10 inch pipe	0.84 gallon per hour
12 inch pipe	1.01 gallon per hour
14 inch pipe	1.18 gallon per hour
20 inch pipe	1.68 gallon per hour
24 inch pipe	2.01 gallon per hour

The above specified test shall be made on sections not exceeding 2000 feet in length.

The City of Lake Forest will not assume any responsibility for tests made against existing valves now in service. The contractor shall make all preliminary tests and bring the work up to standard before requesting inspection of the official test. He shall furnish all necessary labor, force pumps, gauges, test taps, and equipment necessary to complete the tests required.

E. Disinfection

All new water mains shall be disinfected in accordance with ANSI/AWWA C651-92, Standard for Disinfecting Water Mains.

The main shall be flushed and pressure tests complete prior to disinfection. The flushing velocity required shall not be less than 2.5 feet per second.

SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER DISTRIBUTION SYSTEM

Flushing shall not be substituted for preventive measures to preclude contamination before and during pipe laying.

ANSI/AWWA C651-92 provides for three means of chlorination for water mains: tablet, continuous feed, and slug methods.

Proposed disinfection methods other than continuous feed shall be pre-approved by the city.

Continuous Feed Disinfection: This method provides for the introduction into the main of pure liquid chlorine, a water chlorine solution or chlorine gas such that the concentration in the main is a minimum of 50 mg/l available chlorine.

Water from the existing distribution system shall be made to flow at a constant rate into the new pipe line. The chlorine shall be applied to the watermain with a chemical feed pump designed for feeding chlorine.

Prior to the application of the chlorine, valves shall be manipulated to prevent the treatment dosage from flowing back into the line supplying the water. Chlorine application shall not cease until the entire main is filled. The chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. At the end of this 24 hour period, the treated water shall contain no less than 25 mg/l chlorine throughout the length of the main.

Following chlorination, all treated water shall be thoroughly flushed from the new pipe lines until the replacement water has a chlorine concentration no higher than that generally prevailing in the existing system. After final flushing, a sample shall be taken from a sterile metal pipe connection with sampling cock attached to the 1 inch corporation cocks in the new line. A second sample shall be taken 24 hours after the first sample without re-flushing the line. Samples shall be taken at all dead ends, branch lines and at 1000 foot intervals on main lines. Quality of water shall meet the requirements of the Department of Public Health of the State of Illinois for drinking water for at least two consecutive days before placing the new pipe line or section in service. Samples shall be submitted to a licensed Illinois Environmental Protection Agency laboratory for analysis. Type written results shall be forwarded to the City of Lake Forest Engineering Section for approval.

SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER DISTRIBUTION SYSTEM

Should the initial chlorinating treatment fail to result in satisfactory laboratory analysis of the sampled water, the chlorination shall be repeated at the expense of the contractor until approved quality of water is obtained from the new pipe line extensions or sections

Chlorinating, flushing, and pressure testing and tapping activities shall only be performed during normal working hours of the Lake Forest Public Works Department.

F. General Requirements

1. Valves

- a) Type: Resilient Wedge with epoxy coated interior and exterior surfaces, type 304 stainless steel bolts, nuts and fasteners and O-Ring stem seals.
- b) Approved Manufacturers: Mueller or Clow
- c) Adjustable cast-iron valve box: Mueller #H-10360, Clow #F-2454 with “WATER” cast into cover. Note: Valve boxes shall only be used when it has been determined that a valve vault is too large or impractical for the location and the substitution is approved by the City Engineer’s office.
- d) Valve spacing: Every 600 feet and at street intersections and connection points.
- e) All nuts, bolts and washers below grade (including inside valve vaults) shall be stainless steel.

2. Valve Vaults

All newly installed or replaced valves shall be housed in precast concrete valve vault conforming to LF Std. Detail 5.03. Minimum diameter shall be five (5) feet.

- a) Structure foundation shall be precast Class SI concrete. All riser sections shall be precast concrete conforming to ASTM C478,

SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER DISTRIBUTION SYSTEM

Precast Reinforced Concrete Sections. Pipe penetrations shall be sealed using cast in place, flexible, water tight synthetic rubber pipe boots connected with stainless steel internal expanding bands.

- b) Valve vault top sections shall be eccentric cones.
 - c) All joints between precast sections, adjusting rings, and castings shall be sealed with a preformed flexible butyl rubber mastic sealant strips, (Press-Seal “EZ-Stik” or approved equal).
 - d) All adjusting rings shall be precast reinforced concrete (3” minimum, 8” maximum adjustment; 3 adjusting rings maximum.)
3. **Fire Hydrant**
- a) Approved Manufacturer and type : Mueller-Centurion A-423; Break Flange, 6' Bury. All nuts and bolts below grade shall be stainless steel.
 - b) Size of Main Valve Opening: 5 1/4 inch
 - c) Number of hose nozzles: 2 @ 2 1/2 inch
 - d) Number and size of pumper nozzles: 1 @ 4 1/2 inch
 - e) Direction of opening: Counter Clockwise
 - f) Size and shape of operating nut: 1 1/2 inch Pentagon
 - g) Hose and pumper nozzle threads: National Standard Thread
 - h) Type of stem seal: O-Ring
 - i) Auxiliary valve size and type of joints: Mueller 6" gate valve A-2380-18 Flange to mechanical joint
 - j) Adjustable cast-iron valve box spec: Mueller #H-10360, Clow #F-2454 with “WATER” cast into cover
 - k) Fire hydrants shall be spaced at a maximum of 500 feet apart in residential areas and 300 feet apart in commercial areas.

SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER DISTRIBUTION SYSTEM

- l) Fire hydrants shall be covered or “bagged” until the main has been put into service.
 - m) The hydrant barrel and shoe shall be secured by means of stainless steel nuts and bolts. All exposed nuts and bolts below grade shall be stainless steel.
4. **Water main**
- a) Acceptable pipe materials: Cement lined ductile iron and PVC pressure pipe.
 - b) Working pressure: 150 psi.
 - c) Pipe thickness class: Class 52 under normal conditions.
 - d) Allowable pipe lengths: 18 to 20 feet.
 - e) Bedding material: 1/4" to 3/4" crushed limestone.
 - f) Method of disinfection: ANSI/AWWA standard as outlined.
 - g) Pressure connections: Tapping sleeves shall be 304 stainless steel with 3/4" test plug, gridded pipe gasket and flanged outlet with a minimum working pressure of 150 psi, (Ford “FAST” or “FTSS”, Muller “H-304SS” or approved equal.
 - h) Minimum diameter: 8 inch.
 - i) All new mains shall be connected into an existing main to form a complete loop where possible.
 - j) Minimum depth: 5.5 feet from finished grade to top of pipe.
 - k) The City of Lake Forest may require the use of retainer glands, where blocking for a change in direction is not adequately supported.
 - l) Studs, nuts, bolts and washers used on all hydrants, valves, sleeves, saddles and fittings shall be stainless steel.
 - m) Reinforced tracer wire shall be required on all new water mains installed within the city (regardless of pipe material). Wire shall be

SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER DISTRIBUTION SYSTEM

copper clad steel, # 12 AWG, with a minimum average tensile break load of 1150 pounds and a minimum of .045” blue HDPE insulation, (Copperhead Industries 1245B-EHS or approved equal).

Two separate conductors shall be run along the side (at the nine or three o'clock position) of all new mains and hydrant leads, taped to the pipe a minimum of every 5 feet. The wire shall be brought to grade in a tracer box at each hydrant and secured to the top (inside) of each valve vault, leave enough slack in the wire so that it may be pulled out of the valve vault. A magnetized tracer box shall be installed at each new fire hydrant. Locate the box adjacent to the auxiliary valve, within two feet of the hydrant barrel. The box shall be tamper-proof, with cast or ductile iron blue lid with a brass wire harness and external brass connection screw, (Copperhead Industries, LD14-ADJ-B or LDXL36-B in unpaved areas, CD14-B for concrete applications and RB14-B in roadways or approved equal . Additional tracer boxes maybe required at locations to be determined by the City Engineer's office.

All splices in the wire for lateral runs or hydrant leads shall be made with a 3 - way enclosed lug direct bury connector with internal silicone sealant (Copperhead Industries “DryConn” Direct Bury Lug, # 3WB-01 or approved equal). In directional bore operations, splices shall be at valve and fitting locations where excavation is required. If a splice must be done in an unexcavated location, use a wire nut twist connector with restraining cap and internal silicone sealant (Copperhead Industries #SCB – 01SR or approved equal). Wrap connection and wire (minimum three inches each side of connection) with electrical tape.

The contractor is responsible for testing and ensuring the continuity of the tracing wire during installation, the city will test the integrity of the tracing wire at the end of construction.

5. Service Line Details

- a) Corporation type: Mueller H-15020 with tailpiece.
- b) Line Type: Copper type K, 1 1/2" minimum, larger sizes required depending on consumer needs and distance from water main.
- c) Depth: 5.5 feet minimum, 7 foot maximum.
- d) Roundway type: Mueller H-15154, sizes over 1" require O-ring type.

SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER DISTRIBUTION SYSTEM

- e) The City shall make tap connections for service line less than 8" in diameter.
- f) Buffalo box: Minneapolis type, **Mueller 10304*, 2" diameter, minimum 5 1/2 to 6 foot depth. Requires Mueller bushing H-10343 when used on 1-1/2" roundway. (*Change effective 2/1/09)**
- g) Meter location: Inside structure, except if service is over 200 feet long, measured from the centerline of the roadway to the point where the meter is to be placed in the basement, then a meter pit is required in the parkway.
- h) The contractor shall install a 4" x 4" x 8' post or a 4" dia. x 8' post, painted blue, to mark the buffalo box and line valves. Top of post shall be plumb and 3 feet above finished grade.
- i) Tap construction: Taps are to be made by the contractor, under pressure, only after the main has been certified pure by the Lake Forest Engineering Section. All material in a., b., e., and f. above and labor is to be supplied by the contractor. A brass or epoxy coated ductile iron saddle with stainless steel studs, bolts, nuts and washers and two stainless steel straps shall be used for connection to the main, (Smith-Blair "TaperSeal" , Mueller "DR2S" series or approved equal).
- j) Termination: extend 3 feet past property line.
- k) The contractor shall provide the city with a tabular listing of each tap and B-Box location for each service connection. Provide their locations relative to fixed objects such as manholes, fire hydrants, catch basins, etc. Each service connection shall be accurately located by a series of three precise intersecting location measurements. The depth as measured from finished grade for the tap shall also be recorded.

G. Project Closeout As-Built Requirements

- 1. Owner shall, not later than the time it gives the notice of completion and request for approval provide to the City three sets of "as-built" or "record" drawings for all of the Improvements, including one set on a reproducible mylar and one in digital format (see item 5.). The City

SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER DISTRIBUTION SYSTEM

must receive, review and approve "as-built" plans for the project, certified by an Illinois Licensed Professional Engineer, which shall indicate, all geometric changes to roadways, parking lots, entrances, all alignment changes to new or adjusted utilities, outlet structures, special structures, overflow structures, normal water surface elevation, high water surface elevation, verification of right-of-way markers/property corners, changes in benchmarks or control points, all valves and buffalo boxes, depth and location of water mains, as well as all sewer wye locations, culverts, pipes, tanks, field tile (abandoned or not), manholes, catch basins, inlets, stubs, sidewalks, driveways, aprons, curbs, berms, channels, swales, utility poles/boxes, mailboxes, etc.

2. Lot services shall have two (2) measurements from the end of the service to fixed objects such as manholes, fire hydrants, catch basins, etc., all design plan elevations, size, length, width, locations and materials shall be field verified and revised to show actual conditions.
3. City will review the "as-built" drawings and compare them with the approved final engineering drawings. In addition, the City will conduct any field inspections necessary to ensure the validity of the "as-built" plans. If in the opinion of the City Surveyor & Engineer there are unacceptable differences in these two drawings, the developer will correct these differences. The approval of the "as-built" plans shall occur prior to release of the Letter of Credit, or other securities. The "as-built" plans shall show revised 100-year flood limits due to as-built conditions. Due to as-built conditions, the City may require revised drainage calculations prior to final acceptance and approval of the City. This may include but not be limited to storm sewers, overflow routes, weir locations, detention, and other critical locations to establish their compliance with Subdivision Agreement and all Requirements of Law.
4. Any revisions to previous submitted engineering plans, either before or after City approval, shall be duly noted on the plans with revision dates, revision numbers and highlighting the change. All revisions must also be itemized in a letter to accompany the revised engineering plans.
5. Upon acceptance of hard copy of the As- Built drawings, these drawings should be submitted in digital format as well as on reproducible mylar and submitted to the City Engineer in .dgn or .dwg

**SECTION 5.00 – GENERAL REQUIREMENTS FOR WATER
DISTRIBUTION SYSTEM**

file format on a DVD. The As-Built drawings shall be submitted with final improvements shown, noting changes from the original construction plans.

H. Project Closeout GASB Requirements

The Owner shall submit the final quantities and actual costs, certified by an Illinois Licensed Professional Engineer, for each of the following publicly or privately maintained items:

1. Storm sewers by pipe type, size (inches) and length (feet)
2. Storm structures by type and size (inches) (includes frames and grates)
3. Sanitary sewers by pipe type, size (inches) and length (feet)
4. Sanitary structures by type and size (inches) (includes frame and grates)
5. Water mains by pipe type, size (inches) and length (feet)

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

SECTION 6.00 – SITE GRADING, DRAINAGE, AND EROSION CONTROL ORDINANCE

AN ORDINANCE

AMENDING ARTICLE XI, SECTION 2-155 OF THE LAKE FOREST CITY CODE

BE IT ENACTED BY THE CITY COUNCIL OF THE CITY OF LAKE FOREST, ILLINOIS:

Section 1: That Article XI, "City Surveyor and Engineer," Section 2-155 (7) of the Lake Forest City Code is hereby amended to read as follows:

(A) GENERAL

No person, firm or corporation may disturb, change or reshape existing topography in conjunction with building construction, site grading or landscaping without first obtaining a Grading Permit or a Waiver of Permit from the City Surveyor and Engineer. Site grading or landscape work undertaken as part of required subdivision improvements, in accordance with plans approved by the City Surveyor and Engineer, shall not be subject to the provisions of this ordinance.

When the City Surveyor and Engineer determines that the proposed work is of sufficient scope to require a Grading Plan, a Grading Plan shall be submitted to the City Surveyor and Engineer showing that the proposed site grading, landscaping or building shall not adversely affect or change drainage patterns on adjacent property; shall also show erosion control measures, if required, to prevent siltation of downstream properties and drainage facilities; and shall also show how site grading and landscaping shall not adversely affect the principal usage of the site.

Building permits shall not be issued for any structure, construction or addition until a Grading Plan, or revision to an existing Grading Plan is approved by the City Surveyor and Engineer or until a Waiver of Permit and a Waiver of Plan submittal has been issued by the City Surveyor and Engineer as provided herein.

The provisions of this ordinance shall govern undeveloped properties where erosion sedimentation problems exist as determined by the City Surveyor and Engineer

(B) PLAN REQUIREMENTS

The topographic surveying required for a grading plan shall be prepared by either a professional engineer or land surveyor registered in the State of Illinois. The required Grading Plan shall be prepared by a professional engineer registered in the State of Illinois. Unless otherwise approved by the City Surveyor and Engineer, the plan shall include the following minimum requirements:

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

SECTION 6.00 – SITE GRADING, DRAINAGE, AND EROSION CONTROL ORDINANCE

- (1) The plan shall be drawn at a scale of no less than one (1) inch equals twenty (20) feet, except for properties exceeding two (2) acres where a smaller scale may be accepted.
- (2) The drawing size of the plan shall be no less than eight and one-half (8 1/2) inches by eleven (11) inches and no larger than twenty-four (24) inches by thirty-six (36) inches.
- (3) All elevations shall be on the USGS Datum and bench marks used shall be indicated.
- (4) The plan shall show spot elevations of all critical locations.
- (5) The plan shall show spot elevations at lot corners and at twenty-five (25) foot intervals along the property lines or along the perimeter of the area to be regraded or landscaped.
- (6) The plan shall show the elevations and location where drainage courses cross the property lines.
- (7) The plan shall show existing and proposed contours for the entire tract on one (1) foot contour intervals, or one-half (0.5) foot contour intervals if the average slope of the tract is two (2) percent or less, or five (5) foot contour intervals in ravine slopes.
- (8) The plan shall show proposed driveway location and gradients.
- (9) Where driveway culverts are required, the plan shall show proposed location, size and type of culvert, and shall show proposed entrance and discharge elevations and shall show ditch gradients at twenty-five (25) foot intervals, one hundred (100) feet upstream and downstream from the proposed culvert, including inverts of existing upstream and downstream culverts.
- (10) The plan shall show proposed building top of foundation; elevations of all entries; and elevations of proposed finished ground grade at all significant points around the proposed building.
- (11) The plan shall show floodplain elevation, in conformance to the Lake Forest Floodplain Regulations if said floodplain elevation is within three (3) feet of the elevation of the lowest floor of existing or proposed structure.
- (12) The plan shall show conformance to the Lake Forest Floodplain Regulations.

**SECTION 6.00 – SITE GRADING, DRAINAGE, AND EROSION CONTROL
ORDINANCE**

- (13) The plan shall show all proposed connections to public sewers and shall include invert elevations size and location of said public sewers.
- (14) The plan shall show conformance to all Ravine and Bluff Control Regulations.
- (15) The plan shall include provisions and time a schedule for restoring grass and lawns or for other erosion control measures.
- (16) Four (4) copies of the plan shall be submitted.
- (17) A reproducible copy of the original plan shall remain in the possession of the property owners.
- (18) The plan shall show location and disposition of downspouts and footing drain discharge.
- (19) The plan shall include information on adjacent properties to show contours, drainage courses, structure locations, and foundation elevations, within fifty (50) feet of the subject property.

(C) WAIVER OF PERMIT

A waiver of the Grading Permit **may be** approved by the City Surveyor and Engineer only on property previously improved with the principal use or structure; where the project consists only of minor additions to existing dwellings or structures, the construction of accessory buildings, tennis courts, swimming pools, or minor landscaping.

The waiver request shall include a description and address of the property, a brief description and site plan of the work to be performed, and a statement signed by the property owner as follows:

The applicant hereby certifies that he is the owner of the property described above, and certifies that to the best of his knowledge, the above-described project will not disturb existing topography or will not create adverse drainage problems on adjacent property. The applicant further agrees to assume all responsibility for any drainage problems that may be caused directly or indirectly by any action involving the above-described project and further absolves The City of Lake Forest of any responsibility for problems or actions that may result from the granting of the waiver of the Site Grading Permit requirements.

**SECTION 6.00 – SITE GRADING, DRAINAGE, AND EROSION CONTROL
ORDINANCE**

(D) WAIVER OF PLAN SUBMITTAL

Conditions:

A permit may be granted without plan submittal as determined by the City Surveyor and Engineer, when it is determined that the following conditions are present:

- (1) No major water course crossing the buildable portion of the property.
- (2) No portion of proposed building or site grading within the floodplain.
- (3) No portion of proposed building or site grading within bluff or ravine areas.
- (4) No filling, grading, paving or construction of auxiliary buildings or structures within ten (10) feet of side or rear lot lines.
- (5) Principal structure to be twenty (20) feet or more from any side or rear lot lines.
- (6) A contour map of the area or property at no more than two (2) foot contour interval and of scale no less than one (1) inch equal to two hundred (200) feet, shall be on file in the office of the City Surveyor and Engineer
- (7) A building envelope, as defined in Chapter 42 of the City Code, is not required.

Conditions

The request for Plan Waiver shall include the following:

- (1) Legal description of the property.
- (2) Brief description of project.
- (3) Plot plan of project showing dimensions from lot lines, height of foundation, location of driveway, provisions for roof drainage, and proposed grading limits.
- (4) A statement signed by the property owner as follows:
The applicant hereby certifies that he is the owner of the previously described property, and certifies to the best of his knowledge that the described project will conform to the conditions for Plan Waivers stated in part "e" of the Site Grading Ordinance, and will not create adverse drainage problems on adjacent property. The applicant further agrees to assume all

SECTION 6.00 – SITE GRADING, DRAINAGE, AND EROSION CONTROL ORDINANCE

responsibility for any drainage problems that may be caused directly or indirectly by any action involving the above described project and further

absolves The City of Lake Forest of any responsibility for problems or actions that may result from the waivering of the plan submittal as required in part "b" of the Site Grading Ordinance.

(E) FEES AND BONDS

The fee for a Grading Permit associated with new building construction shall be five hundred dollars (\$500.00).

The fee for a Waiver of a Grading Permit shall be one hundred dollars (\$100.00).

Where an existing Grading Plan is to be revised, a new Grading Permit shall be requested for a fee of one hundred and twenty-five dollars (\$125.00).

A bond will not be required when a grading permit is issued in conjunction with new building construction where the applicant is required to submit a cash bond.

Where a permit is requested for grading not associated with new building construction, a cash bond shall be required. This bond shall not be returned until after all grading and landscaping is completed, inspected and approved. The amount of this bond shall be a minimum of \$200.00 and shall increase commensurate with the estimated cost of minimum restoration and landscaping of the project site, as determined by the City Surveyor and Engineer.

A financial guarantee, in the form of cash, certified check, bond, or letter of credit will be required for all site grading permits. This financial guarantee shall not be returned until all grading improvements and required landscaping are completed, inspected, and approved. The amount of this financial guarantee shall be \$3,000.00 per acre of development.

(F) INSPECTION

The City Surveyor and Engineer shall inspect or cause to be inspected all grading and landscaping activities as previously described in "a." above, and including the public parkway.

Where the site grading work cannot be approved at the time of the requested inspection, and where there is no hazard to adjacent property, the owner shall be informed of the required corrective measures and a copy of the inspection report

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

**SECTION 6.00 – SITE GRADING, DRAINAGE, AND EROSION CONTROL
ORDINANCE**

shall be filed with the Director of Building and Zoning. Failure to comply within a reasonable time shall be a violation of this ordinance.

(G) PENALTIES

Violations of this ordinance shall be subject to a two hundred dollar (\$200.00) fine and, in addition, notice of such violation shall be made available to adjacent property owners. Where continued violation persists, after complaints have been registered by adjacent property owners or by the City Surveyor and Engineer, the fine shall be assessed monthly until the violation is corrected.

Violations of this ordinance shall be subject to fines as set forth in Section 1-9 of the City Code of The City of Lake Forest.

Section 2: This ordinance shall be in full force and effect after its passage and approval.

PASSED this _____ day of _____, 1992

City Clerk

APPROVED this _____ day of _____, 1992

Mayor

Attest:

City Clerk

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

SECTION 6.01 PERMIT APPLICATION FOR SITE GRADING

DATE _____

Application is hereby made for a permit to perform site grading on the premises located at
(street address) _____

LOT _____, BLOCK _____, _____ SUBDIVISION

Owned by _____

Plan prepared by (Name of Firm) _____

Address of Firm: _____

Telephone Number of Firm: (_____) _____

Name of Engineer: _____

Illinois Registration Number: _____

*The applicant understands and agrees that the required plan shall conform to all requirements of Article XI, Section 2-155 of the Lake Forest City Code. Furthermore, all work associated with this permit shall be done in such a way that existing drainage facilities, natural or man-made, are maintained at all times. **Four (4) copies** of the Grading Plan shall be submitted with this application to the Office of the City Surveyor and Engineer, accompanied by the fee prescribed.*

Printed Name of Signature: _____

Signature of Applicant: _____

Title of Applicant, i.e., Owner, Engineer, etc.: _____

Telephone Number of Applicant: (_____) _____

Address of Applicant: _____

For Office Use Only:		
Fee:	Restoration Bond:	Permit/Drawing:

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

6.02 WAIVER FOR SITE GRADING PERMIT

The City of Lake Forest Application for Waiver of the Site Grading Permit

Application is hereby made for a waiver of a site grading permit at the following described property:

ADDRESS:_____

PROJECT DESCRIPTION_____

CONTRACTOR:_____

CONTRACTOR'S PHONE:_____

Conditions:

A waiver of the Grading Permit **may be** approved by the City Surveyor and Engineer only on property previously improved with the principal use or structure; where the project consist only of minor additions to existing dwellings or structures, the construction of accessory buildings, tennis courts, swimming pools, or minor landscaping.

The waiver request shall include:

1. **Address or legal description** of the property.
2. **Description of the project.**
3. **Site plan of the project** including the dimensions(s) from the project to the nearest Lot Line(s), provisions for roof drainage (location and direction of discharge), and proposed grading limits.
4. **A statement signed by the property owner** agreeing to the following:

The applicant hereby certifies that he is the owner of the property described above, and certifies that to the best of his knowledge, the above described project will not disturb existing topography or will not create adverse drainage problems on adjacent property. The applicant further agrees to assume all responsibility for any drainage problems that may be caused directly or indirectly by any action involving the above described project and further absolves The City of Lake Forest of any responsibility for problems or actions that may result from the granting of the waiver of the Site Grading Permit requirements.

Signed_____ Date:_____
Property Owner

Printed Name of Signature Above Telephone Number

Waiver Granted_____ Date:_____
City Surveyor and Engineer

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

6.03 APPLICATION FOR A PLAN WAIVER FOR THE SITE GRADING PERMIT

THE CITY OF LAKE FOREST APPLICATION FOR A PLAN WAIVER FOR THE SITE GRADING PERMIT

Application is hereby made for a waiver of the plan requirement for a Site Grading Permit at the following described property (address or Legal Description)

Conditions:

A permit may be granted without a plan submittal as determined by the City Surveyor and Engineer, when it is determined that the following conditions are present:

1. No major water course crosses the buildable portion of the property.
2. No portion of the proposed building or site grading lies within the floodplain.
3. No portion of the proposed building or site grading lies within bluff or ravine areas, as defined by the City of Lake Forest Zoning Code.
4. No filling, grading, paving or construction of auxiliary buildings or structures within ten (10) feet of side or rear lot lines.
5. Principal structure to be twenty (20) feet or more from any side or rear lot lines.
6. A contour map of the area or property at no more than two (2) foot contour interval and of scale, no less than one (1) inch equal to two hundred (200) feet, shall be on file in the office of the City Surveyor and Engineer.
7. A building envelope, as defined in Chapter 42 of the City Code, is not required.

Conditions:

The request for a Plan Waiver shall include the following:

1. Address or legal description of the property.
2. Description of the project.
3. Site plan of the project including the dimensions from the project to the nearest lot lines, provisions for roof drainage (location and direction of discharge), and proposed grading limits.
4. A statement signed by the property owner agreeing to the following:

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

6.03 APPLICATION FOR A PLAN WAIVER FOR THE SITE GRADING PERMIT

The applicant hereby certifies that he is the owner of the previously described property, and certifies to the best of his knowledge that the described project will conform to the conditions for Plan Waivers stated in part "e" of the Site Grading Ordinance, and will not create adverse drainage problems on adjacent property. The applicant further agrees to assume all responsibility for any drainage problems that may be caused directly or indirectly by any action involving the above described project and further absolves The City of Lake Forest of any responsibility for problems or actions that may result from the waiving of the plan submittal as required in part "b" of the Site Grading Ordinance.

Signed _____ Date: _____
Property Owner

Printed Name of Signature Above Telephone
Number

Waiver Granted _____ Date: _____
City Surveyor and Engineer

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

6.04 SITE GRADING PERMIT

**THE CITY OF LAKE FOREST
GRADING PERMIT**

Number: _____

Date: _____

Permission is hereby granted to _____ to have grading work
performed at _____, Lot _____, Block _____,
_____ Subdivision, according to plan number
_____ on file in the Office of the City Surveyor and Engineer.

All work done under this permit shall comply with the Ordinance of The City of Lake Forest and shall be subject to inspection by the City Surveyor and Engineer or his authorized representative. All drainage facilities, natural or man-made shall be maintained at all times. Failure to comply shall be a violation of said Ordinance and the applicant shall be subject to the penalties prescribed.

City Surveyor and Engineer

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

6.05 BERMS

- (A)** Any berm over 7 feet high shall require a special use permit, as set forth in the Lake Forest Zoning Code.
- (B)** All berms shall require a site grading permit.
- (C)** Berms shall not block drainage areas unless the drainage areas are provided for.
- (D)** All berms shall be landscaped.
- (E)** Decomposable materials shall not be used as fill in a berm.
- (F)** All material shall be placed as not to create voids.
- (G)** The top 2 feet over the entire berm shall be free of concrete, rocks, stones asphalt, etc.
- (H)** The maximum side slope on any berm shall be 2:1.
- (I)** The top of all berms shall be flat, and the flat section shall equal a minimum of 10% of the base.

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

6.06 EROSION CONTROL MEASURES FOR RESIDENTIAL CONSTRUCTION SITES

The City of Lake Forest's Engineering Department has established the following required erosion control measures for residential construction sites. These measures will aid in controlling sediment erosion and will also aid in maintaining an attractive construction site. It is required that many of these measures, where applicable, be incorporated into the site grading plans.

(A) SILT FENCE:

- (1) Install fence before any other work is done.
- (2) Install on downslope side(s) of site with ends extended up side slopes a minimum of ten (10) feet.
- (3) Place parallel to the contour of the land to allow water to pond behind fence.
- (4) Entrench eight (8) inches deep (see detail).
- (5) Stake fence every ten (10) feet.
- (6) Overlap sections of silt fence by six (6) inches.
- (7) Maintain daily. Remove sediment if deposits reach half (1/2) the fence height.
- (8) Maintain until a lawn is established.

(B) SOIL PILES

- (1) Locate away from any downslope street, driveway, stream, lake, wetland, ditch or drainageway.
- (2) Temporary seed such as annual rye is recommended for topsoil piles.

(C) GRAVEL DRIVE

- (1) Install a single access drive using two (2) to four (4) inch crushed aggregate.
- (2) Place gravel six (6) inches deep and ten (10) feet wide from the foundation to the street (50 foot minimum from street) on geotextile filter fabric.
- (3) Use to prevent tracking dirt onto the road by all vehicles.
- (4) Maintain throughout construction.

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

6.06 EROSION CONTROL MEASURES FOR RESIDENTIAL CONSTRUCTION SITES

(D) SEDIMENT CLEANUP

- (1) By the end of each work day, sweep or scrape up soil tracked onto the road.
- (2) By the end of the next work day after a storm, clean up soil washed off-site.

(E) DOWNSPOUT EXTENDERS

- (1) Not required, but highly recommended, especially where downspouts are directed at adjacent properties.
- (2) Install as soon as gutters and downspouts are completed.
- (3) Route water to a grassed or paved area.
- (4) Maintain until a lawn is established.

(F) SEEDING SPECIFICATIONS

- (1) Topsoil should be sandy, black loam with a pH level not lower than 6.0 nor higher than 7.2. It should be placed, graded and compacted to a minimum depth of four (4) inches over the area to be seeded.
- (2) Fertilizer should be spread at a uniform rate of 500 lbs. per acre prior to seeding, meeting the following specifications:

Nitrogen	6%
Phosphorous	25%
Potash	25%

The fertilizer should be incorporated into the topsoil to a depth of two (2) inches by disking, harrowing or other methods which produce similar results.

- (3) Cross seeding should be applied at a minimum rate of 175 lbs. per acre. (If hydroseeding, increase rate to 225 lbs. per acre.) The seed should comply with the following specifications:

SUN CONDITIONS: NORTHROP KING ATHLETIC PRO II

25% Parade Kentucky Bluegrass
25% Trenton Kentucky Bluegrass
25% Caddy Perennial Ryegrass
25% Delray Perennial Ryegrass

6.06 EROSION CONTROL MEASURES FOR RESIDENTIAL CONSTRUCTION SITES

SHADE CONDITIONS:

NORTHROP KING SHADE MIX

25% Glade Kentucky Bluegrass
25% Dawson Creeping Red Fescue
25% Scalds Hard Fescue
15% Rugby Kentucky Bluegrass
10% Delray Perennial Ryegrass

- (4) Seeded areas should be mulched with small grain straw at a uniform rate of two (2) tons per acre, to give a quarter (1/4) inch cover. A mulch spreader should be used for this operation. The seeded area shall be rolled after the mulch has been applied.
- (5) An erosion control excelsior blanket or fiber net should be placed on slopes steeper than three (3) horizontal to one (1) vertical, along sides and bottoms of ditches and swales and all areas within ten (10) feet of catch basins and inlets in seeded areas.

(G) SODDING SPECIFICATIONS

- (1) Topsoil should be sandy, black loam with pH level not lower than 6.0 nor higher than 7.2. It should be placed, graded and compacted to a minimum depth of four (4) inches over the area to be sodded.
- (2) Fertilizer should be spread at a uniform rate of 500 lbs. per acre prior to sodding, meeting the following specifications:

Nitrogen	6%
Phosphorous	25%
Potash	25%

The fertilizer should be incorporated into the topsoil to a depth of two (2) inches by disking, harrowing or other methods which produce similar results.

- (3) Place sod where lateral joints are staggered and butted together tightly in order to prevent voids which would cause air drying of sod roots and weed growth.
- (4) On sloping areas (3:1 or steeper), lay sod parallel to slope contours, stagger lateral joints, and secure sod with wood stakes at minimum of four (4) stakes per square yard and at least one (1) per piece of sod.

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11

6.06 EROSION CONTROL MEASURES FOR RESIDENTIAL CONSTRUCTION SITES

- a) Drive stakes with flat side against slope and ten (10) inches into ground leaving approximately half (1/2) inch above grade.
 - b) Begin sod laying on sloping areas at toe of slope.
- (5) As sodding is completed in an area, roll area with roller weighing 75 to 150 lbs./ft. of roller width to ensure contact between sod root system and prepared sod bed.
- (6) Watering of sod is recommended in accordance with the following minimum schedule:
- a) Weeks One (1) and Two (2): First watering immediately after laying sod. Three subsequent waterings at four (4) day intervals.
 - b) Week Three (3): One watering.
 - c) Subsequent Watering: Apply at weekly intervals as needed.
 - d) Adjust recommended watering program as necessary to account for actual weather conditions occurring following installation of sod to ensure establishment of healthy appearing and vigorous growing turf.
- During periods of intensive watering, protect sod from heavy traffic to avoid disturbing established finished grade.
- (7) The sod should be mowed after the grass has reached an average height of three (3) inches. Mowing shall be continued to maintain grass at a height of between two (2) and two and one-half (2-1/2) inches.

(H) GENERAL NOTES

- (1) All Sediment Control Measures to be adjusted to meet field conditions at the time of construction, and be constructed prior to any grading or disturbance of existing surface material on balance of site.
- (2) Periodic inspection and maintenance of all sediment control structures must be provided to ensure intended purpose is accomplished. Developer shall be responsible for all sediment leaving the property. Sediment Control Measures shall be in working condition at the end of each working day.
- (3) The Sediment Control Measures will be maintained on a continuing basis until the site is permanently stabilized and all permit requirements are met.

6.06 EROSION CONTROL MEASURES FOR RESIDENTIAL CONSTRUCTION SITES

- (4) These Erosion Control Measures are to be incorporated into the site grading plan.

LAKE FOREST CONSTRUCTION STANDARD REV. 1/08

SECTION 6.01 PERMIT APPLICATION FOR SITE GRADING

DATE _____

Application is hereby made for a permit to perform site grading on the premises located at (street address)

LOT _____, BLOCK _____, _____ SUBDIVISION

Owned by _____

Plan prepared by (Name of Firm) _____

Address of Firm: _____

Telephone Number of Firm: (_____)_____

Name of Engineer: _____

Illinois Registration Number: _____

*The applicant understands and agrees that the required plan shall conform to all requirements of Article XI, Section 2-155 of the Lake Forest City Code. Furthermore, all work associated with this permit shall be done in such a way that existing drainage facilities, natural or man-made, are maintained at all times. **Four (4) copies** of the Grading Plan shall be submitted with this application to the Office of the City Surveyor and Engineer, accompanied by the fee prescribed.*

Printed Name of Signature: _____

Signature of Applicant: _____

Title of Applicant, i.e., Owner, Engineer, etc.: _____

Telephone Number of Applicant: (_____)_____

Address of Applicant: _____

For Office Use Only:

Fee:

Restoration Bond:

Permit/Drawing:

LAKE FOREST CONSTRUCTION STANDARD REV. 9/12

6.02 WAIVER FOR SITE GRADING PERMIT

The City of Lake Forest
Application for Waiver of the Site Grading Permit

Application is hereby made for a waiver of a site grading permit at the following described property:

ADDRESS:_____

PROJECT DESCRIPTION_____

CONTRACTOR:_____

CONTRACTOR'S PHONE:_____

Conditions:

A waiver of the Grading Permit **may be** approved by the City Surveyor and Engineer only on property previously improved with the principal use or structure; where the project consist only of minor additions to existing dwellings or structures, the construction of accessory buildings, tennis courts, swimming pools, or minor landscaping.

The waiver request shall include:

1. **Address or legal description** of the property.
2. **Description of the project.**
3. **Site plan of the project** including the dimensions(s) from the project to the nearest Lot Line(s), provisions for roof drainage (location and direction of discharge), and proposed grading limits.
4. **A statement signed by the property owner** agreeing to the following:

The applicant hereby certifies that he is the owner of the property described above, and certifies that to the best of his knowledge, the above described project will not disturb existing topography or will not create adverse drainage problems on adjacent property. The applicant further agrees to assume all responsibility for any drainage problems that may be caused directly or indirectly by any action involving the above described project and further absolves The City of Lake Forest of any responsibility for problems or actions that may result from the granting of the waiver of the Site Grading Permit requirements.

Signed_____ Date:_____
Property Owner

Printed Name of Signature Above Telephone Number

Waiver Granted_____ Date:_____
Engineering Section

**7.00 LAKE FOREST CONSTRUCTION STANDARDS FOR OFF-STREET
PARKING AND PARKING LOTS**

GENERAL REQUIREMENTS

1. These standards shall be used in addition to the requirements for Off-Street Parking and Loading as set forth in Article IX of the Lake Forest Zoning Code.
2. All outdoor off-street parking and loading areas shall be adequately drained in such manner so as not to create adverse conditions on public streets and sidewalks or adjacent private property. Drainage plans shall be approved by the City Surveyor and Engineer's Office.
3. Wheel stops or bumper guards shall be used to protect abutting property or streets from vehicle protrusion over the property lines. Product specifications and location as approved by the City Surveyor and Engineer's Office.
4. All parking spaces shall have a minimum vertical clearance of 7.5 feet and all loading spaces shall have a minimum vertical clearance of 14.0 feet.

8.00 GENERAL REQUIREMENTS FOR RESIDENTIAL STREET LIGHTING

A. Scope

This Section shall establish the basic design, construction and requirements for public street lighting.

B. Standard Specifications

Where referred to, "Standard Specifications" shall mean the Standard Specifications for Traffic Control Items as adopted by the Illinois Department of Transportation, latest edition. Provisions of the Standard Specifications shall prevail unless otherwise stipulated in the following requirements.

C. Spacing

Street lights on all public streets shall be required to provide a Lake Forest standard street light at all intersections, cul-de-sacs and at intervals of no more than 400 feet.

D. Line Cable

All cables shall conform with the requirements of the Standard Specifications. Line cable shall be stranded single copper conductor direct burial type USE neoprene sheathed of number 6 AUG minimum size. All line cables shall be installed in conduit, at a minimum depth of 18 inches.

E. Galvanized Steel Conduit

All line cable installation in area of limited accessibility such as utility easements and under proposed pavements shall be installed in galvanized steel conduit of minimum 2 inch I.D. material and installation requirements shall conform to Section T 420 of the Standard Specifications.

F. PVC Conduit

All line cables not installed in steel conduit shall be installed in HDPE electrical conduit of minimum 1 ½ inch I.D. and installation shall conform to the Standard Specifications and to the following Specifications:

U.L. 651 "Rigid Nonmetallic Conduit"

NEMA TC 2-1970 EPC - 40 P.V.C.

Article 347-1978 National Electric Code

G. Splices and Handholes

All splices to the line cable shall be made within handholes or base of light standard. A minimum of ten (10) feet of slack wire shall be left at all splices.

8.00 GENERAL REQUIREMENTS FOR RESIDENTIAL STREET LIGHTING

Splices shall be performed in accordance with the manufacturer's instructions (Minnesota Mining Thermoplastic joint splicing kit, or equal) of preparing the cable ends in accordance with the Standard Specifications. There will be no splices allowed between light standards. If wire is damaged, new wire shall be installed in conduit between light standards.

H. Control Installation

1. This item shall include the electrical devices needed to provide for the safe, automatic control of the proposed circuits as shown on the plans and circuit diagram, where there are six or more lights on a circuit.

The control devices shall be enclosed in a waterproof, cast, aluminum cabinet approximately 14" x 22" x 11 1/4", inside dimensions Crouse Hinds No. 22, or equal, stand mounted and anchored to a concrete base as indicated on the plans, and given a protective coating of an approved paint upon assembly.

This shall include construction of the concrete bases; furnishing and installing the conduit on the power pole; furnishing and installing the cabinet, photo electric cell, multiple relay, circuit breaker, toggle switches, fuse blocks, and making all necessary connections with the control box and to the existing power sources as shown on the plans.

2. Each light shall be individually fused.

I. System Ground

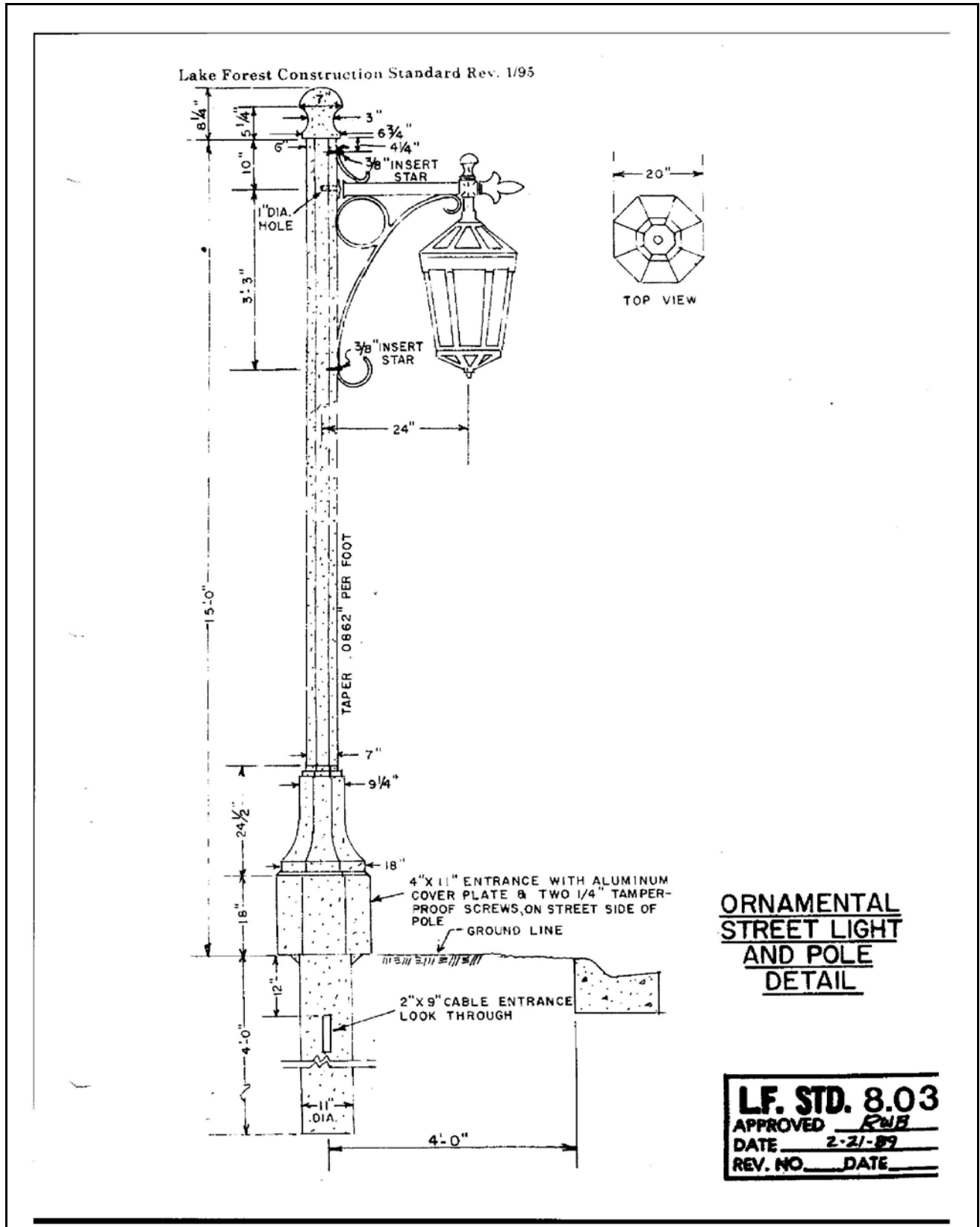
The entire system shall be grounded using a 3 wire line system grounded at each light. Ground rods shall be a minimum of 8 feet in length and 3/4 inch diameter, and consists of a steel core with a heavy exterior of pure copper bonded to the core. A ground clamp capable of accommodating a No. 6 copper connecting wire shall be furnished.

8.00 GENERAL REQUIREMENTS FOR RESIDENTIAL STREET LIGHTING

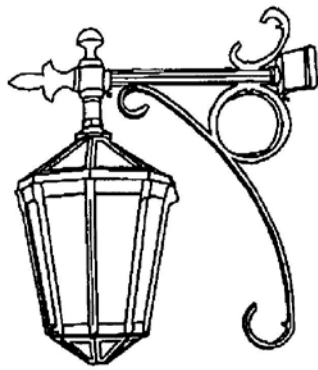
J. Residential Ornamental Street Light (L.F. Std. 8.03)

1. Pole Specifications
 - a. Part # D915LF-SG-EA-MI
 - b. Concrete minimum 7000 p.s.i.
 - c. Finish - exposed aggregate glacial gravel - pea size
 - d. Cement Type III, A.S.T.M., C-150
 - e. Steel - 60 KIPS
Four (4) #4 Longitudinal X 18'-10"
#3 stirrups 9" O.C.
 - f. Raceway - 1" G.S. conduit (rigid)
 - g. Light pole will conform to all loads and wind velocity as stated in ASSHTO Standard Specifications for Structural Supports for Highway Signs.
 - h. Manufacturer: Traditional Concrete Products, Inc.
P.O. Box 157
W142 N 9110 Fountain Blvd.
Menomonee Falls, WI 53052-0157
Phone: (262) 250-7599
2. Light Fixture Specifications (L.F. Std. 8.03)
 - a. Fixture Part #203-870510248801 Lake Forest Luminarie
Octagon Aluminum
 - b. Lense - cracked ice
 - c. Ballast – 100 Watt MH multi-tap
 - d. Photo cell - Tork 3000
 - e. Bulb – 100 Watt MH Med – Base Clear
 - f. Manufacturer: TAPCO
800 Wall Street
Elm Grove, WI 53122
Phone: (877) 818-7317
Mobile: (262) 853-8239

8.00 GENERAL REQUIREMENTS FOR RESIDENTIAL STREET LIGHTING



8.00 GENERAL REQUIREMENTS FOR RESIDENTIAL STREET LIGHTING



Octagon Queen Scroll Mount Luminaire
TAPCO Part # 203-870510248801
Specifications:
Fixture Height 35"
Top Width 17.5"
Bottom Width 10"
Can be pole mounted, Single or Double
Optional Wall Mount available

Octagon Queen Scroll Mount Luminaire, pole mount version

CONSTRUCTION

All fixtures are constructed from heavy sand-cast aluminum with non-ferrous and stainless steel fasteners. The lid is seal-closed with a poly foam tape, designed to resist weather and insects. The lens is a 1/8" thick, one-piece 'Cracked Ice' Polycarbonate, sealed with poly foam tape. Eight polycarbonate lenses are secured to lower canopy with stainless steel screws. Underside of upper canopy is painted with gloss white for increased reflectivity.

ASSEMBLY

The lamp fixture is secured to the vertical arm with 1-1/2" machine-threaded coupler. Arm assembly is welded. The horizontal arm is welded to the pole mounting clamp.

HARDWARE

Stainless steel bolts are included to attach scrolls to arm and pole. Stainless steel bolts are included for mounting clamps.

ELECTRICAL COMPONENTS

Ballast: 100W Metal Halide Multi-tap
Socket: Mogul Base

FINISH

Tough powder-coat finish, 60% gloss Vulcan Black unless otherwise specified.

MAINTENANCE

Accessible top and bottom via hinged upper and lower canopies.

TAPCO Traffic & Parking Control Company, Inc.
800 Wall Street . Elm Grove, WI 53122 800-236-0112 www.tapconet.com

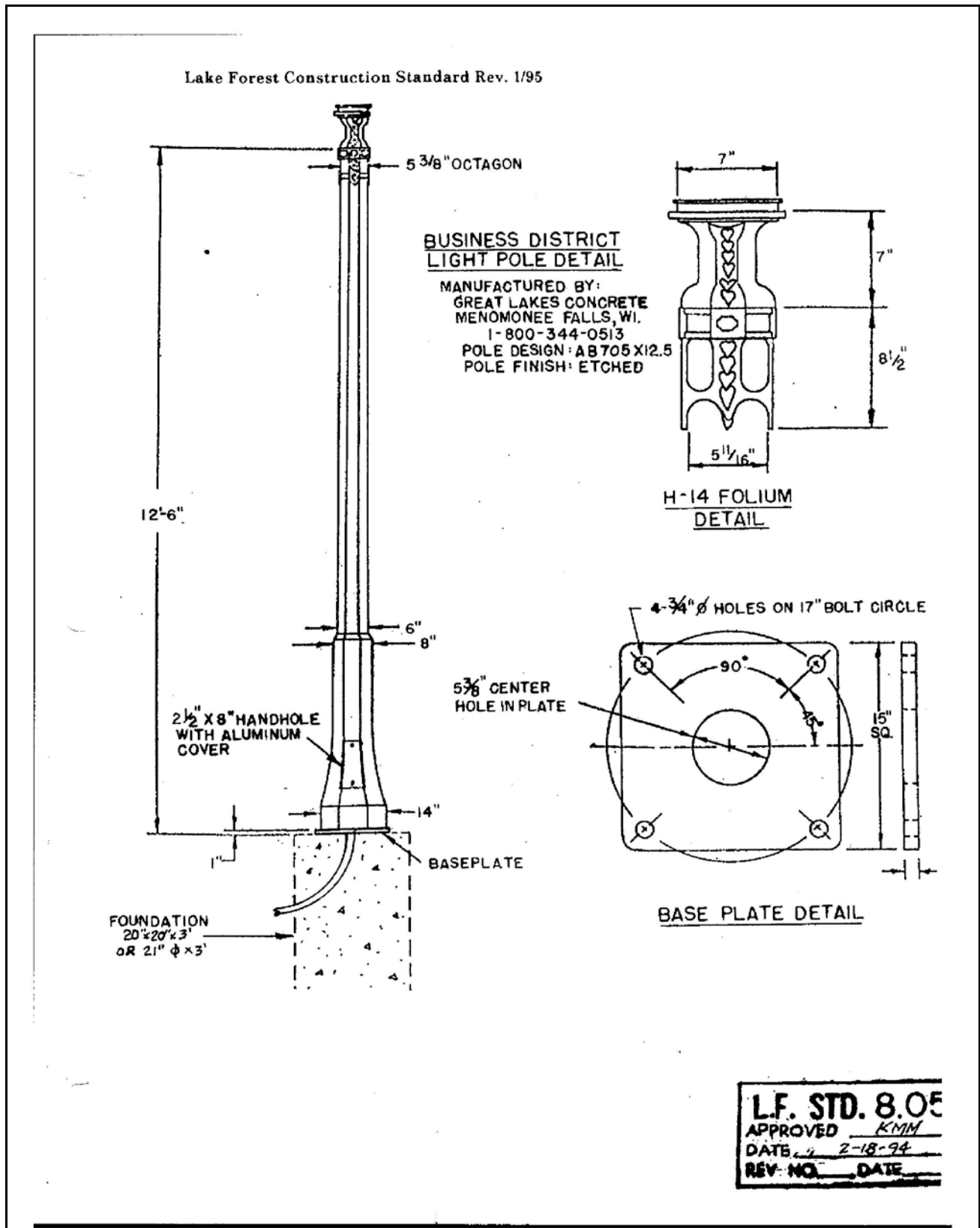
8.00 GENERAL REQUIREMENTS FOR COMMERCIAL/CBD STREET LIGHTING

K. Business District Ornamental Street Light (L.F. Std. 8.05)

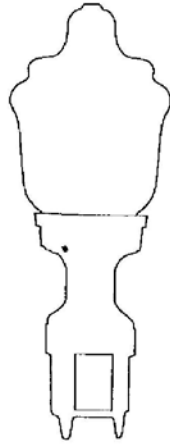
1. Pole Specifications
 - a. Part # A612.5-SG-PA
 - b. Concrete minimum 7000 p.s.i.
 - c. Finish - polished
 - d. Cement - Type III, A.S.T.M., C-150
 - e. Raceway - 1" G.S. conduit (rigid)
 - f. Light pole will conform to all loads and wind velocity as stated in AASHTO Standard Specifications for Structural Supports for Highway Signs.
 - g. Manufacturer: Traditional Concrete Products, Inc.
PO Box 157
Menominee Falls, WI 53052-0157
(262) 250-7599
2. Light Fixture Specifications (L.F. Std. 8.05)
 - a. Fixture – Part #203-8103510248501 Globe Luminarie
 - b. Globe - #8-103-00-2510 (White)
 - c. Mounting bracket - #H-14 Folium
 - d. Ballast – 100 Watt MH Multi-tap, metal halide
 - e. Bulb – 100 Watt MH Med. Base Frosted
 - f. Manufacturer: TAPCO
800 Wall Street
Elm Grove, WI 53122
Phone: (877) 818-7317
Mobile: (262) 853-8239

LAKE FOREST CONSTRUCTION STANDARD REV. 8/07

8.00 GENERAL REQUIREMENTS FOR COMMERCIAL/CBD STREET LIGHTING



8.00 GENERAL REQUIREMENTS FOR COMMERCIAL/CBD STREET LIGHTING



8103 Acorn, Castle Capitol Pole Mount
TAPCO Part # 203-8103510248501

Specifications:

Fixture Height 28.5"

Top Width 17.75"

Base to Light Center 4.5"

Base I.D. 5.5"

8103 Acorn, Castle Capitol Pole Mount

CONSTRUCTION

Base fixture is constructed from heavy sand-cast aluminum with non-ferrous and stainless steel fasteners. The Globe is made from one-piece polycarbonate construction for durability and excellent weathering characteristics. The globe is secured to its base with three brass thumb nuts for easy maintenance access. The capitol is secured to pole with four set screws.

ELECTRICAL COMPONENTS

Socket/Ballast Assembly is modular to allow for easy removal and maintenance.

Ballast: 100W Metal Halide Multi-tap

Socket: Mogul Base

FINISH

Tough powder-coat finish, 60% gloss Vulcan Black resists weather and oxidation.

MAINTENANCE

Accessible top via hinged upper canopy.

TAPCO Traffic & Parking Control Company, Inc.
800 Wall Street . Elm Grove, WI 53122 800-236-0112 www.tapconet.com

8.00 GENERAL REQUIREMENTS FOR RESIDENTIAL STREET LIGHTING

Received Fax : Jul 13 2007 10:23AM Fax Station : The City of Lake Forest p. 2

13-07-'07 11:10 FROM-Benson Electric, Inc 18473369979 T-197 P002/008 F-713

To Select the Enclosure You Need for Your Application:

- Determine UL Requirements
- Determine Load Ratings
- Determine Handhole Opening Size
- Select Cover Series & Style
- Select Box Style
- Determine Options & Hardware

Enclosure Selection Guide

➤ Cover Series & Styles

CA/WA Series Covers

CA covers are designed to bolt down. WA covers do not have provisions to bolt the covers in place.

- Design Load: 8,000 lbs. over a 10" square with a minimum test load of 12,000 lbs. (For PG, PT, PR and smaller PC styles)
- Design Load: 5,200 lbs. over a 10" square with a minimum test load of 11,284 lbs. (For PC 13" x 24" and PC 17" x 30" styles and all PX and LG styles)

HA Series Covers

Heavy duty covers (available for PG, PD, PC and PR box styles) are designed for driveways, parking lots and off-roadway applications where subject to occasional non-deliberate vehicular traffic.

- Design Load: 15,000 lbs. over a 10" square with a minimum test load of 22,568 lbs.

HH Series Covers

Extra heavy duty HH covers are designed for driveways, parking lots and off-roadway applications where subject to occasional non-deliberate traffic by heavy vehicles. Contact your local QUAZITE® representative for availability of sizes.

- Design Load: 22,568 lbs. over a 10" x 20" plate with a minimum test load of 33,852 lbs.

ENCLOSURE SELECTION

Cover Load Rating

QUAZITE® Cover Performance Chart (Wheel Loads)*

Cover		Design (lbs.)	Test Load (lbs.)	Test Area
Style	Series			
LG	CA/WA	5,000	7,500	10" x 10"
PC1324 & PC1730	CA/WA	5,200	11,284	10" x 10"
PC all other sizes	CA/WA	8,000	12,000	10" x 10"
PG/PT	CA/WA	8,000	12,000	10" x 10"
PC	HA	15,000	22,568	10" x 10"
PG/PT	HA	15,000	22,568	10" x 10"
PG	HH	22,568	33,852	10" x 20"
PR	CA/WA	8,000	12,000	10" x 10"
PR	HA	15,000	22,568	10" x 10"

* Not all products are UL Listed. For specific UL Listed products, please refer to individual drawings.

Cover Numbering System

Cover Style	Cover Size	Cover Series	Cover Variation	Cover Logo #	Bolt Option
PC	1730	CA	00	09	P
<div> <div>PC</div> <div>PT</div> <div>PG</div> <div>PX</div> <div>PR</div> <div>LG</div> </div>	(width x length) example: 17" x 30"	<div> <div>CA-standard cover</div> <div>HA-heavy duty cover</div> <div>WA-standard/no bolts</div> <div>CS-split cover</div> <div>HS-heavy duty split cover</div> <div>CT-torsion assist cover</div> <div>HH-extra heavy duty</div> <div>CC-overlapping cover</div> <div>HC-heavy duty overlapping cover</div> </div>	<div> <div>Standard Cover - No Variation</div> <div>Contact your local QUAZITE® representative for more information on cover variations:</div> </div>	<div> <div>09 - Blank</div> <div>(See chart on next page for a listing of commonly used cover logos)</div> </div>	<div> <div>Penta-head</div> <div>(Hex head bolts standard, no designation needed)</div> </div>

Highlighted areas indicate UL Listing

8.00 GENERAL REQUIREMENTS FOR RESIDENTIAL STREET LIGHTING

Received Fax : Jul 13 2007 10:23AM Fax Station : The City of Lake Forest p. 3

13-07-'07 11:10 FROM-Benson Electric, Inc 18473369979

T-197 P003/008 F-713

Enclosure Selection Guide

Box Styles


To Select the Enclosure You Need for Your Application:

- Determine UL Requirements
- Determine Load Ratings
- Determine Handhole Opening Size
- Select Cover Series & Style
- **Select Box Style**
- Determine Options & Hardware

PG/LG Style

For use as a splice box, pull box, equipment enclosure or for any application requiring easy access to an underground service. Stackable for increased depth. Straight sides for easy adjustment of box to grade.

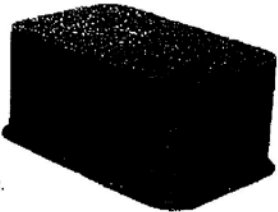
- LG style is 32% lighter in weight as compared to the PG box.
- Available in sizes:
 - 11" x 18" 24" x 24" 30" x 60" 36" x 72" 48" x 96"
 - 13" x 24" 24" x 36" 36" x 36" 48" x 48"
 - 17" x 30" 30" x 48" 36" x 60" 48" x 72"
- Design load: 22,568 lbs. Test load: 33,852 lbs
- 12" - 48" depths



PD/LD Style

Enclosures with 1" (degree) flare for maximum strength. Flared design optimizes internal volume and prevents frost heave.

- Available in sizes:
 - 17" x 30" x 30", 30" x 48" x 24", 30" x 48" x 48"
- Design load: 15,000 lbs. Test load: 22,568 lbs.



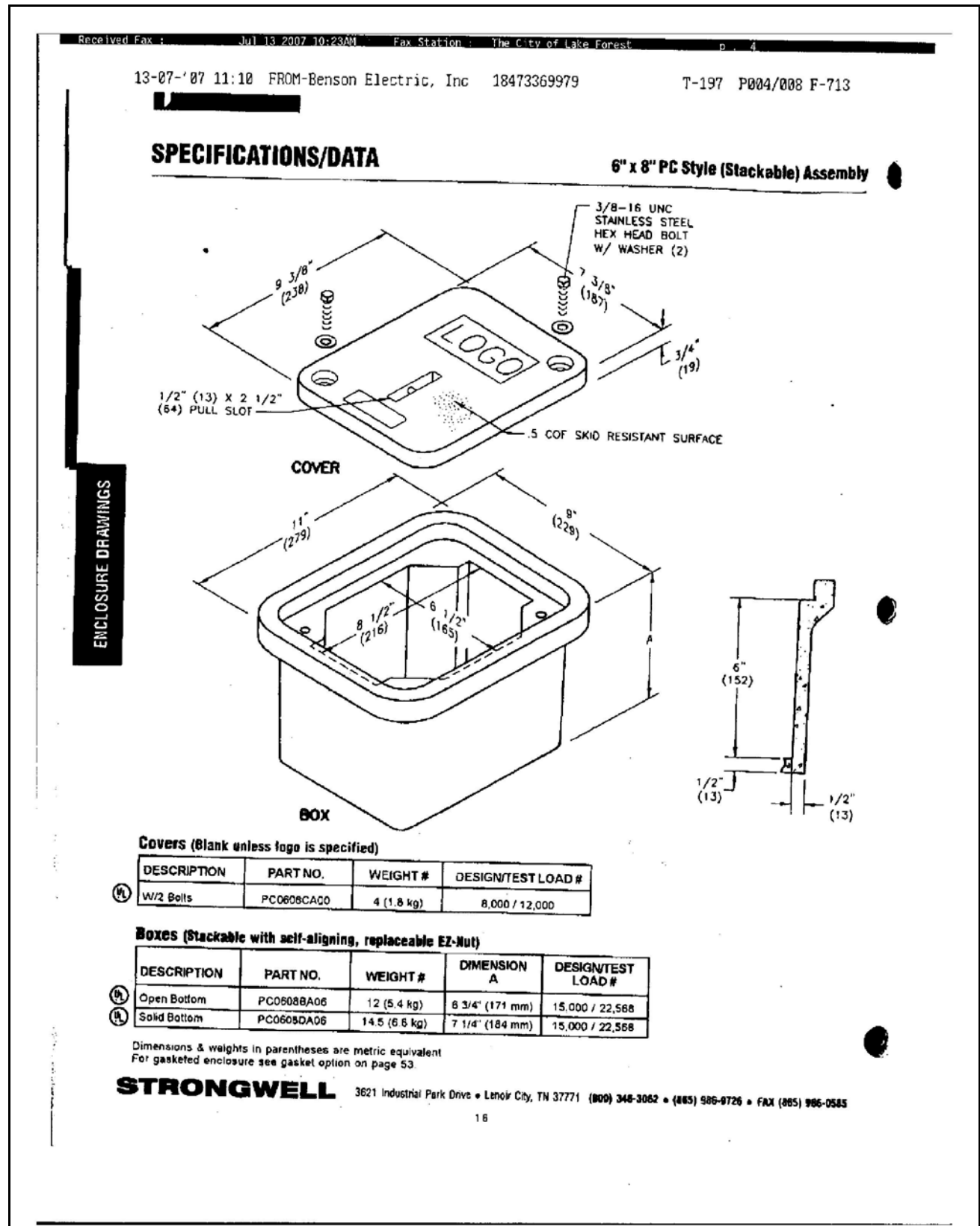
Box Numbering System

QUAZITE® products are referred to by an identifying part number. An example of the numbering system is shown below to help you understand how to identify the product you need for your application. Contact your local QUAZITE® representative if you have any questions.

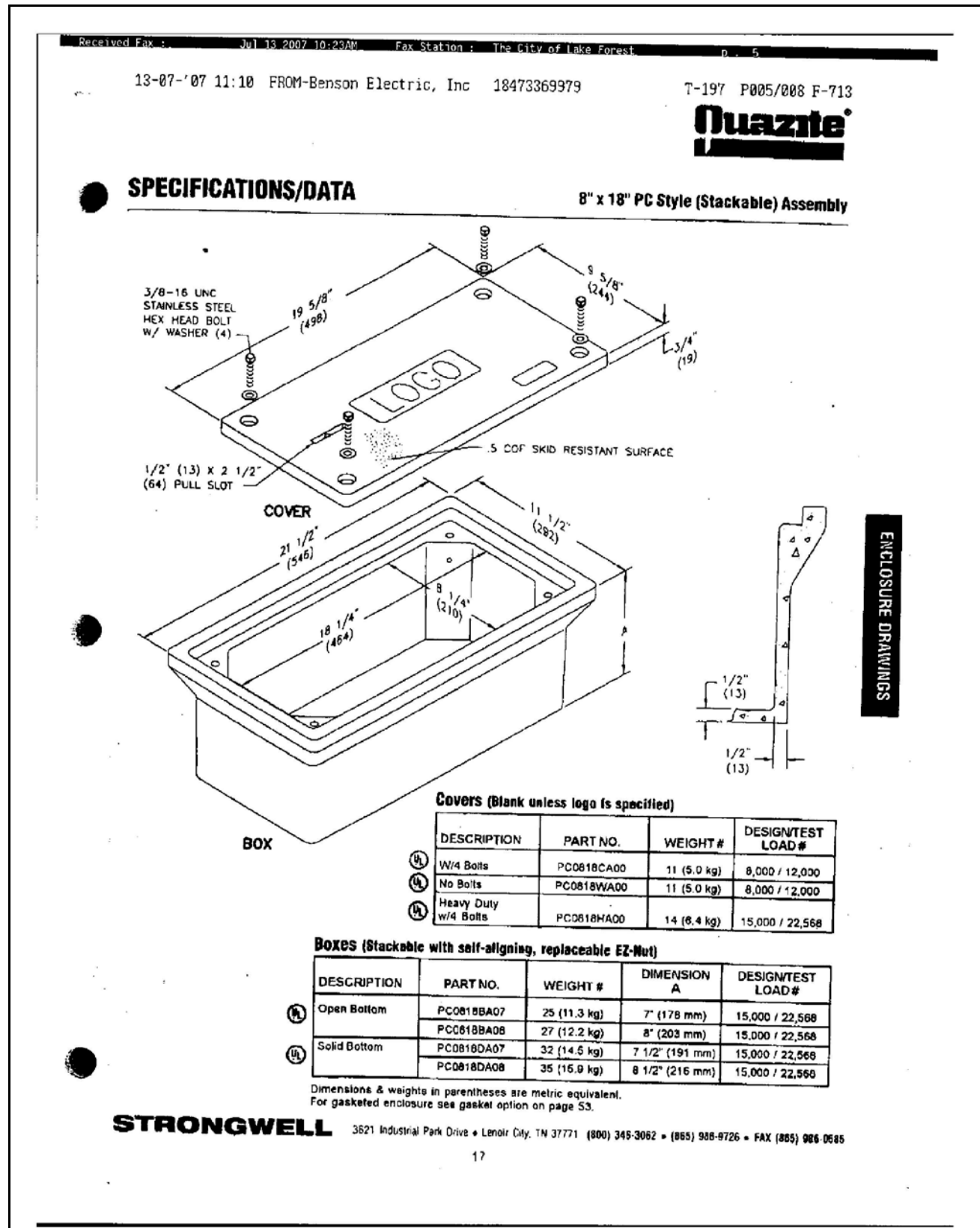
Box Style	Nominal Size	Box Variation	Box Depth
PC	1730	BA	12
<div style="border: 1px solid black; padding: 2px; display: inline-block;"> PC PT PG LX PR LR PD </div>	(width x length) example: 17" x 30"	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> BA-box w/open bottom BB-box w/mouse holes BC-divided box BD-gasketed box w/open bottom BH-extra heavy duty box w/ open base BK-heavy duty BA box DA-box w/solid bottom DG-gasketed box w/solid bottom DH-extra heavy duty box w/ solid bottom DK-heavy duty DA box JA-footed box EA-extension EH-extra heavy duty extension EK-heavy duty extension RA-solid base extension </div>	12" deep

Highlighted areas indicate UL Listing

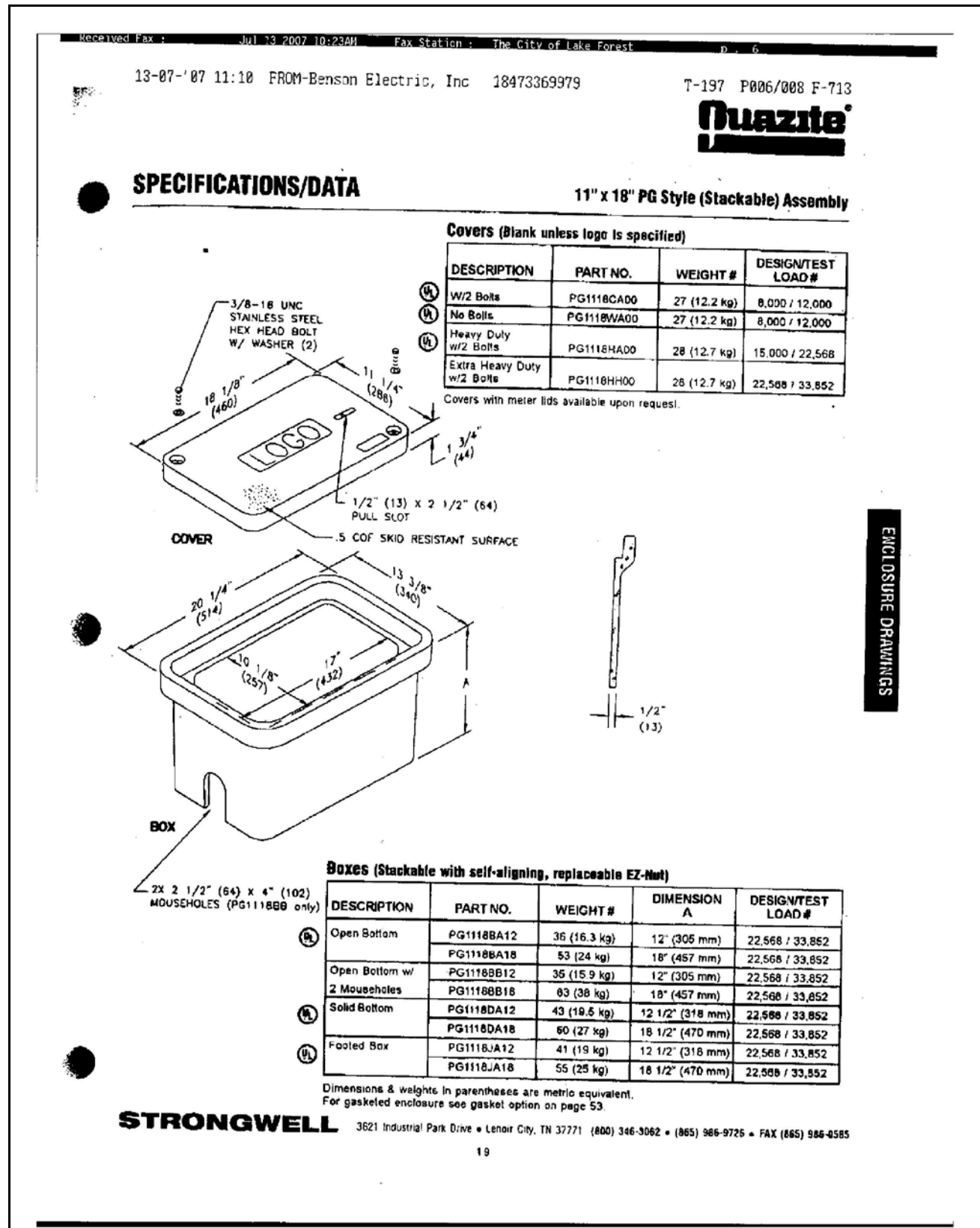
8.00 GENERAL REQUIREMENTS FOR RESIDENTIAL STREET LIGHTING



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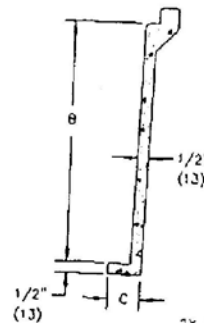
SPECIFICATIONS/DATA

11" x 18" PC Style (Stackable) Assembly

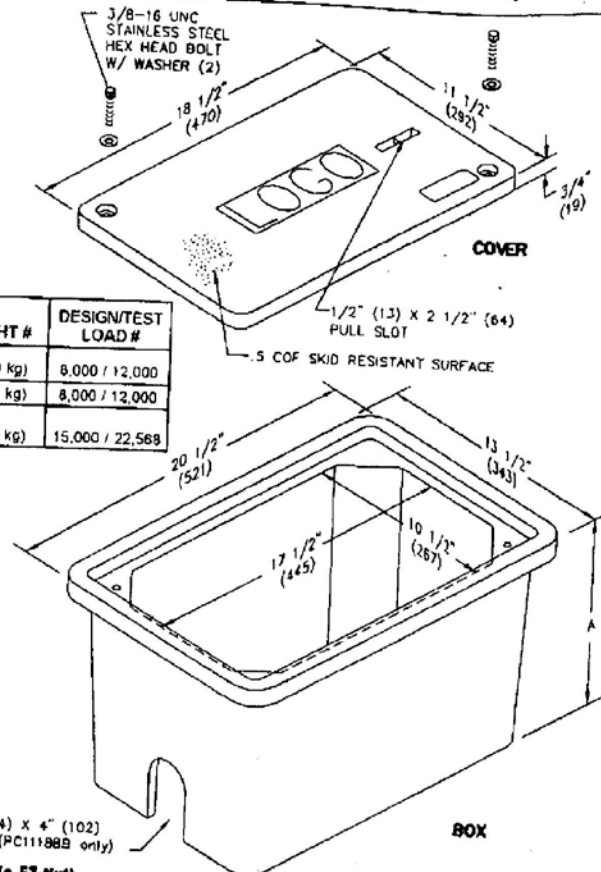
Covers (Blank unless logo is specified)

DESCRIPTION	PART NO.	WEIGHT #	DESIGN/TEST LOAD #
W/2 Bolts	PC1118CA00	13 (5.9 kg)	8,000 / 12,000
No Bolts	PC1118WA00	13 (5.9 kg)	8,000 / 12,000
Heavy Duty w/2 Bolts	PC1118HA00	13 (5.9 kg)	15,000 / 22,568

ENCLOSURE DRAWINGS



2x 2 1/2" (64) x 4" (102) MOUSEHOLES (PC1118BB only)



Boxes (Stackable with self-aligning, replaceable EZ-Not)

DESCRIPTION	PART NO.	WEIGHT #	DIMENSION A	DIMENSION B	DIMENSION C	DESIGN/TEST LOAD #
Open Bottom	PC1118BA12	37 (16.8 kg)	12 3/4" (324 mm)	11 1/4" (286 mm)	N/A	15,000 / 22,568
	PC1118BA18	53 (24.0 kg)	18" (457 mm)	17 1/4" (438 mm)	N/A	15,000 / 22,568
	PC1118BB12	30 (13.6 kg)	12 3/4" (324 mm)	11 1/4" (286 mm)	N/A	15,000 / 22,568
Open Bottom w/ 2 Mouseholes	PC1118BB18	41 (18.6 kg)	18" (457 mm)	17 1/4" (438 mm)	N/A	15,000 / 22,568
	PC1118DA12	45 (20.4 kg)	13 1/4" (337 mm)	11 1/4" (286 mm)	N/A	15,000 / 22,568
Solid Bottom	PC1118DA18	60 (27.2 kg)	18 1/2" (470 mm)	17 1/4" (438 mm)	N/A	15,000 / 22,568
	PC1118JA12	37 (16.8 kg)	13 1/4" (337 mm)	11 1/4" (286 mm)	1 1/2" (38 mm)	15,000 / 22,568
	PC1118JA18	56 (25.4 kg)	18 1/2" (470 mm)	17 1/4" (438 mm)	1 1/2" (38 mm)	15,000 / 22,568

Dimensions & weights in parentheses are metric equivalent.
For gasketed enclosure see gasket option on page 53.


STRONGWELL

3621 Industrial Park Drive • Lenoir City, TN 37771 (800) 348-3062 • (865) 986-6726 • FAX (865) 986-0585

8.00 GENERAL REQUIREMENTS FOR RESIDENTIAL STREET LIGHTING

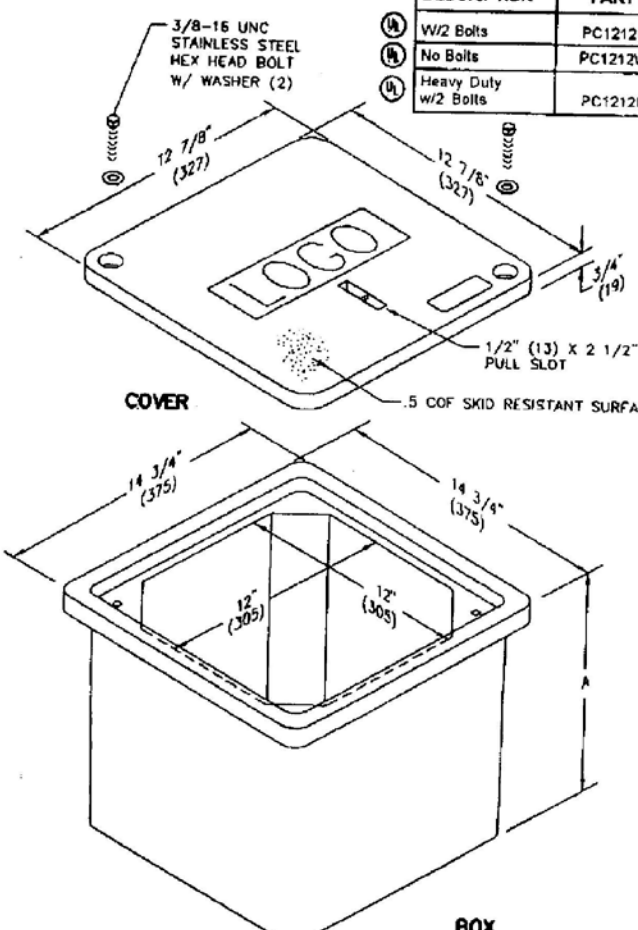
Received Fax : Jul 13 2007 10:23AM Fax Station : The City of Lake Forest
P. 8

13-07-'07 11:10 FROM-Benson Electric, Inc 18473369979
T-197 P008/008 F-713



SPECIFICATIONS/DATA

12" x 12" PC Style (Stackable) Assembly



COVER

BOX

Covers (Blank unless logo is specified)

DESCRIPTION	PART NO.	WEIGHT #	DESIGN/TEST LOAD #
W/2 Bolts	PC1212CA00	12 (5.4 kg)	8,000 / 12,000
No Bolts	PC1212WA00	12 (5.4 kg)	8,000 / 12,000
Heavy Duty w/2 Bolts	PC1212HA00	12 (5.4 kg)	15,000 / 22,568

BOXES (Stackable with self-aligning, replaceable E2-Nut)

DESCRIPTION	PART NO.	WEIGHT #	DIMENSION A	DESIGN/TEST LOAD #
Open Bottom	PC1212BA12	31 (14.1 kg)	12 3/4" (324 mm)	15,000 / 22,568
Solid Bottom	PC1212DA12	37 (16.8 kg)	13 1/4" (337 mm)	15,000 / 22,568

Dimensions & weights in parentheses are metric equivalent
For gasketed enclosure see gasket option on page 53

ENCLOSURE DRAWINGS

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LAKE FOREST CONSTRUCTION STANDARD REVISED 1/11

SECTION 9.00 – CONSTRUCTION TRAFFIC CONTROL

A. Description

1. Contractor shall be solely responsible to keep work areas open to pedestrian and vehicular traffic to maximum extent practical and to provide safe passage of such traffic and continuous access for emergency vehicles. Full closure of the roadway must be approved by the Owner prior to undertaking the closure.
2. Provide, install and maintain items such as barricades, beacons warning signs, temporary pavement markings, lane delineators, temporary fencing, flag persons and other appurtenances to protect pedestrian traffic, vehicular traffic, and Contractor's own work forces during construction operations as described in Specification section. These control measures shall be in place whenever a hazardous condition exists. The contractor is solely responsible for ensuring the maintenance of the control measures at all times whether or not work is taking place on the site.
3. Remove temporary equipment and facilities when no longer required; restore area to original condition.

B. Reference Standards

1. Illinois Department of Transportation
 - a. Standard Specifications for Road and Bridge Construction (Current Edition) (IDOTSPECS).
2. Illinois Department of Transportation. Bureau of Design.
 - a. Highway Standards (ILHWSTDS).
3. Illinois Department of Transportation. Bureau of Local Roads.
 - a. BLR Standard 17-3 - Standard Design Typical Application of Traffic Control Devices for Day Labor Construction on Rural Local Highways.
 - b. BLR Standard 21-6 - Standard Design Typical Application of Traffic Control Devices for Contract Construction on Rural Local Highways.

C. Submittals

1. Traffic Control Schedule:
 - a. Submit traffic control schedule of street and walkway closings, partial closings and detours prior to implementation.
 - b. Submit updates as necessary to keep Owner fully informed of traffic routing.
2. Submit updates as necessary to keep Owner fully informed of traffic routing.

LAKE FOREST CONSTRUCTION STANDARD REVISED 1/11

SECTION 9.00 – CONSTRUCTION TRAFFIC CONTROL

3. Owner will review schedules and updates only for maintenance of adequate traffic patterns within and through construction areas.
 - a. Owner's review and acceptance shall not be construed as confirming adequacy of protection measure proposed.
 - b. Owner will notify residents of construction schedules and traffic plans. Contractor shall be solely responsible for full protection of public and Contractor's own forces.
4. Work will not be allowed until Owner has reviewed and accepted traffic control schedules and updates as well as their implementation.
5. Submit a list of traffic control maintenance personnel with 24 – hour phone numbers. These personnel shall respond to the work site regardless of the time of day when contacted by city Public Works or Police department employees concerning inadequate or control measures or unsafe conditions on the job site. This 24 - hour maintenance shall be considered incidental to the work and not paid for separately.

D. Materials

1. Traffic control materials shall conform to following:
 - a. IDOTSPECS Section 701.
 - b. ILHWSTDS Section F.
 - c. OSHA applicable provisions.

E. Traffic Control Schedule

1. Prepare plan for pedestrian and vehicular traffic control compatible with construction procedures employed in each construction area. Incorporate proposed construction sequencing to form continuous traffic control schedule.
2. Include detailed descriptions of proposed procedures for pedestrian and vehicular traffic routing and protection in immediate construction area and surrounding area during both working and non-working hours.

F. Vehicular Traffic Control

1. Provide traffic control for work in or adjacent to streets and alleys as described.
2. General Requirements:
 - a. The minimum requirement for traffic control is described herein. Contractor shall institute any other measures necessary to ensure safety of vehicular and pedestrian traffic.

LAKE FOREST CONSTRUCTION STANDARD REVISED 1/11

SECTION 9.00 – CONSTRUCTION TRAFFIC CONTROL

- b. For streets and alleys along or in which construction is occurring and for areas where construction vehicles are entering or leaving streets, warning signs informing traffic of construction activities ahead and restricting roadway to local traffic only shall be posted.
 - c. When it is necessary to completely close a street, as determined by the Engineer and approved by the Owner, detour signs shall be posted under the supervision of the Engineer so that traffic can be properly rerouted around the construction site.
 - d. For unpaved trenches and other disturbed areas in pavement: Provide flashing light barricades, Type I or II, to channelize traffic into undisturbed pavement.
 - e. At cross-streets and alleys: Flashing light barricades, Type III, to screen off disturbed areas in trenches.
 - f. Grade backfilled trenches uniformly to permit safe crossing by vehicles.
3. During Working Hours:
- a. Driveways: Open to maximum practical extent. Maximum duration of closure - 4 hours except for replacement of driveway.
 - b. Sidewalks and cross-walks: Open to maximum practical extent.
 - c. Alleys: Closed to through traffic; open to adjoining property to maximum practical extent.
 - d. Two-lane streets: One lane continuously open in alternating directions controlled by flag persons.
4. During Non-Working Hours:
- a. Driveways: Open except for replacement of driveway.
 - b. Sidewalks and cross-walks: Open except for replacement of walks.
 - c. Alleys: Open, one-way travel restrictions permitted.
 - d. Two-lane street: Both lanes continuously open.
5. Barricade and warning sign arrangements shall conform to the following ILHWSTDS as minimum. The specific type of arrangement to be utilized shall be determined by Engineer.

LAKE FOREST CONSTRUCTION STANDARD REVISED 1/11

SECTION 9.00 – CONSTRUCTION TRAFFIC CONTROL

- a. Full closure local traffic permitted BLR Standard 17-3.
 - b. Full closure no traffic permitted BLR Standard 17-3.
 - c. Full closure local traffic permitted BLR Standard 21-6.
 - d. Full closure no traffic permitted BLR Standard 21-6.
6. Provide more extensive warnings, markings and controls in areas having special local conditions such as:
- a. High daily or hourly traffic volumes.
 - b. Unusual turning patterns.
 - c. Moderate to high pedestrian traffic.
 - d. School zones.
 - e. Hospitals or other emergency care facilities.
 - f. Police, fire, ambulance, civil defense or other emergency services.
 - g. Public works facilities.
7. Specific Requirements:
- a. Maintain the following throughout the duration of the work.
 1. Two-way traffic at all times.
 2. During working hours as construction crosses road, maintain two-way traffic, one lane open with flag persons to alternate traffic flow.
 3. Parking restricted where necessary.

G. Pedestrian Traffic Control

1. The minimum requirements for pedestrian traffic control are described herein. Contractor shall institute the requirements and any other measures necessary to protect pedestrians and residents from construction operations and from vehicular traffic traveling through construction area.

SECTION 9.00 – CONSTRUCTION TRAFFIC CONTROL

2. During working hours, provide Type I or II barricades to protect public from open excavations, wet paint, wet concrete, other construction operations, stockpiled materials, construction equipment and vehicular traffic.
3. Control excavation operations so size of open excavation at end of each work day is minimum as specified in Section 02200.
4. Upon stopping construction operations for the day, provide and install temporary fencing, 4 ft. high minimum around open excavations and rough terrain areas. Lock and shutter construction equipment.
5. Stockpile materials so as not to block streets, alleys, drives, sidewalks, and crosswalks. Grade backfilled trenches uniformly to permit safe crossing by pedestrians.

H. Traffic Control for Contractor's Equipment

1. Operate construction equipment in accordance with applicable traffic laws and safety regulations.
2. Equip equipment with warning lights and audible warning devices as minimum.
3. Where equipment enters or leaves public roadways, provide warning signs and barricades. In moderate and high vehicular traffic volume areas, provide flag persons or temporary traffic signals to control traffic and aid travel of construction equipment. In moderate or high pedestrian traffic areas, provide flag persons to control traffic.

SECTION 10.00 – WATERSHED DEVELOPMENT ORDINANCE

The City of Lake Forest has adopted the Lake County, IL Watershed Development Ordinance. This document can be found at:

Lake County Website:

http://www.lakecountyil.gov/Stormwater/Documents/Regulatory/WDO%202012/WDO%2006-11-13_0713.pdf

11.00 EROSION CONTROL MEASURES FOR RESIDENTIAL CONSTRUCTION SITES

The City of Lake Forest's Engineering Department has established the following required erosion control measures for residential construction sites. These measures will aid in controlling sediment erosion and will also aid in maintaining an attractive construction site. It is required that many of these measures, where applicable, be incorporated into the site grading plans.

A. DECI Requirements

A Designated Erosion Control Inspector, hired or employed by the applicant, is required for all development that exceeds 10 acres of hydrologic disturbance or exceeds 1 acre of hydrologic disturbance and has a Regulatory Floodplain, Isolated Waters of Lake County or Waters of the United States on-site or on adjoining property

B. SILT FENCE

1. Install fence before any other work is done.
2. Install on downslope side(s) of site with ends extended up side slopes a minimum of ten (10) feet.
3. Place parallel to the contour of the land to allow water to pond behind fence.
4. Entrench six (6) inches deep (see L.F. Stand. Detail 11.02).
5. Stake fence every ten (10) feet.
6. Overlap sections of silt fence by six (6) inches.
7. Maintain daily. Remove sediment if deposits reach half (1/2) the fence height.
8. Maintain until a lawn is established.

C. SOIL PILES

1. Locate away from any downslope street, driveway, stream, lake, wetland, ditch, or drainageway.
2. Temporary seed such as annual rye is recommended for topsoil piles.

D. GRAVEL DRIVE

11.00 EROSION CONTROL MEASURES FOR RESIDENTIAL CONSTRUCTION SITES

1. Install a single access drive using two (2) to four (4) inch crushed aggregate.
2. Place gravel six (6) inches deep and ten (10) feet wide from the foundation to the street (50 foot minimum from street) on geotextile filter fabric.
3. Use to prevent tracking dirt onto the road by all vehicles.
4. Maintain throughout construction.

E. SEDIMENT CLEANUP

1. By the end of each work day, sweep or scrape up soil tracked onto the road.
2. By the end of the next work day after a storm, clean up soil washed off-site.

F. DOWNSPOUT EXTENDERS

1. Not required, but highly recommended, especially where downspouts are directed at adjacent properties.
2. Install as soon as gutters and downspouts are completed.
3. Route water to a grassed or paved area.
4. Maintain until a lawn is established.

G. SEEDING SPECIFICATIONS

1. Topsoil should be sandy, black loam with a pH level not lower than 6.0 nor higher than 7.2. It should be placed, graded and compacted to a minimum depth of four (4) inches over the area to be seeded.
2. Fertilizer should be spread at a uniform rate of 500 lbs. per acre prior to seeding, meeting the following specifications:

Nitrogen	6%
Phosphorous	25%
Potash	25%

11.00 EROSION CONTROL MEASURES FOR RESIDENTIAL CONSTRUCTION SITES

The fertilizer should be incorporated into the topsoil to a depth of two (2) inches by disking, harrowing or other methods which produce similar results.

3. Cross seeding should be applied at a minimum rate of 175 lbs. per acre. (If hydroseeding, increase rate to 225 lbs. per acre.) The seed should comply with the following specifications:

SUN CONDITIONS:

NORTHROP KING ATHLETIC PRO II

25% Parade Kentucky Bluegrass
25% Trenton Kentucky Bluegrass
25% Caddy Perennial Ryegrass
25% Delray Perennial Ryegrass

SHADE CONDITIONS:

NORTHROP KING SHADE MIX

25% Glade Kentucky Bluegrass
25% Dawson Creeping Red Fescue
25% Scaldis Hard Fescue
15% Rugby Kentucky Bluegrass
10% Delray Perennial Ryegrass

4. Seeded areas should be mulched with small grain straw at a uniform rate of two (2) tons per acre, to give a quarter (1/4) inch cover. A mulch spreader should be used for this operation. The seeded area shall be rolled after the mulch has been applied.
5. An erosion control excelsior blanket or fiber net should be placed on slopes steeper than three (3) horizontal to one (1) vertical, along sides and bottoms of ditches and swales and all areas within ten (10) feet of catch basins and inlets in seeded areas.

H. SODDING SPECIFICATIONS

1. Topsoil should be sandy, black loam with pH level not lower than 6.0 nor higher than 7.2. It should be placed, graded and compacted to a minimum depth of four (4) inches over the area to be sodded.

**11.00 EROSION CONTROL MEASURES FOR RESIDENTIAL
CONSTRUCTION SITES**

2. Fertilizer should be spread at a uniform rate of 500 lbs. per acre prior to sodding, meeting the following specifications:

Nitrogen	6%
Phosphorous	25%
Potash	25%

The fertilizer should be incorporated into the topsoil to a depth of two (2) inches by disking, harrowing or other methods which produce similar results.

3. Place sod where lateral joints are staggered and butted together tightly in order to prevent voids which would cause air drying of sod roots and weed growth.
4. On sloping areas (3:1 or steeper), lay sod parallel to slope contours, stagger lateral joints, and secure sod with wood stakes at minimum of four (4) stakes per square yard and at least one (1) per piece of sod.
 - a) Drive stakes with flat side against slope and ten (10) inches into ground leaving approximately half (1/2) inch above grade.
 - b) Begin sod laying on sloping areas at toe of slope.
5. As sodding is completed in an area, roll area with roller weighing 75 to 150 lbs./ft. of roller width to ensure contact between sod root system and prepared sod bed.
6. Watering of sod is recommended in accordance with the following minimum schedule:
 - a) Weeks One (1) and Two (2): First watering immediately after laying sod. Three subsequent waterings at four (4) day intervals.
 - b) Week Three (3): One watering.
 - c) Subsequent Watering: Apply at weekly intervals as needed.
 - d) Adjust recommended watering program as necessary to account for actual weather conditions occurring following installation of

**11.00 EROSION CONTROL MEASURES FOR RESIDENTIAL
CONSTRUCTION SITES**

sod to ensure establishment of healthy appearing and vigorous growing turf.

During periods of intensive watering, protect sod from heavy traffic to avoid disturbing established finished grade.

7. The sod should be mowed after the grass has reached an average height of three (3) inches. Mowing shall be continued to maintain grass at a height of between two (2) and two and one-half (2-1/2) inches.

I. GENERAL NOTES

1. All Sediment Control Measures to be adjusted to meet field conditions at the time of construction, and be constructed prior to any grading or disturbance of existing surface material on balance of site.
2. Periodic inspection and maintenance of all sediment control structures must be provided to ensure intended purpose is accomplished. Developer shall be responsible for all sediment leaving the property. Sediment Control Measures shall be in working condition at the end of each working day.
3. The Sediment Control Measures will be maintained on a continuing basis until the site is permanently stabilized and all permit requirements are met.
4. These Erosion Control Measures are to be incorporated into the site grading plan.

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11
SECTION 12.00 – STEEP SLOPES ORDINANCE

Sec. 46-15. STEEP SLOPES

- (A) **PURPOSE.** The provisions contained herein are adopted to protect public and private property from damage or destruction resulting from natural erosion processes occurring within the ravines and bluffs along the shore of Lake Michigan, or abnormal or accelerated ravine and bluff erosion resulting from land development and construction activities occurring on adjacent or nearby properties, and to protect the fragile ravine and bluff ecosystem from unwarranted damage or destruction caused by land development and construction activities.
- (B) **APPLICABILITY.** The provisions contained herein shall apply to all land development and construction activities on all properties abutting ravines and bluffs
- (C) **REQUIREMENTS AND RESTRICTIONS.**
- (1) Building Setbacks:
- (a) From Ravines
- All building construction shall be on Table Land, but in no case shall any structure or building foundation be located closer than twenty (20) feet to the Ravine Area.
- (b) From Bluffs
- All building construction shall be on Table Land, but in no case shall any structure or building foundation be located closer than seventy-five (75) feet to the Bluff Area.
- (2) Construction Activity:
- (a) Adjacent to Ravines
- All construction activity; i.e., grading, excavating, filling, terracing, tree removal, stockpiling of excavated material, is prohibited within twenty (20) feet of the Ravine Area, except as may be necessary to provide site drainage improvements, as may be approved and/or required by the City Engineer.
- (b) Adjacent to Bluffs
- All construction activity; i.e., grading, excavating, filling, terracing, tree removal, stockpiling of excavated material, is prohibited within fifty (50) feet of the Bluff Edge, except as may be necessary to provide site drainage improvements, as may be approved and/or required by the City Engineer.
- (3) Site Landscaping:

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11
SECTION 12.00 – STEEP SLOPES ORDINANCE

Upon completion of construction activities, minimal grading and clearing of existing vegetation may be allowed within the Bluff or Ravine Area in order to install new vegetation and lawn landscaping. However, no such grading, clearing or landscaping will be permitted within twenty (20) feet of the Ravine Edge or within fifty (50) feet of the Bluff Edge.

(4) Site Drainage:

A Site Grading Permit, approved by the City Engineer, shall be required before any site grading work may take place. Measures shall be required to control storm water runoff from impervious areas, lawns, and footing drains. Wherever feasible, such runoff shall be collected and carried to established storm drainage facilities located away from the Ravine or Bluff Area as the case may be. If discharge into an established storm drainage structure is not feasible, drainage shall be collected and discharged into the ravine channel or from the top of the bluff to its base in a manner which minimizes disruption of the ravine or bluff slope and potential erosion of the bluff toe or the ravine toe and channel, subject to the specific approval of the City Engineer.

(5) Channel Modification:

Where the City Engineer finds that an unstable ravine or bluff slope or toe exists or is likely, or where the configuration of the ravine channel has resulted in erosion or suggests the probability of future erosion, channel, toe or slope stabilization measures may be required by the City Engineer.

(6) Required Information:

Prior to submission to the City of a request for Tentative Approval of a Plat of Subdivision or review of an Application for a Building Permit, the owner or agent of the owner of property, subject to this Section, shall submit to the City Engineer all applicable site information, including but not limited to topography, existing trees and vegetation, ravine and/or bluff conditions (including establishment of the limits of the Ravine or Bluff Area), geological and soil conditions, proposed plans for landscaping and lawn installation, and such other information as may be deemed necessary by the City Engineer in order to implement the policy and requirements of this Section.

(7) Definitions:

- a.) RAVINE AREA - The Ravine Area shall include all property within or adjacent to a ravine beginning at the point of

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11
SECTION 12.00 – STEEP SLOPES ORDINANCE

intersection of a line with the table land, said line extending from the toe of the slope upward at a vertical angle of twenty-two (22) degrees.

- b.) **RAVINE EDGE** - That point on the ravine side of the table land where the slope of the land first exceeds ten (10) percent.
- c.) **TABLE LAND** - Land where the slope in any direction does not exceed ten (10) percent.
- d.) **TOE OF SLOPE** - The toe of the ravine or bluff slope is that point in the ravine or bluff where the slope is less than twenty-two (22) degrees or where the slope reverses directions. On compound slopes where there may be more than one possible toe location, the controlling point shall be whichever toe location provides the greater ravine or bluff area.

(D) REVIEW GUIDELINES AND APPROVAL PROCEDURES.

- (1) The City Surveyor and Engineer may approve encroachments into the bluff or ravine setback area for the construction of landscape features, auxiliary buildings (slab foundation), bridges, wood decks or other similar facilities, if the City Surveyor and Engineer finds that:
 - (a) The proposed construction is appropriate only for requested location.
 - (b) The proposed construction will have no significant impact on the ravine or bluff area.
 - (c) The proposed construction is of relatively low value, except for items related to ravines such as vehicular bridges.
- (2) The Zoning Board of Appeals may consider variations from the requirements of this section for construction of habitable facilities such as room additions or new residences, and construction of significant auxiliary buildings. In considering such variations, the following guidelines, in addition to the four findings of fact as set forth in Section 46-21-(F)-(3), shall be considered:
 - (a) Construction in the twenty (20) foot setback for the twenty-two (22) degree slope intersect could be recommended if there exists adequate toe of slope improvements.
 - (b) Construction in the twenty-two (22) degree slope angle could be recommended if there exists adequate slope or other improvements that effectively increase the stable slope angle.

LAKE FOREST CONSTRUCTION STANDARD REV. 1/11
SECTION 12.00 – STEEP SLOPES ORDINANCE

- (c) Variation from building on land that exceeds ten (10) percent slope but is outside of the twenty (20) foot setback from the twenty-two (22) degree slope angle could be recommended if entire slope shows no indication of instability.
- (d) Variation from any restriction could be recommended if the requested construction is less nonconforming than the existing residence and the ravine or bluff slope does not show any indication of instability; or if the applicant submits evidence based on current geotechnical engineering practices such as the Simplified Bishop Method of stability analysis whereby variables of soil shear strength, ground water level, unit weight of soil and slope angles are considered which result in the determination that the particular slope is stable at an angle greater than twenty (22) degrees.

13.00 GENERAL REQUIREMENTS FOR TREE PRESERVATION

A. Tree Protection

1. Construction Zone

It is the responsibility of the contractor, as a condition of the bid specifications to protect all public trees located on the adjacent public right-of-way that may reasonably be expected to be affected or damaged by construction activity. Existing trees subject to construction damage shall be fenced or otherwise protected before any work is started. The trees to be protected, the method of protection, and the dimensions involved shall be determined by the City Arborist or duly authorized agent conjunctly with the contractor or his/her agent. Once assembled, no boxing, fencing or other protection device shall be removed without prior approval of the City Arborist, and there will be no construction activity or material within the enclosure.

DIMENSIONS: Small trees, as determined by the City Arborist, shall be fenced in such a manner as to encompass the entire drip-line area of the tree (figure 1). In no case shall the enclosure be less than two (2) feet from the center-line of the tree. Medium to large trees shall be fenced in a manner determined by the City Arborist based on sound arboricultural practices.

2. Utility Installation (Underground)

All installations of underground utilities on the public right-of-way are subject to approval by the City. Any and all installation that impact on public trees due to underground conflicts (roots) are specifically subject to the review and approval of the City Arborist or duly authorized agent before the project starts. A plan showing the path of the underground utility in relationship to surrounding trees will be submitted to the City Arborist (2) weeks before any work begins.

a.) Trenching Small Trees

Open trenching in the root zone area of a public tree is prohibited except in the case where the trenching falls outside the drip-line of the tree involved. (Figure 3) In some instances exceptions may be allowed if in the opinion of the City Arborist or his duly authorized agent, the impact of trenching upon the tree will be negligible.

13.00 GENERAL REQUIREMENTS FOR TREE PRESERVATION

b.) Trenching and Tunneling Medium to Large Trees

When the drip-line of trees becomes extensive or overlapping, the only reasonable means of utility installation on the public right-of-way is a combination of trenching and tunneling. This applies particularly to trees in excess of five (5) inches in diameter where there is insufficient space to bypass the drip-line by trenching must be tunneled. In no case shall the tunnel be less than two (2) feet in depth. When the tunneling procedure is required, the distance of the tunnel from the face of the tree will be determined by the diameter of the tree 4 1/2 feet from the ground-line. Unless specified otherwise by the City Arborist or duly authorized agent.

Since the cutting of large roots is unavoidable in a trenching operation, all roots over two (2) inches in diameter must be cut cleanly and painted with an appropriate tree wound dressing. All trenches should not stay open longer than necessary and must be properly barricaded. Where possible, the roots will be cut prior to the start of work to avoid tearing. This can be accomplished with a concrete saw or stump grinder. The need for pre-construction root pruning shall be determined by the City Arborist.

3. Subdivision Landscape Plans

Construction drawings of proposed streets, sewers, watermain and any utilities connected with a new subdivision shall be submitted to the Superintendent of Parks and Forestry in accordance with Administrative Directive 34. Two (2) copies of all landscape plans shall be submitted, one to be kept on file in Engineering and one (1) to be kept on file by the Forestry Department.

4. Review of Construction Plans

A full review of all construction plans shall include:

- a.) A field check of the condition of each tree or shrub and its value in relationship to what procedures and costs may be required to preserve it.

13.00 GENERAL REQUIREMENTS FOR TREE PRESERVATION

- b.) Plotting of valuable trees on cut and fill cross sections to determine the approximate location of the tree or shrub in relation to the amount of earth to be removed or added.
- c.) Trees desired to be saved will be noted on construction drawings.
- d.) In some instances, final decisions regarding preservation or removal of trees or shrubs may be deferred until after construction has begun, notwithstanding previous construction plan notes.

PARKWAY TREE AUGERING SPECIFICATION

General Subject: **Construction Around Parkway Trees**

Specific Subject: **Augering Specifications for Tree Roots**

Purpose:

To establish and use a standard specification for augering, instead of trenching, the root zone of parkway trees.

Rationale for the Specification:

Every Municipal Forester, Arborist, Urban Forester and Horticulturist is concerned and has a responsibility for the maintenance and protection of all publicly owned trees which are located adjacent to public streets, sidewalks, or right-of-ways, or in grass areas, called parkways. The trenching operation when allowed to be used in the root zone of a tree, causes damage to that tree's root system. Trenching through the tree's root zone will cause any or all of the following damage to occur to the tree and remaining root system. Trenching damage causes slowing of the growth rate, die-back and decline of the tree's crown and or root system, deadwood formation, wind throw, invasion of wood-decaying fungi and or insects, or total tree mortality. The maintenance and protection responsibilities not only included the portion of the tree above ground, but also the root system of the tree. The lack of an augering specification has resulted in varying interpretations for what is adequate for the protection of the tree's root system. Therefore, to minimize damage to parkway tree roots, the following augering specification has been developed to provide adequate protection for the roots of parkway trees.

Specification:

The parkway tree root zone shall be protected by augering in the manner described hereafter.

13.00 GENERAL REQUIREMENTS FOR TREE PRESERVATION

TREE DIAMETER (DBH):

0 - 2 inches in diameter	Auger one (1) foot from face of tree in all directions if trench located within the radius.
3 - 4 inches in diameter	Auger two (2) feet from face of tree in all directions if trench located within this radius.
5 - 9 inches in diameter	Auger five (5) feet from face of tree in all directions if trench located within this radius.
10 - 14 inches in diameter	Auger ten (10) feet from face of tree in all directions if trench located within this radius.
15 - 19 inches in diameter	Auger twelve (12) feet from face of tree in all directions if trench located within this radius.
19 - over inches in diameter	Auger fifteen (15) feet from face of tree in all directions if trench located within this radius.

DBH = Diameter Breast Height, measured at 4.5 feet above ground.

The minimum depth of auger within the root zone, as described above, shall be a minimum of 24 inches below the soil surface. No trenching within the root zone of the tree, as described, shall be permitted.

13.01 LANDSCAPE MATERIAL

SPECIFICATIONS FOR LANDSCAPE MATERIAL

I. SCOPE OF WORK

All work shall be made on the basis of the bidder providing nursery grown plant materials including the digging, balling, burlapping and delivery of the materials to The City of Lake Forest. The Contractor shall follow all specifications as stated below.

II. PLANT MATERIALS

A. Source of Supply

1. All plant materials supplied shall conform to the current edition (ANSI Z60.1) of the American Standard for Nursery Stock as approved by the American National Standards Institute, Inc.
2. Plant materials may be inspected and approved by a city representative, at the source of supply prior to digging. All materials are to be of highest quality.
3. All plant materials shall have been grown under climatic conditions similar to those in Chicago, Illinois.
4. All plants shall be freshly dug. No heeled-in plants or plants from cold storage will be accepted. One-sided plants or plants taken from tightly planted nursery rows will also be rejected. All plants shall be typical of their species or variety and shall have a sufficient normal growth of spread and height. They shall be sound, healthy, and vigorous, well-branched and densely foliated when in leaf. They shall be free of disease, insect pests and larvae. They shall have healthy, well-developed root systems.

B. Measurements

Caliper of trees up to six inches (6") shall be taken six inches (6") above the ground level. Trees over six inches (6"+) shall be measured 4.5 feet above the ground level.

All plant material will be required to meet the minimum height or spread on material as designated on the City approved plan.

13.01 LANDSCAPE MATERIAL

These measurements will be taken either from ground level to the terminal bud or the horizontal plane which exhibits the greatest plant density.

C. Inspection

1. All plant materials may be inspected and approved by an authorized city representative prior to digging.
2. Certificates of inspection of plant materials required by the federal, state or other governmental agencies are to accompany all shipments within the State of Illinois and outside Illinois.
3. Inspection and approval by the authorized city representative at the source of supply does not abdicate the right of the city to reject any materials after they have been delivered to the site. A final determination of acceptability of the material will be made at the time of delivery. The City of Lake Forest will notify the contractor either by phone or in writing no more than five (5) days after delivery of all materials not found to be acceptable .

D. Digging and Handling

1. Plant materials indicated "B&B" on the proposal form shall be balled and burlapped with firm, natural balls of earth. The balls shall be of sufficient depth and width to include adequate fibrous and feeding roots to insure full recovery and development of the plants. No plant dug with a ball shall be accepted if the ball is broken before or during delivery operations.
2. The ball size shall be increased at least two (2) sizes in diameter from those specified in ANSIZ60.1 when using a machine for digging which digs a tapered ball similar to a mechanical tree spade.
3. Trees with broken major branches, or badly bruised or damaged bark, are not acceptable, and may be rejected by the city.

13.01 LANDSCAPE MATERIAL

4. Roots, balls and crowns, if in leaf, of all plants shall be protected at all times from sun, and/or drying winds prior to and during delivery.

E. Alternates

Substitutions for species will not be permitted. If proof is submitted that any plant specified is not obtainable, a proposal will be considered for use of nearest equivalent variety. Such proof shall be substantiated in writing to the City.

F. Nomenclature

The plants indicated to be provided shall be true to name and the nomenclature shall generally conform with that accepted in the nursery trade.

13.02 PLANTING OF LANDSCAPE MATERIAL - SPECIFICATIONS

I. SCOPE OF WORK

The work shall consist of planting various trees and shrubs of the sizes stated on the approved plan which shall be planted by the vendor. The City shall reserve the right to accept or reject any or all materials which do not meet the planting specifications as stated below.

II. PLANTING

A. Layout

Locations for the plant materials, and outlines of the area to be planted, shall be marked on the ground and staked prior to any excavations.

B. Roots, balls and crowns, if in leaf, of all plants shall be protected at all times from sun, and/or drying winds between the delivery site and planting site.

C. Planting Pits shall be excavated with vertical sides and be circular in outline. All tree pits shall be excavated to the depth equal to the depth of the root ball. Excess excavated material shall be removed and legally disposed of from the site. If required by the city, the pits shall be backfilled with top soil as the trees are set. Topsoil shall be reasonably free of subsoil, quack grass roots, noxious weed seeds, stones, lumps, plants or their roots, and other extraneous matter. Topsoil shall not be used for planting operations while in a frozen or muddy condition. All topsoil material shall be approved by the authorized city representative.

D. Setting of the Plants

1. Wire baskets shall be removed by the Contractor before planting.
2. Plants shall be set in the center of the pits, plumb and straight.
3. When balled and burlapped plants are set, compact soil around the base of the ball until all voids three-quarters of the way up from the bottom are eliminated. Twine wrapping the ball shall be cut and removed prior to backfilling. Natural burlap may be left on the ball, synthetic burlap must be removed. The planting pits shall be filled to finished grade.

13.02 PLANTING OF LANDSCAPE MATERIAL - SPECIFICATIONS

4. A four inch (4") deep circular water saucer of soil shall be constructed, slightly larger than the ball, so that the ridge is off the root system.
5. After this operation is completed, water shall be applied immediately by the Contractor. The amount of water shall be sufficient to ensure soaking of the root ball.
6. The City shall supply a source of water at the Municipal Services Building, 800 N. Field Drive providing all permits have been obtained. The use of fire hydrants as source of water is prohibited.

E. Pruning

Each tree shall be pruned in accordance with horticultural practice to preserve the natural character of the plant.

1. All dead, broken, or badly bruised branches shall be removed.
2. Pruning shall be done with clean sharp tools.

F. Notification

The Contractor shall, before digging, notify J.U.L.I.E and all non-member utility owners. He/she will also be responsible for all underground irrigation systems and street light cables

G. Bracing

Bracing may be required by the city.

H. Mulching

Mulching shall be completed on all planted trees and planting beds as required on the landscape plan. Mulch material shall be approved by the city prior to placement. Mulch shall be between 3 and 4 inches deep.

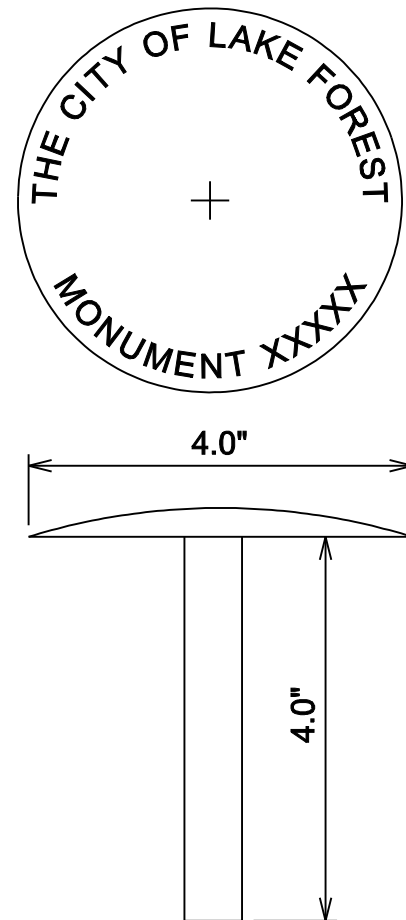
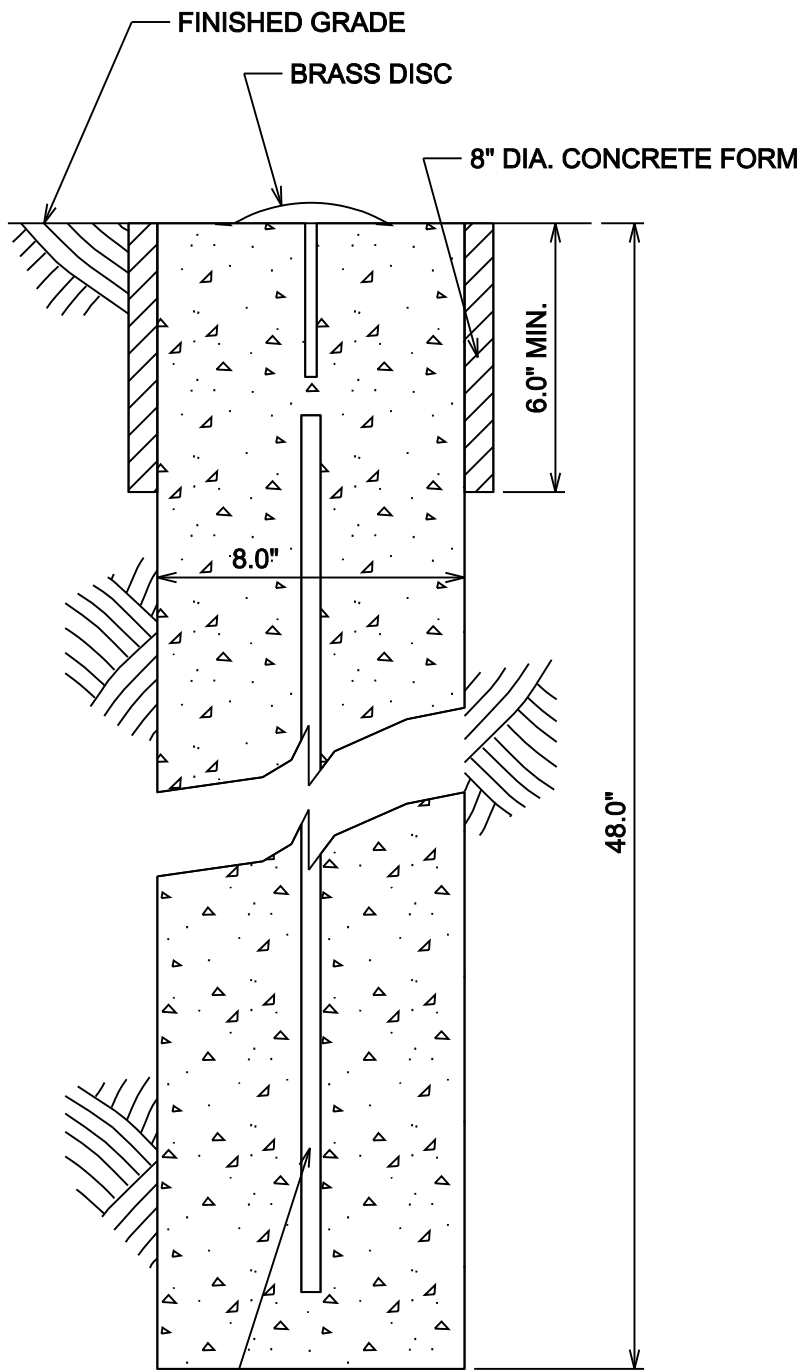
III. TIME OF COMPLETION

- A. It shall be the responsibility of the Landscape Contractor to schedule the planting operations to complete the work within the following time period. Fall planting shall begin after October 1 and shall be completed no later than November 16. Spring planting shall begin no

13.02 PLANTING OF LANDSCAPE MATERIAL - SPECIFICATIONS

earlier than March 22 and shall be completed no later than May 15.
No work will be done on Sundays.

- B. All plantings are to be coordinated with the Public Works Forestry Supervisor at least twenty-four (24) hours in advance of planting.



POURED CONCRETE SURVEY MONUMENT

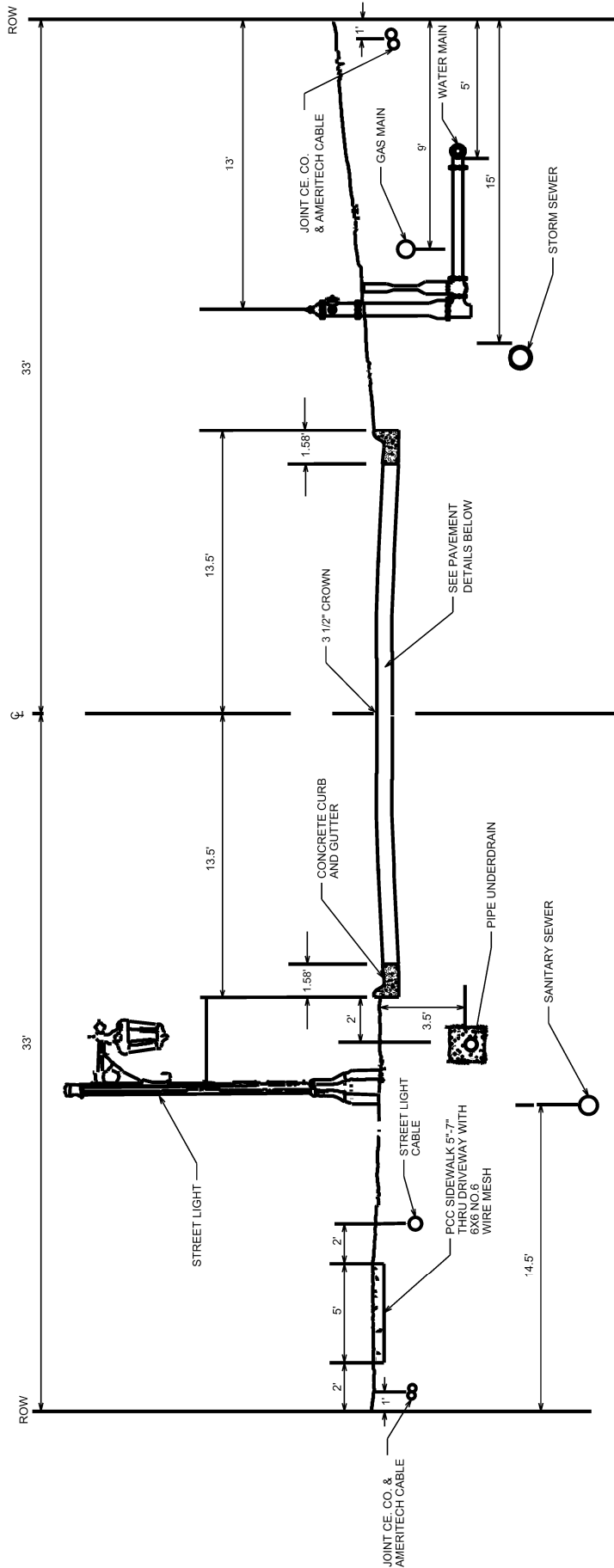
NO. 4 REINFORCING BAR

LAKE FOREST STANDARD 1.00

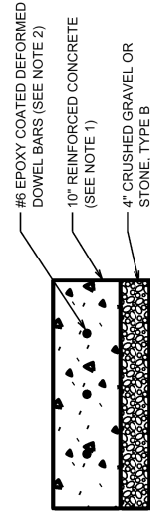
APPROVED BY : KMM

DATE : 10/30/2006

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ALTERNATE 2

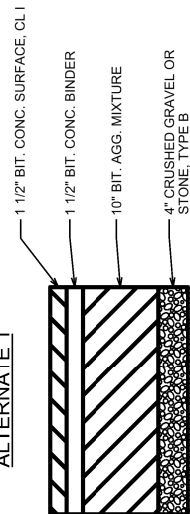


PAVEMENT DETAIL

NOTES:

1. PORTLAND CEMENT CONCRETE PAVEMENT SHALL CONFORM TO SECTION 420 OF THE IDOT STANDARD SPECIFICATIONS.
2. #6 EPOXY COATED DOWEL BARS SHALL CONFORM TO ARTICLE 1006.11 OF THE STANDARD SPECIFICATIONS, BE 24" LONG, AND SPACED A MAXIMUM OF 24" APART ALONG ALL JOINTS.

ALTERNATE 1



PAVEMENT DETAIL

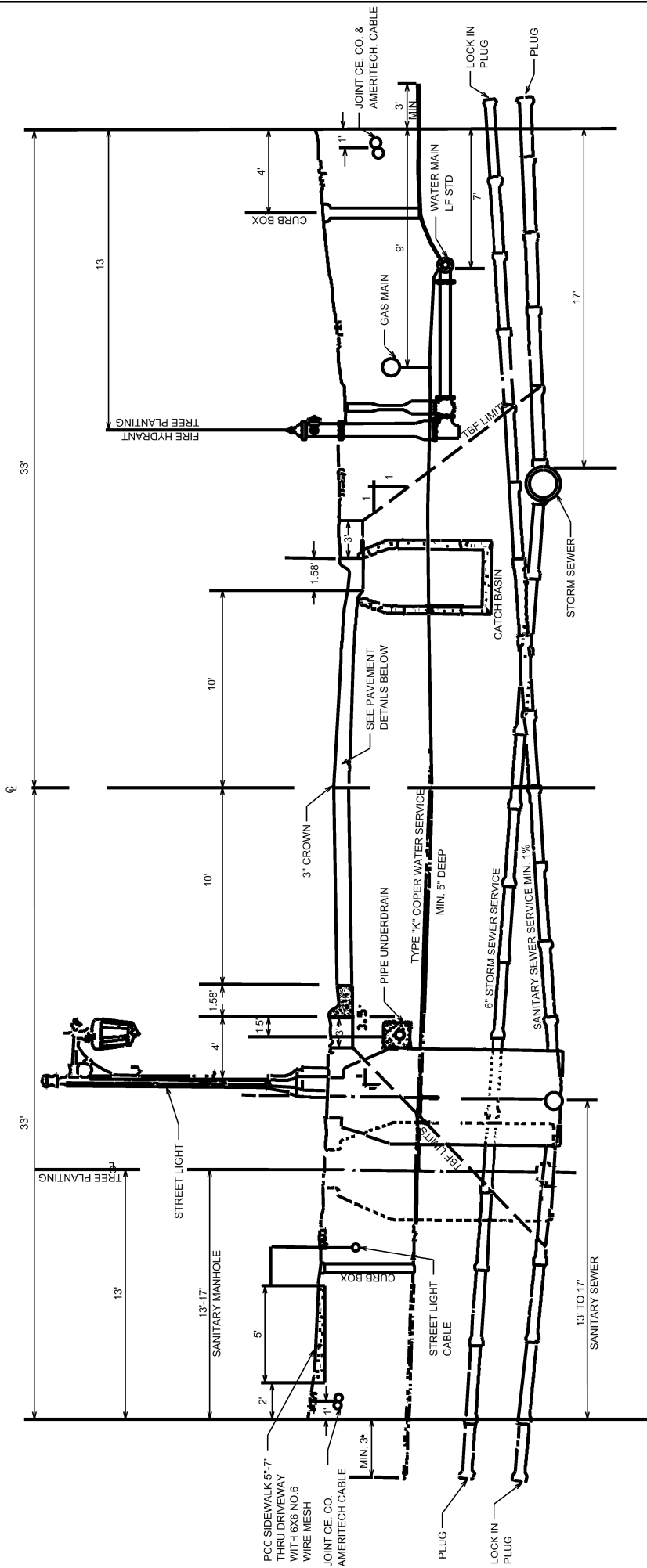
TYPICAL CROSS-SECTION FOR COLLECTOR STREET

LAKE FOREST STANDARD 2.01

APPROVED BY : KMM

DATE : 4/23/2009

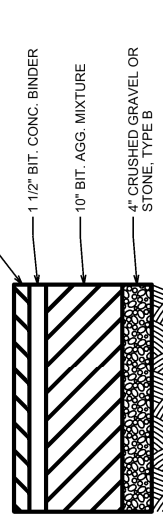
G:\Engineer\Standard Details\...X-Section Collector Streets 2-01



NOTES:

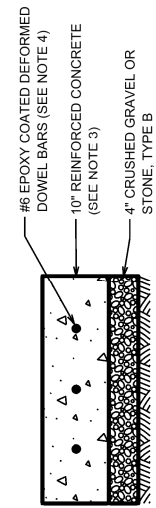
1. CURB AND GUTTER SHALL BE SHAPED TO FIT CATCH BASIN FROM A POINT 10' EACH SIDE OF BASIN.
2. PARKWAY SHALL BE GRADED AND SEEDED, MIN. SLOPE 1/2" PER FOOT, MAX. SLOPE 4" PER FOOT. WHERE SIDEWALKS ARE TO BE CONSTRUCTED THE MAX. SLOPE WILL BE 1" PER FOOT.
3. PORTLAND CEMENT CONCRETE PAVEMENT SHALL CONFORM TO SECTION 420 OF THE IDOT STANDARD SPECIFICATIONS.
4. #6 EPOXY COATED DOWEL BARS SHALL CONFORM TO ARTICLE 1006.11 OF THE STANDARD SPECIFICATIONS, BE 24" LONG, AND SPACED A MAXIMUM OF 24" APART ALONG ALL JOINTS.

ALTERNATE 1



PAVEMENT DETAIL

ALTERNATE 2



PAVEMENT DETAIL

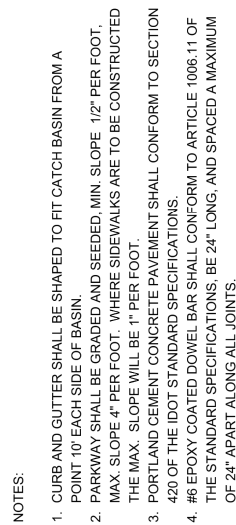
TYPICAL CROSS-SECTION FOR

STREET IMPROVEMENT IN RESIDENTIAL AREAS

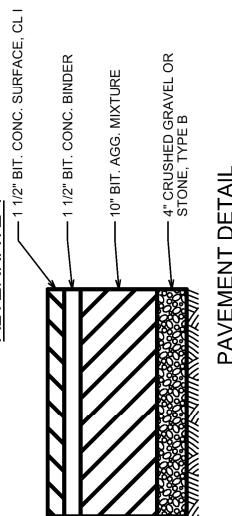
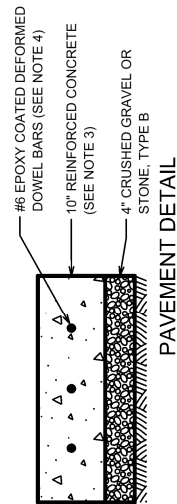
THE CITY OF LAKE FOREST, ILLINOIS

ALTERNATE 1

LAKE FOREST STANDARD 2.02
APPROVED BY : KMM
DATE : 4/23/2009



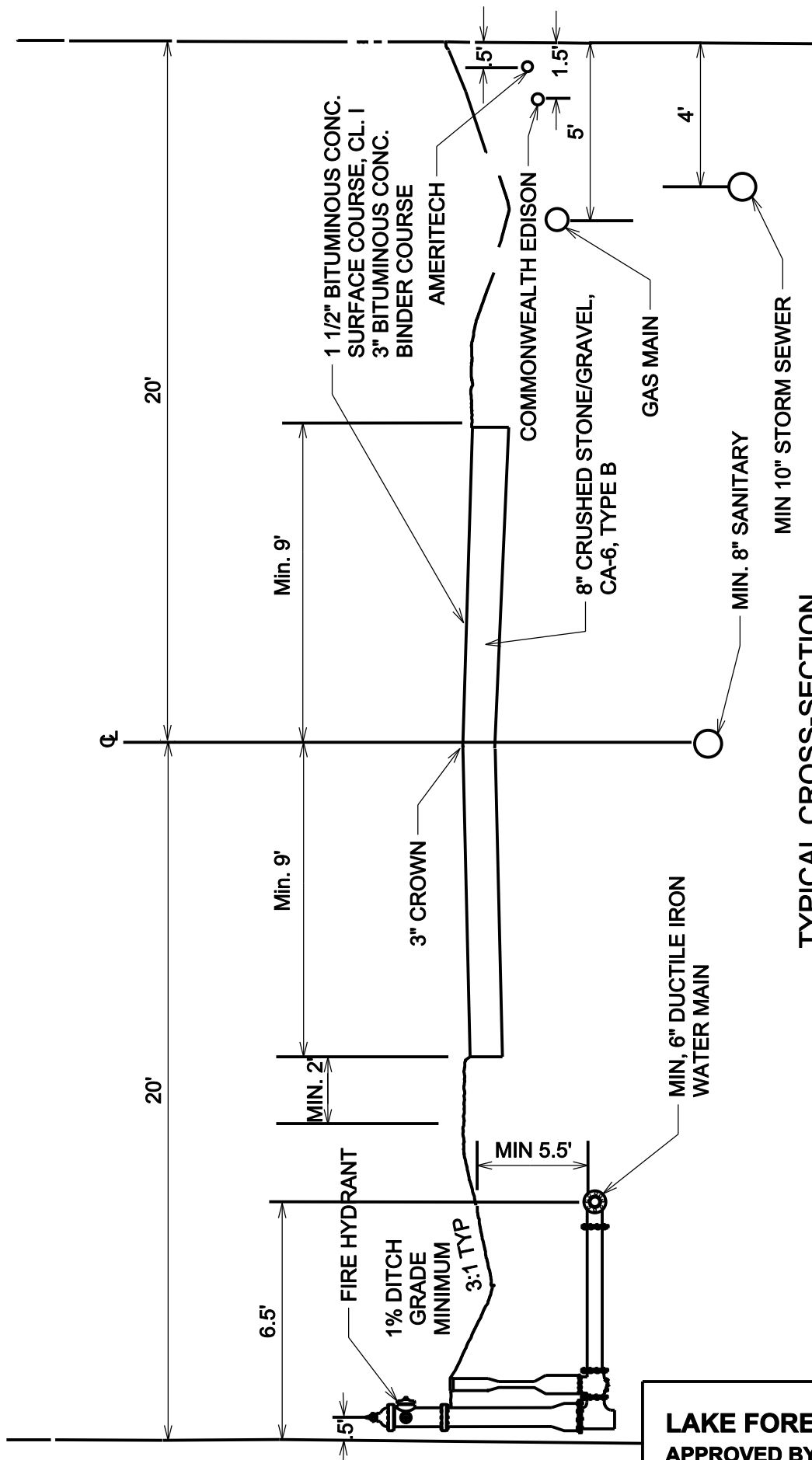
ALTERNATE 1



TYPICAL CROSS-SECTION
FOR
STREET IMPROVEMENTS IN RESIDENTIAL AREAS

ALTERNATE 2

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TYPICAL CROSS-SECTION

FOR

PRIVATE ROADS

(MAXIMUM 5 HOMES)

THE CITY OF LAKE FOREST, ILLINOIS

ALTERNATE 1

LAKE FOREST STANDARD 2.04

APPROVED BY : KMM

DATE : 1/1/2006

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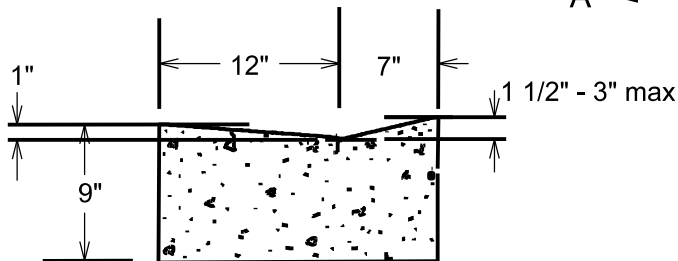
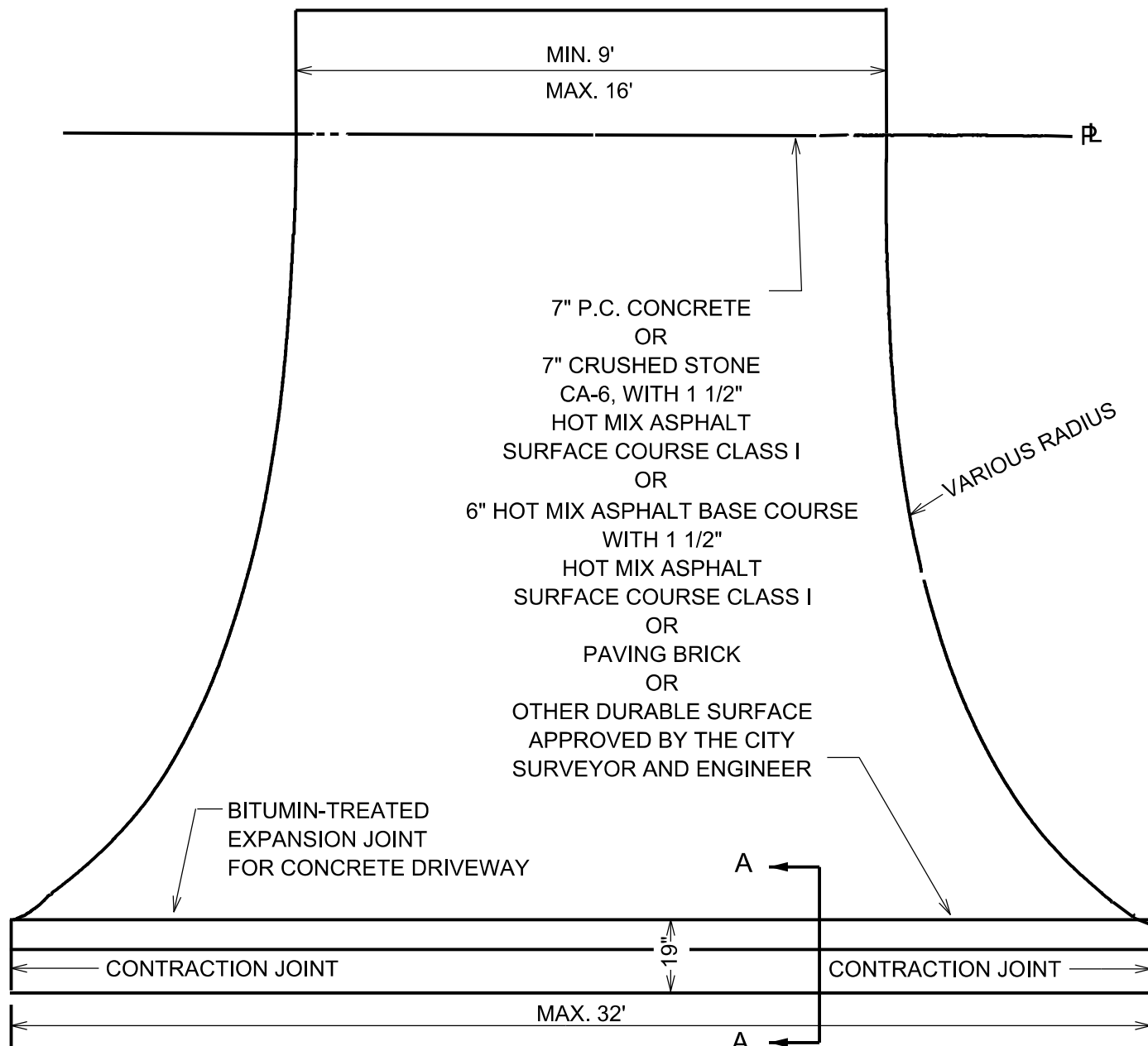


BARRIER CURB



- ## STANDARD CURB SECTIONS

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SECTION A - A

RESIDENTIAL DRIVE APPROACH

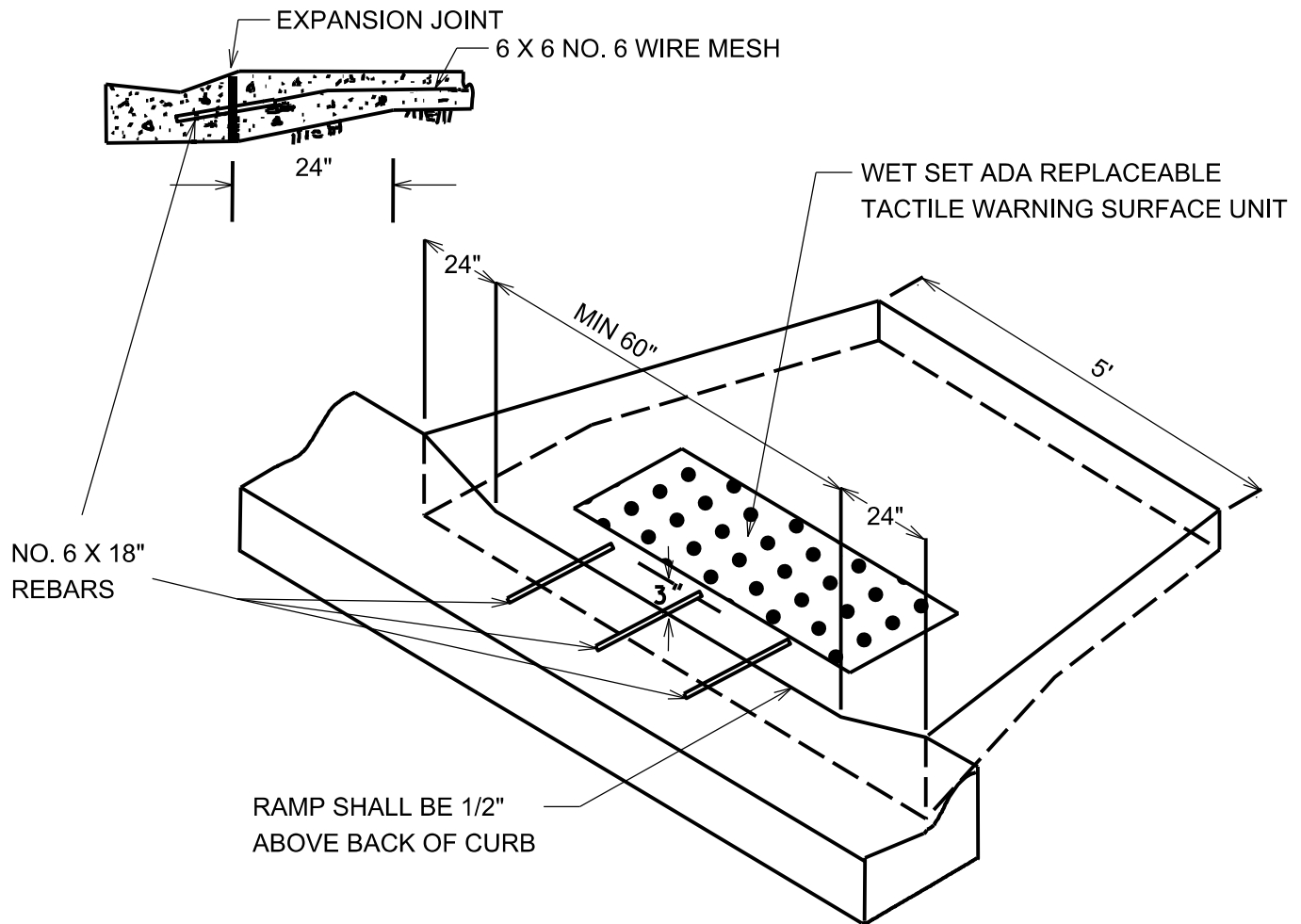
CONTRACTOR MUST CALL FOR AN INSPECTION
PRIOR TO PLACING/POURING THE APPROACH

LAKE FOREST STANDARD 2.07

APPROVED BY : KMM

DATE : 2/19/2009

G:\Engineer\Standard Details\Drive Approach



GENERAL NOTES

- THE RAMP SHALL HAVE A MAXIMUM SLOPE OF ONE INCH (1") PER FOOT, BE FIVE INCH (5") P.C.C. AND HAVE A TRANSVERSE ROUGH BROOM FINISH.
- A 'WET SET ADA REPLACEABLE TACTILE WARNING SURFACE UNIT' SHALL BE PLACED INTO THE SIDEWALK RAMP. THE INSERT SHALL HAVE OUTSIDE DIMENSIONS OF 24" x 48" AND SHALL HAVE TRUNCATED DOMES WITH A NOMINAL DIAMETER OF 0.9", A NOMINAL HEIGHT OF 0.2", AND A NOMINAL SPACING OF 2.35" CENTER TO CENTER.
- THE SURFACE OF THE INSERT WILL BE RED.
- THE BACK OF CURB, IN THE DEPRESSED SECTION SHALL BE TWO INCHES (2") ABOVE THE FLOW LINE. THE EDGE OF THE SIDEWALK RAMP SHALL BE ONE-HALF OF AN INCH (1/2") ABOVE THE BACK OF CURB.
- PREMOLDED EXPANSION JOINT SHALL BE PLACED BETWEEN THE BACK OF THE CURB AND THE RAMP.
- 6X6 NO. 6 WIRE MESH IN SIDEWALK

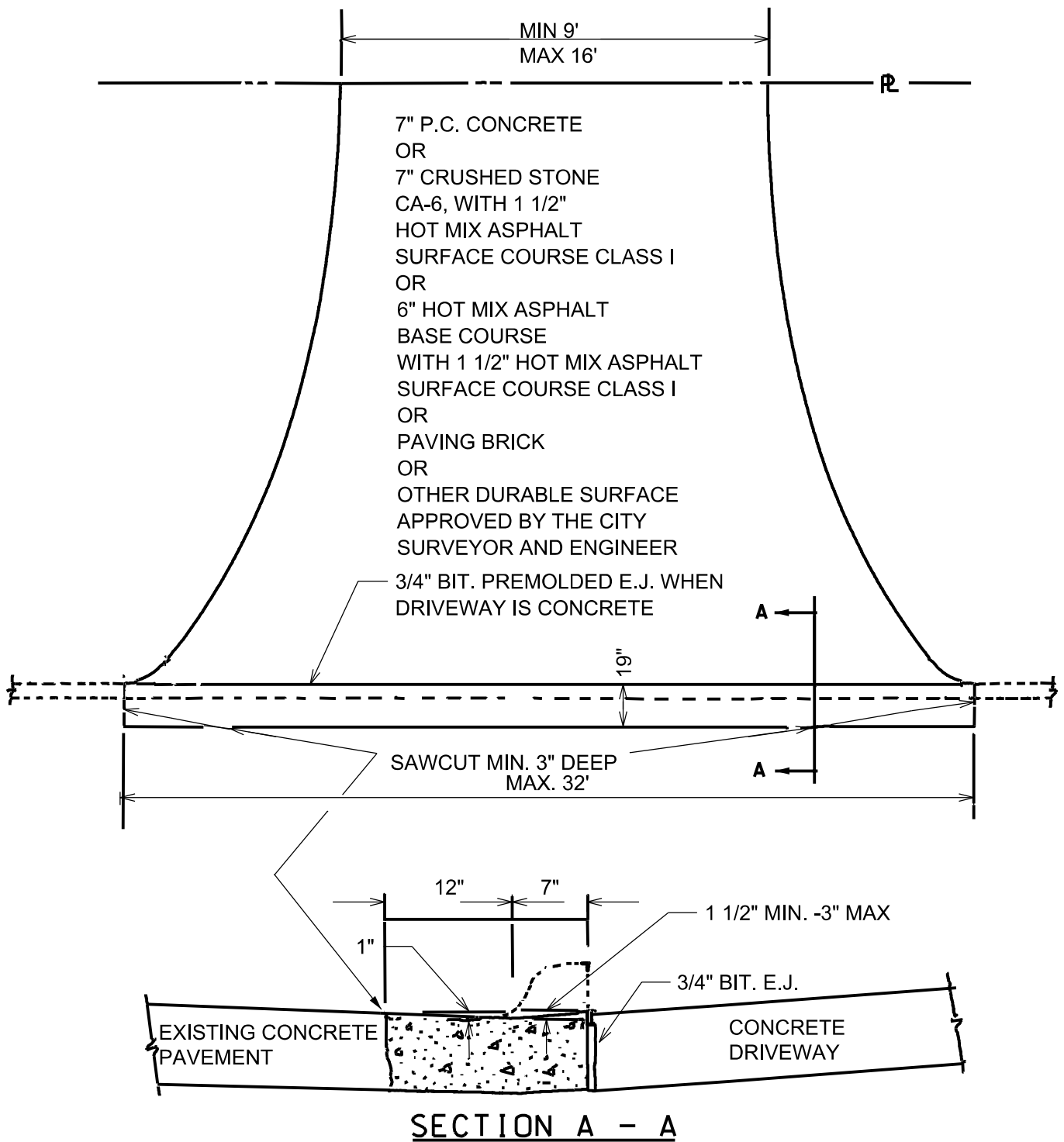
STANDARD SIDEWALK RAMP

LAKE FOREST STANDARD 2.08

APPROVED BY : KMM

DATE : 1/1/2011

G:\Engineer\Standard Details\Handicap Ramp 2-08



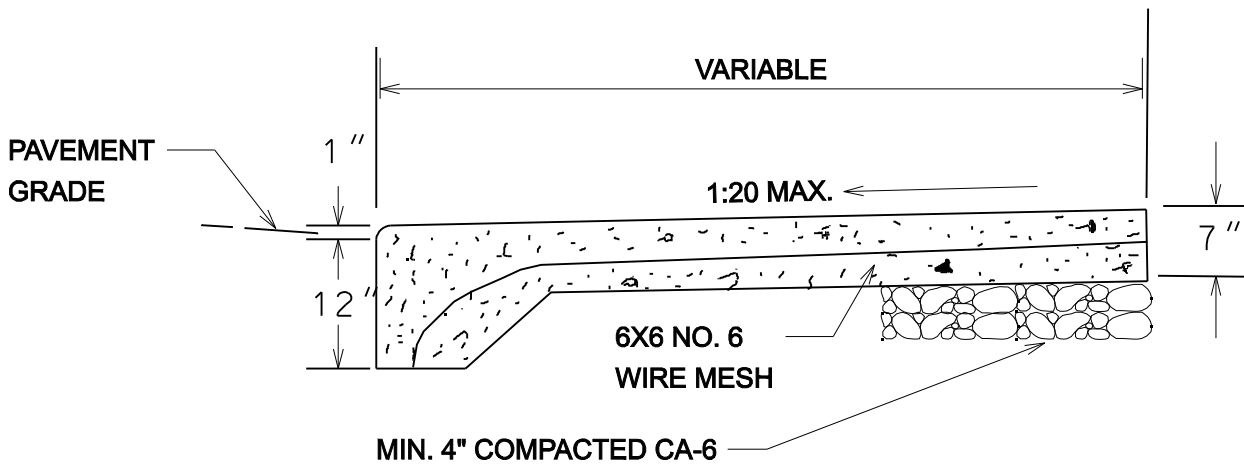
RESIDENTIAL DRIVE APPROACH IN CONCRETE STREET

LAKE FOREST STANDARD 2.09

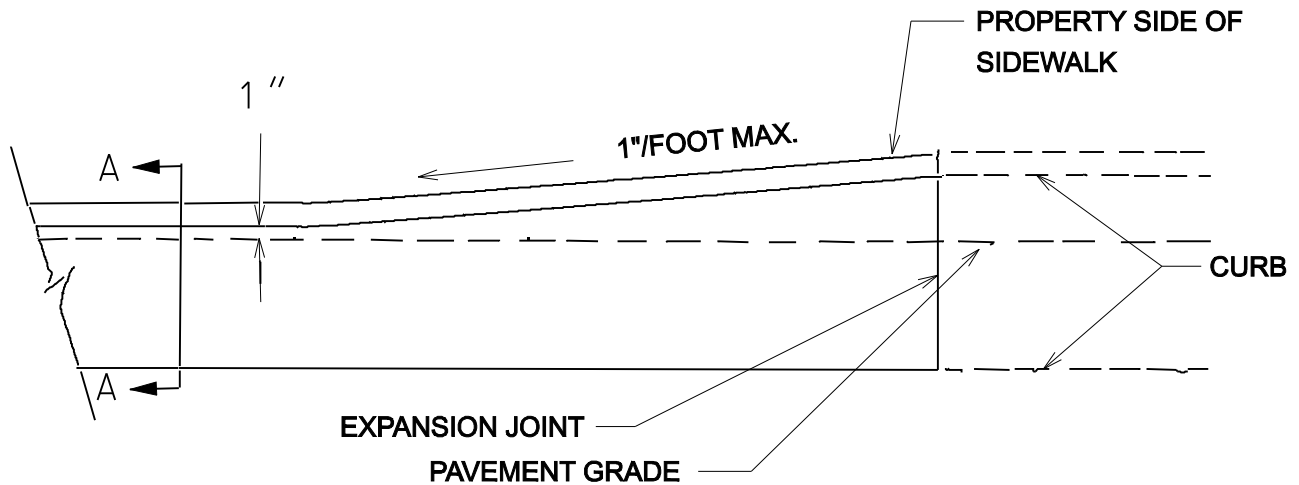
APPROVED BY : KMM

DATE : 2/19/2009

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SECTION A - A

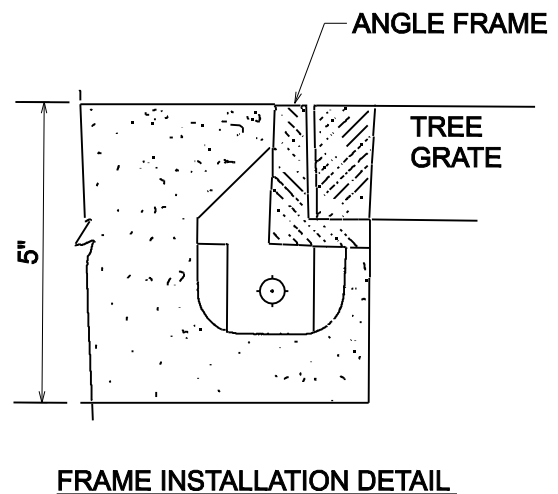
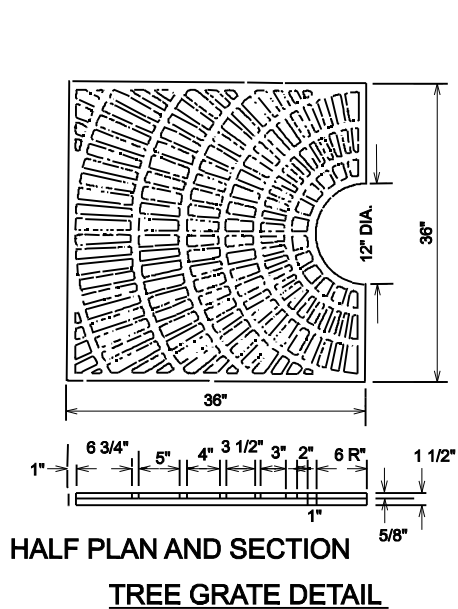
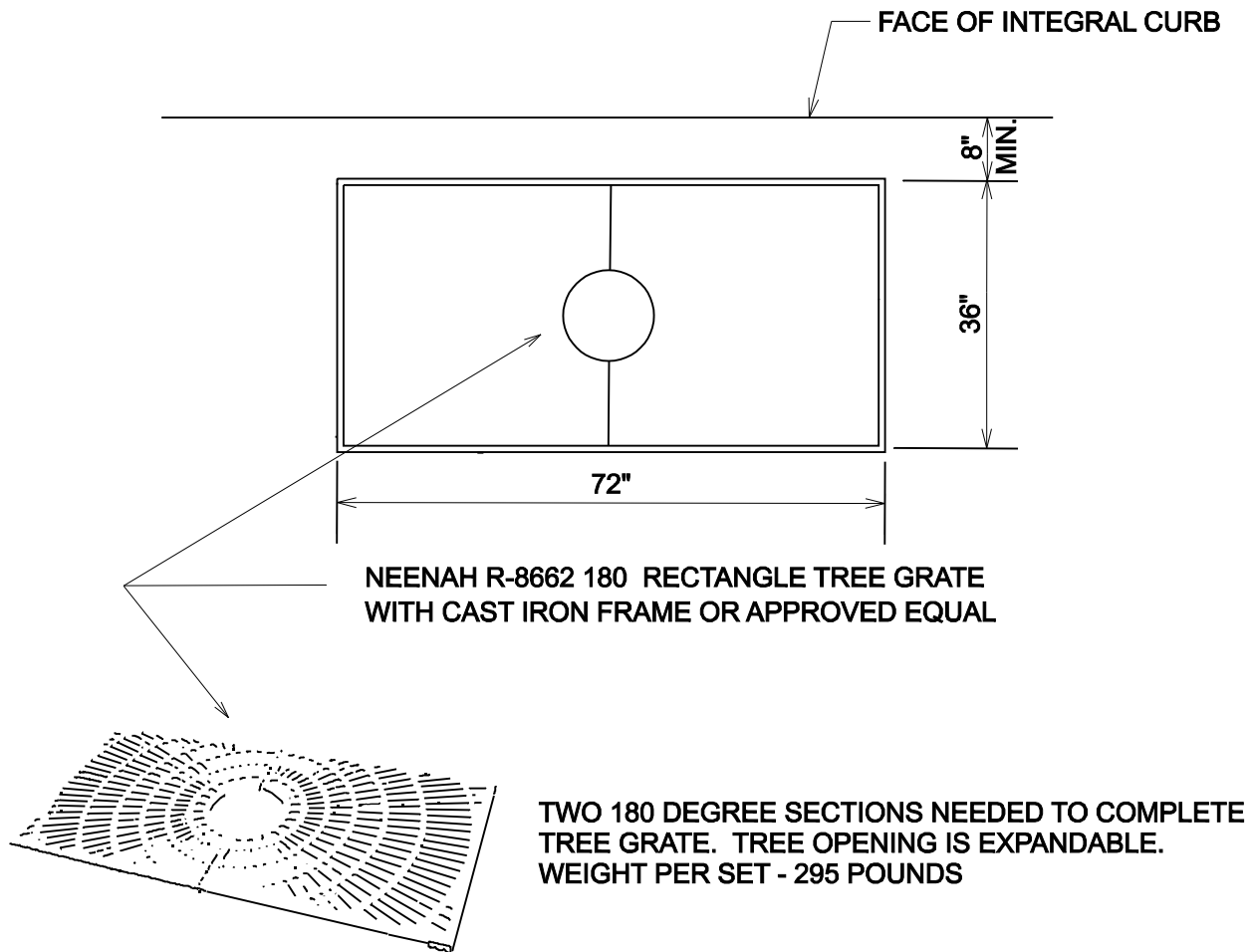


ELEVATION

STANDARD DRIVE APPROACH FOR INTEGRAL SIDEWALK & CURB

LAKE FOREST STANDARD 2.10
APPROVED BY : KMM
DATE : 1/1/2006

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TREE HOLE DETAIL

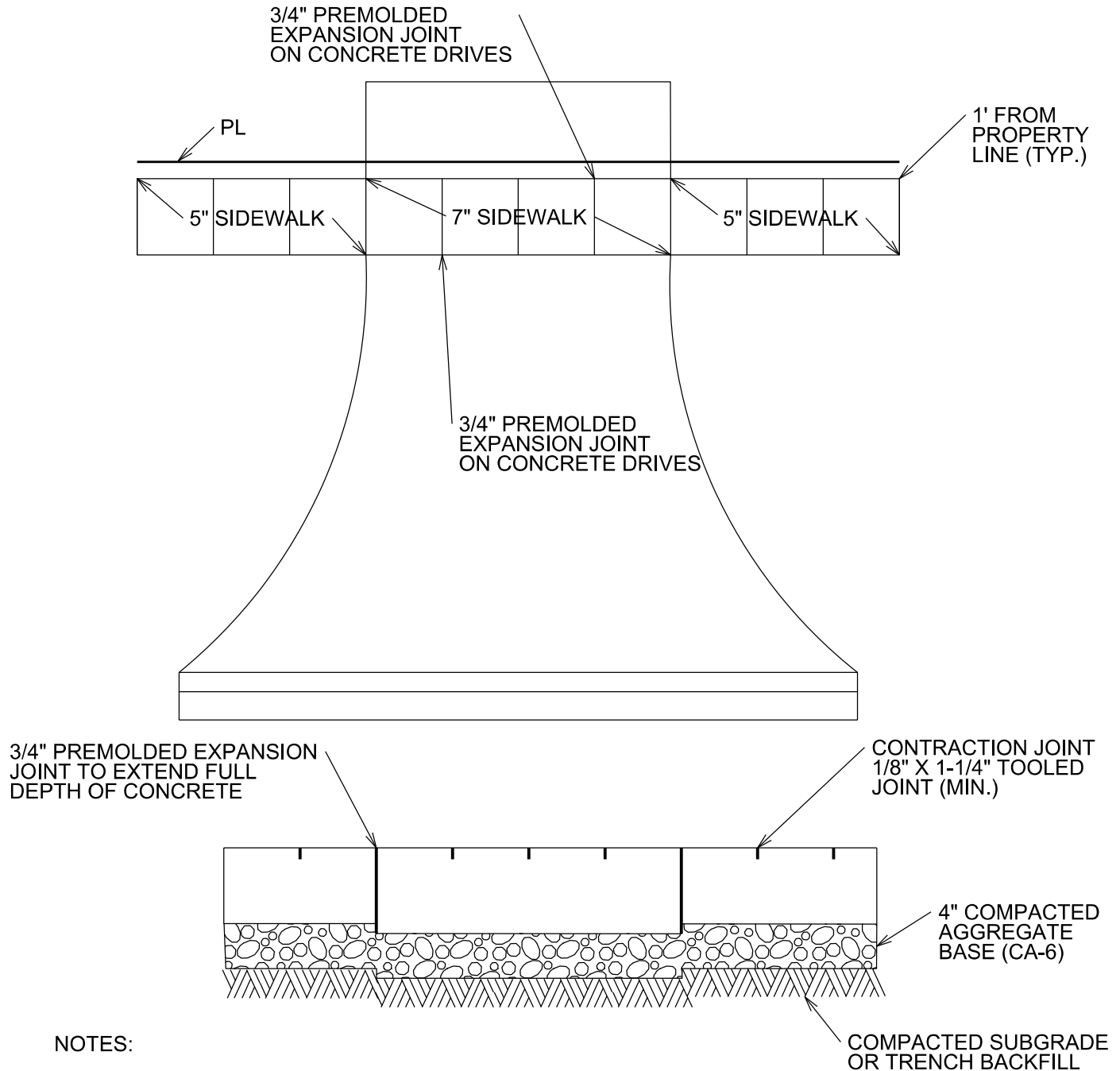
LAKE FOREST STANDARD 2.11

APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Tree Hole 2-11

SIDEWALK DETAIL



NOTES:

1. UNLESS OTHERWISE NOTED ON PLANS, CONTRACTION JOINTS TO BE AT 5' O.C.
2. EXPANSION JOINTS TO BE 50' O.C. MAX. AND AT BACK OF CURB, CHANGE IN DIRECTION, OTHER WALK, UTILITY APPURTENANCE OR FACE OF STRUCTURE.
3. PORTLAND CEMENT CONCRETE SHALL CONFORM TO IDOT CLASS SI MIN. 3,500 PSI (6.1 BAG MIX) AT 14 DAYS, WITH 5% TO 8% AIR ENTRAINMENT. (NO FLY ASH ALLOWED)

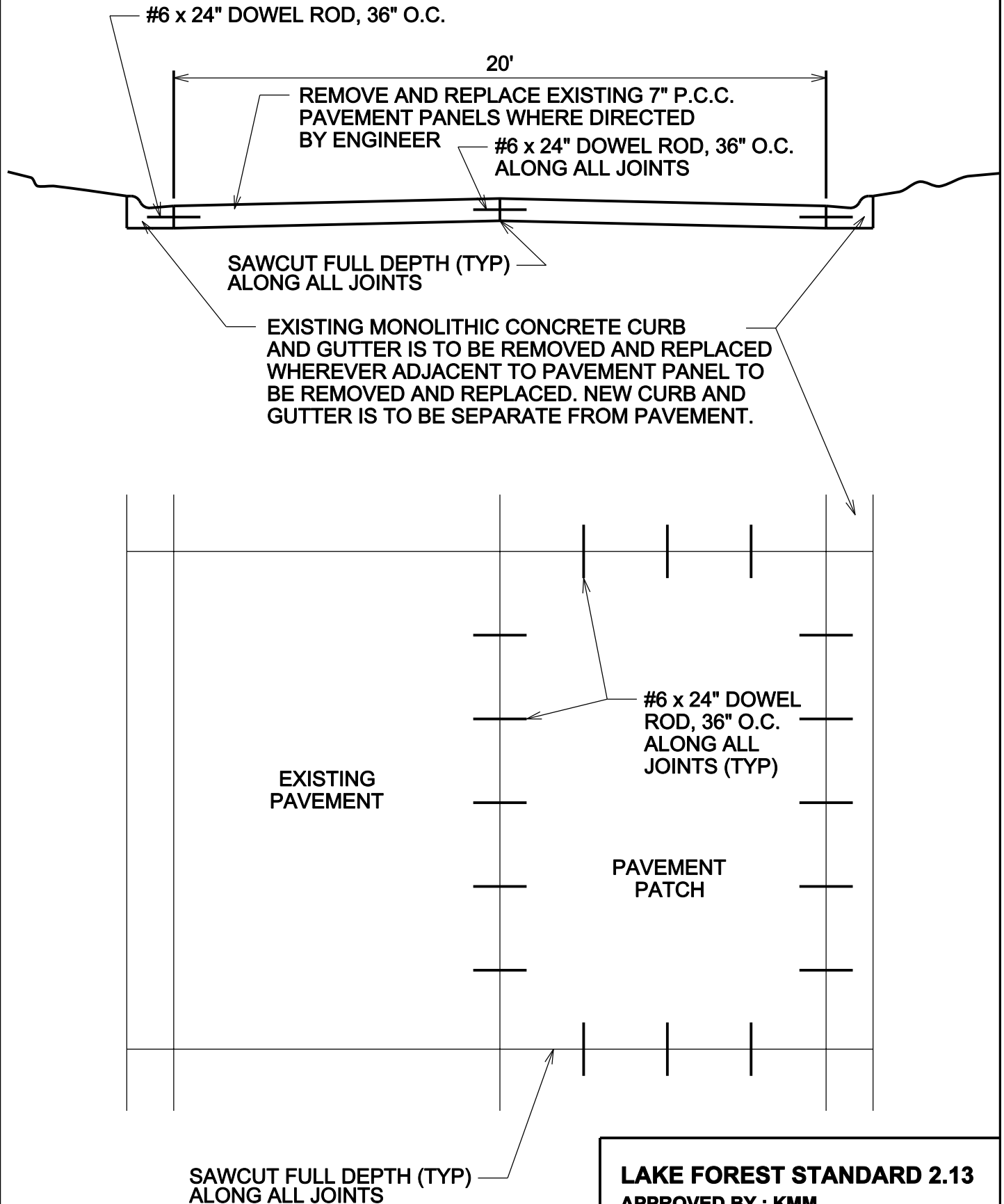
LAKE FOREST STANDARD 2.12

APPROVED BY : KMM

DATE : 2/19/2009

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P.C.C. PAVEMENT PATCHING DETAIL



LAKE FOREST STANDARD 2.13

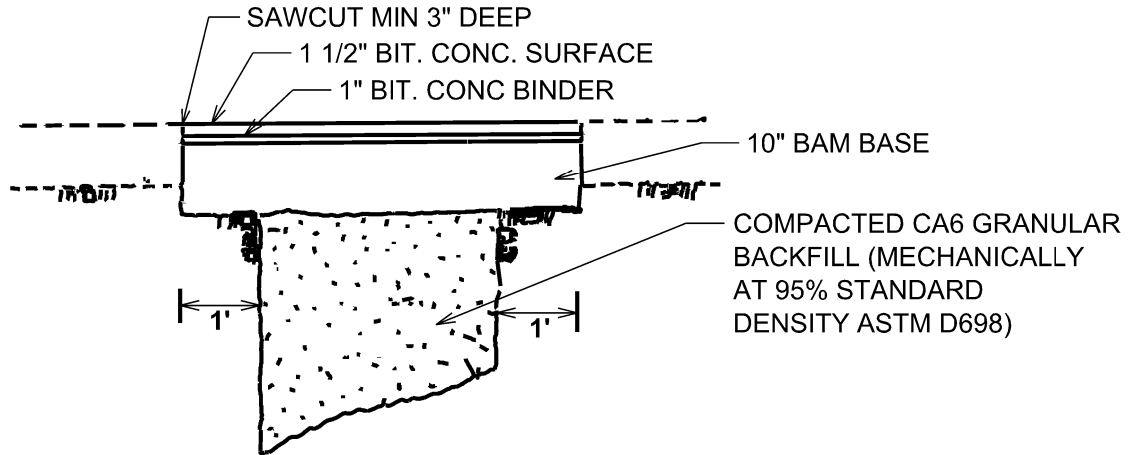
APPROVED BY : KMM

DATE : 2/18/2009

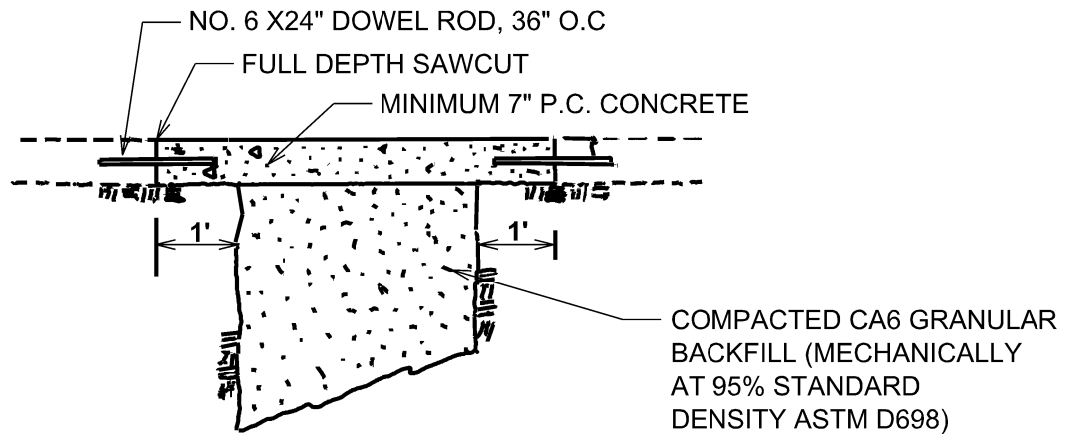
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TYPICAL PAVEMENT RESTORATION FOR NEW CITY MAIN UTILITY INSTALLATIONS

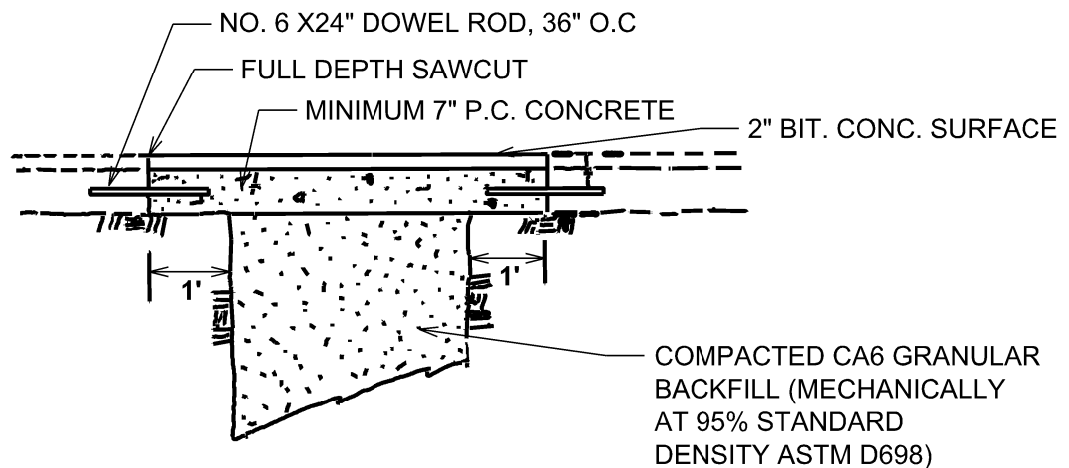
(FOR CROSSINGS, UTILITY CONNECTIONS, SERVICE LINES SEE DETAIL 2.15)



FOR PAVEMENT WITH AGGREGATE BASE AND BITUMINOUS SURFACE



FOR CONCRETE PAVEMENT



FOR CONCRETE PAVEMENT WITH BITUMINOUS OVERLAY

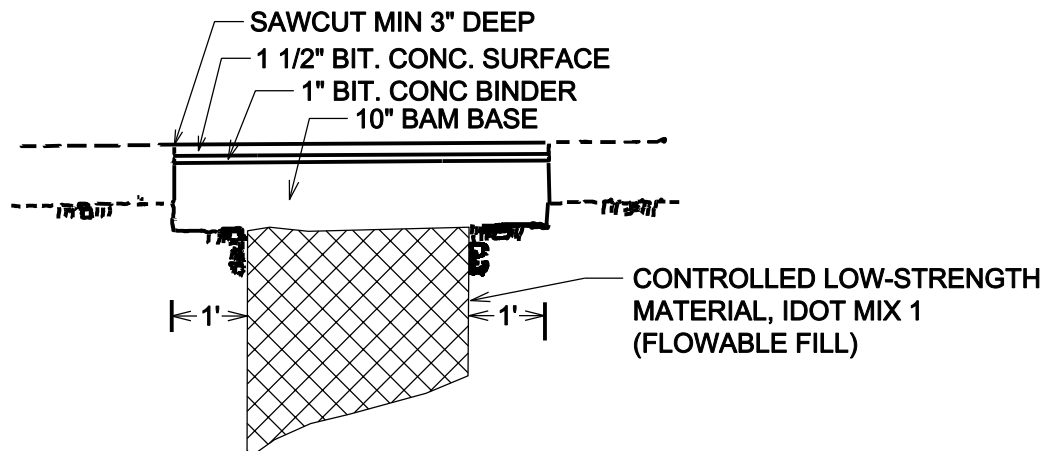
LAKE FOREST STANDARD 2.14

APPROVED BY : KMM

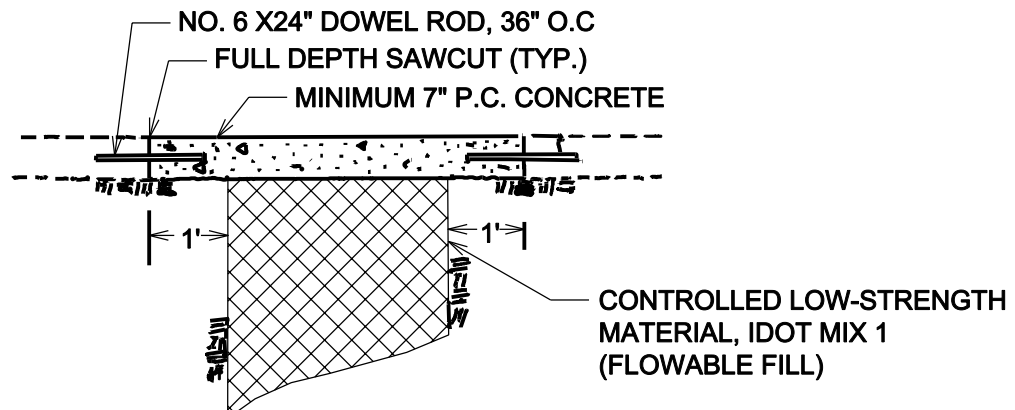
DATE : 4/23/2009

G:\Engineer\Standard Details\PDF Details\Pavement Restoration 2-14

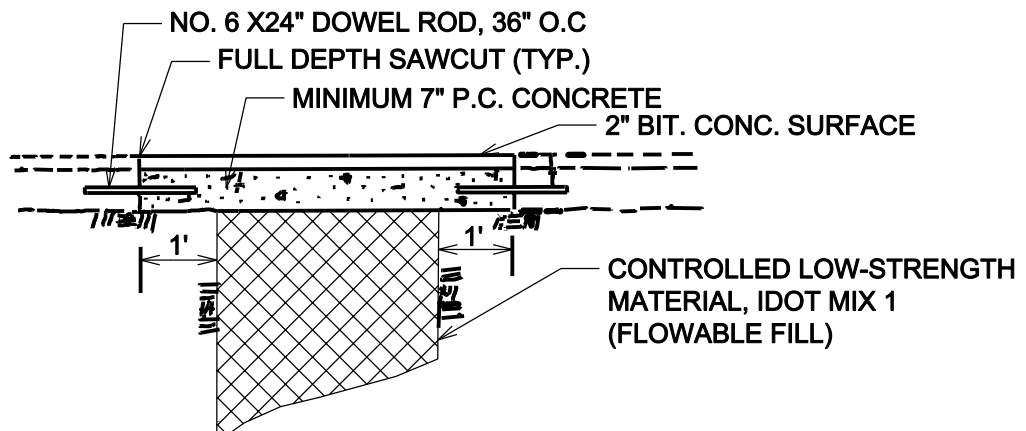
**TYPICAL PAVEMENT RESTORATION
FOR SERVICE CONNECTIONS AND UTILITY CROSSINGS**



FOR PAVEMENT WITH AGGREGATE BASE AND BITUMINOUS SURFACE



FOR CONCRETE PAVEMENT



**FOR CONCRETE PAVEMENT WITH
BITUMINOUS OVERLAY**

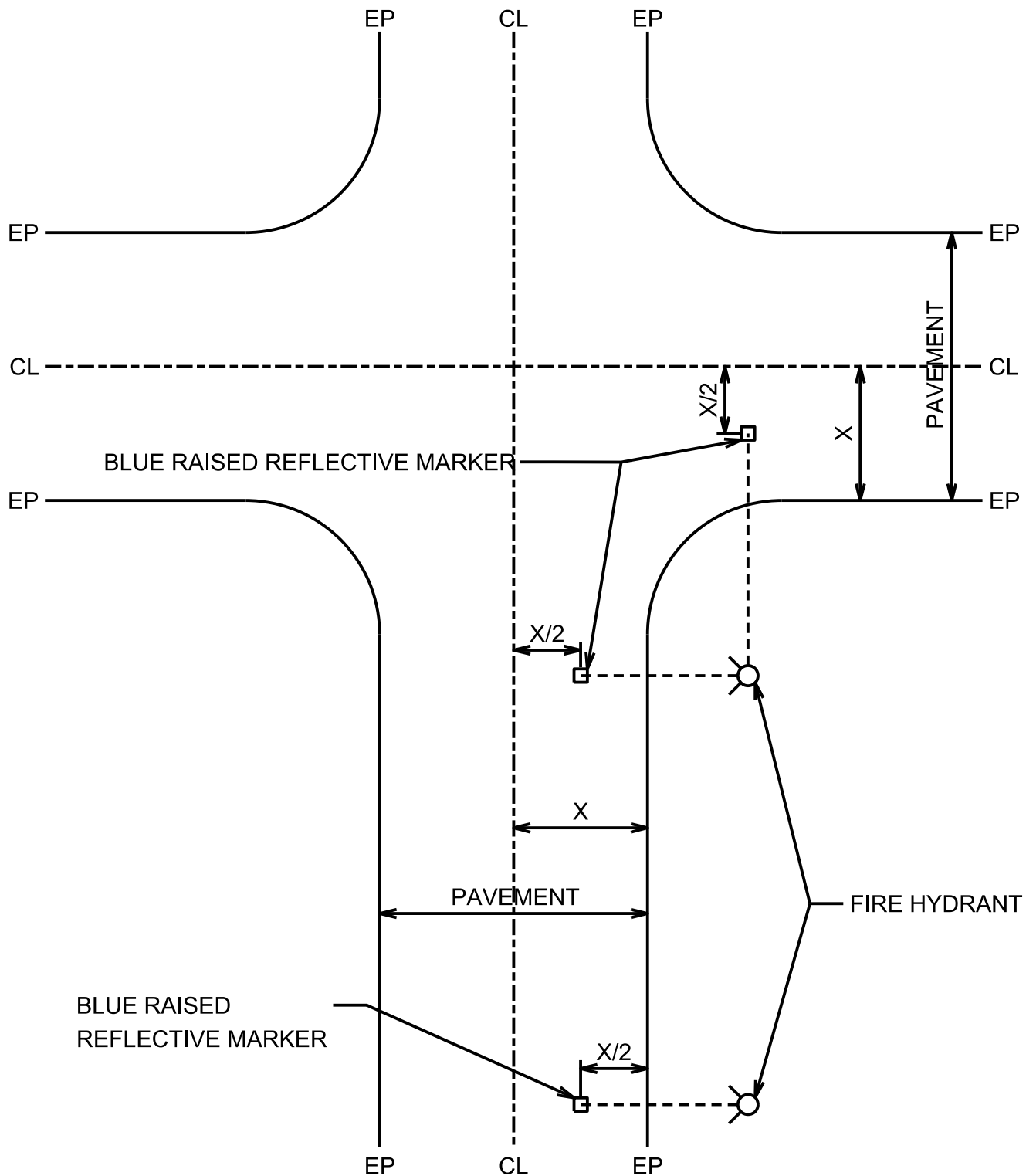
CONTRACTOR MUST CALL FOR AN INSPECTION
PRIOR TO PLACING THE FLOWABLE FILL AND
PRIOR TO PLACING THE ASPHALT/CONCRETE

LAKE FOREST STANDARD 2.15

APPROVED BY : KMM

DATE : 2/18/2009

G:\Engineer\Standard Details\Pavement Restoration Flowable Fill 2-15



RAISED REFLECTIVE PAVEMENT MARKERS

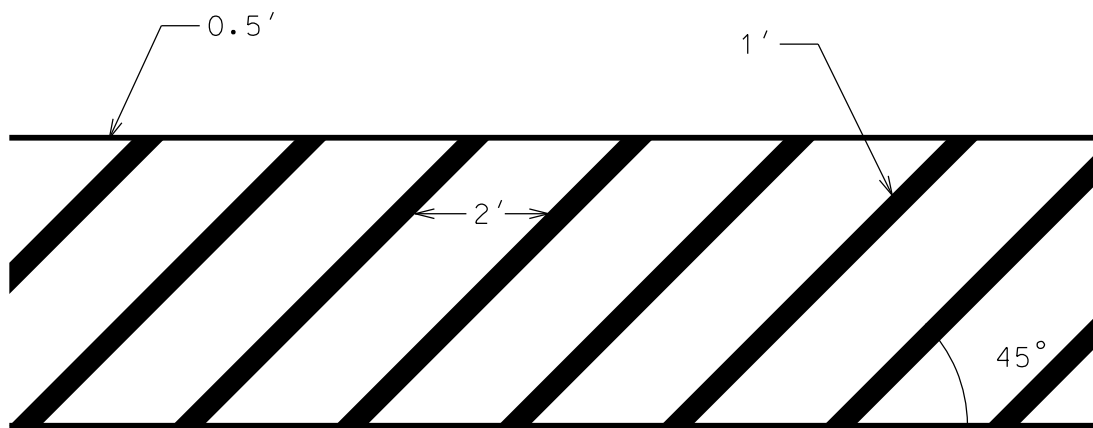
NTS

LAKE FOREST STANDARD 2.16

APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\ Reflective Pavement Markers 2-16



TYPICAL CROSSWALK

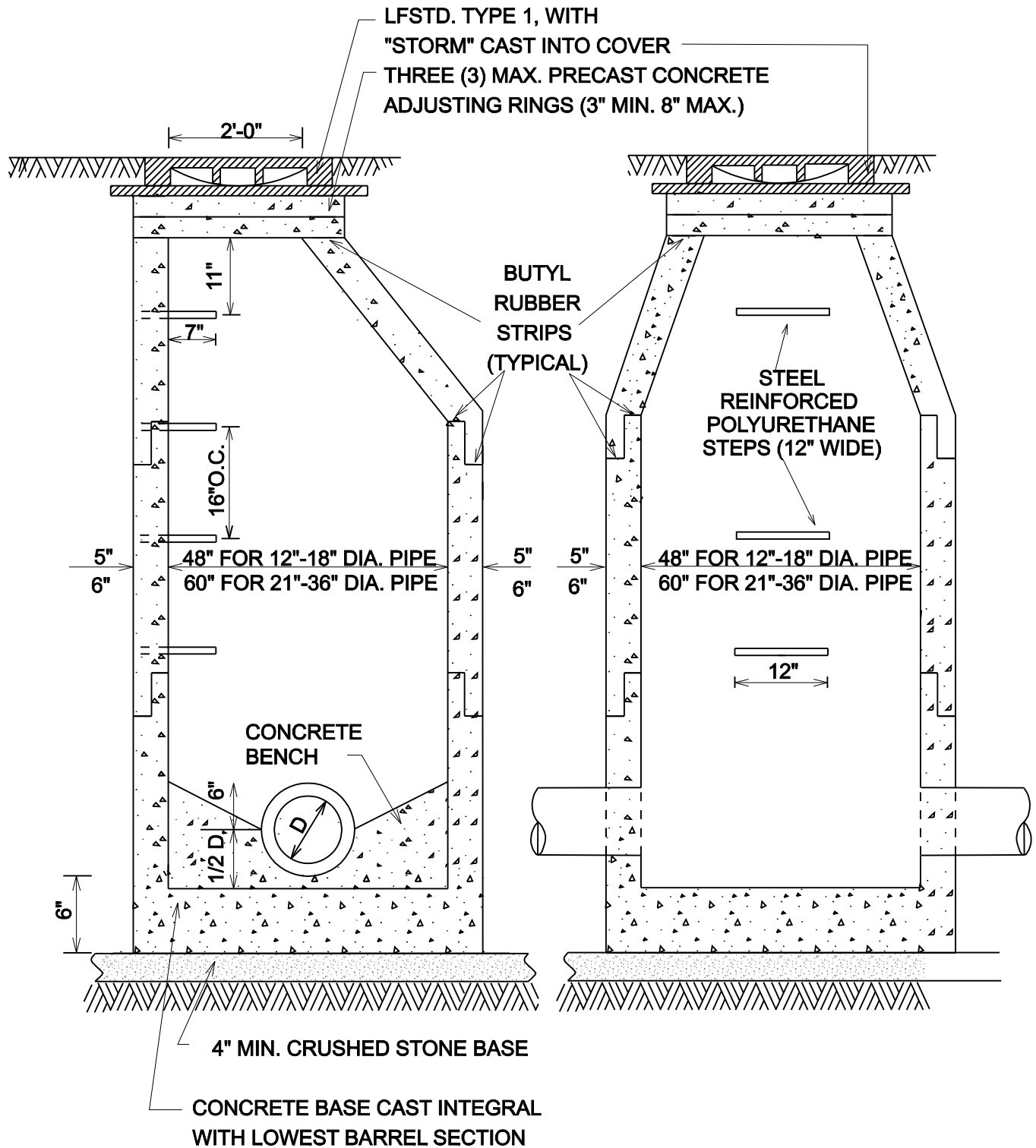
NTS

LAKE FOREST STANDARD

APPROVED BY : KMM

DATE : 11/18/2010

G:\Engineer\Standard Details\ Crosswalk



TYPE A STORM MANHOLE DETAIL

NOT TO SCALE

NOTES:

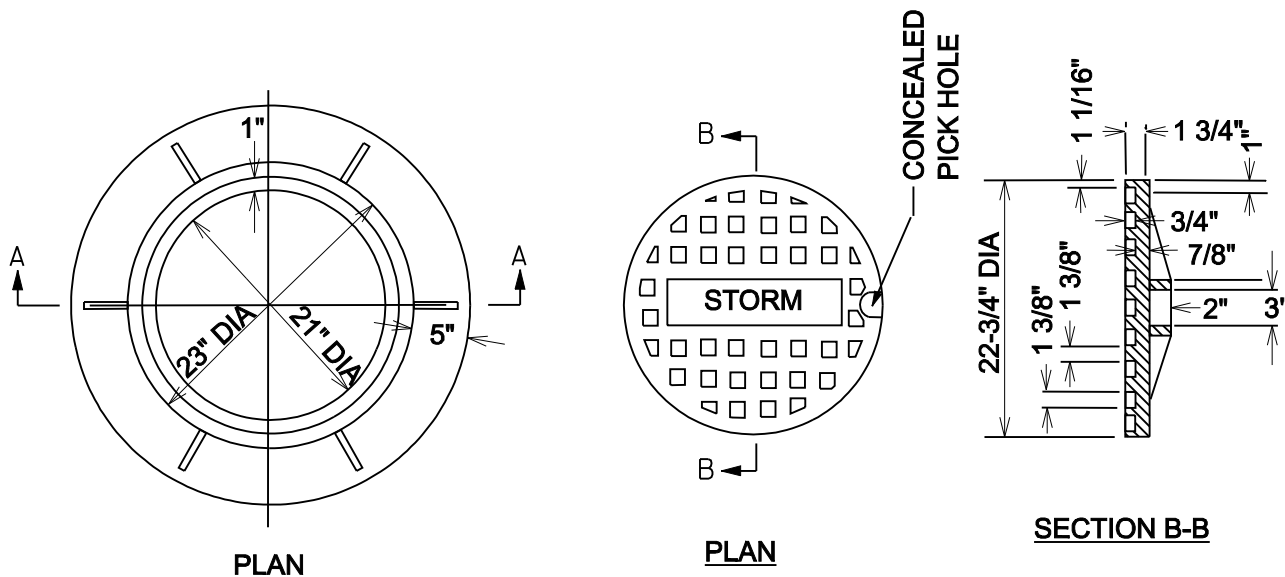
1. MANHOLES MUST CONFORM TO ASTM C-478.
2. MANHOLE SECTIONS TO BE TONGUE AND GROOVED.
3. BENCHES MUST BE PROVIDED IN ALL STORM SEWER MANHOLES.
4. ALL PIPE PENETRATIONS TO BE CORED, AND MORTARED INSIDE AND OUTSIDE OF STRUCTURE WITH HYDRAULIC CEMENT.

LAKE FOREST STANDARD 3.01

APPROVED BY : KMM

DATE : 1/1/2006

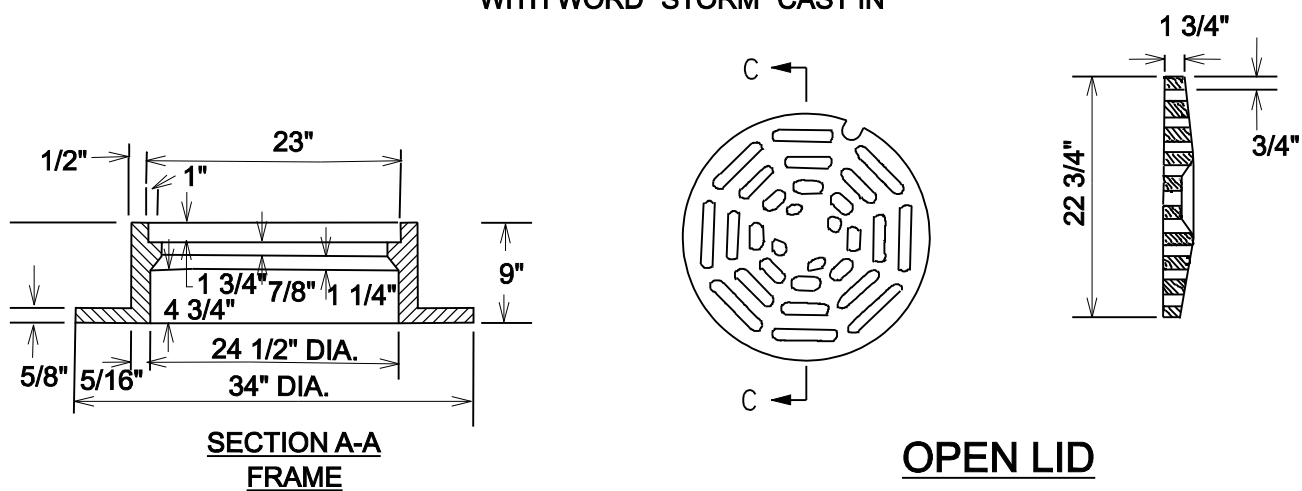
G:\Engineer\Standard Details\Storm Manhole Type A 3-01



SELF SEALING CLOSED LID

DESIGNATION 1-C

NEENAH NO.R-1713-B OR APPROVED EQUAL
WITH WORD "STORM" CAST IN



DESIGNATION 1-P

NEENAH NO. R-2504-D OR APPROVED EQUAL
(TO BE USED ONLY WHEN SPECIFIED)

TYPE 1 LID AND FRAME FOR STORM MANHOLE

LAKE FOREST STANDARD 3.02

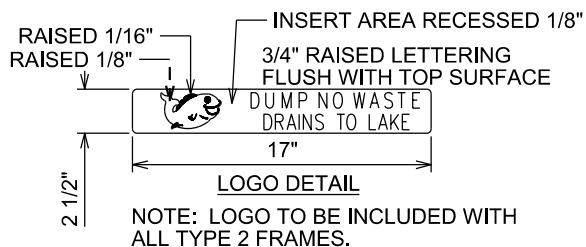
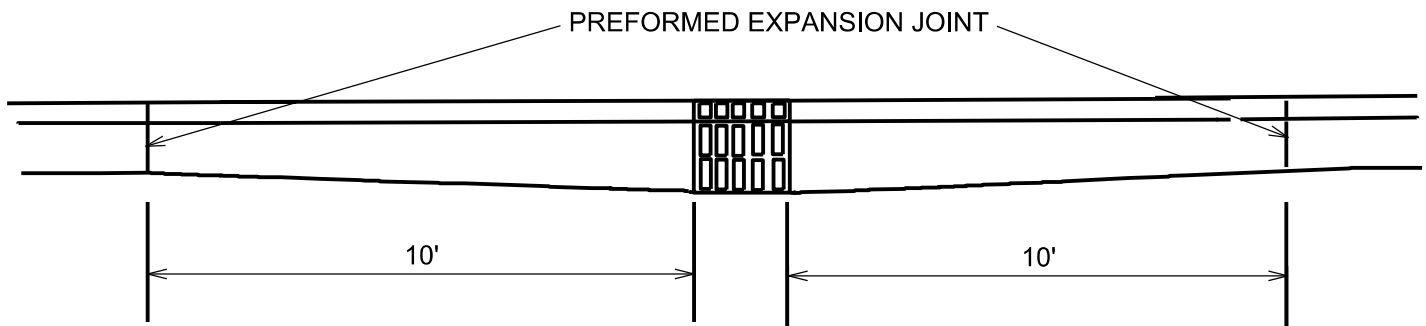
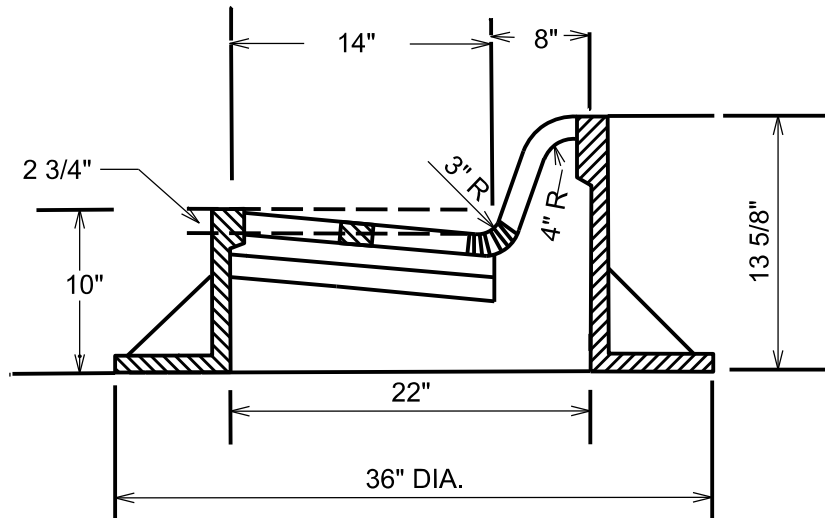
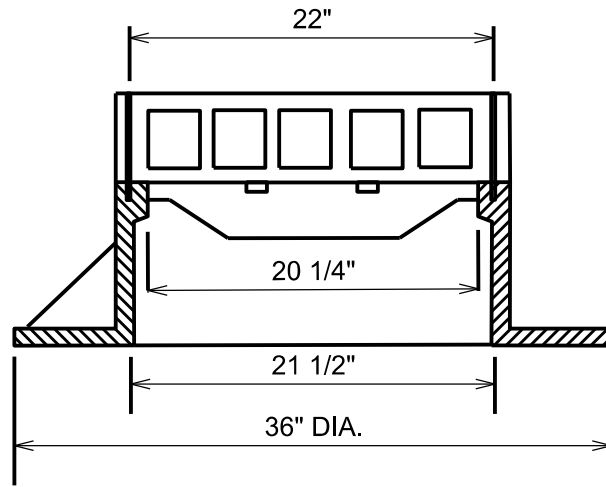
APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Storm TY 1 Frame & Grate 3-02

TYPE 2 FRAME AND GRATE FOR L.F. STD. CURB AND GUTTER

NEENAH R-3502-B OR APPROVED EQUAL

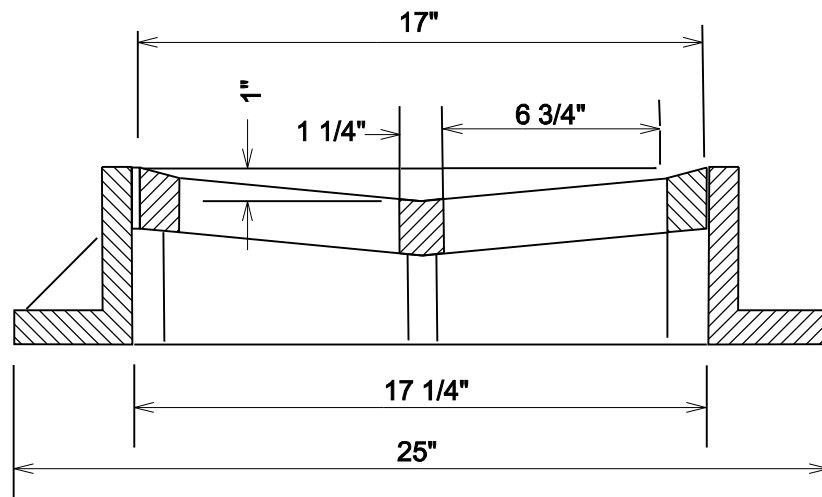
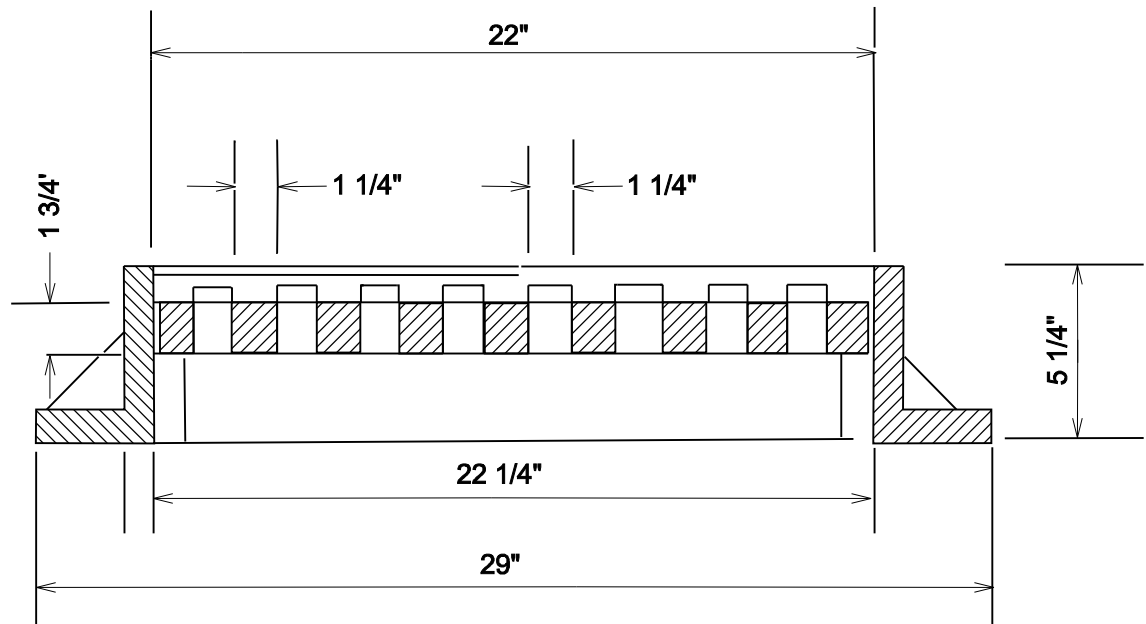


LAKE FOREST STANDARD 3.03

APPROVED BY : KMM

DATE : 2/7/2007

G:\Engineer\Standard Details\Curb Frame 3-03



NEENAH R-3205 OR APPROVED EQUAL

TYPE 3
FRAME AND GRATE
FOR DEPRESSED CURB

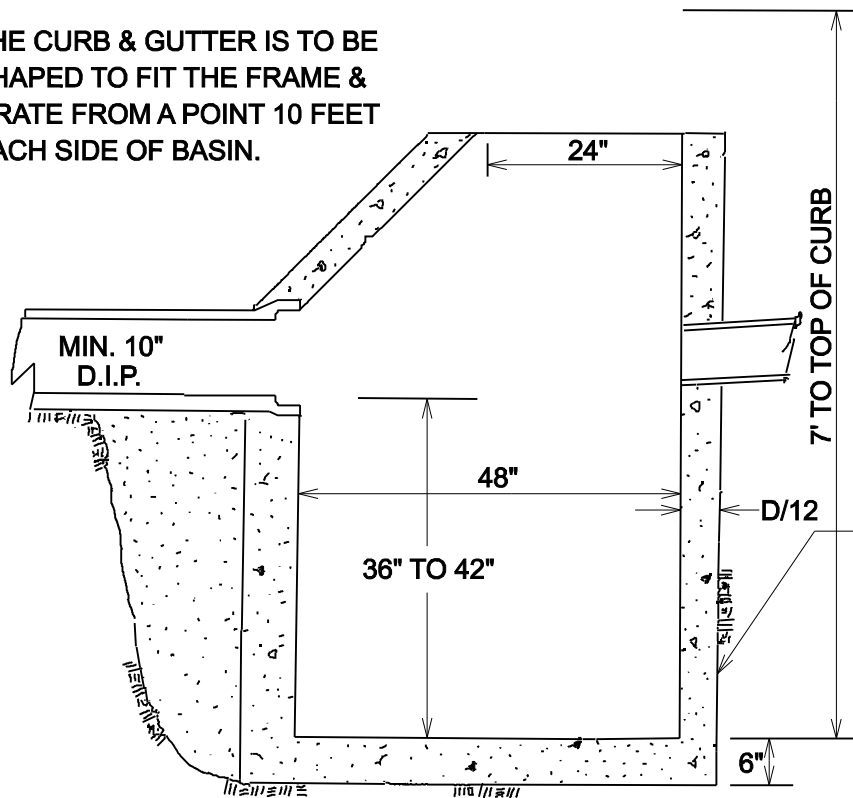
LAKE FOREST STANDARD 3.04

APPROVED BY : KMM

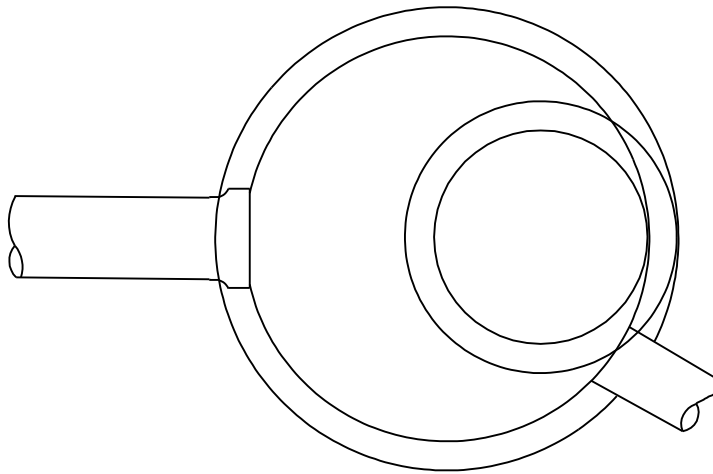
DATE : 1/1/2006

G:\Engineer\Standard Details\Depressed Curb Frame 3-04

THE CURB & GUTTER IS TO BE SHAPED TO FIT THE FRAME & GRATE FROM A POINT 10 FEET EACH SIDE OF BASIN.



ALL CATCH BASIN PARTS TO BE PRECAST CONCRETE CONFORMING TO ASTM C-478 WITH BITUMINOUS JOINTS, THE REINFORCED CONC. BASE SHALL BE INTEGRAL WITH THE WALLS

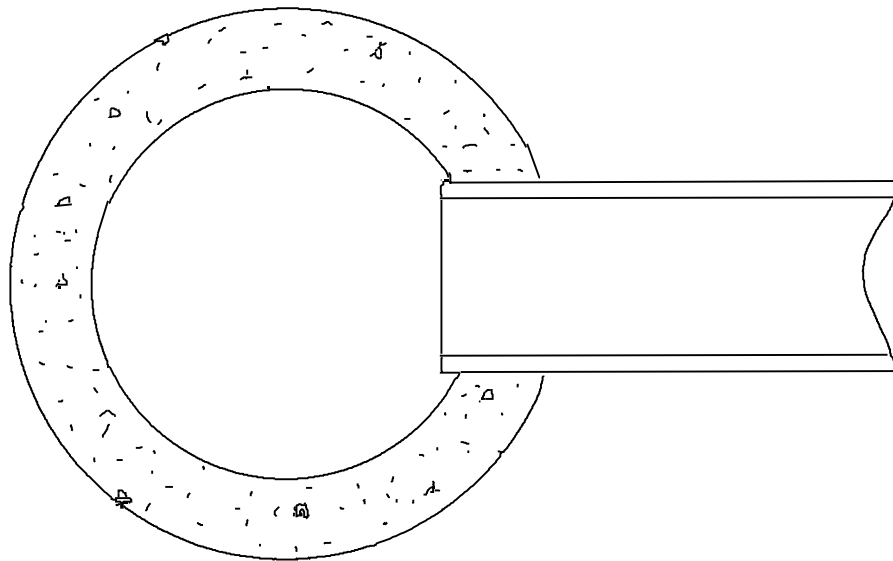
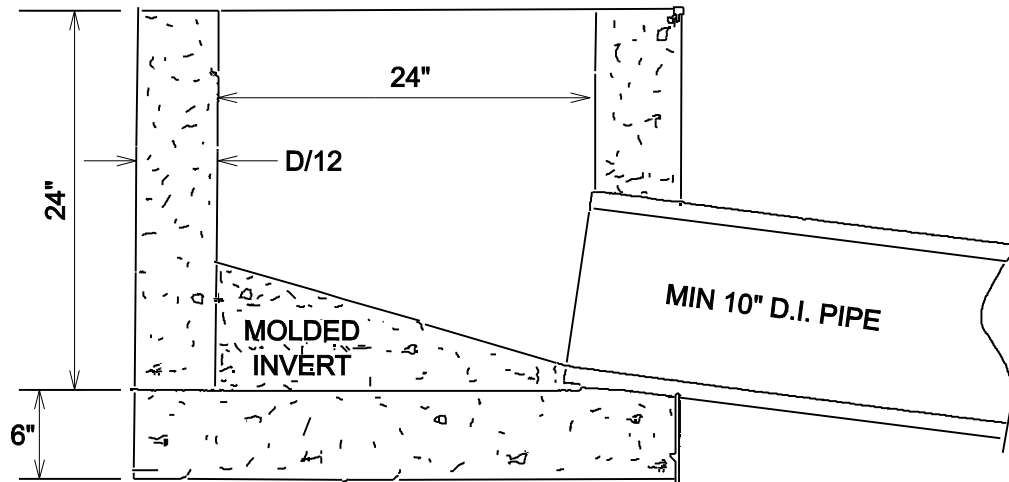


CATCH BASIN TYPE A

LAKE FOREST STANDARD 3.06
APPROVED BY : KMM
DATE : 1/1/2006

G:\Engineer\Standard Details\Catch Basin 3-06

**RISER TO BE PRECAST
CONCRETE CONFORMING
TO ASTM C-478**



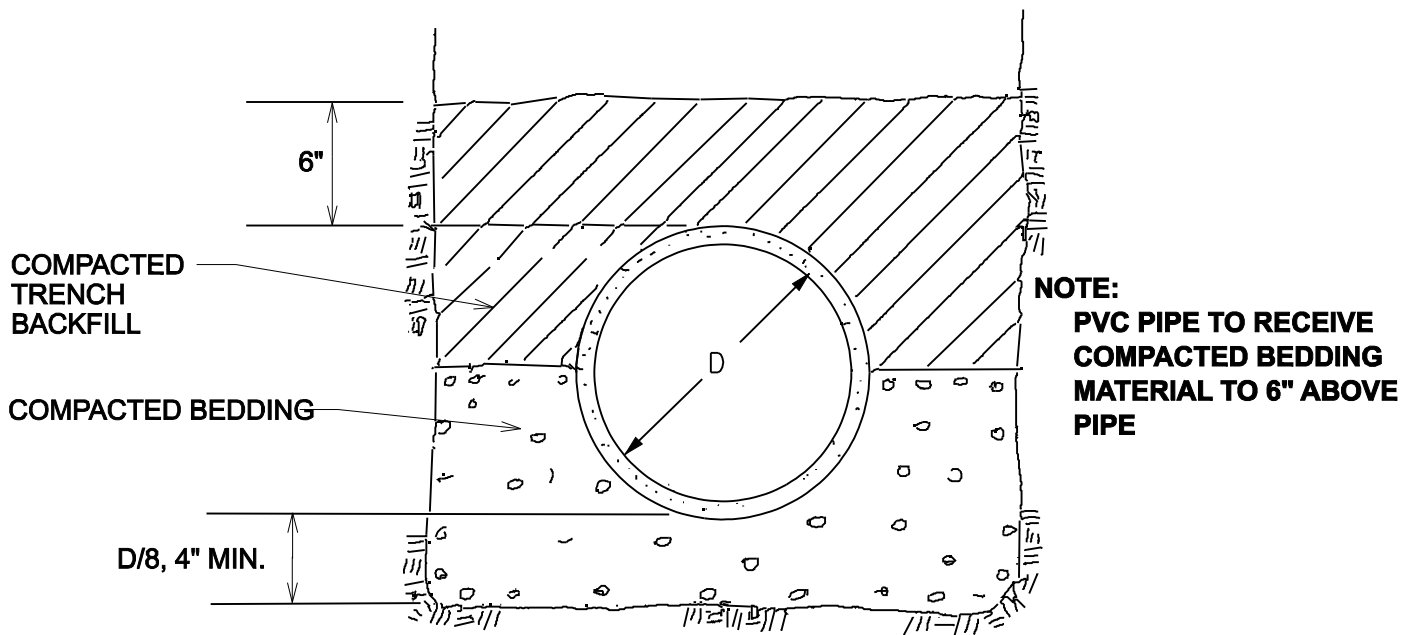
INLET TYPE A

LAKE FOREST STANDARD 3.07

APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Inlet Type A 3-07



COMPACTED BEDDING SHALL BE CRUSHED GRANULAR
MATERIAL MEETING GRADATION CA-6

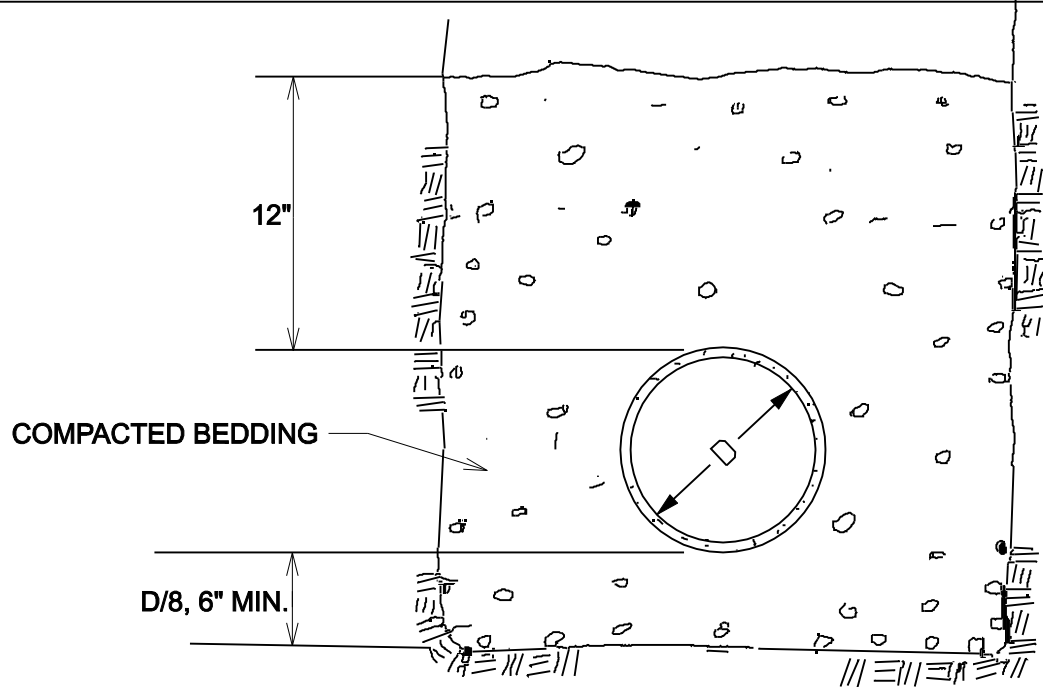
1. BEDDING AND GRANULAR TRENCH BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95% STANDARD DENSITY IN ACCORDANCE WITH A.S.T.M. D698
2. EXCAVATED TRENCH BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 90% STANDARD DENSITY IN ACCORDANCE WITH A.S.T.M. D698
3. GRANULAR TRENCH BACKFILL SHALL BE INSTALLED UNDER AND WITHIN THREE (3) FEET OF PROPOSED PAVEMENTS AS SHOWN ON TYPICAL CROSS SECTION. GRANULAR TRENCH BACKFILL SHALL CONFORM TO FA-6 OR CA-6 COMPACTED TO 95% STANDARD DENSITY IN ACCORDANCE WITH ASTM D698. BACKFILL UNDER EXISTING PAVEMENTS, WHERE AN OPEN CUT OF THE PAVEMENT HAS BEEN APPROVED, SHALL BE FLOWABLE FILL WHICH MEETS THE IDOT STANDARDS OF CONTROLLED LOW STRENGTH MATERIAL (CLSM) MIXTURE 1. INSTALL 12" OF COMPACTED GRANULAR TRENCH BACKFILL OVER SEWER BEFORE PLACING THE FLOWABLE FILL

STORM SEWER

BEDDING DETAIL

LAKE FOREST STANDARD 3.09
APPROVED BY : KMM
DATE : 1/1/2006

G:\Engineer\Standard Details\Bedding Storm Sewer 3-09



COMPACTED BEDDING SHALL BE CRUSHED GRANULAR MATERIAL MEETING GRADATION CA-6

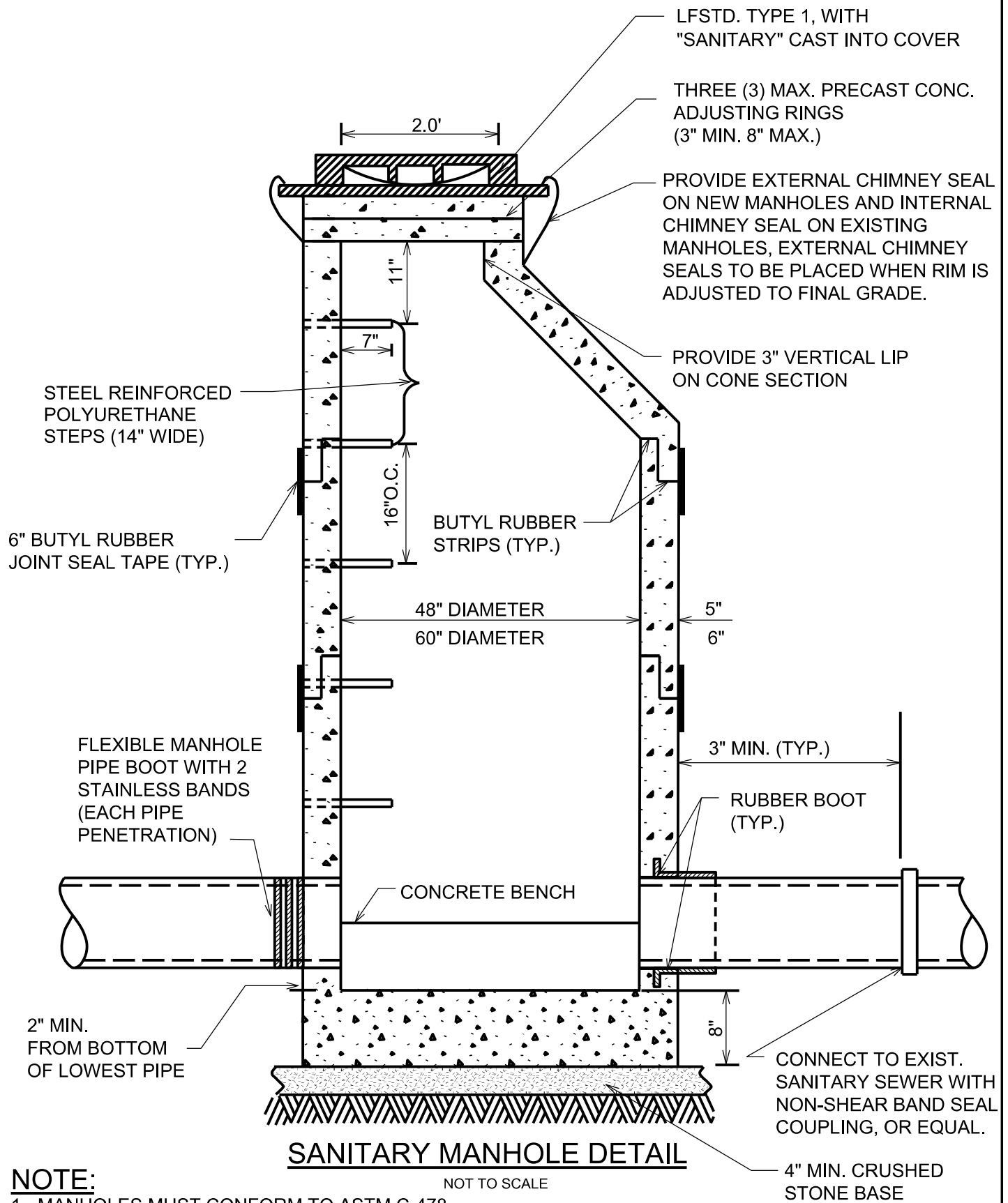
- 1. BEDDING AND GRANULAR TRENCH BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95% STANDARD DENSITY IN ACCORDANCE WITH A.S.T.M. D698**
- 2. EXCAVATED TRENCH BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 90% STANDARD DENSITY IN ACCORDANCE WITH A.S.T.M. D698**
- 3. GRANULAR TRENCH BACKFILL SHALL BE INSTALLED UNDER AND WITHIN THREE (3) FEET OF PROPOSED PAVEMENTS AS SHOWN ON TYPICAL CROSS SECTION. GRANULAR TRENCH BACKFILL SHALL CONFORM TO FA-6 OR CA-6 COMPACTED TO 95% STANDARD DENSITY IN ACCORDANCE WITH ASTM D698. BACKFILL UNDER EXISTING PAVEMENTS, WHERE AN OPEN CUT OF THE PAVEMENT HAS BEEN APPROVED, SHALL BE FLOWABLE FILL WHICH MEETS THE IDOT STANDARDS OF CONTROLLED LOW STRENGTH MATERIAL (CLSM) MIXTURE 1. INSTALL 12" OF COMPACTED GRANULAR TRENCH BACKFILL OVER SEWER BEFORE PLACING THE FLOWABLE FILL**

SANITARY SEWER

BEDDING DETAIL

LAKE FOREST STANDARD 4.01
APPROVED BY : KMM
DATE : 1/1/2006

G:\Engineer\Standard Details\Bedding Sanitary Sewer 4-01



NOTE:

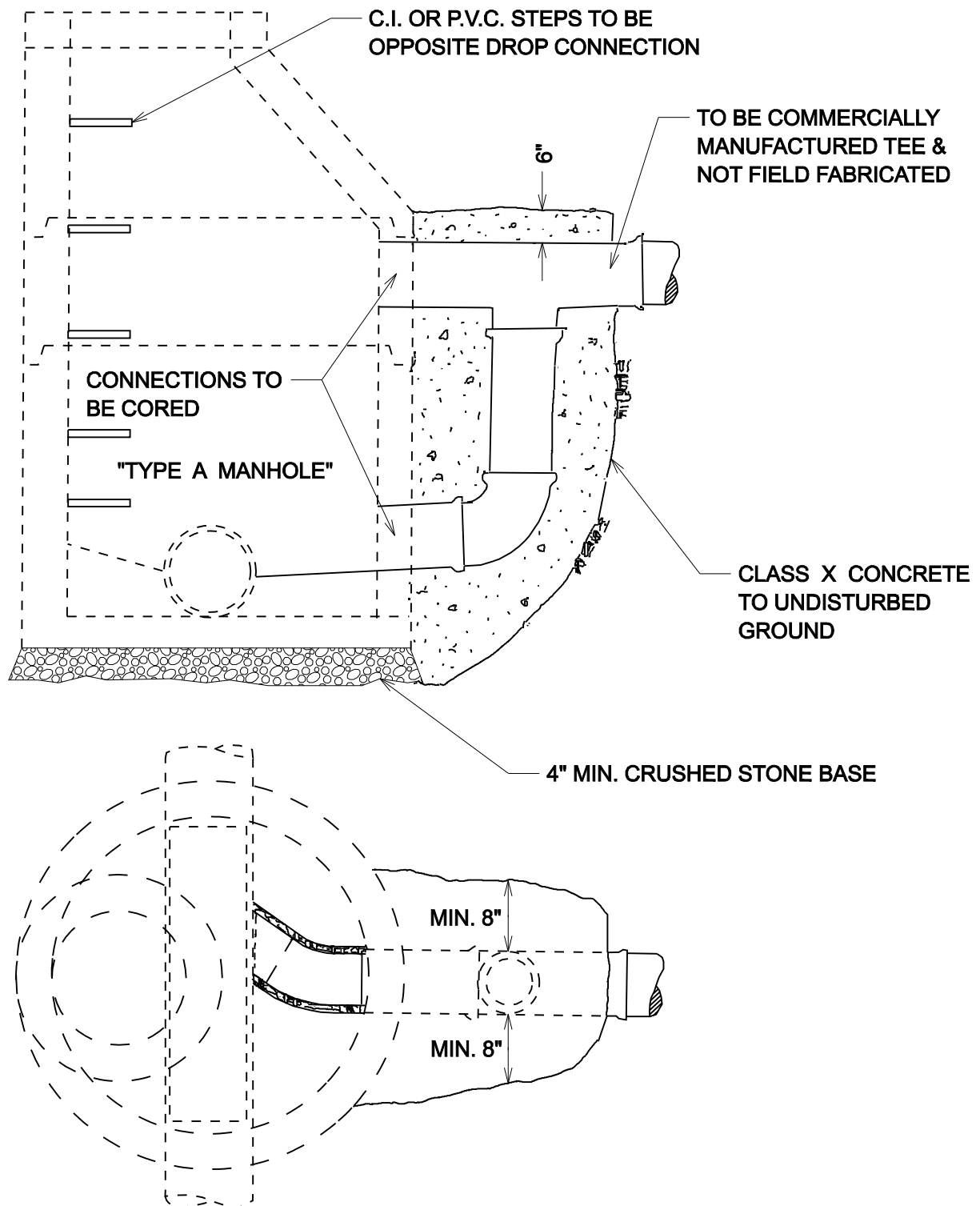
1. MANHOLES MUST CONFORM TO ASTM C-478.
2. MANHOLE SECTIONS TO BE TONGUE AND GROOVED.
3. BENCHES MUST BE PROVIDED IN ALL SANITARY SEWER MANHOLES
4. USE EXTERNAL LIFTING "HOLES" ONLY, BUT NOT FULL PENETRATION..
5. ALL PIPE PENETRATIONS TO BE RUBBER BOOTED AND INTERIOR MORTARED.
7. USE ECCENTRIC CONE ONLY.

LAKE FOREST STANDARD 4.02

APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Sanitary Manhole 4-02



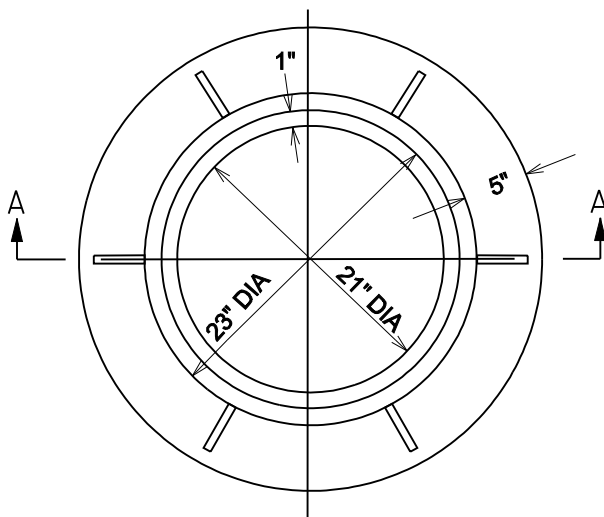
DROP MANHOLE

LAKE FOREST STANDARD 4.03

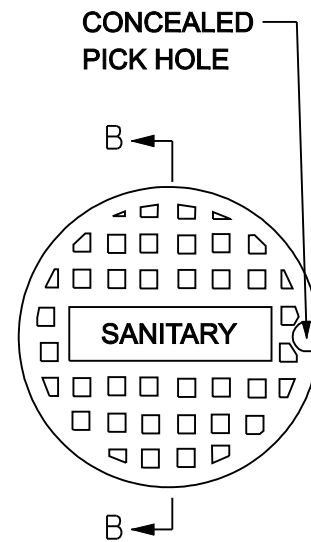
APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Drop Manhole 4-03



PLAN

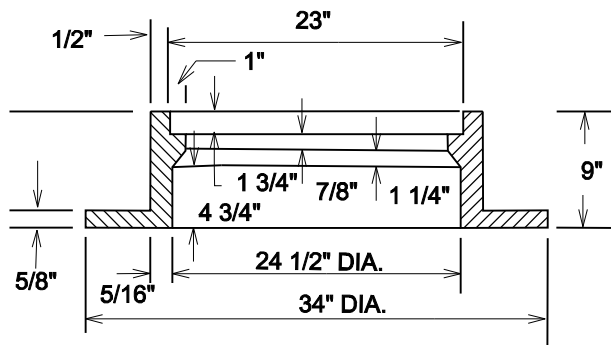


PLAN

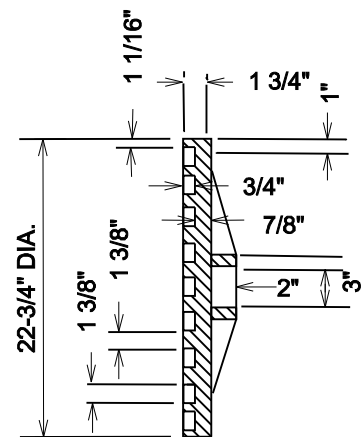
SELF SEALING CLOSED LID

DESIGNATION 1-C

NEENAH NO.R-1713-B OR APPROVED EQUAL
WITH WORD "SANITARY" CAST IN



**SECTION A-A
FRAME**



SECTION B-B

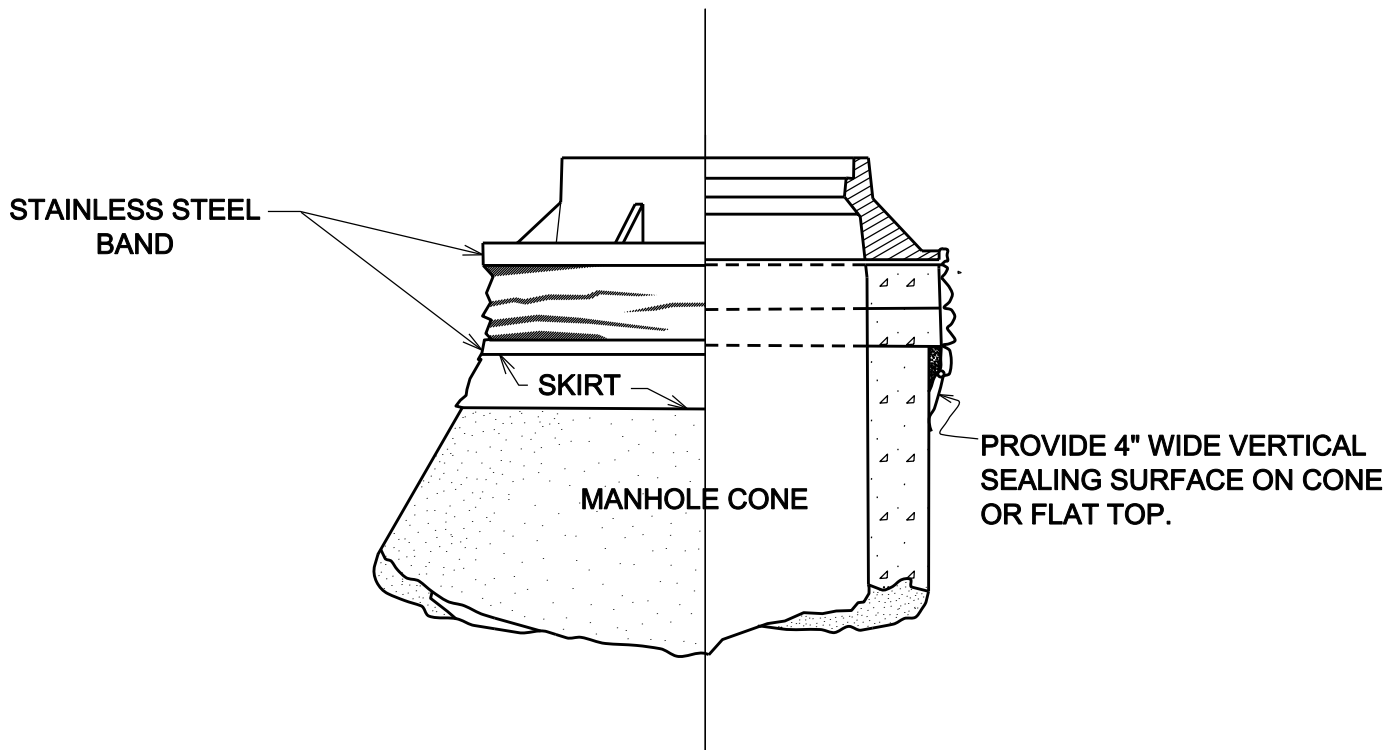
TYPE 1 LID AND FRAME FOR SANITARY MANHOLE

LAKE FOREST STANDARD 4.06

APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Sanitary Frame & Grate 4-06



**INTERNAL CHIMNEY SEALS
TO SPAN CHIMNEY HEIGHTS OF:**

0 - 4 1/2 "	CHIMNEY SEAL ONLY
4 1/2 " TO 9"	SEAL + 7" EXTENTION
9" TO 12"	SEAL + 10" EXTENTION
OVER 12"	SEAL + MULTI. EXTENTIONS

**EXTERNAL CHIMNEY SEALS
TO SPAN CHIMNEY HEIGHTS OF:**

0 - 3"	NARROW (6") SEAL ONLY
3 TO 6 1/2 "	STANDARD (9") SEAL ONLY
6 1/2 " TO 12"	STD. SEAL + EXTENTION
OVER 12"	SEAL + MULTI. EXTENTIONS

NOTE:

1. PROVIDE EXTERNAL SEALS ON NEW MANHOLES, INTERNAL SEALS ON EXISTING MANHOLES.
2. "CRETEX" EXTERNAL/INTERNAL SEALS ARE REQUIRED. OTHER PRODUCTS OR OTHER DESIGN SOLUTIONS SHALL REQUIRE THE APPROVAL OF THE ENGINEERING DEPARTMENT.
3. IF INTERNAL SEALS ARE USED, THE STRUCTURE, INCLUDING ADJUSTMENT RINGS, MUST BE INSPECTED BEFORE INSTALLATION.
4. CHIMNEY SEALS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

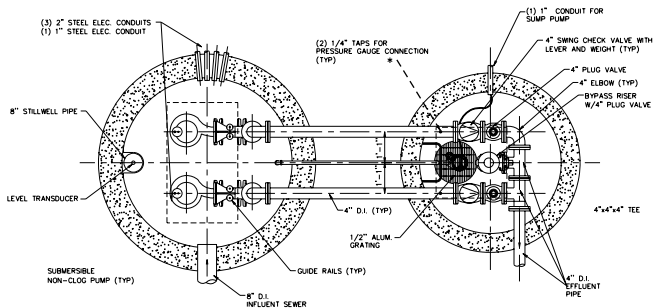
NOT TO SCALE

LAKE FOREST STANDARD 4.07

APPROVED BY : KMM

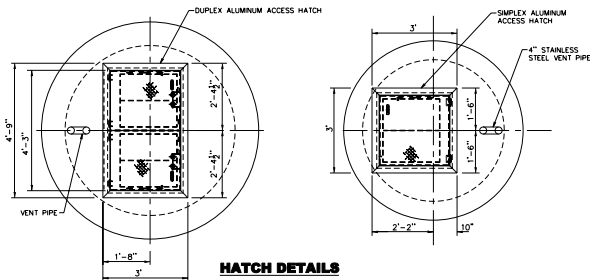
DATE : 1/1/2006

G:\Engineer\Standard Details\Chimney Seal 4-07



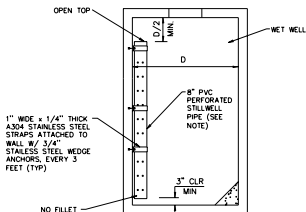
PLAN VIEW

SCALE: 1" = 4'



HATCH DETAILS

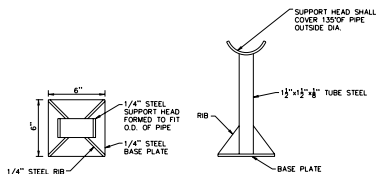
SCALE: 1" = 4'



STILLWELL PIPE DETAIL

SCALE: NTS

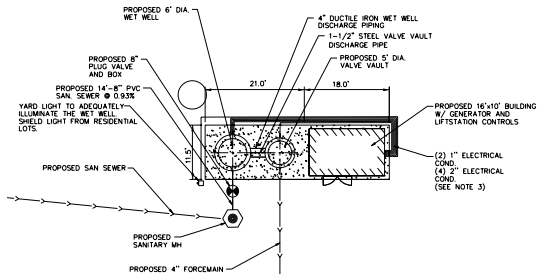
NOTE:
PVC PIPE TO BE PERFORATED W/ 1/2" HOLES EVERY 6" VERTICALLY AND 3" HORIZONTALLY.



PIPE SUPPORT DETAIL

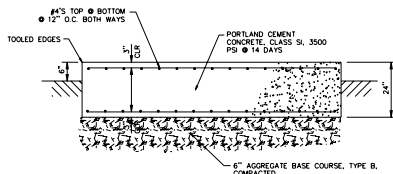
SCALE: NTS

NOTES:
1. PARTS SHALL BE WELDED TOGETHER, CLEANED OF ALL GREASE AND DIRT, AND PAINTED TO PREVENT CORROSION.
2. ALTERNATE PIPE SUPPORTS MAY BE USED AS APPROVED BY ENGINEER.



SITE PLAN DETAIL

SCALE: NTS

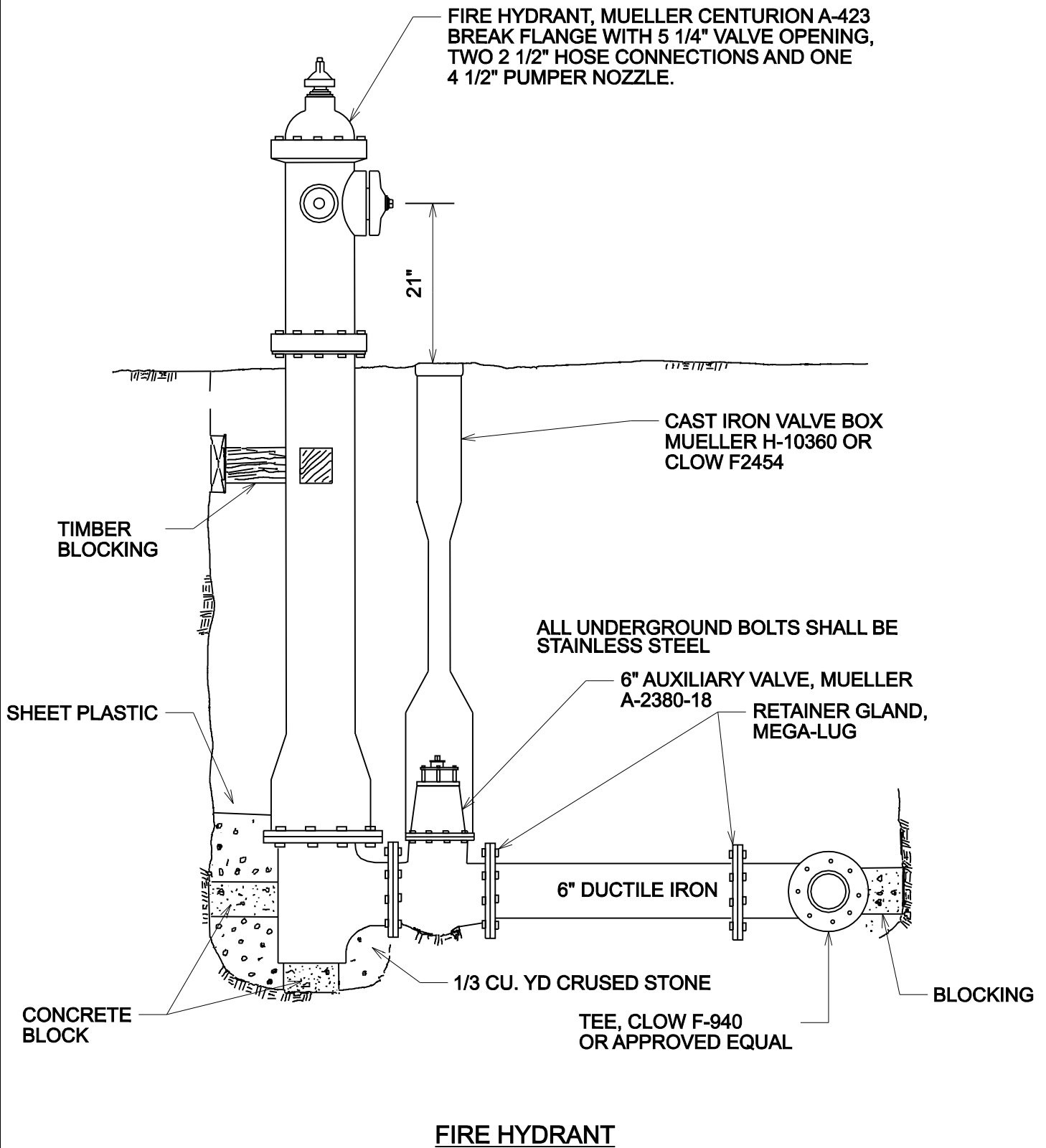


CONCRETE PAD DETAIL

SCALE: NTS

GENERAL NOTES:

1. LIFT STATION TO BE INSTALLED BY AN EXPERIENCED AND QUALIFIED CONTRACTOR.
2. ALL CONCRETE WORK IS THE RESPONSIBILITY OF THE CONTRACTOR.
3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PIPING LAYOUT, AND ORIENTATION OF INLET(S), DISCHARGE AND CONDUIT(S).
4. CONTROL AND POWER CORDS MUST BE OF SUFFICIENT LENGTH TO REACH CONTROL PANEL FROM POINT OF INSTALLATION ON PUMPS WITHOUT SPLICING.
5. ELECTRICAL LINES SHOWN ON PLANS ARE SCHEMATIC. CONTRACTOR SHALL COORDINATE WITH MANUFACTURERS AND UTILITY COMPANIES FOR PROPER INSTALLATION.
6. SEAL ALL CONDUIT TO PREVENT WET WELL GASES FROM ENTERING THE CONTROL BUILDING.
7. ALL PIPING ENTERING OR EXITING THE VAULTS SHALL BE DUCTILE IRON AND SHALL EXTEND 10 FEET IN LENGTH AS MEASURED FROM THE EXTERIOR OF EACH VAULT UNLESS OTHERWISE INDICATED ON PLANS.
8. CONTRACTOR SHALL COORDINATE WITH MANUFACTURER AND UTILITY COMPANY TO PROVIDE ADEQUATE SERVICE FOR THE COMPLETE INSTALLATION OF ALL DEVICES AND STRUCTURES WITHIN THE PROJECT LIMITS.
9. ALL PRECAST OPENINGS SHALL INCLUDE A RUBBER GASKET OR "A-LOCK" GASKET INSERT CONNECTION.
10. ALL BURIED DUCTILE IRON PIPE WITHIN THE LIMITS OF THE LIFT STATION AND WITHOUT SHALL BE WRAPPED IN POLYETHYLENE IN CONFORMANCE WITH AWWA STANDARD C105.
11. CONTINUOUS MASTIC COMPOUND SHALL BE PLACED BETWEEN PRECAST CONCRETE MANHOLE SECTIONS.
12. TRANSDUCER WIRE LENGTH SHALL BE SIZED SUCH THAT TRANSDUCER LOCATION IN PIPE IS SUSPENDED AT PROPER ELEVATION.
13. CONTRACTOR SHALL VERIFY YARD LIGHT LOCATION AND TYPE WITH THE CITY.
14. CONTRACTOR SHALL VERIFY BUILDING MATERIALS AND COLOR WITH CITY PRIOR TO ORDERING AND INSTALLATION.

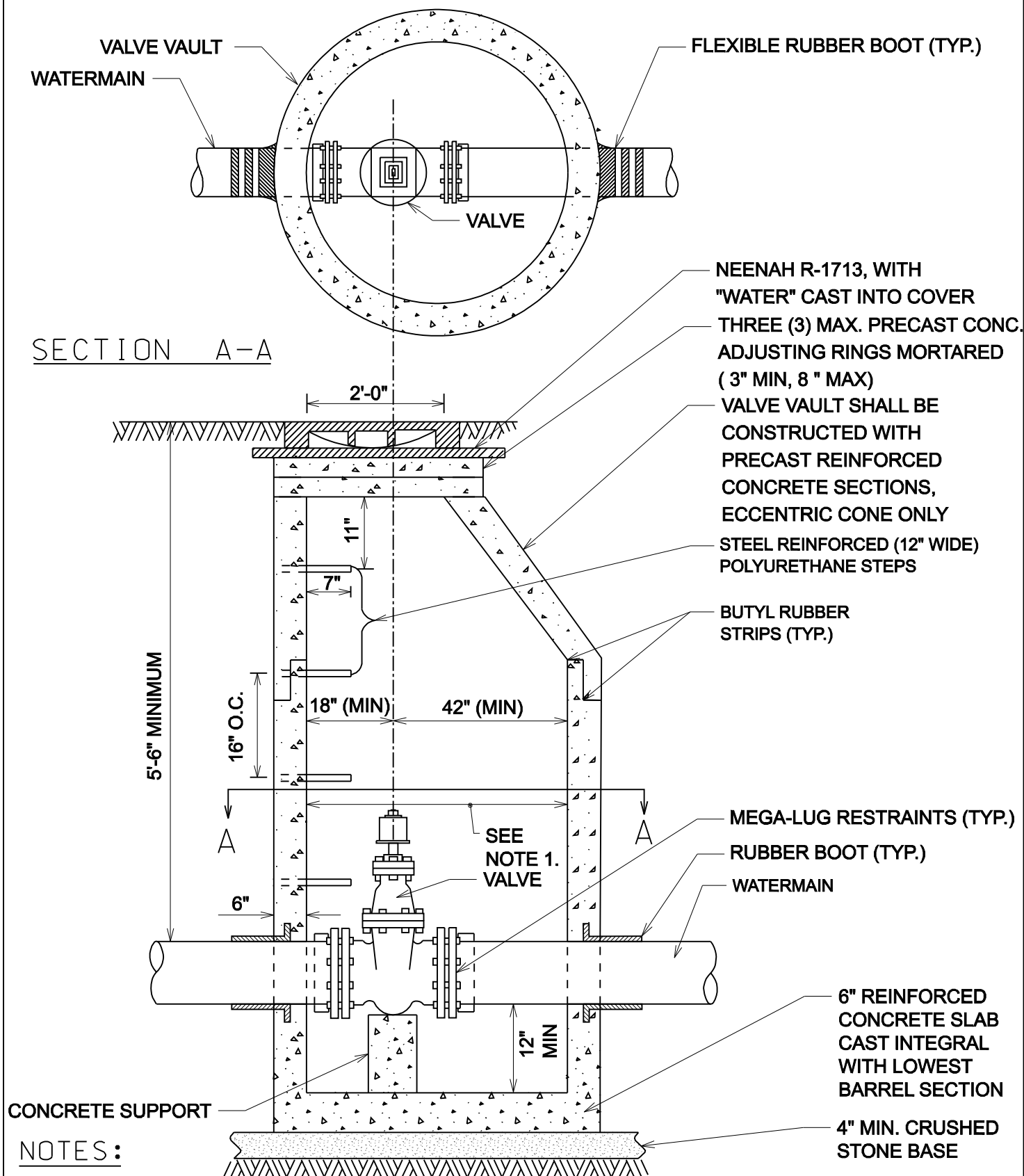


LAKE FOREST STANDARD 5.01

APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Fire Hydrant 5-01



NOTES :

1. 60" (MIN) INSIDE DIA. FOR ALL VALVE VAULTS FOR MAINS < 12"
- 72" (MIN) INSIDE DIA. FOR ALL VALVE VAULTS FOR MAINS > 12"
2. VALVE VAULT MUST CONFORM TO ASTM C-478.
3. VAULT SECTIONS SHALL BE TONGUE AND GROOVED.
4. ALL PRECAST PIPE OPENINGS SHALL BE CORED AND RUBBER BOOTS INSTALLED.
5. BACKFILL MATERIAL SHALL BE IDOT CA-6 STONE.
6. ALL BOLTS & NUTS SHALL BE COMPOSED OF STAINLESS STEEL.

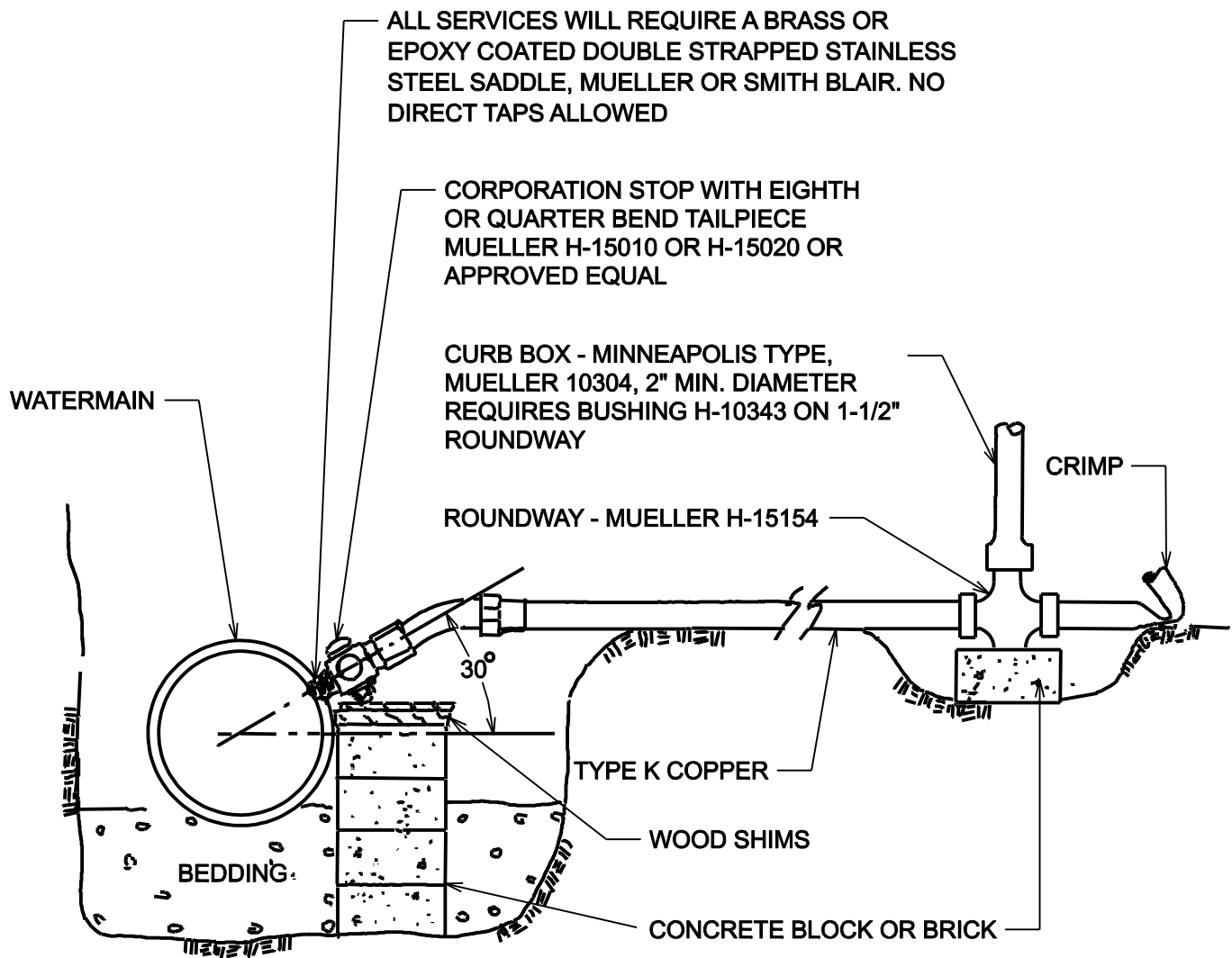
VALVE VAULT DETAIL NTS

LAKE FOREST STANDARD 5.03

APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Valve Vault 5-03



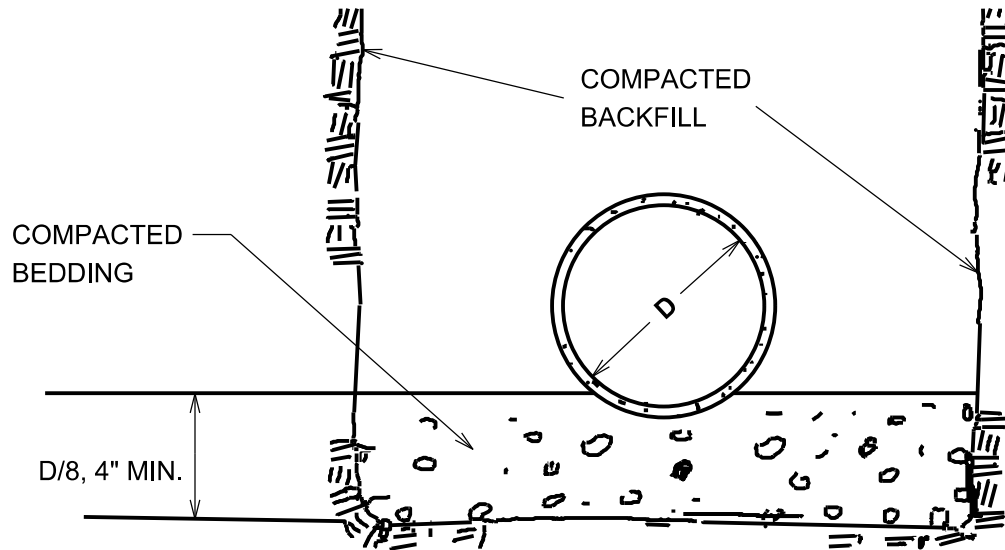
WATER SERVICE DETAIL

LAKE FOREST STANDARD 5.04

APPROVED BY : KMM

DATE : 2/1/2009

G:\Engineer\Standard Details\Water Service 5-04



COMPACTED BEDDING SHALL BE CRUSHED GRANULAR MATERIAL MEETING GRADATION CA-6

- 1. BEDDING AND GRANULAR TRENCH BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95% STANDARD DENSITY IN ACCORDANCE WITH A.S.T.M. D698**
- 2. EXCAVATED TRENCH BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 90% STANDARD DENSITY IN ACCORDANCE WITH A.S.T.M. D698**
- 3. GRANULAR TRENCH BACKFILL SHALL BE INSTALLED UNDER AND WITHIN THREE (3) FEET OF PROPOSED PAVEMENTS AS SHOWN ON TYPICAL CROSS SECTION. GRANULAR TRENCH BACKFILL SHALL CONFORM TO CA-6 COMPACTED TO 95% STANDARD DENSITY IN ACCORDANCE WITH ASTM D698. BACKFILL UNDER EXISTING PAVEMENTS, WHERE AN OPEN CUT OF THE PAVEMENT HAS BEEN APPROVED, SHALL BE FLOWABLE FILL WHICH MEETS THE IDOT STANDARDS OF CONTROLLED LOW STRENGTH MATERIAL (CLSM) MIXTURE 1. INSTALL 12" OF COMPACTED GRANULAR TRENCH BACKFILL OVER WATER MAIN BEFORE PLACING THE FLOWABLE FILL**

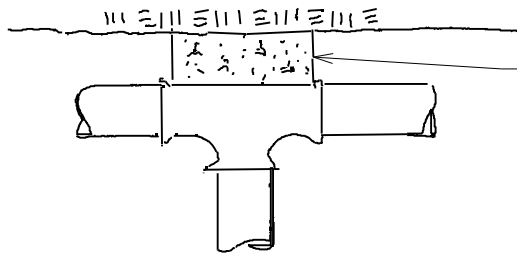
WATER MAIN BEDDING DETAIL

LAKE FOREST STANDARD 5.05

APPROVED BY : KMM

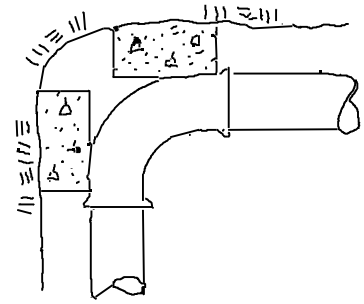
DATE : 1/1/2006

G:\Engineer\Standard Details\Bedding Water Main 5-05

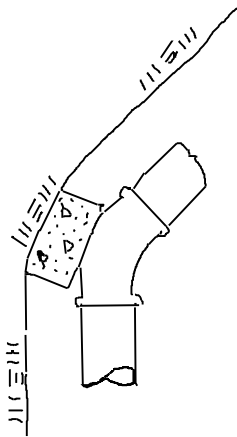


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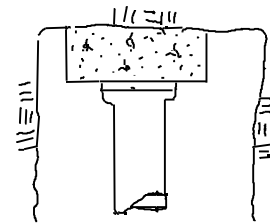
CONCRETE BLOCK OR
CONCRETE BRICK, TYPICAL



1/4 BEND



1/8 BEND



CAP OR PLUG

NOTE:

HARDWOOD WEDGES
MAY BE USED BETWEEN
CONCRETE BLOCKS AND FITTINGS

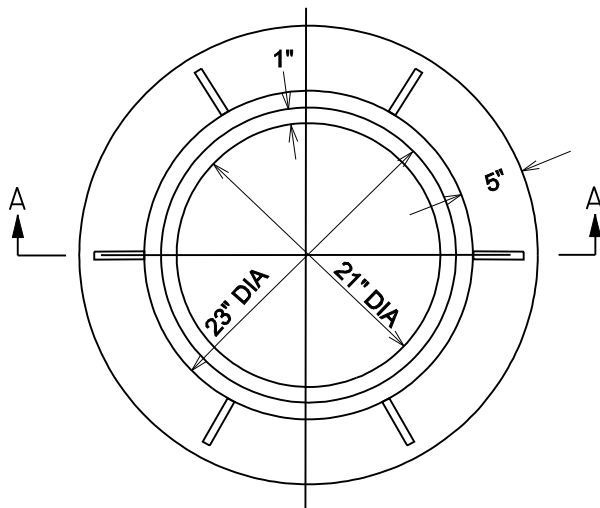
WATER MAIN THRUST BLOCKING **DETAIL**

LAKE FOREST STANDARD 5.08

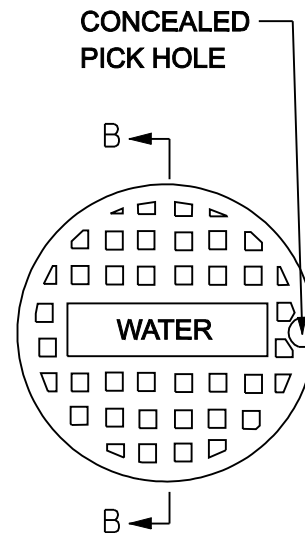
APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Thrust Blocking 5-08



PLAN

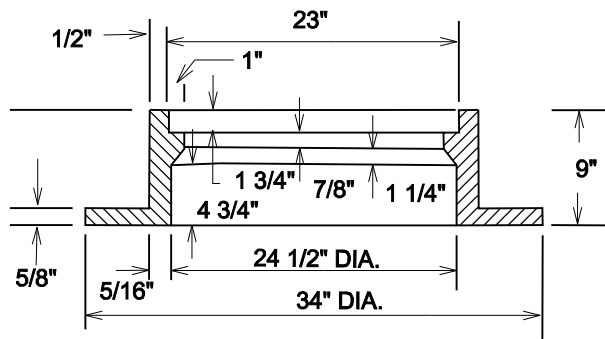


PLAN

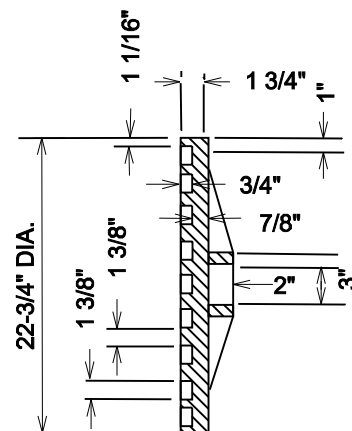
SELF SEALING CLOSED LID

DESIGNATION 1-C

NEENAH NO.R-1713-B OR APPROVED EQUAL
WITH WORD "WATER" CAST IN



SECTION A-A
FRAME



SECTION B-B

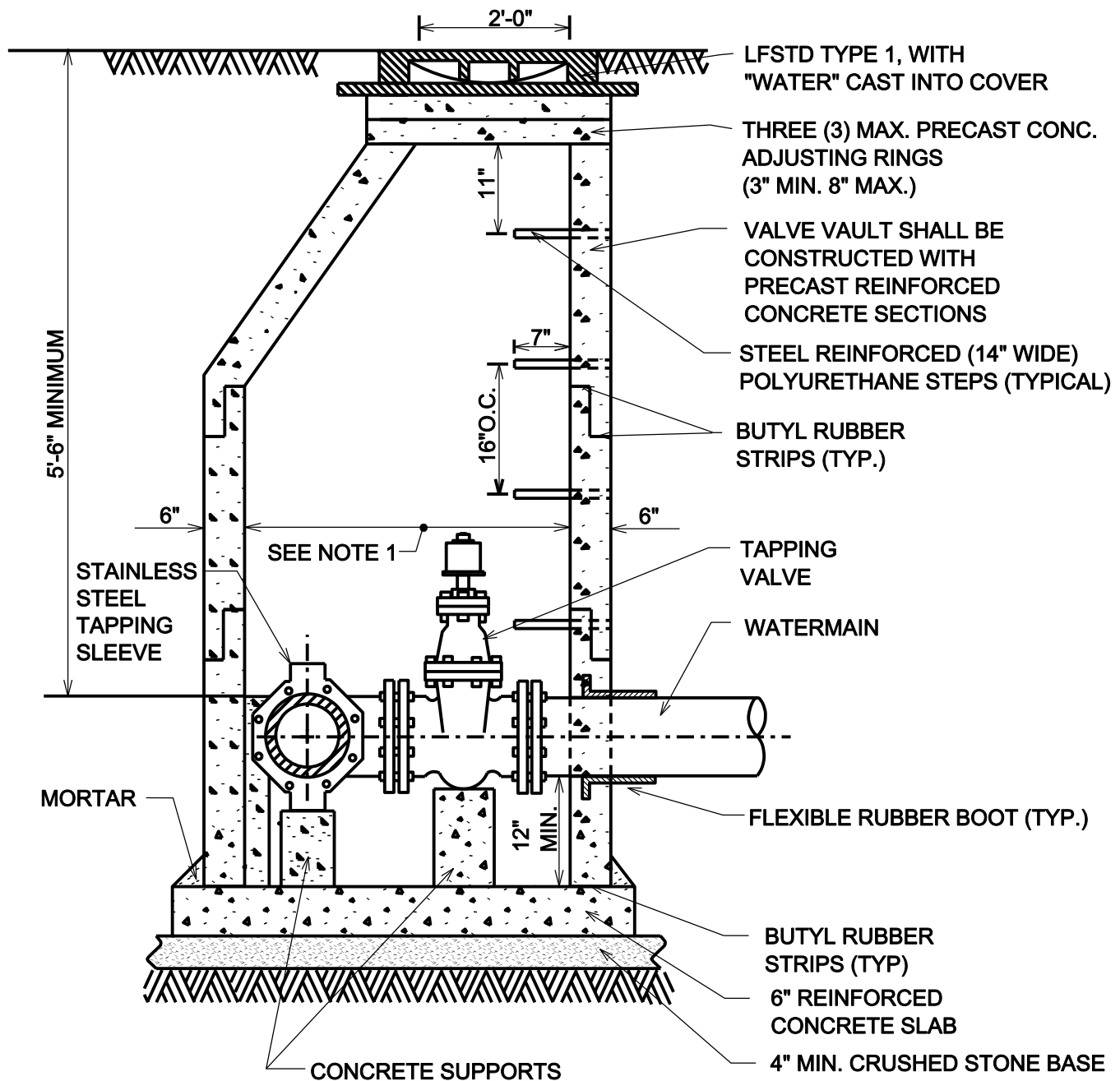
TYPE 1 **LID AND FRAME** **FOR VALVE VAULTS** **IN PAVEMENT**

LAKE FOREST STANDARD 5.09

APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Storm Frame & Grate 5-09



PRESSURE CONNECTION

NOT TO SCALE

NOTES:

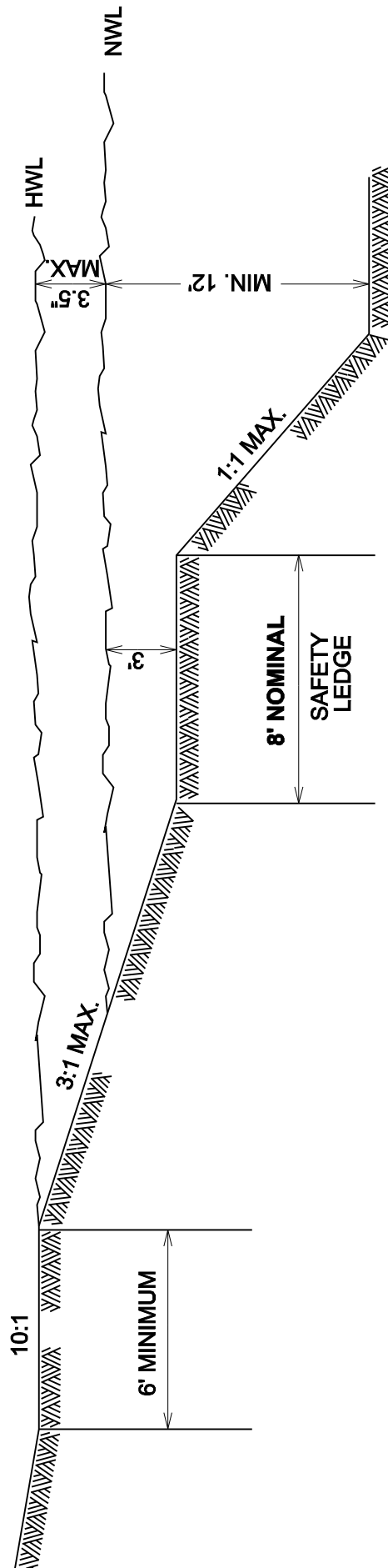
1. 60" (MIN) INSIDE DIA. FOR ALL PRESSURE CONNECTION VAULTS.
2. ALL NON-PRECAST PIPE OPENINGS TO BE CORED AND RUBBER BOOTED.
3. BACKFILL MATERIAL SHALL BE IDOT CA-6 STONE.
4. BOLTS SHALL BE STAINLESS STEEL.
5. USE ECCENTRIC CONE ONLY.
6. VALVE VAULT MUST CONFORM TO ASTM C-478.
7. ALL SECTIONS TO BE TONGUE AND GROOVED.

LAKE FOREST STANDARD 5.10

APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\ENGSTD\Standard Details\... \Pressure Connection 5-10



TYPICAL DETENTION POND DETAIL

NOTES:

1. FOR STORMWATER WETLANDS AND SHORELINE/SLOPE STABILIZATION USE DESIGNED STANDARDS CONTAINED IN THE ILLINOIS URBAN MANUAL, AS AMENDED.
2. A MINIMUM DEPTH OF 12' SHALL BE MAINTAINED OVER 25% OF THE POND AREA AT THE NORMAL WATER LEVEL (NWL). ALL REMAINING AREAS, OUTSIDE OF THE SAFETY LEDGE AREA SHALL BE AT A MINIMUM DEPTH OF 5' FROM THE NWL.

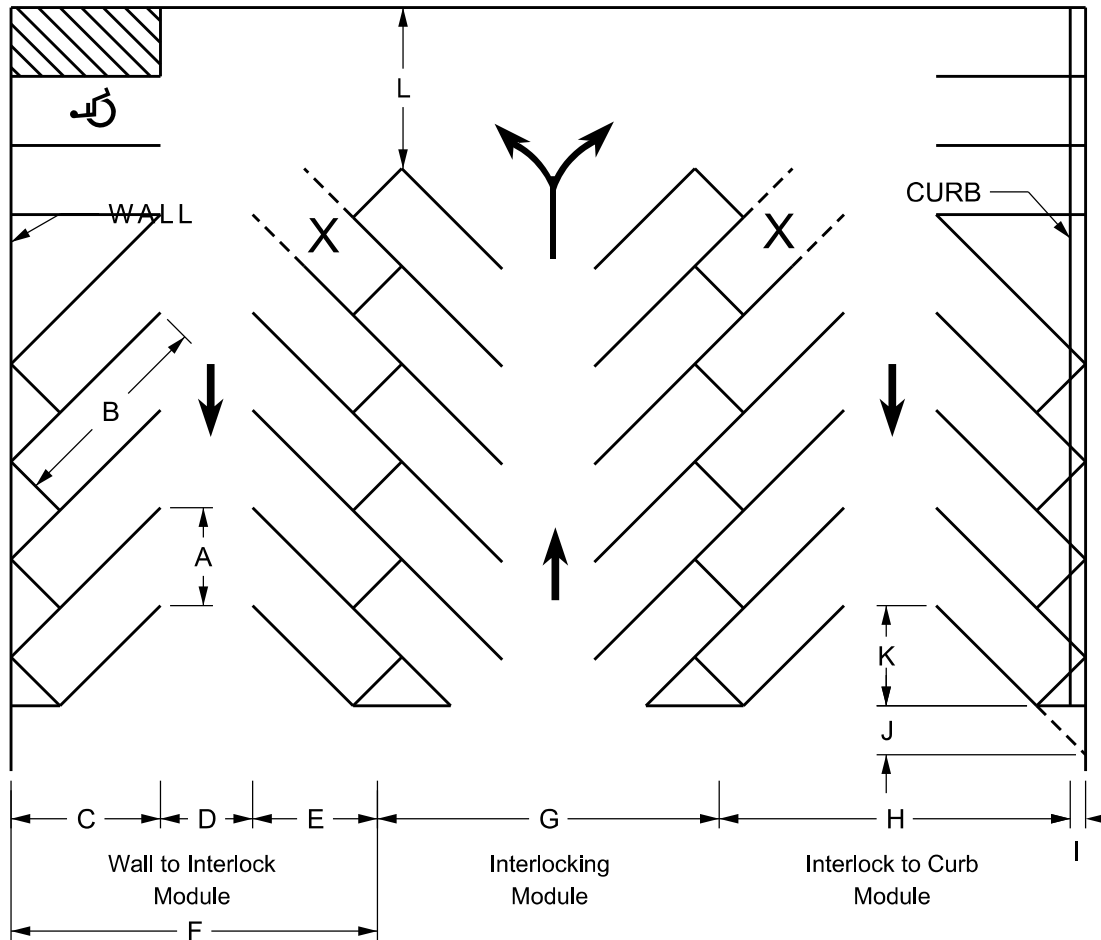
LAKE FOREST STANDARD 6.07

APPROVED BY : KMM

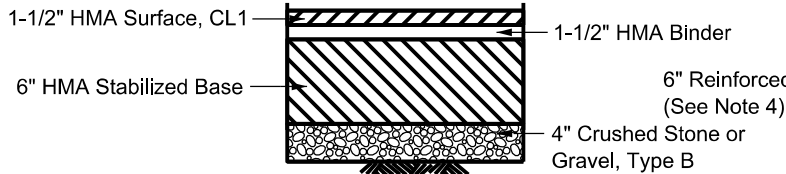
DATE : 1/1/2006

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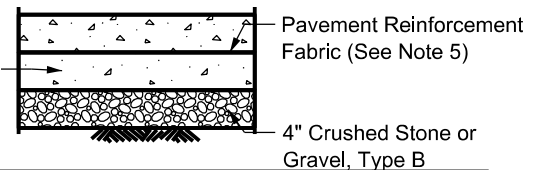
PARKING LOT STANDARDS



HMA PAVEMENT DETAIL



PCC PAVEMENT DETAIL



Description	On Diagram	Angle				
		0°	30°	45°	60°	90°
Stall width, parallel to aisle	A	23.0	18.0	12.7	10.4	9.0
Stall length of line	B	23.0	34.1	27.5	23.7	18.5
Stall depth to wall	C	9.0	17.0	19.5	20.5	18.5
Drive aisle width between stalls	D	12.0	12.0	12.0	16.0	24.0
Stall depth, interlocking	E	9.0	13.5	16.5	18.5	18.5
Module, wall to CL interlock	F	30.0	42.5	48.0	55.0	61.0
Module, CL interlock to CL interlock	G	30.0	39.0	45.0	53.0	61.0
Module, CL interlock to curb face	H	N/A	41.0	46.0	52.5	58.5
Bumper overhang (typical)	I	N/A	1.5	2.0	2.3	2.5
Offset	J	0.0	13.5	6.4	2.6	0.0
Setback	K	0.0	16.0	13.1	9.3	0.0
Cross drive aisle, one way	L	14.0	14.0	14.0	14.0	14.0
Cross drive aisle, two way	-	24.0	24.0	24.0	24.0	24.0

NOTES:

- All dimensions are given in feet.
- Interpolation between given dimensions permissible with approval of City Engineer and Surveyor.
- X = Stall not available in certain layouts.
- P.C.C. Pavement shall conform to Section 421 of the Standard Spec.
- Pavement Reinforcement Fabric shall conform to Art. 1006.10 of the Standard Specifications.
- Provide adequate lighting for parking lot use.

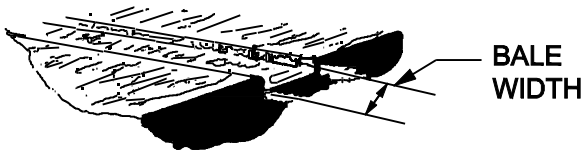
LAKE FOREST STANDARD 7.02

APPROVED BY : KMM

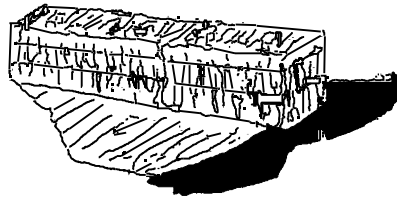
DATE : 4/23/2009

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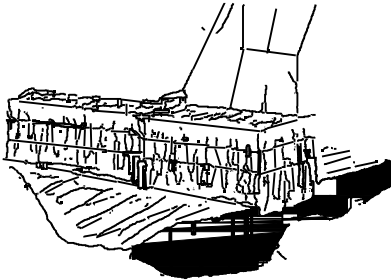
1. EXCAVATE THE TRENCH



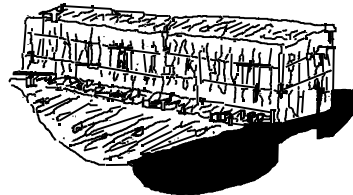
2. PLACE AND STAKE STRAW BALES



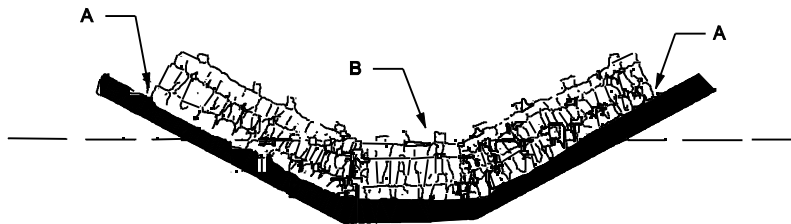
3. WEDGE LOOSE STRAW BETWEEN BALES



4. BACKFILL AND COMPACT THE EXCAVATED SOIL

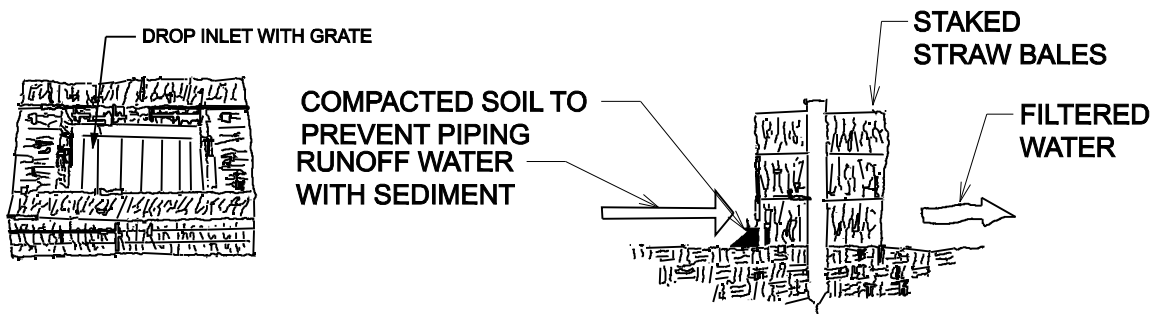


CONSTRUCTION OF STRAW BALE BARRIER



POINTS "A" SHOULD BE HIGHER THAN POINT "B"

PROPER PLACEMENT OF STRAW BALE BARRIER IN DRAINAGE WAY



SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE THE INLET DRAINS A RELATIVELY FLAT AREA (SLOPES NO GREATER THAN 5 PERCENT) WHERE STREET OR OVERLAND FLOWS (NOT EXCEEDING 0.5 C.F.S.) ARE TYPICAL. THE FILTER SHALL NOT APPLY TO INLETS RECEIVING CONCENTRATED FLOWS, SUCH AS STREET OR HIGHWAY MEDIANS.

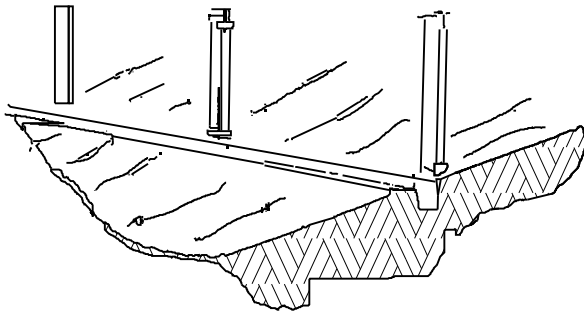
STRAW BALE DROP INLET SEDIMENT FILTER

LAKE FOREST STANDARD 11.01

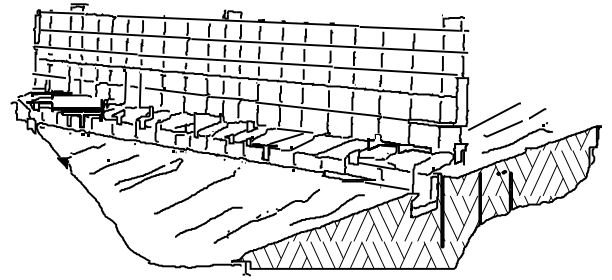
APPROVED BY : KMM

DATE : 1/1/2006

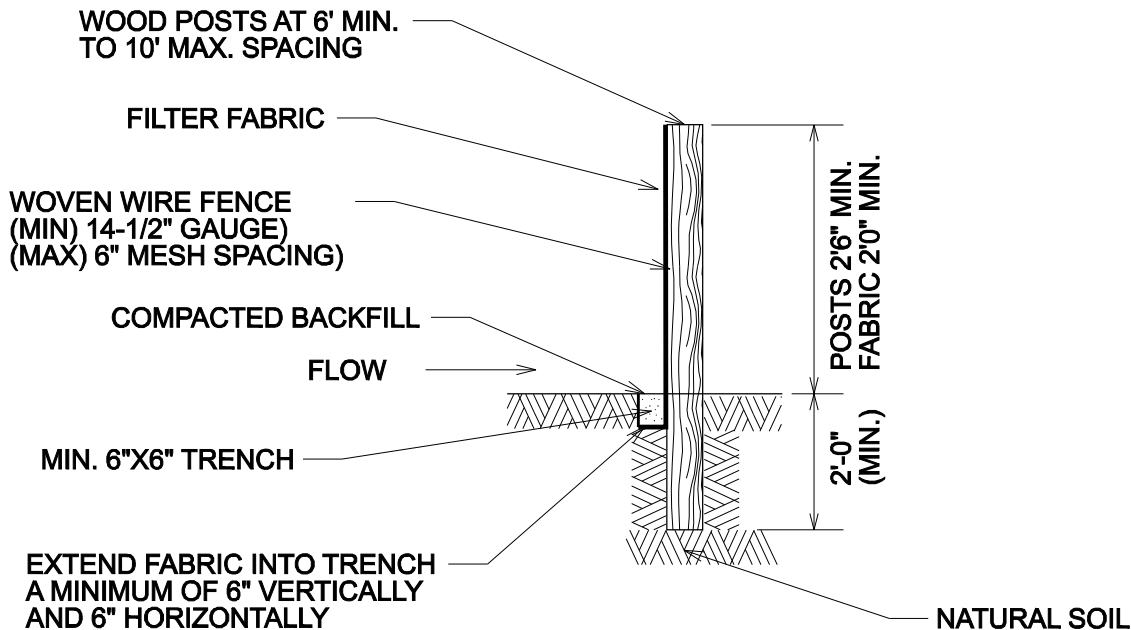
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1. SET POSTS AND EXCAVATE A 6"X6" TRENCH UPSLOPE ALONG LINE OF POSTS



2. STAPLE WIRE FENCE TO POSTS, ATTACH FILTER FABRIC TO WIRE FENCE AND EXTEND BOTH INTO THE TRENCH



NOTES:

1. FILTER BARRIERS SHALL BE PLACED AT THOSE LOCATIONS SHOWN ON THE PLANS.
2. OVERLAP FILTER FABRIC BY 6" AND FOLD WHERE 2 SECTIONS ADJOIN.
3. INSPECTION OF SILT FENCES SHALL BE AT LEAST ONCE PER WEEK AND AFTER RAIN EVENTS IN EXCESS OF 1/2". REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. SEDIMENT TRAPPED BY THE FENCE SHALL BE REMOVED AND PROMPTLY DISPOSED OF WHENEVER SIGNIFICANT ACCUMULATION OCCURS.
5. BARRIERS SHALL BE MAINTAINED IN PLACE UNTIL COMPLETION OF CONSTRUCTION AND THE UPSLOPE AREA HAS BEEN STABILIZED, AND BE REMOVED ONLY WHEN DIRECTED BY THE CITY.

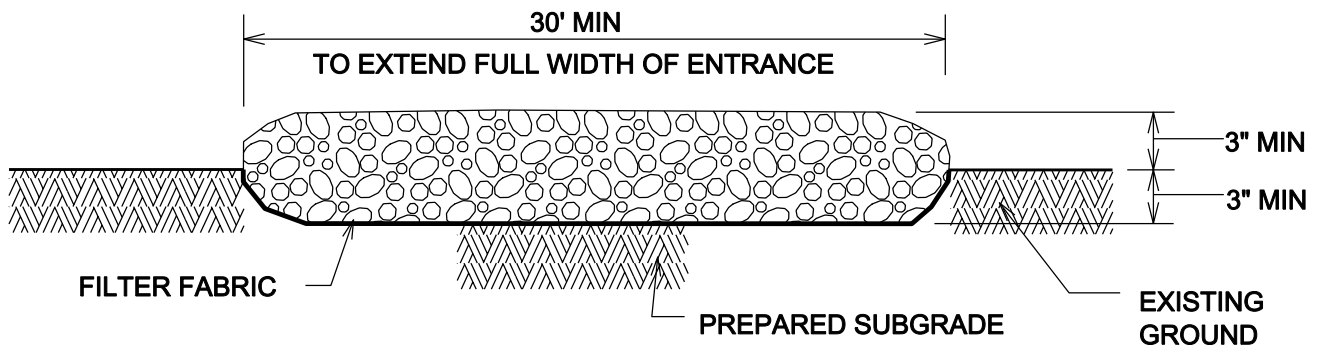
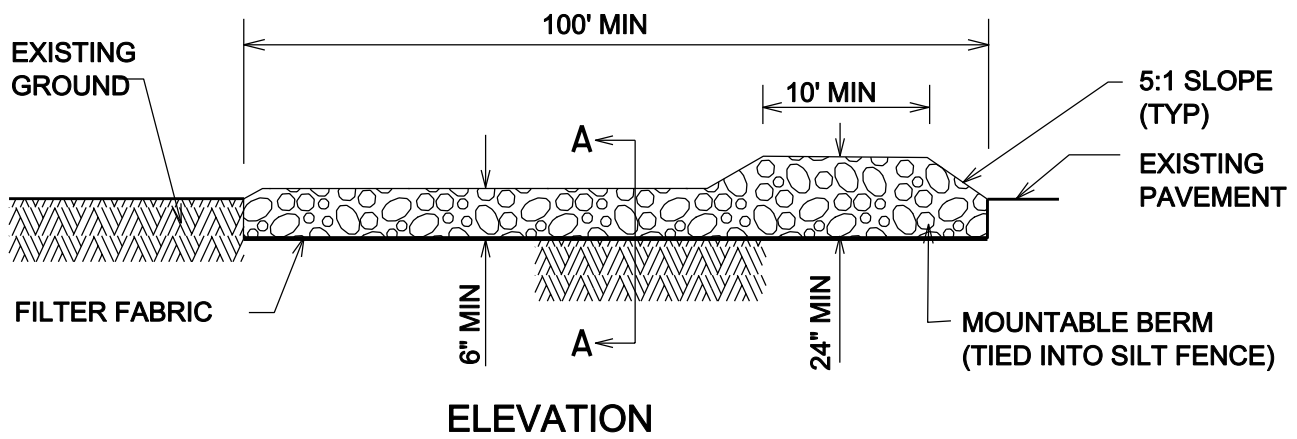
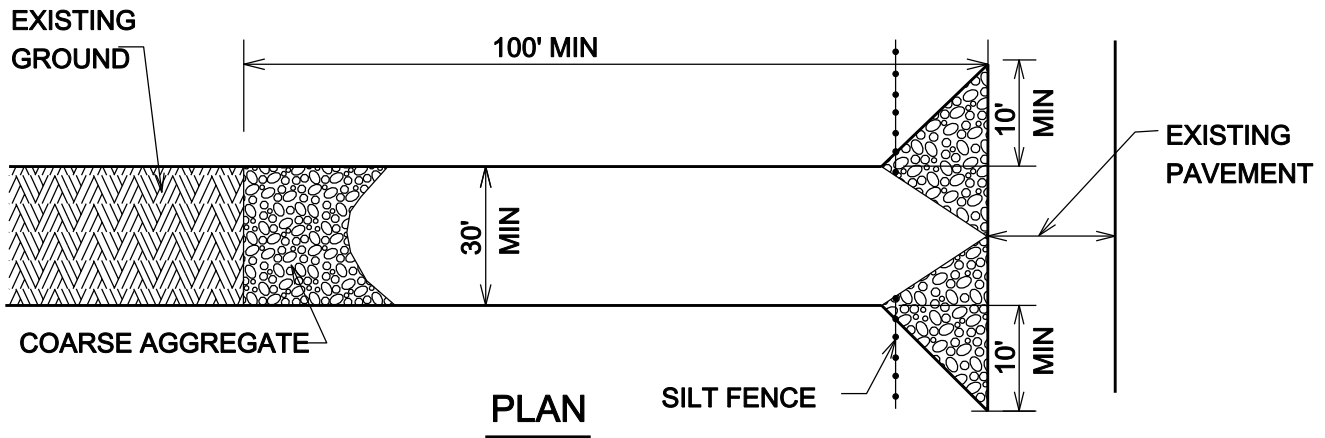
SILT FENCE DETAIL

LAKE FOREST STANDARD 11.02

APPROVED BY : KMM

DATE : 1/1/2006

G:\Engineer\Standard Details\Silt Fence 11-02



NOTES:

1. GEOTEXTILE FILTER FABRIC SHALL BE PLACED OVER THE CLEARED AREA PRIOR TO PLACING COARSE AGGREGATE
2. COARSE AGGREGATE (OR CRUSHED CONCRETE) SHALL MEET IDOT GRADATION FOR CA-1 CRUSHED AGGREGATE.
3. STABILIZED CONSTRUCTION ENTRANCE SHALL BE INSTALLED, PRIOR TO ONSET OF CONSTRUCTION OPERATIONS AND SHALL BE MAINTAINED THROUGHOUT THE PROJECT.
4. CONSTRUCTION ENTRANCE SHALL BE REMOVED UPON COMPLETION OF CONSTRUCTION AND ONLY WHEN DIRECTED BY THE CITY ENGINEER.

STABILIZED CONSTRUCTION ENTRANCE

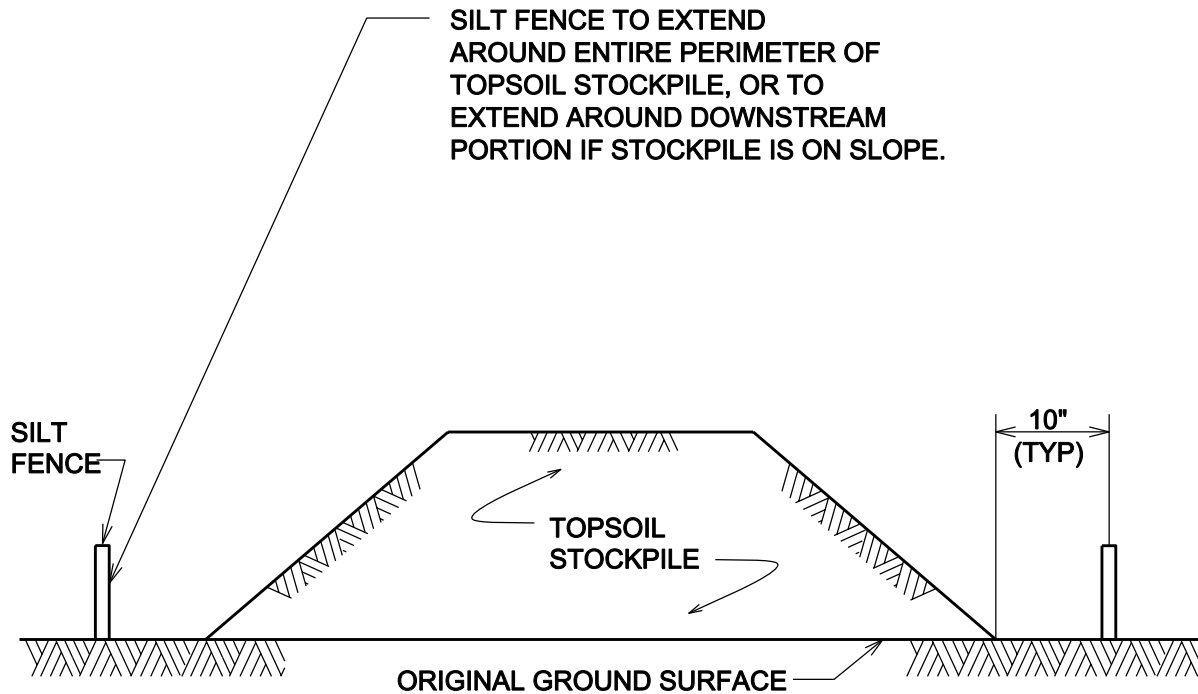
NOT TO SCALE

LAKE FOREST STANDARD 11.03

APPROVED BY : KMM

DATE : 1/1/2006

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NOTES:

1. AN ON-SITE DRAINAGE SWALE SHALL BE LOCATED BETWEEN THE TOPSOIL STOCKPILE AND OFF-SITE PROPERTY.
2. REFERENCE IS MADE TO THE SILT FENCE DETAIL FOR MATERIALS AND INSTALLATION METHODS.
3. IF THE STOCKPILE IS TO REMAIN FOR MORE THAN 14 DAYS, IT SHALL BE STABILIZED WITH BURLAP MATTING OR SEEDING WITHIN 7 DAYS OF COMPLETION TO MINIMIZE EROSION.
4. INSPECTION OF SILT FENCES SHALL BE AT LEAST ONCE PER WEEK AND AFTER RAIN EVENTS IN EXCESS OF 1/2". REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
5. SEDIMENT TRAPPED BY THE FENCES SHALL BE REMOVED AND PROPERLY DISPOSED OF WHENEVER SIGNIFICANT ACCUMULATION OCCURS.
6. SILT FENCES SHALL BE MAINTAINED IN PLACE UNTIL TOPSOIL STOCKPILE HAS BEEN ELIMINATED AND SHALL BE REMOVED ONLY WHEN DIRECTED BY THE CITY ENGINEER.

TEMPORARY TOPSOIL STOCKPILE

NOT TO SCALE

LAKE FOREST STANDARD 11.04

APPROVED BY : KMM

DATE : 1/1/2006

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