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**ENGINEERING & CONSTRUCTION STANDARDS**

**FOR**

**Utility and Street Construction  
Water, Sanitary Sewers, Storm Drainage  
Streets and Sidewalks**

**City of St. Johns**



**Approved by the City Commission on February 13, 2017**

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## INTRODUCTION

The standards and provisions contained herein have been adopted by the City of St. Johns as an aid to developers and contractors proposing to do work within the City.

This document is intended to be a supplement to the requirements and provisions contained in the CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES; Chapter 52, Water Utility; Chapter 53, Sewer Service; Chapter 55, Drainage Service; Chapter 95, Streets and Sidewalks; and; Chapter 154, Subdivision Regulations as well as requirements for any other residential, commercial or industrial development or redevelopment. In the event of any conflicts between these standards and the CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES, the City Code shall govern.

Since it is in the best interest of the community to provide well-conceived and properly installed public utilities of the highest quality possible, these standards shall be used for all extensions, additions or modifications to existing public facilities and utilities. Privately owned and maintained utilities, such as those located on private property, by necessity will require connection to public distribution, collection or treatment systems. Therefore, it is required that these private utility systems be designed, installed and tested in the same manner as public facilities.

Any standards of this nature must allow flexibility in its application for unusual situations and changing technology, therefore, deviation from these standards may be considered. Any deviation being proposed shall be submitted to the City in writing indicating the purpose, justification and proposed alternative to be used. This request shall include descriptive information and sketches or drawings indicating, in detail, the proposed alternative.

The information and guidelines contained herein are minimum standards and are not considered to be specifications adequate for construction purposes. Therefore, documents submitted for review shall include detailed construction specifications which meet or exceed these standards.

If, in the opinion of City Staff, special or unusual conditions exist or are discovered during the course of construction, these minimum standards will be revised to address such special or unusual conditions.

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## GENERAL PROCEDURES

To establish an adequate, high quality, well maintained public utility or street, the following procedure shall require satisfactory completion prior to acceptance by the City of any utility, sidewalk or street.

Design Verification - Prior to the construction of systems included in these standards, the developer shall submit a preliminary report and detailed plans and specifications for approval by the City. After the City and all other local and state approvals have been obtained, the developer shall notify the City of the date when construction will begin.

Dedication and Access - Any utility or street proposed to be dedicated to the City shall be placed and constructed according to these standards within a public right-of-way or easement dedicated to the City.

City's Status During Construction – The City will monitor activities during the construction period. Monitoring will be conducted by City Staff or by an outside firm hired by the City.

The City's representative will make periodic visits to the site to observe the progress and quality of the executed work and to determine, in general, if the work is proceeding in accordance with the City standards. The City's representative will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the work nor will they be responsible for the construction means, methods, techniques, sequence, or procedures, or the safety precautions incident thereto. The City's representative efforts will be directed toward providing assurance for the City that the completed Project will conform to the requirements of these Standards, but will not be responsible for the Developer's failure to perform the work in accordance with the Contract Documents.

The City's representative will have authority to disapprove of or reject work which is defective, i.e., if it is unsatisfactory, faulty or defective, or does not conform to the requirements of these Standards or does not meet the requirements of the Plans, Specifications, and inspection, test or approval.

The City's representative shall inform all City Staff concerns of the progress of the work, the manner in which it is being done and the quality of materials being used. The City's representative shall call to the attention of the developer any failure to follow the Plans and Specifications that he may observe. The City's representative shall have the authority to prevent the use of materials which do not meet specifications and to stop work being done which they believe does not conform to the Plans and Specifications until such time as the City shall have the opportunity to inspect the material and/or work in question.

In no instance shall any action or omission on the part of the City's representative relieve the Developer of the responsibility of completing the work in accordance with the Plans and Specifications.

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Installation & Inspection - The developer shall assure that the City's representative shall have access to the site at all times during preparation and progress. The City's representative shall have the right to reject materials and workmanship which are defective or do not meet the minimum requirements defined herein. All defective or inferior materials and workmanship shall be removed, replaced or otherwise corrected. Failure to do so within a reasonable time shall be cause for the City to:

- 1) revoke any or all permits
- 2) disallow connection to the existing utility
- 3) make the necessary corrections and charge the cost of such repairs to the developer
- 4) refuse to issue an occupancy permit, or
- 5) any combination of the above.

Safety - Any work performed pursuant to these standards as defined by the issued permit, shall progress in such a manner as to protect the life and property of personnel on the job site and the general public. All hazardous conditions shall be guarded against or eliminated.

The developer and the developer's contractors are entirely responsible for all aspects of job safety and will execute the work in strictest conformance with all federal, state and local safety codes, rules, regulations, statutes and ordinances, including but not limited to the Michigan Occupational Safety and Health Administration (MIOSHA) and the Michigan Manual of Uniform Traffic Control Devices (MUTCD).

System Testing - Upon completion of installation of any utility or street, the developer shall cause all systems to be tested as herein specified. Pressure testing of utility systems shall be done only in the presence of the City's representative. Soil, concrete and bituminous testing shall be completed by qualified individuals with test results being submitted to both the City and developer.

Certification - Prior to acceptance of any public system by the City or prior to use of a private system connecting to a public system, the developer shall submit a certificate of compliance from a licensed professional experienced in the field to which the system pertains.

The licensed professional shall certify that he/she has personally inspected all construction and that all facilities were installed in conformance with the approved plans and specifications. Along with the certification, the developer shall submit drawings, specifications, and equipment and material operation and maintenance manuals electronically in a format usable by the City, which have been revised to accurately reflect actual installation.

Financial Guarantee – Prior to the City issuing occupancy permits for any residence or structure constructed in any development, the water, sewer and storm drainage systems must have passed all required testing and be available for use by the occupants of the residence or structure. Streets, sidewalks and parking lots must be completed to the point of being useable by all occupants. A conditional occupancy permit may be issued prior to total completion of water, sewer, drainage, street and sidewalk facilities if a financial guarantee, in a form and amount acceptable to the City, is deposited with the City to insure completion. Financial guarantees shall comply with the latest City practices and policies.

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Warranty and Maintenance Bond - Performance Guarantees, Maintenance Bonds and Inspections shall be required and shall conform to Chapter 154, Section 154.50 of the CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES.

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## PLAN CONTENT

### I. General Preparation Sequence

- A. Any person, firm or organization wishing to construct Public/Private street or utility systems in the City of St. Johns, which systems are to be designed to service more than one building unit, shall engage the service of an engineer, licensed to practice engineering in the State of Michigan and shall be referred to as the Engineer. Said Engineer shall be instructed to prepare the necessary planning documents for submission to City Staff for approval.
- B. Any Engineer proposing the construction of streets or utility systems in the City of St. Johns shall present to City Staff prior to preparation of plans, a preliminary report for determination of feasibility of the project. The preliminary report shall outline the general location of the main facilities, provide the design basis and shall show all elevations and details as later specified under "Preliminary Report".
- C. Following review and recommendation by City Staff, the Engineer shall prepare detailed construction documents as later specified.
- D. Following completion of detailed construction documents, two copies shall be submitted to City Staff for approval, who shall request any changes found necessary to conform to the standards or sound construction practice.
- E. On completing the revisions requested by City Staff, a digital copy of the completed construction documents shall be forwarded to City Staff.
- F. On determining that the documents are complete, City Staff shall forward copies to the Michigan Department of Environmental Quality for Construction Permits. Additional copies may be required for submission to the Clinton County Road Commission, Clinton County Drain Commissioner, or private utility companies and for use by the City. The Engineer will be notified if such additional copies are required.
- G. Following receipt of all Construction Permits and any necessary deposits, City Staff will notify the developer that construction may begin. Construction shall in all respects comply with the requirements of these documents and the City's representative shall have the right to inspect workmanship and materials throughout construction and to reject same whenever they do not conform to these standards or sound construction practice.
- H. Final approval for use of the system will not be granted until the following items are acceptable to City Staff:
  1. All Construction and Testing

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2. Payment of Inspection Costs
  3. Receipt of Easement Descriptions in an electronic format
  4. Receipt of As-Constructed Measurements
  5. Receipt of as-constructed drawings in an electronic format
  6. Receipt of operation and maintenance manuals in electronic format

- I. The City will have easement documents drawn up from the descriptions furnished by the Engineer. This easement will transfer the system to the City for operation and maintenance plus certify that all rights and interests in the street and utility systems are hereby deeded to the City free and clear and that any subsequent use of the system by the developer or by those purchasing property from the developer shall conform in every respect to the regulations of the City, including all connection and inspection charges, all standards of construction of building connections and City requirements regarding sewer and water service charges. Easements for sewer, water and drainage facilities shall have a width equal to the depth but not less than 15 feet.

## **II. Engineer's Preliminary Report**

- A. The Developer's Engineer shall prepare an engineering report outlining, with suitable descriptive material and drawings, the scope and nature of the project proposed, together with preliminary details of the proposed construction.
- B. The report shall include site drawing(s) for the proposed improvements to any convenient scale showing the location of the proposed development in relation to all existing streets and utility systems. Also there shall be shown on the drawing(s) any significant details of soil condition, ground water problems, unstable or undesirable soils, known surface obstructions and construction problems and all known subsurface utilities. If surface flooding presents a problem in the area, the anticipated high water level shall be shown on the drawing.
- C. The report shall also contain an enlarged scale map of the area proposed for construction.
- D. The preliminary report and plan shall contain all of the design criteria detailed in the sections of these standards applicable to streets and specific utility systems.

Design of street and utility systems for any particular development shall be in accordance with the best interests of the City system as a whole and shall be coordinated with the ultimate plan for development of the total City system.

- E. With the preliminary report data there shall be furnished details of any special conditions anticipated in connection with construction or operation of the streets and utility systems and any special requirements of the developer. If all streets and utility systems proposed for the development are not to be constructed at one

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time, the preliminary report shall present an anticipated time schedule for construction of the total streets and/or utility systems.

### III. Construction Documents

- A. The Developer's Engineer shall cause to be prepared suitable construction documents showing all details of construction of the sanitary sewer, water, storm, street, and sidewalk systems and appurtenances. Appended to these standards are certain requirements of the City regarding construction procedures. These standards shall be incorporated as a part of any contract entered into between any developer of lands and the contractor constructing sewer, water, storm, street, and sidewalk systems in the City of St. Johns.
- B. The City's representative may require that the Developer's Engineer submit specifications and/or drawings on any item or work not sufficiently covered herein. Shop drawings shall be required prior to the installation of equipment or special structures on all projects. Any systems not constructed in full conformity with these requirements will not be accepted by the City for operation and maintenance and no connection will be permitted into the existing City system.
- C. The Developer's Engineer shall prepare the detailed plans for sewer, water, storm, street, and sidewalk system construction in order that a permanent record can be provided for the City. All construction drawings shall be prepared on 24-inch by 36-inch sheets with the Engineer's title block imprinted there on.
- D. Also included and made a part of the construction plans shall be copies of the City's Standard Water, Sewer, Storm, and Street Construction Details. Reproducible copies of the City's Standard Construction Details may be purchased from the City.
- E. Following completion of all construction work and addition to the drawings of constructed measurements, an electronic file, in format acceptable to the City, containing all of the drawings shall be furnished to the City.
- F. All drawings shall include a plan and profile of the proposed construction. The plan is to be drawn to the scale of 1" = 40' and the profile to a scale of 1" = 4', with all details of surface topography, surface and subsurface obstructions and proposed utility and street improvements shown on the plan and in the profile.
- G. All of the elevations shown on the plans, or referred to shall be in feet above mean sea level datum as established by the United States Geological Survey. Permanent bench marks shall be established at distances not exceeding 1,000 feet and shown on the plans.
- H. In the space provided in the title block, the appropriate description of the street or utility system as proposed on the drawing is to be inserted. Also, the name and address of the Professional Engineer preparing the drawings.

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## IV. Insurance Requirements

The developer shall not commence work on any project until he has obtained all the insurance required under this section and such insurance has been approved by the City, nor shall the Developer allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor has been so obtained and approved. Developers and subcontractors are required to file with the City completed certificates of insurance, as evidence that they carry adequate insurance to comply with the requirements of this section.

### A. Worker's Compensation Insurance

Contractors and subcontractors shall procure and shall maintain during the life of the project, Worker's Compensation Insurance for all employees to be engaged in work on the project.

### B. Bodily Injury and Property Damage

Contractors and subcontractors shall procure and shall maintain during the life of the project adequate insurance to afford protection against all claims for damages to public or private property, and injuries to persons, arising out of and during the progress of the work, and to its completion and, when specified, similar insurance to protect the owner of premises on or near which construction operations are to be performed. Specific policies and minimum limits shall meet the current City Standard.

#### 1. Bodily Injury and Property Damage other than Automobile

Such insurance shall include, but not limited to, coverage for:

- comprehensive form
- premises-operations
- explosion and collapse hazard
- underground hazard
- products/completed operations hazard
- contractual insurance
- broad form property damage
- independent contractor
- personal injury

#### 2. Bodily Injury and Property Damage - Automobile

Such insurance shall include, but not limited to, coverage for:

- comprehensive form
- owned vehicles
- hired vehicles
- non-owned vehicles

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C. Builder's Risk Insurance (Fire and Extended Coverage)

Until the project is completed and accepted by the City, the Contractor is required to maintain Builder's Risk Insurance (fire and extended coverage) on a 100 percent completed value basis on the insurable portion of the project for the benefit of the City, the Contractor, and subcontractors as their interest may appear.

D. City Protective Liability

The contractor shall procure and shall maintain during the life of the contract adequate insurance to protect and hold harmless the City from all claims, damages, losses and expenses including attorney's fees arising out of the operations of the Contractor, or any subcontractor or any agent, servant or employee of either, and the Contractor shall indemnify and save the Owner, its officers, agents, servants or employees harmless therefrom. The furnishing by the Contractor of any insurance required, or the acceptance or approval thereof by the City as provided above, or otherwise, shall not diminish the Contractor's obligation to fully indemnify the City as set forth in this paragraph.

In addition to the above required insurance, the Contractor and his Surety shall protect against and be solely responsible for any damages to work not otherwise protected by insurance whether such damage is a result of an act of God, fire, vandalism, theft, accidental or malicious acts by any person or any unexplained event.

The Contractor shall not cancel or reduce the coverage of any insurance required by this section without providing a 30-day prior written notice to the City. All such insurance must include an endorsement whereby the insurer shall agree to notify the City immediately of any reduction by the Contractor. The Contractor shall cease operations on the occurrence of any such cancellation or reduction, and shall not resume operations until new insurance is in force.

**V. Requirements During Construction**

A. Superintendence

The Developer shall give his personal superintendence to the work or shall designate a competent superintendent who shall have the authority to act for the Developer. Notification by the Developer shall be given to the City's representative prior to commencement of construction, of the individual who will act as his representative.

B. Compliance with The Law

The Developer shall comply with all applicable Federal, State, County and Municipal laws, regulations, rules and ordinances.

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C. Permits

The Developer shall secure and pay for all permits, bonds, deposits and licenses required by the City or other governmental units prior to the prosecution of the work.

D. Preconstruction Conference

Work on the project will not commence, if in the opinion of City Staff, a preconstruction conference is necessary to insure that all parties are aware of any unusual project requirements or to assure the City that all project requirements are going to be met.

E. Inspection

The City's representative shall at all times have access to the work whether it is in preparation or progress and the Developer shall provide proper facilities for such access and/or inspection. The City's representative shall have the right to reject materials and workmanship which are defective, or require their correction. Rejected workmanship shall be satisfactorily corrected and rejected materials shall be removed from the premises. If the Developer does not correct such condemned work and remove rejected materials within a reasonable time, fixed by written notice, the City may remove them and charge the expense to the Developer.

F. Quality of Materials and Equipment Furnished

All material and equipment furnished shall be new and conform to specifications. The Developer shall submit to the City's representative four copies of the manufacturer's drawings and data for all equipment furnished. No work shall be undertaken until the City's representative has given written approval to the shop drawings, but this approval shall not relieve the Developer of responsibility for errors in these drawings. The checking of the drawings is a precautionary measure and it is not intended that this checking shall enter into every detail of the work.

G. Testing

It shall be the responsibility of the Developer to perform any necessary testing. Required testing must be witnessed by the City's representative, who shall be given a 24-hour notice prior to any testing.

If the system fails to meet any testing requirements, the Developer shall determine the cause of failure and shall repair the cause of failure and/or replace defective material as necessary. Upon completion of the corrections, the testing shall be redone.

Any section of the system that repeatedly fails consecutive tests may be subject to removal and replacement. All costs of this work shall be the Developer's responsibility.

H. Final Approval

Upon completion of the construction, the Developer shall notify the City that the project is complete and ready for a final inspection and testing. The Developer

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shall accompany and assist the City's representative with the Final Inspection and all subsequent inspections required. The City may tentatively approve the use of the system upon receipt of a cash deposit sufficient to cover the cost of making the repairs. The amount of the deposit will be determined by the City and deposited with the City prior to tentative approval of the system. The date of Final Approval shall be the date when all defects are corrected and written acceptance is given by the City.

I. Correction of Work After Final Approval

Neither the final approval nor any provision in the contract documents shall relieve the Developer of the responsibility for negligence or faulty materials or workmanship within the extent and period provided by law, and, upon written notice, he shall remove any defects and pay for any damage which shall appear within one year after date of completion and written acceptance of the system by the City.

J. Protection of Work

The Developer shall continuously maintain adequate protection of all work from damage and shall protect the City's and adjacent property from injury arising in connection with his contract, and shall be responsible for all damage and/or injury caused by or arising out of his operations.

K. Use of Job Site

The Developer shall confine his equipment, apparatus, the storage of materials and operations of his workmen to limits indicated by law, ordinances, permits or directions of the City or property owners and shall not encumber the premises with his materials.

L. Plans and Specifications

The Developer shall keep on the work site, a copy of the drawings and specifications and shall at all times give the City's representative access thereto.

M. Cleaning Up

The Developer shall at all times keep the premises free from accumulations of waste material or rubbish caused by his employees or work and at the completion of the work he shall remove all his rubbish from and about the project and all his tools, equipment, scaffolding and surplus materials and shall leave his work clean and ready for use.

N. Reports, Records and Data

The Developer and each of his subcontractors shall submit to the City's representative such schedule of quantities, costs, progress schedules, payrolls, reports, estimates, records and other data as the City's representative may request concerning work performed or to be performed as part this project.

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O. Non-Discrimination In Employment

The Developer shall not discriminate against any employee or applicant for employment because of race, creed, color, sex or national origin. The Developer shall take affirmative action to ensure that applicants are employed and that employees are treated during employment, without regard to their race, creed, color, sex or national origin, and that all subcontractors employed on said work similarly ensure against such discrimination.

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## STREET CONSTRUCTION

The requirements of this section shall apply to the internal streets and drives within a development as well as streets and sidewalks intended to be dedicated to the City for public use. All streets and drives shall require a minimum 4-inch edge drain located under the curb.

### I. Typical Section

#### A. Right-of-way

See CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES, Chapter 117.

#### B. Pavement Section

Pavement sections shall be constructed in accordance with the following tables:

##### 1. Bituminous Pavement with Granular Base

Classification	13A Top	13A Leveling	MDOT 22A Base	MDOT Class II Subbase
All Streets	1.5 inches*	1.5 inches*	8 inches	12 inches

#### C. Curb & Gutter Section

Curb and gutter shall conform to the *City of St. Johns Construction Specifications for Concrete Sidewalks, Driveway Approaches And Curb And Gutter* and the following:

Classification	Curb and Gutter Type
Local Street	Special Section - high back or roll type
Collector Street - Residential	Special Section - high back or roll type
Collector Street - Industrial	MDOT Detail C-4 or F-4
Major Street	MDOT Detail C-4 or F-4

#### D. Sidewalks

Sidewalks shall conform to the *City of St. Johns Construction Specifications for Concrete Sidewalks, Driveway Approaches And Curb And Gutter*.

All sidewalks shall be a minimum of 5-feet wide and 4-inches thick, except at vehicular crossing where the thickness shall be 6-inches.

Sidewalks shall be constructed along the frontage of any development that abuts an existing public street.

For new residential developments, all sidewalks shall be installed at the time of street construction.

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Sidewalks shall extend from the interior of all developments to a sidewalk within a public right of way.

E. Public Utilities

All underground utilities shall be constructed at the following locations:

1. Storm Drains and Sanitary Sewers - near centerline of roadway.
2. Water Mains - South or East side of road, between curb and sidewalk.
3. Gas Mains - in private easement outside road right-of-way.
4. Electric, Telephone, Cable TV - in private easement outside road right-of-way.

F. Alignment - Horizontal and Vertical curves, Visibility and Intersections

See CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES, Chapter 95.13

## II. Materials and Installation

A. Clearing and Grubbing

All stumps, brush and prohibited trees (see CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES, Chapter 96) shall be removed. Any other trees or vegetation deemed desirable by the City, and so located as to not interfere with street, utility, or sidewalk construction, and not a hazard to visibility or other safety consideration shall be protected and preserved.

B. Roadway

1. Street Subbase, Base and Surface - Shall conform to the requirements of the latest edition of the Michigan Department of Transportation Standard Specifications for Construction.
2. Curb and Gutter and Sidewalks - Shall conform to the latest standard of the City of St. Johns. Sidewalks shall also conform to the CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES, Chapter 95 plus current local, state and federal barrier free design standards.

C. Curb Cuts and Driveways

1. Existing Curb Cuts - See CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES, Chapter 95; Section 95.37.
2. Proposed curb openings and driveway openings shall conform to the latest standard of the City of St. Johns. Commercial driveway opening is the MDOT type M.

D. Surface restoration

All areas to be seeded shall meet the following:

1. Topsoil - 3" minimum

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2. Seeding and Mulch – Seeding, fertilizer, and mulch shall be applied using hydroseeding methods unless otherwise authorized by the City. Apply a fertilizer, mulch and seeded slurry with a hydraulic seeder at a rate of 220 lbs per 1,000 sft evenly in one pass. After application, apply water with fine spray immediately after each area has been hydroseeded. Saturate to 4-inches of soil and maintain moisture levels 2 to 4 inches.
    - a. Seed - Shall be labeled in accordance with USDA rules and regulations. Mix shall be Merion Blue 60%, Red Top 20%, and Perennial Rye 20%.
    - b. Fertilizer and Mulch - As required to establish growth.
  3. Establishment of Seeded Areas - It shall be the developer's responsibility to take all necessary precautions, including watering and weeding, to establish a smooth, uniform lawn.
  4. Trees and shrubs within the existing street right-of-way shall be protected and left in place in accordance with the CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES, Chapter 96; Section 96.06.

E. Signage and Barricades

All signage and barricades shall be in accordance with Section 95.31 of the CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES and the Michigan Manual of Uniform Traffic Control Devices.

F. Lighting

Street lighting shall conform to standard developed by the Edison Electric Institute Manual for Street Lighting and the latest standards of Consumers Energy Co. The light source shall be high-pressure sodium vapor or LED and shall be consistent with adjacent developments.

G. Excavation

Where trench excavation is required within an existing street or road bed the following standards shall apply:

1. Hard surface streets shall be saw cut prior to excavation. Surface removal and replacement shall be parallel with and at right angles to the street centerline.
2. Where a trench crosses a street at more or less right angles the restored surface shall extend a minimum of one foot beyond the limits of the trench. Saw cuts shall be perpendicular to the street centerline extending the full width of the street. If a trench or pit is required in one lane only the limit of surface removal and restoration shall terminate at the street centerline.
3. When a trench is more or less parallel with the street centerline, removal shall be from the centerline to the edge of pavement. If a trench is on or crosses the street centerline the entire width shall be removed and replaced from point of beginning to point of ending.
4. Bituminous surfaced streets shall be restored according to section I above. Streets with concrete base and bituminous overlay shall be replaced with bituminous base equal to the concrete thickness and surface course equal to

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the existing overlay. Concrete surface shall be replaced with equal thickness reinforced concrete surface.

5. Assurances may be required prior to any construction. The assurances shall be in the form of a bond, letter of credit or cash deposits filed with the City of St. Johns. The amount shall be equal to 50% of the proposed construction. Upon approval of completion of the project by the City the assurance may be reduced to the actual cost of the finished surface. This amount to be retained by the City until the first anniversary of the completion date. If no maintenance or repair is required on or before this anniversary date the retainer will be returned to the owner.

H. Clean-Up

Contractor shall be responsible for proper clean-up of the work site and any storage yards. All trash and leftover material shall be properly disposed of off-site. See the CITY OF ST. JOHNS, MICHIGAN CODE OF ORDINANCES, Chapter 95, Section 95.38.

**III. Testing and Tolerances**

- A. Where required, testing of materials, soils, devices or instruments shall be completed using personnel experienced in the obtaining, transporting, analyzing, and reporting of the specific tests required. Certified test results shall be submitted to the City’s representative as soon as it is practical after the samples have been obtained and analyzed. All required testing shall be by a firm selected by the City.
- B. Except for bituminous paving and concrete work, samples will be taken when the Developer feels the work is prepared sufficiently to pass testing. The City’s representative shall select the exact location where samples for testing are to be taken.

The following tests shall be completed:

Type of Work	Type of Test
Pipe Bedding	Percent Compaction
Trench Backfill	Percent Compaction
Manhole, Inlet, and Catch Basin Backfill	Percent Compaction
Roadway Subgrade	Percent Compaction
Granular Base	Percent Compaction
Bituminous Concrete	Percent Compaction and Extraction Analysis
Concrete	Air Entrainment, Slump and Compression Strength (7 and 28 days)

- C. All compaction tests required shall yield a minimum of 95 percent of the maximum unit weight of the material being tested.

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Compaction Tests shall include one material sieve analysis for every 3,000 cubic yards of a specific material used. The minimum number of Density Tests which shall be taken is as follows:

Trenches and Excavated Subgrade	One every 300 feet or part thereof horizontally and one every 3 feet vertically
Subgrade	Visual inspection will be performed by the City's representative. Any Unstable soils will be replaced and tested the same as trenches.
Subbase	One every 300 feet or part thereof horizontally unless such testing reveals lack of density.
Granular Base	One every 300 feet or part thereof horizontally unless such testing reveals lack of density.

Lack of density will require correction and re-testing. In addition, more frequent testing may be required.

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## SANITARY SEWERS

### I. Design Criteria

#### A. Velocity

Pipes shall have a minimum velocity of two feet per second when flowing full.

#### B. Slope

Piped shall be installed uniform and straight between manholes with a slope not less than the following:

Size	Slope
4"	1.00% - House service only.
6"	1.00% - House or building service only.
8"	0.40%
10"	0.30%
12"	0.22%
15"	0.16%

#### C. Size

Pipe size shall be calculated using average day flow shall be based on the following:

	<u>Gallons Per Day</u>
1. Single Family	350 per unit
2. Duplex	300 per unit
3. Multi-Family, 1 Bdrm	200 per unit
4. Multi-Family, 2 Bdrm	300 per unit
5. Multi-Family, 3 Bdrm	350 per unit
6. Professional Office	500 per acre of site
7. Commercial	1,000 to 4,500 per acre of site
8. Industrial	As approved by the City

Actual size of pipe shall be based on computed average day flow multiplied by a peaking factor taken from the *Ratio of Peak Hourly Flow to Design Average Flow* chart from the latest edition of the Recommended Standards for Wastewater Facilities as adopted by Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers.

- D. In addition to being adequate to serve the proposed development, sewers must be adequate to provide capacity for upstream vacant land development. Any sewer lying in natural drainage valley shall be extended to the uppermost point in that valley within the confines of the proposed development. Suitable easements and rights-of-way must be provided to permit future extension up the valley.

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Amounts of sewage for all areas upstream shall be determined on an area basis, with all areas draining naturally to any point within the proposed development calculated on a basis consistent with the current City of St. Johns Comprehensive Development Plan.

- E. In design of the sewer system arrangement, lateral sewers shall have a manhole at their upstream terminus. Where locations of platted lots or building sites are known, a suitable tee, 45-degree elbow, service line to a point 10-feet beyond the property line and plug shall be provided for connection to the sewer main. Services shall be marked with a 4-inch x 4-inch timber and/or a suitable material that extends from the pipe invert to a point of 18-inches above finish grade. GPS coordinates will also be required.
- F. All aspects of sewer design shall, at a minimum, be in accordance with the latest edition of the Recommended Standards for Wastewater Facilities as adopted by Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers and the Michigan Department of Environmental Quality.

## **II. Materials and Installation**

### **A. Clearing and Grubbing**

See STREET CONSTRUCTION, paragraph IIA.

### **B. Sewer Installation**

1. Excavation - all organic and other soils not capable of supporting the imposed loads developed by the pipe and structures, contents, trench backfill, surfacing and traffic loading shall be totally removed. Excavation below the pipe base elevation shall be backfilled with sand, stone, or other granular material capable of supporting the imposed loads without excess settlement.
2. Pipe Bedding - All pipe and structures shall be placed on a cushion of MDOT class II granular material modified to 100% passing a 1-inch sieve. Bedding material shall also be placed around the pipe in six-inch layers and compacted to 95% maximum density. For depth of bedding see Standard Details.
3. Line and Grade - All pipe shall be laid to the line and grade called for on the plans utilizing an in-line laser beam system for vertical and horizontal control. Each pipe, as laid, shall be checked by the contractor with a suitable target to insure that this result is obtained.
4. Backfilling - Where the excavation is made through, or undercuts proposed or existing vehicular routes the entire trench shall be backfilled with pipe bedding material or sand and compacted in 12-inch layers.

When a trench lies within the influence of a vehicular route the trench shall be backfilled with bedding material or sand for that portion below a 45-degree plane from the edge of the vehicular route (MDOT Trench Detail B). The remainder of this trench and trenches in other locations may be backfilled with clean excavated material.

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All backfill shall be compacted to 95% of maximum unit weight.

C. Sewer System Materials

1. Main Line Pipe and Fittings

- a. 8-inch through 15-inch shall be PVC conforming to ASTM D-3034, SDR 26 with rubber gasket joints conforming to ASTM F-477 and ASTM D-3212.
- b. 18-inch and larger shall be PVC conforming to ASTM D-3034, SDR 26 with rubber gasket joints conforming to ASTM F-477 and ASTM D3212.
- c. All pipe buried greater than 18ft deep shall be thickness class 52 Ductile Iron meeting ANSI/AWWA C151/A21.51. Pipe interior shall be epoxy coated. Pipe exterior shall have a 0.04-inch thick asphaltic coating. Push on and restrained joints shall comply with ANSI/AWWA C111/A21.11.

2. Manholes

- a. Precast concrete shall conform to ASTM C478. Cone sections shall be eccentric type. Joints to be o-ring gasket conforming to ASTM C923.
- b. Pipe connections shall be made with an integrally cast seal boot.
- c. Steps shall be plastic-coated steel conforming to ASTM C478.
- d. Castings shall be as shown on standard detail, adjusted to grade with pre-cast concrete grade rings and 1" butyl rope gasket.
- e. Refer to standard detail sheet for construction details.
- f. Service lines shall not be connected to manholes without written permission from the City.
- g. The number of manholes shall be kept to a minimum, with the distance between manholes maximized, but not to exceed 400 feet without the approval from the City.

**III. Sewer System Testing**

- A. Before the sewer may be tested, the contractor shall run a mandrel through all pipes between manholes and clean the sewer with a hydraulic system consisting of a high pressure pump feeding water to a nozzle which directs the water against the walls and flowline of the pipe, dislodging the debris and flushing it toward a manhole. All debris shall be removed at the nearest downstream manhole.
- B. The contractor shall furnish all equipment and personnel to conduct an acceptance test using low pressure air. Manholes shall be tested according to ASTM C497. PVC pipe shall be tested according to ASTM F1417. Ductile Iron Pipe shall be tested according to AWWA C600. All tests shall be conducted in the presence of the City's representative.

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- C. The Developer shall furnish certification from the manufacturers of all pipe and manhole sections that they have been manufactured in accordance with the applicable ASTM standards.

#### IV. Services

##### A. Pipe

###### 1. Stubs, Risers and House Services

- a. Allowable sizes are 4-inch, 6-inch or as approved by the City.
- b. 4-inch pipe shall be one of the following:
  - i. PVC conforming to ASTM D 2665 with 0.237-inch wall thickness (Schedule 40).
  - ii. PVC conforming to ASTM D 2665 with 0.237-inch wall thickness (Schedule 40).
  - iii. ABS conforming to ASTM D 2751 with 0.180-inch wall thickness (SDR 23.5).
  - iv. PVC conforming to ASTM D 3034 with 0.162-inch wall thickness (SDR 26).
- c. 6-inch pipe shall be one of the following:
  - i. PVC conforming to ASTM D 3033 or D 3034 with 0.180-inch wall thickness (SDR-35).
  - ii. ABS conforming to ASTM D 2751 with 0.180-inch wall thickness (SDR-35).
- d. Joints for PVC and ABS shall be either glued or bell and spigot with a rubber gasket.

##### B. Fittings

1. All fittings used shall be pre-formed, factory-manufactured conforming to the specifications listed above for pipe. Cut bends formed at the site from pipe will not be allowed nor will 90-degree bends be used.
2. Connections to main lines where a wye is not existing shall be made by installing a wye into the main line or by cutting a hole in the main line and gluing a preformed saddle to the main-line pipe or by banding a preformed saddle with a rubber gasket to the main-line pipe with stainless steel bands.
3. Fernco-style flexible couplings shall be used when extending a house service from the stub if a pipe bell with gasket is not available.

##### C. Construction

###### A. Placement

1. Pipe must be bedded on sand or fine excavated material free of rocks or lumps and compacted to spring line. Peat, muck and marl are not acceptable bedding materials.

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2. Pipe must be laid in a straight line and to a uniform grade of 1.0% (1-foot drop for each 100 lineal feet of pipe) except as permitted by City Staff.
  3. Clean-outs shall be installed in a straight run of pipe at a maximum spacing of 90 feet and at all pre-formed bends. Standard wyes must be used to construct clean-outs. Clean-outs must extend to within 6 inches of finish grade and be securely capped. All clean-outs shall be marked with a minimum 36" length of 1/2" diameter steel pipe or reinforcing rod or shall have a cast iron cap.
  4. If ground water is present, pumping equipment and crushed stone bedding shall be used to remove the water and place the pipe in a dry trench.

D. Inspection

1. Stages of inspection:
  - a. During the making of connection to main line, if stub is not available.
  - b. After pipe is placed and bedded.
2. Service shall be fully visible during all inspections. If the pipe becomes covered with water or backfill material before final inspection, contractor shall uncover pipe before inspections are made.
3. After inspection, the sewer lead shall be covered with sand or fine excavated material free of lumps and rocks to a depth of 1.0 foot above the top of the pipe. The remainder of the trench may be filled with excavated material.
4. Two hours' notice must be given to City Offices for all inspections.

E. Guarantee

1. All contractor's materials and services shall be guaranteed for a period of one year from the date of acceptance by the City.

**V. Grease Traps or Oil/Sand Separators**

- A. Shall be installed for certain commercial and industrial uses such as restaurants, car washes or vehicle service centers or any other use that would transmit solid particulate matter, oil, grease or similar materials to the sanitary sewer system.
- B. Shall be a minimum volume of 1,000 gallons and conform to the City's standard detail.
- C. Shall be so located on the site as to be readily accessible for cleaning by a truck-mounted unit.
- D. Sanitary waste from restroom facilities shall not be piped to grease traps or oil/sand separators.
- E. Contractor shall submit shop drawing of unit proposed to be used.

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## STORM DRAINAGE

### I. Design Criteria

#### A. General

1. All drainage systems shall be in accordance with the City of St. Johns Storm Water Ordinance.
2. All drainage systems shall be enclosed unless otherwise approved by the City.

#### B. Velocity - Three (3) feet per second minimum.

#### C. Pipe Size

1. Single catch basin leads shall be 10-inch minimum.
2. Lines serving only foundation drains shall be 8-inch minimum.
3. All other pipes shall be 12-inch minimum.
4. Pipe capacity shall be demonstrated and reported using calculations in accordance with the City of St. Johns Storm Water Ordinance.

#### D. Future Extensions - The size, terminal location and depth of all drains will be required to be increased or altered over that necessary to serve the proposed development to accommodate drainage of upstream portions of the drainage basin.

#### E. On-site Detention or Retention - When an existing drainage system is not adequate to serve a proposed development, the developer shall extend, upgrade or alter the existing system to provide capacity for the proposed development. As an alternative, the proprietor may propose to detain or retain, on site any additional drainage which may occur due to the proposed development.

#### F. Building Connections - Each residence or structure requiring individual service for foundation or roof drains shall be provided with a separate service lateral. Service laterals shall be able to access the main line storm drain without crossing other parcels or crossing the frontage of other parcels. Services shall be marked with a 4-inch x 4-inch timber and/or a suitable material that extends from the pipe invert to a point of 18-inches above finish grade. GPS coordinates will also be required.

#### G. No sump pump or downspout outlets will be allowed to discharge to the street surface.

#### H. Branch Drains - All low areas at the rear of buildings that cannot be graded so as to slope to the front of the building site shall be served by branch drains and catch basins. These branch drains shall extend between buildings and shall be constructed as required for main drains.

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## II. Materials and Installation

- A. Clearing and Grubbing - See STREET CONSTRUCTION, Paragraph II.A.
- B. Excavation, Pipe Bedding, and Backfilling - See SANITARY SEWERS, Paragraph II.B.
- C. Manholes - See SANITARY SEWERS, Paragraph II.C.2., except that manholes containing pipe in excess of 18-inch diameter will be larger than 4-foot diameter, depending on the number, size and arrangement of storm drains in the manhole.
- D. Catch Basins
  - 1. Shall be min. 2-foot diameter.
  - 2. Basins shall be perforated HDPE or concrete structures as directed by the City.
  - 3. HDPE basins shall conform to ASTM F405 and ASTM F606.
  - 4. Concrete structures shall conform to ASTM C-478 with integral bottom, flat-slab top, no steps and a two-foot deep sump below the outlet pipe invert.
  - 5. Flow-through basins will be permitted to have only one upstream inlet or catch basin.
  - 6. Cover shall be MDOT standard or special of the type shown on the plans.
- E. Pipe
  - 1. Storm sewer pipe shall be concrete tongue and groove pipe, perforated HDPE pipe, or PVC bell and spigot pipe as directed by the City.
  - 2. Reinforced concrete pipe shall be Class IV and conform to ASTM C-76 for circular pipe and ASTM C-507 for elliptical pipe. Joints shall be allowed to absorb ground water; however, each joint shall be protected with O ring or Mastic against infiltration of soil or matter of any kind.
  - 3. Perforated HDPE pipe shall conform to ASTM F405 and ASTM F606 and only used a bury depths less than 10-feet.
  - 4. PVC pipe shall conform to ASTM D-3034. Joints shall be in conformance with those for sanitary sewers.
- F. Service Connections
  - 1. Pipe and fittings shall be as specified for SANITARY SEWERS, paragraph II.C.1.a.& b.
  - 2. Foundation drains and sump pump outlets for all structures shall discharge by gravity or mechanical means into an approved drainage system. An approved drainage system shall consist of an underground connection to a storm drain, roadside ditch or natural waterway that carries the discharge away from the structure.

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3. For new, remodeled, repaired or existing buildings that do not have access to an underground storm drain, the foundation drains and sump pump outlets shall be extended underground to a roadside ditch or natural waterway that carries the discharged water away from the structure.
  4. Under no conditions will foundation drains or sump pump outlets be allowed to discharge to the sanitary sewer system, directly onto the surface of a street or sidewalk or onto the ground surface at a point closer than 30 feet to any structure. Extension of the service line through the back of the curb will not be allowed.

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## **WATER SYSTEM**

### **I. Design Criteria**

- A. General Standards - All water main systems shall be in accordance with these standards, the Recommended Standards for Water Works by the Great Lakes Upper Mississippi River Board of State Provincial Public Health and Environmental Managers and the requirements of the Michigan Department of Environmental Quality.
- B. Size – All water mains shall be 8-inch diameter minimum.  
  
Any main constructed shall be sized to serve the immediate development and any future development that would logically be served by the main or mains required for the proposed project.
- C. Velocity - Velocity of water within the water main shall be a maximum of 10 feet per second.
- D. Valves - Gate valves shall be installed in the system adequate to isolate sections of main not to exceed 500 feet in commercial and industrial development and 800 feet in other developments. Valves shall also be installed at points where water mains intersect.
- E. Main Layout - The system of water mains shall provide for proper placement of fire hydrants and building services. In general, water mains shall abut at least one side of all buildings served by the system. Cross-connecting mains shall be provided at intervals not to exceed 800 feet.
- F. Pressure - All water mains, including those not designed to provide fire protection, shall be sized after a hydraulic analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. The normal working pressure in the distribution system should be approximately 60 psi and not less than 35 psi.
- G. Fire Hydrants - Placement shall be at all street intersections and at street intersection with major driveways to commercial, industrial and multiple housing developments. Spacing shall not exceed 500 feet in residential areas and 300 feet in commercial, industrial and multiple housing areas.  
  
Placement shall also satisfy the requirements of the National Fire Code.
- H. Service Lines and Meters - Each building served by the system shall be individually metered and have a separate connection to a water main. Each meter

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and service line shall have a shut-off located outside of the building. Minimum service line size shall be one-inch.

Duplex and triplex units shall have separate meters and services. Four or more units may have one meter and one service line or may be metered individually with a single service line if the meters are set in a manifold arrangement in an area accessible to City personnel.

All meters shall be set horizontally in a heated area that is accessible for periodic inspection by City personnel. The top of the meter shall not be visually obstructed. Remote reading units shall be located on the outside of the building.

Each resident or structure shall be provided with a separate service line for each potable meter to be installed. Service lines shall be able to access the water main without crossing other parcels or cross in the frontage of adjacent parcels. Services shall be marked with a 4-inch x 4-inch timber and/or a suitable material that extends from the pipe invert to a point of 18-inches above finish grade. GPS coordinates will also be required.

The required outside shut off shall be installed between the sidewalk and street curb or as directed by the City.

**II. Material and Installation**

- A. Clearing and Grubbing - See STREET CONSTRUCTION, paragraph IIA.
- B. Excavation - All water mains and service lines shall be placed at least 5 feet below finished grade. All organic and other soils not capable of supporting the imposed loads developed by the pipe and structures, contents, trench backfill, surfacing and traffic loading shall be totally removed. Excavation below the pipe base elevation shall be backfilled with sand, stone or other granular material capable of supporting the imposed loads without excess settlement.
- C. Pipe Bedding - All water lines shall be placed on a 4-inch bed of Class II sand. Backfill material around the pipe and to point 12-inches above the top of the pipe shall be Class II sand.
- D. Pipe - All pipe used for water mains shall be push-on joint (compression type) with a single rubber gasket conforming to ANSI/AWWA C151/A21.51 and ANSI/AWWA C111/A21.11. Wall thickness of pipe shall be as follows:

8-inch	-	0.25 inch (Pressure Class 52)
12-inch	-	0.28 inch (Pressure Class 52)
16-inch	-	0.32 inch (Pressure Class 52)
20-inch	-	0.36 inch (Pressure Class 52)

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Pipe sizes not listed above will not be used in the City water system.

All pipes shall have a cement mortar lining conforming to ANSI/AWWA C104/A21.4. Pipe shall be coated inside and outside with a bituminous coating of either coal tar or asphalt base one mil thick. Each push-on joint shall receive a minimum of (2) two copper wedges.

When the City of St. Johns specifies PVC pipe for water main for a project it shall be C-900 DR18.

- E. Fittings – Shall be manufactured in the United States of America, All fittings shall be mechanical joint ductile iron or cast grey iron, shall be short bodied and conform to ANSI/AWWA C110/A21.10 and AWWA C153/A21.53 Standards. Ductile Iron fittings shall be designed for a working pressure of 350 pounds per square inch (psi). Cast grey iron fittings shall be designed for a working pressure of 250 pounds per square inch (psi).

Fittings shall be bituminous coated inside and outside as specified for pipe.

All mechanical joints shall be restrained using MEGALUG type joint restraints and shall be manufactured in the United States of America including glands, rubber gaskets and bolts shall be furnished for each joint opening.

Tapping sleeves shall be from the same manufacturer as the valve. They shall be stainless steel and DI flange. The flange dimensions and drilling shall comply with ANSI B16.1 Class 125 with MSS SP-60. The mechanical joint shall comply with AWWA C111.

- F. Valves – Shall be manufactured in the United States of America, valves shall be Ductile Iron manufactured and tested to meet the requirements of ANSI / AWWA C515. Valves shall meet or exceed the requirements of Underwrites Laboratories Standard UL262.

The rated working pressure of the valve shall be 250 psi.

The body, bonnet, and seal plate shall be made of ductile iron in accordance with ASTM A536. The wedge shall be ductile iron in accordance with the ASTM A536 and shall be totally encapsulated in rubber. No paint shall be allowed in wedge. This rubber coating shall be permanently bonded to the ductile iron wedge casting and shall meet ASTM D429 tests for rubber to metal bonding.

The stem and stem nut shall be made of high strength stainless-steel. There shall be three stem seal o-rings; two in the seal plate which shall be replaceable with the valve in the full open position at rated working pressure, and one under the stem thrust collar. All gaskets shall be O-ring seals. O-rings set in a cartridge shall not be allowed all fasteners to be 304 grade of stainless steel.

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The body, bonnet and seal plate shall be epoxy coated in accordance with ANSI / AWWA C550. This coating shall be on the interior and the exterior of the valve. The manufacturers name, valve size, year of manufacture, pressure rating (“250W”), C515 and “DI” shall be cast on the valve.

Each valve shall be tested in accordance with ANSI / AWWA C515 and UL262. This shall include hydrostatic pressure testing 500 psi. A certification of manufacture and testing shall be provided at the purchaser’s request.

Butterfly valves shall be installed in a manhole according to the City of St. Johns standard detail.

- G. Valve Boxes – Shall be manufactured in the United States of America, Valves 12-inch and smaller shall be fitted with a valve box. The valve boxes shall be cast iron, screw type, three piece, consisting of the base, the center section and top section. The length shall be adjusted by means of threads cast into the top and center section. The center section shall lock into the base. A cover shall be furnished marked "Water".

The base shall be No. 6 Round and the shaft shall be 5-1/4 inch. The size shall provide for a range of extension adequate to provide for the installed depth of the pipe plus 8-inches of future extension.

- H. Fire hydrants - Fire hydrants shall conform to AWWA specification C-502, latest revision. The hydrant type and/or manufacturer shall be approved by City Staff prior to installation.

Valve openings shall be 5 ¼” with a 6" mechanical joint inlet.

Each hydrant shall have two 2 ½” hose connections, one 4 ½” Pumper connection all with National Fire Standard Threads. The hydrants shall have a 1 ⅛” pentagon operating nut and shall open left. Every hydrant shall be equipped with a drain plug and shall be installed with a mechanical joint auxiliary valve. See Standard Hydrant Detail for additional information.

Hydrants shall be uniformly painted, delivered and installed Safety Red. Hydrants caps shall be color coordinated, painted by City staff. Color shall be based on the size of main line that the hydrant is connected to as follows:

4-inch or less	-	Safety Red,	Paint #43827
6- and 8-inch	-	Safety Blue,	Paint #43830
10-inch or larger	-	Safety Yellow,	Paint #43828

Paint shall be Rust –Oleum fire hydrant enamel high performance acrylic or as approved by City Staff prior to application. Hydrants must conform to the paint codes above unless otherwise directed by City Staff.

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## I. Water Services

### A. Materials

#### 1. Service Pipe

1. Allowable sizes are 1-inch, 1-1/2-inch, 2-inch, 3-inch, 4-inch, or as specified for mains.
2. Material for 3-inch and 4-inch shall be ductile iron or PVC as specified for mains. Material for 1-inch, 1-1/2-inch, and 2-inch shall be ASTM B-88 Type K copper or SDR9 Blue CTS (must use insert stiffener with plastic pipe).

#### 2. Service Fittings

- a. Corporation stops, curb stops and unions shall be Mueller or AY McDonald Compression and shall be approved by the City.
- b. Curb boxes shall be Minneapolis Pattern, 6-1/2-foot depth, cast iron.
- c. Double strap service clamps shall be used with 1-1/2-inch and 2-inch corporation stops.
- d. Shut-off valves for 3-inch and larger services shall be gate valves and boxes as specified for mains.

### B. Construction

#### 1. Placement

- a. All service pipe shall be buried a minimum of 5 feet below finished grade. **Locations under driveways and sidewalks shall be avoided. Curb stops shall not be installed under driveways or sidewalks.**
- b. Joints for 1-inch, 1-1/2-inch and 2-inch services shall be made using straight compression couplings as described above. Solder and band-type couplings will not be allowed.
- c. Water and sewer service lines may be installed in a common trench if a minimum horizontal separation of 3.0 feet is maintained.

#### 2. Inspection

- a. All service lines shall be inspected by City personnel prior to being backfilled.
- b. A minimum of 2 hours' notice shall be given for inspections.

#### 3. Guarantee

- a. All contractor's materials and services shall be guaranteed for a period of one year from the date of acceptance by the City.

### C. Meters

1. Meters shall be purchased from the City and installed by City personnel.

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2. Meters shall be installed in a heated space that is accessible to City personnel for inspection and maintenance.
  3. Remote reading units shall be installed by City personnel after meter is in place.
  4. A shut-off valve will be installed on the service line within 6-inches of entering the building. A second shut-off will be installed within 12-inches of the meter outlet. The water meter must be installed in a level, horizontal position.
  5. The top of the meter shall not be visually obstructed.

- J. Thrust Blocks - All bends, stub ends, plugs and any other portion of the system which may be subject to separation of joints because of water pressure shall be securely thrust blocked. Blocking shall be concrete placed blocks and shall be so placed as to prevent any movement of pipe or fitting points due to water pressure. Size and shape of blocks shall be in accordance with the City of St. Johns standard detail.

### III. Testing

- A. Field Testing - The Contractor shall furnish all equipment for testing, and the testing shall in accordance with AWWA standard C600 run by him and witnessed by the City's representative. The testing shall be made at 150 psi hydrostatic pressure and shall be maintained for at least two (2) hours and the leakage shall not exceed 11.65 gallons per day, per mile, per inch of nominal diameter. The Contractor shall furnish all labor and equipment to complete the testing. In the event the testing does not meet the above requirements, the Contractor shall do what is necessary to reduce the leakage to meet the requirements.

For informational purposes, the following formula is for calculating pressure loss in pipe.

$$(23.3) \left( \frac{2}{24} \right) \left[ \left( \frac{Ft.of 10''}{5280} \right) 10 + \left( \frac{Ft.of 8''}{5280} \right) 8 + \left( \frac{Ft.of 6''}{5280} \right) 6 \right]$$

- B. Flushing and Chlorination - Before the mains are chlorinated, they shall be thoroughly flushed. All mains shall be chlorinated for a period of twenty-four (24) hours. The Contractor shall furnish all necessary equipment and materials and the work shall be done under the direction of City Staff. Chlorine shall be added in sufficient quantity to give a 50 ppm residual of free chlorine after a twenty-four (24) hour period.

After completion of the chlorination procedure, the main shall be flushed and samples of water shall be taken from the main by the City for bacteriological tests. Two such samples shall be taken at 24-hour intervals. If the results of these tests indicate safe water, the main may be placed in service. If either test should result in unsafe conditions, the chlorination and sampling shall be repeated until two consecutive samples reflect safe water.

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CITY OF ST. JOHNS

SIDEWALK AND DRIVEWAY APPROACH REPLACEMENT PROGRAM

**I. Purpose of Program**

To encourage and assist property owners to repair, replace and install sidewalks and driveway approaches those are located within public right-of-ways abutting the owner's property.

**II. Qualifications and Application Procedure**

- A. Property owner must make application for reimbursement prior to any work being done.
- B. City personnel will inspect the property and/or sidewalk and driveway approach for qualifying under this program.
  - 1. If there is an existing sidewalk it must be in such a deteriorated condition that total replacement is the only viable option. Minor repairs do not qualify.
  - 2. Each application will be individually reviewed. The City Manager will make the final decision as to qualification for the program.
- C. A Right-of-Way Use Permit will be issued to those property owners desiring to proceed with construction
- D. Property owners are notified that this is a reimbursement program. The City will make payment to the property owner, not the contractor, within 30 days of being notified that the work has been properly completed.

Proper completion requires certification by City personnel that all construction requirements have been met.

Property owner must submit an invoice (or copy) to the City, from the contractor completing the work.

- E. Reimbursement for sidewalks will be on a square foot basis, and on a lump sum basis for driveway approaches. The City Commission will determine amounts annually.

The City will reimburse 100% of the cost of barrier-free MDOT ADA version sidewalk ramp replacement or installation at street crossings.

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### **III. Construction and Inspection**

- A. Property owners applying for reimbursement agree to require their contractors to follow the City's construction and inspection requirements. Copies of the construction specifications for concrete sidewalk and driveway approaches are available upon request.
- B. City personnel must inspect the site before the concrete is placed, but after the forms are set. Under no circumstances will concrete be placed without the approval of the City.
- C. A minimum of two hours' notice must be given prior to the inspection.

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CITY OF ST. JOHNS

CONSTRUCTION SPECIFICATIONS FOR CONCRETE SIDEWALKS, DRIVEWAY  
APPROACHES AND CURB AND GUTTER

**I. Materials**

- A. The use of transit-mixed concrete shall be required.
- B. All concrete materials, mixing, batching, equipment, testing, operations and construction methods shall conform to the applicable sections of the current Michigan Department of Transportation (MDOT) Standard Specifications for Construction:
  - 1. Curb & Gutter
    - a. Grade P1
    - b. Reference Section: 601
  - 2. Sidewalk & Drive Approaches
    - a. Grade S2
    - b. Reference Section: 701
  - 3. Sacks per cubic yard: 6.0
  - 4. Maximum slump: 3 inches
  - 5. 28-day compression: 3,500 psi
  - 6. Joint Fillers
    - a. Reference Section: 914
  - 7. Curing Materials
    - a. Reference Section: 903
  - 8. Sand/Aggregates
    - a. Reference Section: 902
  - 9. Steel Reinforcement
    - a. Epoxy Coated
    - b. Reference Section: 905
- C. Batching and mixing operations shall conform to MDOT Standards. Water shall not be added to the mix at the construction site unless the actual slump is less than 3 inches. Approval of the City's representative is necessary prior to adding any water.
- D. All concrete shall be air-entrained and shall contain 5.0 to 8.0 percent entrained air.

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## II. Construction

### A. Earthwork

1. All topsoil and plant material shall be removed from the subgrade.
2. A minimum thickness of 4-inches of MDOT Class II aggregate material shall be placed and compacted under all proposed concrete work.

All soft and yielding material shall be removed and replaced with MDOT Class II material.

3. In cut or fill area, grading shall be done in accordance with MDOT Standard Specification 205.
4. Subgrade shall be excavated, smoothed, trimmed and compacted prior to placement of forms.
5. A template extending the full depth of the required thickness shall be dragged along the forms to ensure that the full required thickness of concrete is achieved.

Care shall be taken to retain 12 inches of reinforcing steel at each end of the curb cut. New steel shall be tied to existing steel.

Gutter sections shall be as shown on MDOT Standard Plan II-29E, detail L and Section A-A of detail M.

### B. Concrete

1. Sidewalks and driveways approaches shall be constructed per MDOT Standard Specification 801, 802 and 803 except that grade P1 or S2 concrete shall be used.
2. Contraction joints shall be sawed 1/8-inch wide and 1-inch deep or shall be formed with a grooving tool having a minimum width of 6-inches and a radius of curvature at the joint of approximately 1/8-inch.

Sidewalk joints shall be spaced at 6-feet and placed as shown on MDOT Standard Plan II-29E (modified).

Driveway approach joints shall be spaced at a maximum of 10-feet and shall be placed as shown on MDOT Standard Plan II-29E (modified).

3. Expansion joints shall be installed as shown on MDOT Standard Plan II-29E (modified).
4. The sidewalk surface shall not be more than 1/2-inch above the adjacent ground and shall be free draining.

- 
5. A 10-foot straight edge will be used to measure surface tolerances. The variation of the concrete surface from the testing edge of the straight edge between any two contacts with the surface shall at no point exceed 1/4 inch.
  6. When curb cuts are required, the existing curb shall be removed by using a concrete saw and curb cuts shall be formed and poured.

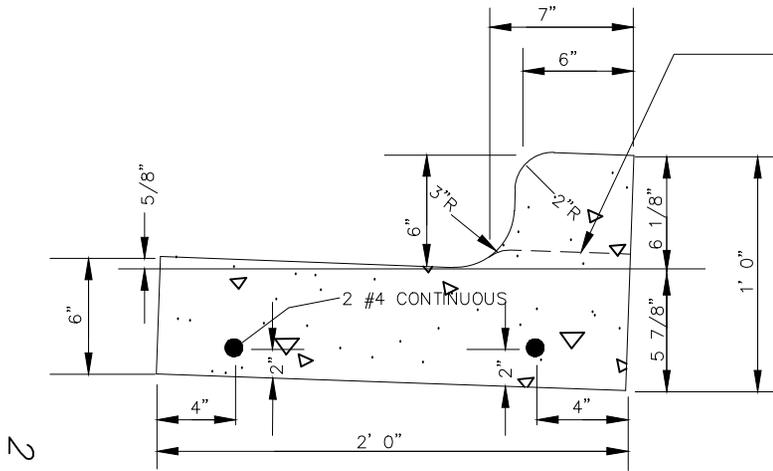
All cuts will be made to the full depth and thickness of the existing concrete. If the existing curb and gutter section is broken, cracked, settled or otherwise determined, the entire section will be removed and reconstructed.

No saw-cutting will be allowed on any sidewalk ramp installation.

7. MDOT Standard Plan II-29E (2 sheets), as modified by the City, is attached and hereby made a party of these specifications.

### **III. Inspection**

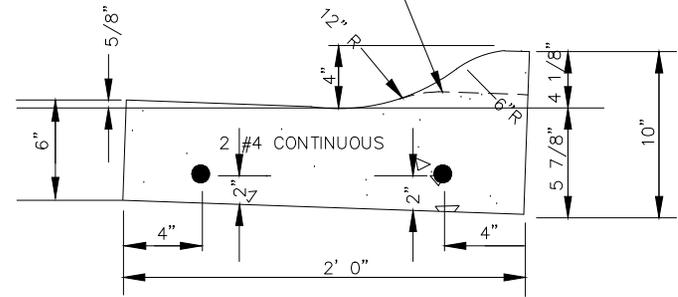
- A. City personnel shall inspect the subgrade and forms prior to the placing of any concrete and shall be notified in advance of all concrete pouring operations.
- B. A minimum of 2 hours' notice shall be given for all inspections.



1" MAXIMUM HEIGHT  
FOR RAMP OPENING

CURB & GUTTER F4  
SPECIAL (HIGH BACK)

NO SCALE

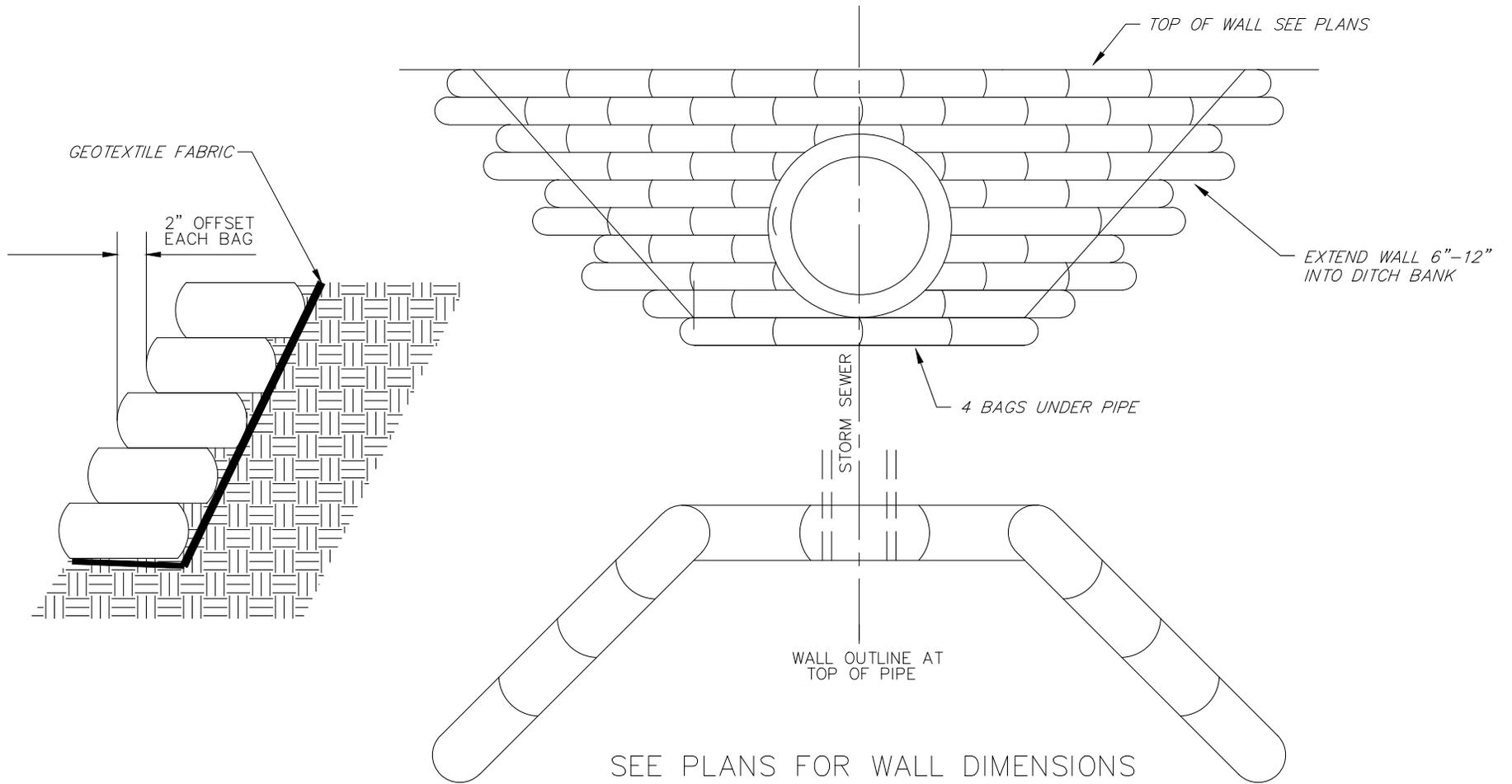


CURB & GUTTER  
SPECIAL (ROLL)

NO SCALE

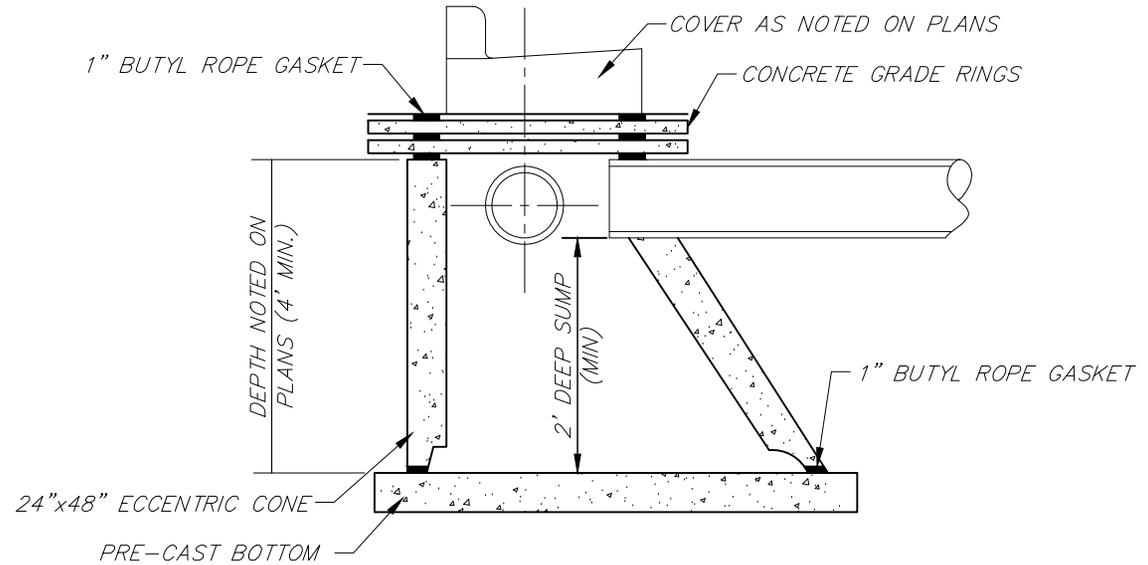
REVISE 4-18-05 CLE

6



CONCRETE BAG HEADWALL DETAIL  
NO SCALE

REVISE 6-19-02 CRC



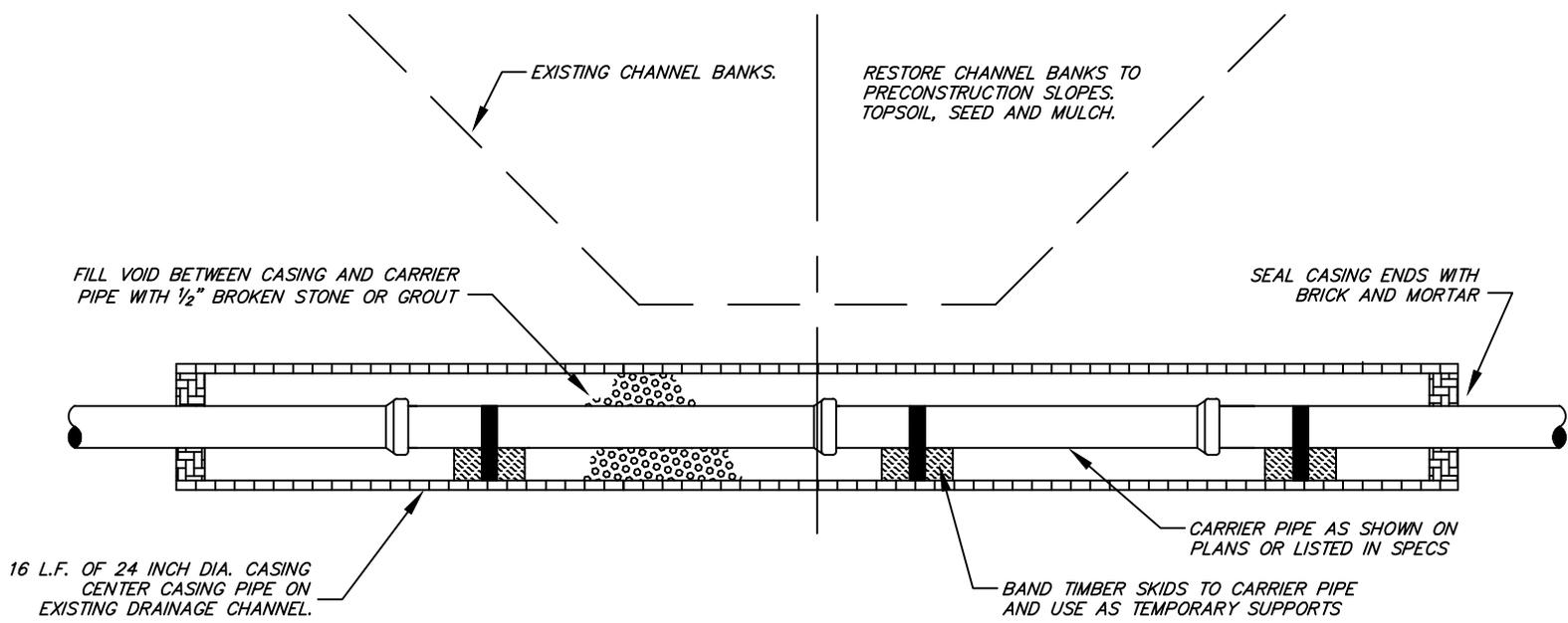
\* NOTCH TOP OF CONE FOR  
INLET AND/OR OUTLET PIPES;  
MORTAR AROUND PIPES.

NOTES: REFER TO MANHOLE CASTING DETAIL

- 1.) 1" BUTYL GASKET IN FLEXIBLE ROPE FORM (E-Z STICK, BUTYL-LOK), 1" DIA. O-RING OR APPROVED EQUAL
- 2.) FILL INTERIOR JOINTS WITH CEMENT MORTAR, ALL JOINTS MUST HAVE SMOOTH BRUSHED FINISH
- 3.) OMIT BUTYL GASKET AT TOP JOINT, MAKE WITH MORTAR
- 4.) CEMENT MORTAR COATING ON EXTERIOR BETWEEN RINGS TO GASKETS

DRAINAGE STRUCTURE - TYPE I  
NO SCALE

REVISE 6-19-02 CRC



CASING INSTALLATION DETAIL FOR OPEN CHANNEL

NOTES:

- 1) WORK IN ROAD, RAILROAD AND DRAINAGE RIGHT-OF-WAYS SHALL BE IN ACCORDANCE WITH THE APPROPRIATE REGULATORY AGENCY'S REQUIREMENTS.
- 2) CASING PIPE SHALL BE ASTM 139, GRADE B OF ASTM 1-53, GRADE B OR API 5-L, GRADE B WITH 0.375" MINIMUM WALL THICKNESS.
- 3) DIRECTIONAL BORE USING FUSED HDPE PIPE WILL BE CONSIDERED WITH APPROVED DRAWING SUBMITTAL.

0	Review	kpi			
No.	DESCRIPTION	DRW	CKD	APP	DATE
REVISIONS					
DRAWN BY: kpi					
CHECKED BY: js					
APPROVED: DJV					

2009 WWTP INFLUENT SEWER  
 CHANNEL CROSSING  
 15 Inch SEWER CASING  
 CHANGE ORDER No. 1

*City of St. Johns*

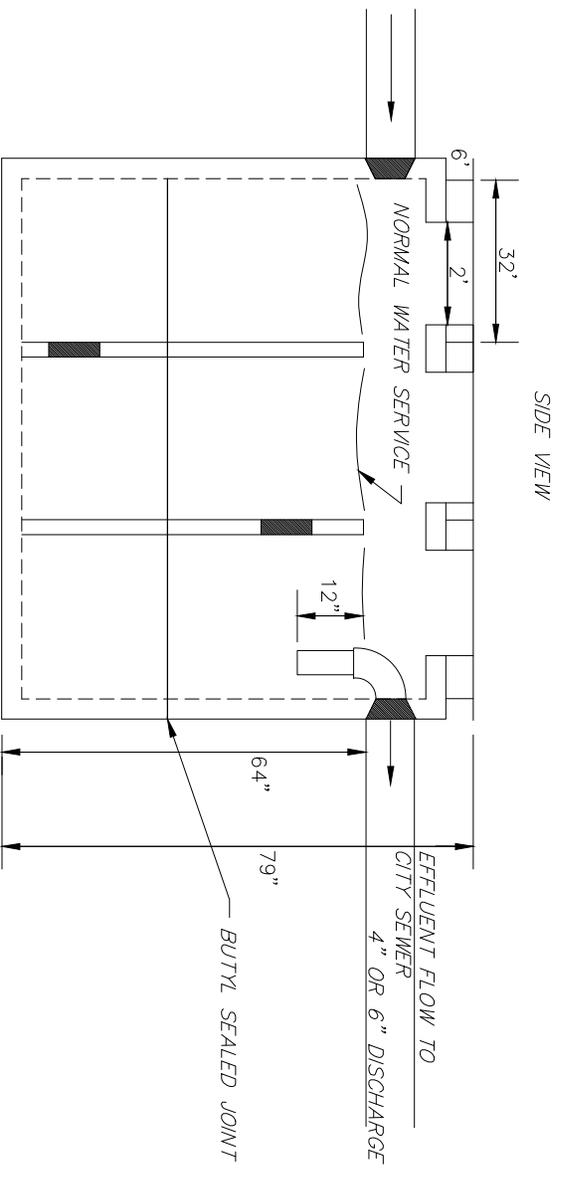
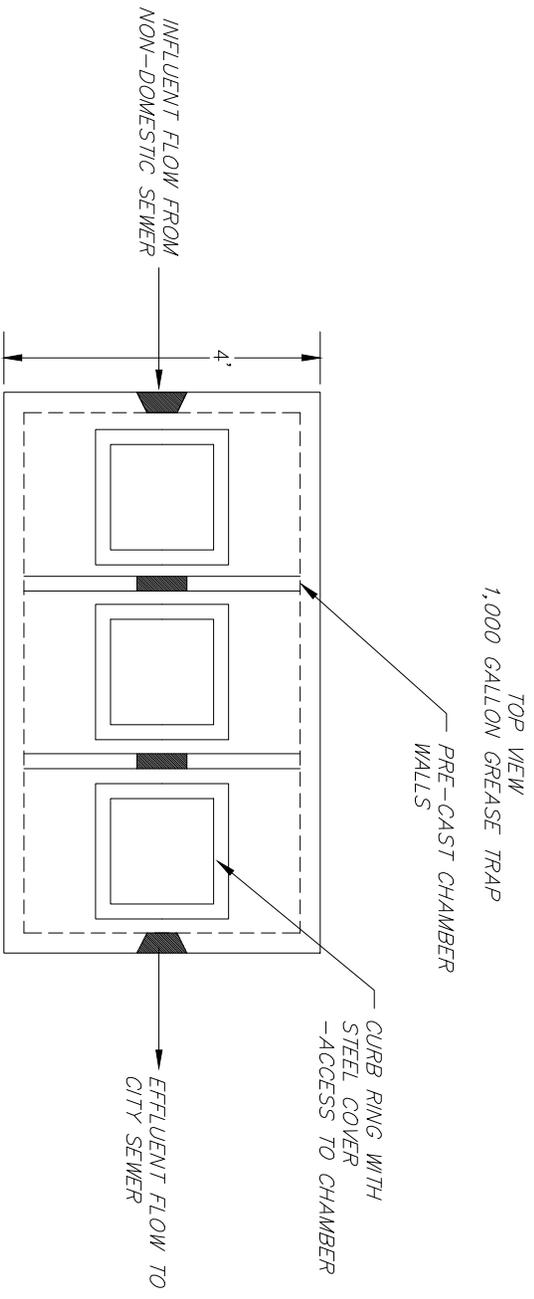


ENGINEERING  
DEPARTMENT

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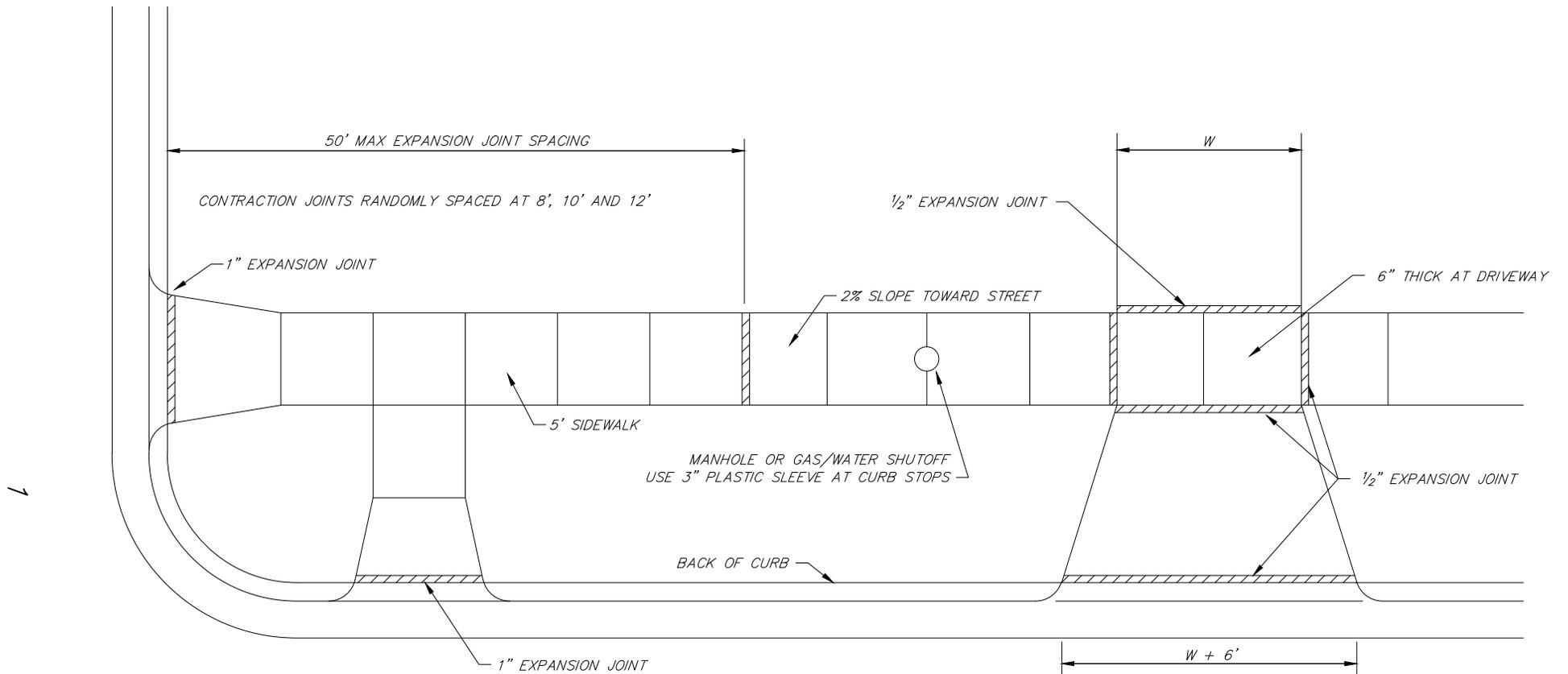
SHEET 1 of 1

DWG No. 09.0006.SAN.C01



OIL/SAND/GREASE TRAP DETAIL  
NO SCALE

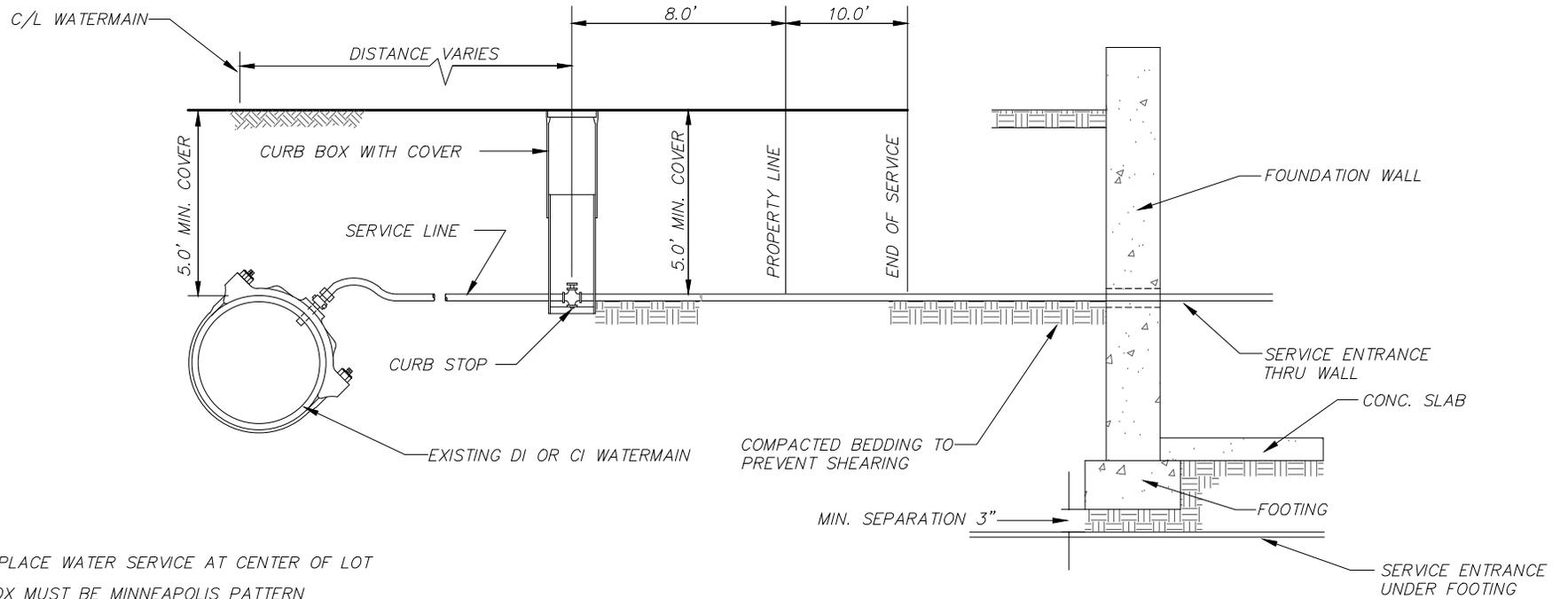
REVISE 6-19-02 CRC



JOINT LOCATIONS FOR CONCRETE SIDEWALKS,  
RAMPS, DRIVEWAY OPENINGS AND APPROACHES  
NO SCALE

REVISE 6-19-02 CRC





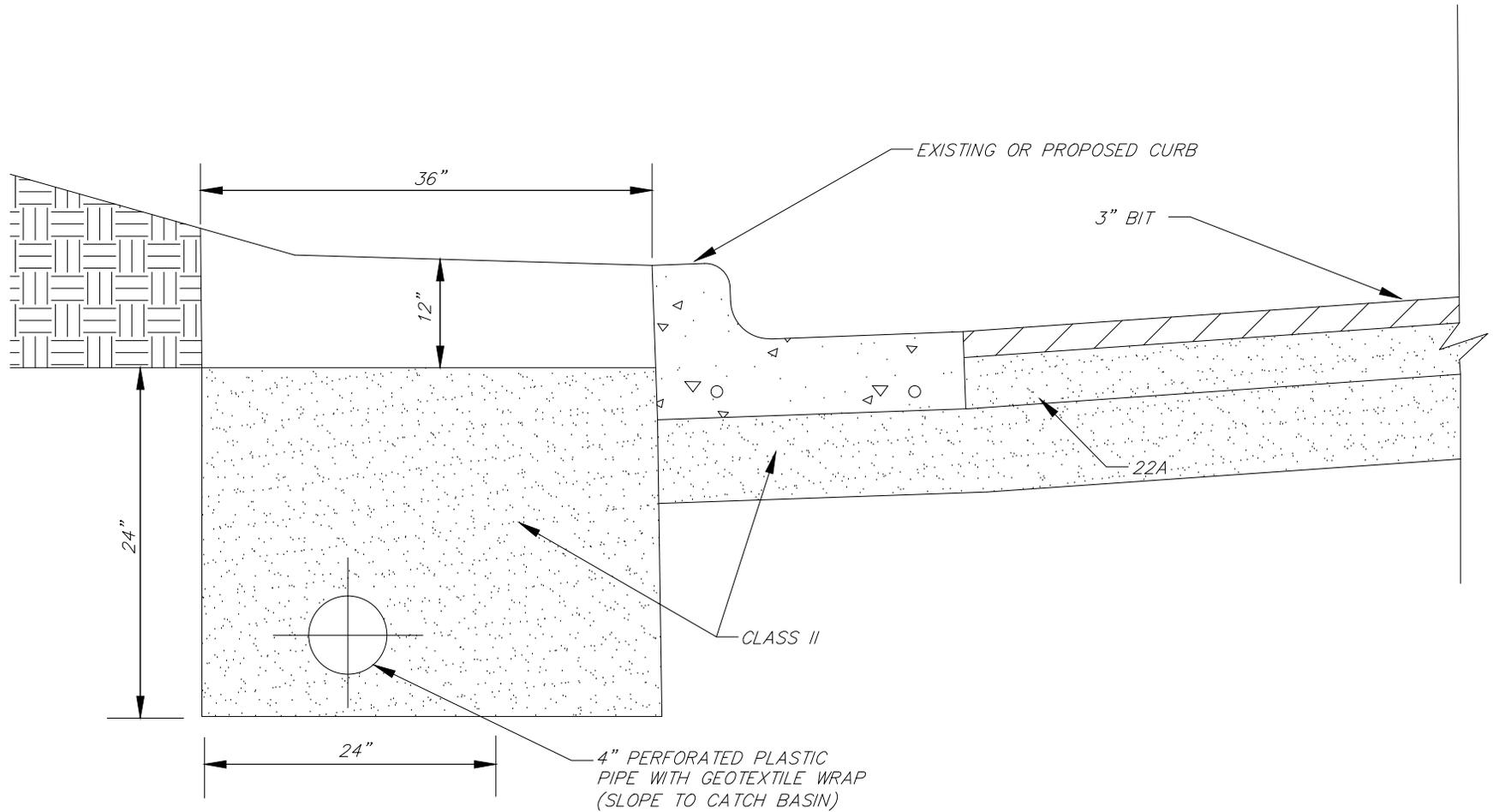
NOTES:

- 1.) ALWAYS PLACE WATER SERVICE AT CENTER OF LOT
- 2.) CURB BOX MUST BE MINNEAPOLIS PATTERN
- 3.) LOCATE CURB BOX OUTSIDE OF DRIVEWAY
- 4.) MIN. 3.0' SEPARATION BETWEEN WATER & SEWER SERVICES
- 5.) USE DOUBLE-STRAP SERVICE  
CLAMP FOR 1.5" AND 2" SERVICES

WATER SERVICE PLACEMENT DETAIL  
NO SCALE

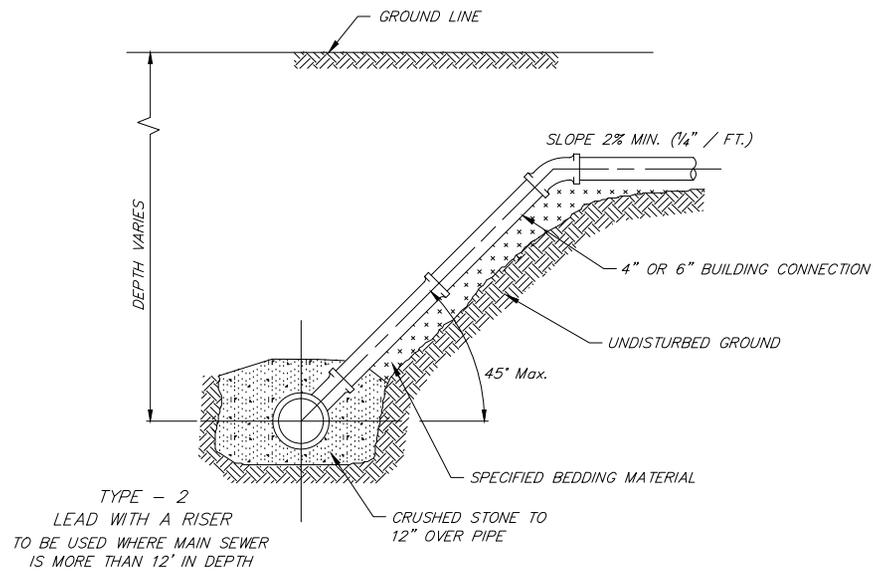
REVISE 6-19-02 CRC

Z

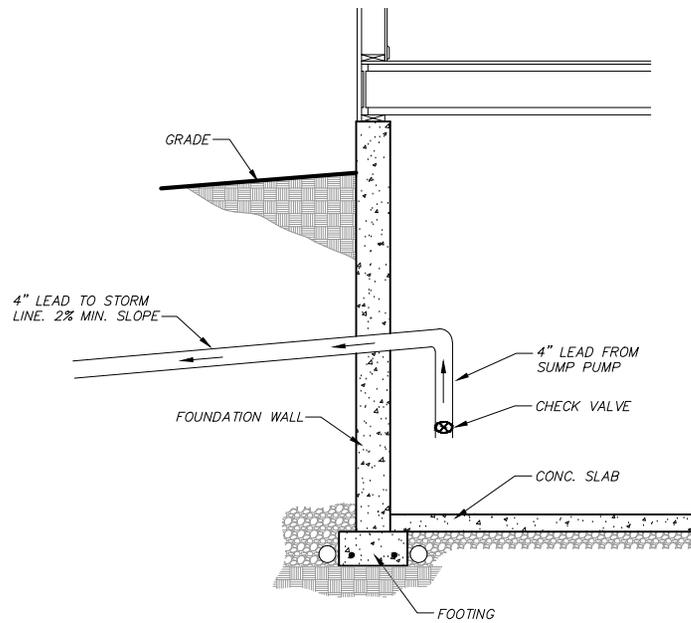


UNDERDRAIN DETAIL - TYPE II  
NO SCALE

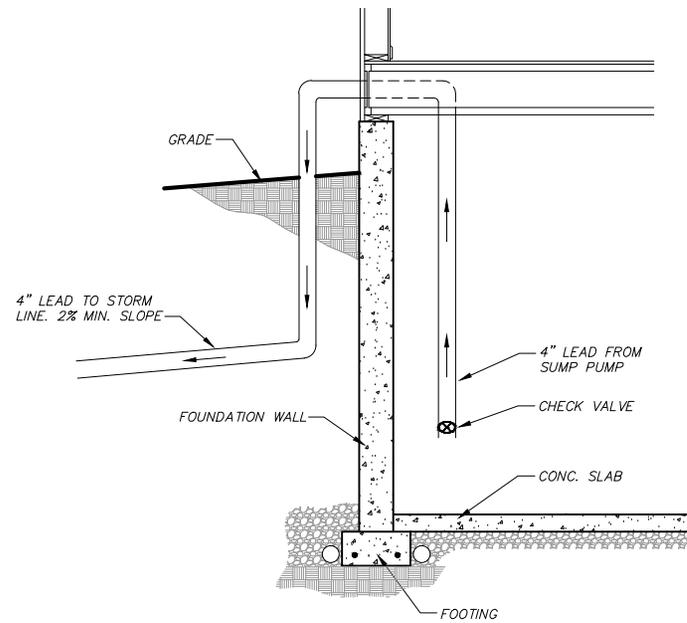
REVISE 6-19-02 CRC



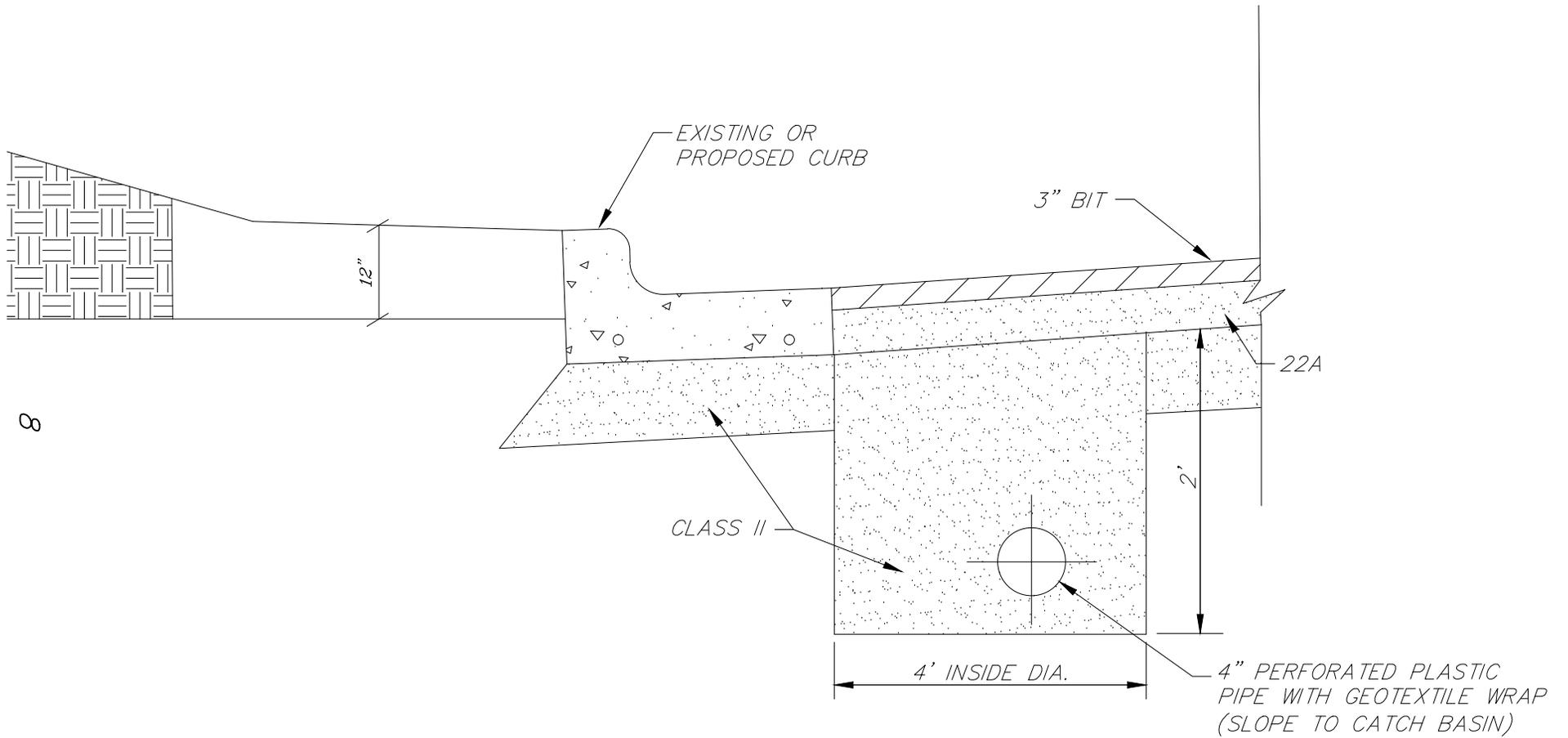
SUMP CONNECTION DETAIL @ MAIN  
NO SCALE



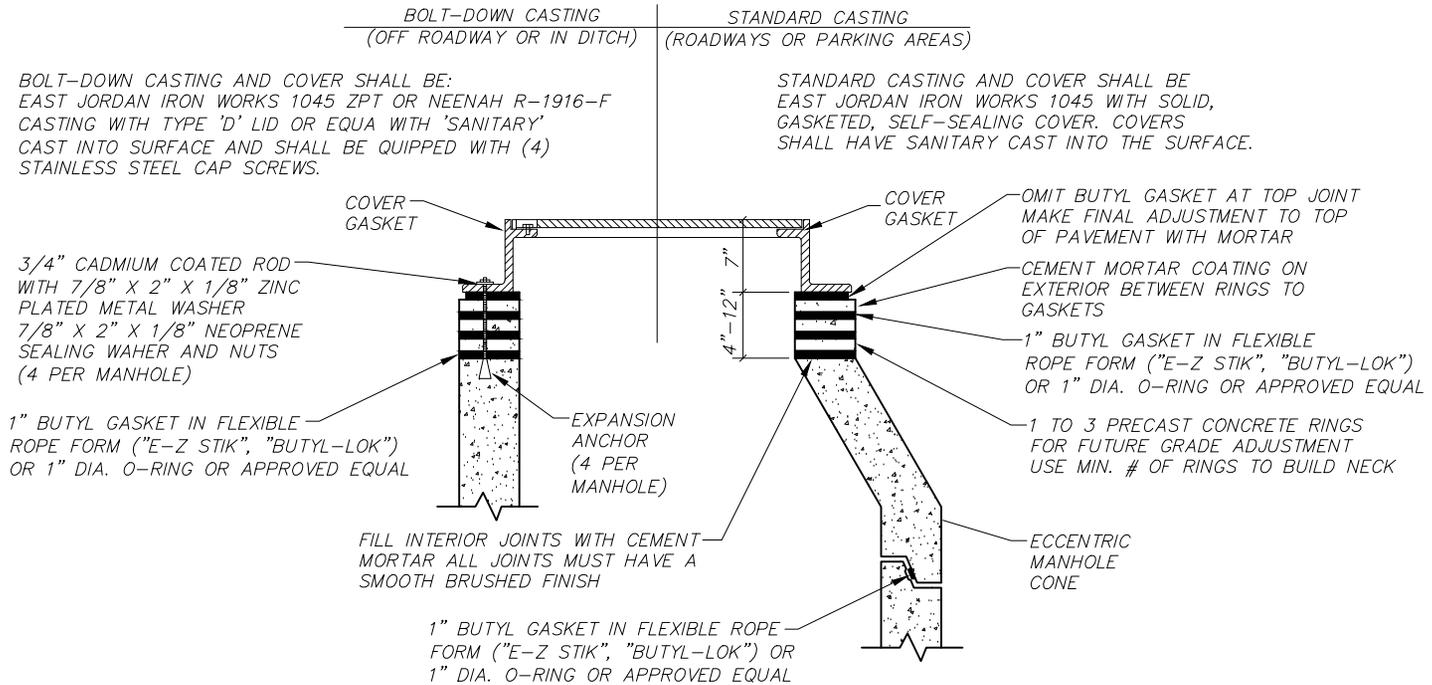
SUMP CONNECTION DETAIL (THROUGH FOUNDATION)  
NO SCALE



SUMP CONNECTION DETAIL (ABOVE FOUNDATION)  
NO SCALE



UNDERDRAIN DETAIL - TYPE III  
NO SCALE



### MANHOLE CASTING DETAIL

NOTE:

NO SCALE

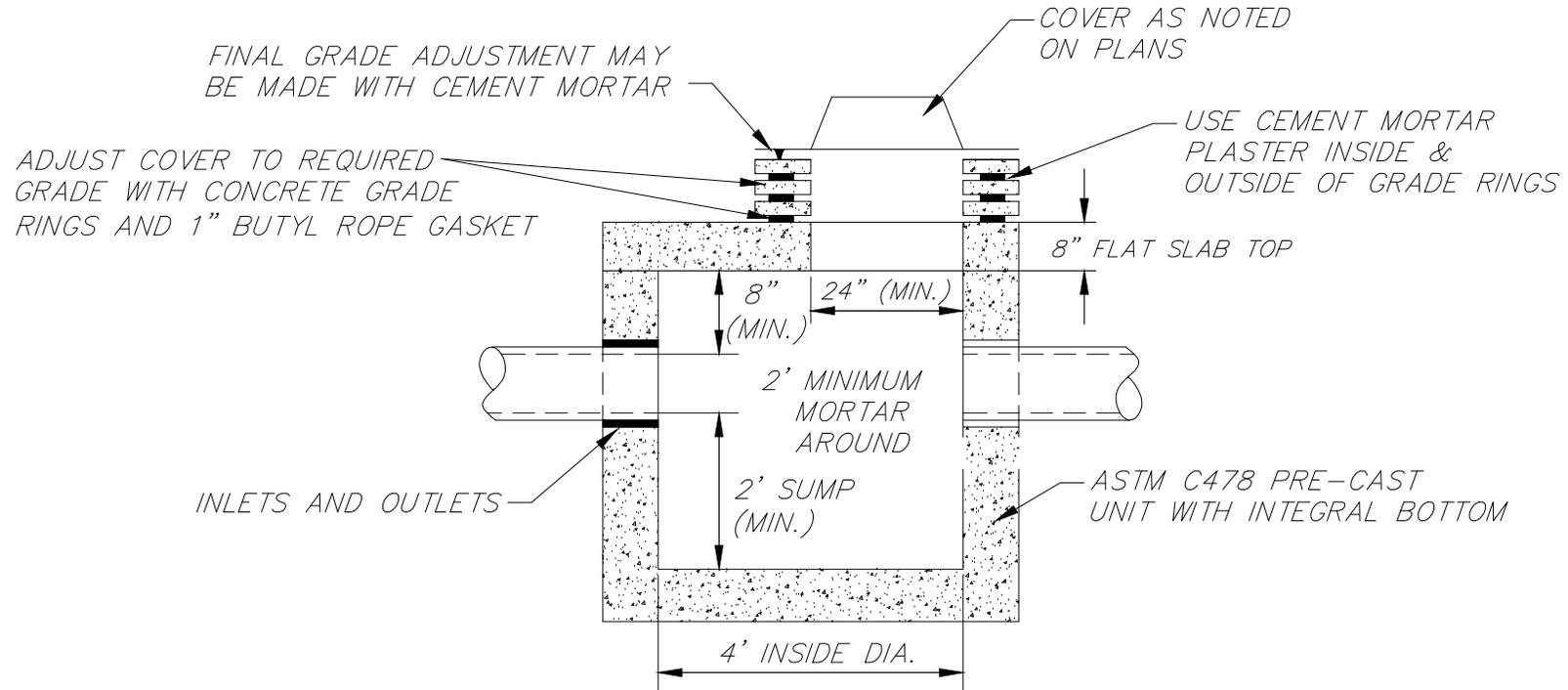
- 1.) MANHOLE TOP SECTION TO BE ECCENTRIC
- 2.) MANHOLE COVER TO BE SET FLUSH WITH PAVEMNT, 6" BELOW SURFACE OF GRAVEL ROADS, 6" ABOVE DITCH BOTTOM OR AS SPECIFIED ON PLANS.
- 3.) A DROP CONNECTION IS REQUIRED IF INVERT DIFFERENCE IS 24" OR MORE.
- 4.) DROP CONNCECTION TO BE TOTALLY ENCASED IN CLASS "B" CONCRETE OR USE DUCTILE IRON PIPE WITH STONE BEDDING.
- 5.) 30" MAXIMUM FROM TOP OF CASTING TO FIRST STEP.
- 6.)BOLT-DOWN CASTING IS FOR SANITARY SEWER MANHOLE ONLY.
- 7.) STORM MANHOLE CASTING SHALL BE EQUAL TO MDOT TYPE B SPECIAL.

REVISE 6-19-02 CRC

NOTES: REFER TO MANHOLE CASTING DETAIL

- 1.) 1" BUTYL GASKET IN FLEXIBLE ROPE FORM (E-Z STICK, BUTYL-LOK), 1" DIA. O-RING OR APPROVED EQUAL
- 2.) FILL INTERIOR JOINTS WITH CEMENT MORTAR, ALL JOINTS MUST HAVE SMOOTH BRUSHED FINISH
- 3.) OMIT BUTYL GASKET AT TOP JOINT, MAKE WITH MORTAR
- 4.) CEMENT MORTAR COATING ON EXTERIOR BETWEEN RINGS TO GASKETS

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DRAINAGE STRUCTURE—TYPE II  
NO SCALE