Infrastructure Design Criteria

and

Construction Specifications

for

Land Development

Town of Oakfield
Genesee County, New York

April 2013

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Introduction

This document serves as a standard guide for, and a control over, the development of property within the Town of Oakfield.

The intent is to assure proper design and construction of facilities that will be turned over to the Town of Oakfield for perpetual maintenance. Further, it is to assure proper design and construction of facilities, which will affect the health and general welfare of the community, minimize long term operating costs, and prevent depreciation of property values. Thirdly, it is to assure that development is compatible with the long-range development plan of the Town of Oakfield.

It is not the intent of the booklet to conflict with land subdivision regulations, zoning policies, Master Plan, or general overall supervision of development by the Town Board, Planning Board, or other authorized agencies. Rather, it is intended to supplement such policies by providing the technical details necessary to carry out general policy in a successful manner.

This document does not concern itself with control over building design or construction. These matters are covered elsewhere by Town policy and ordinance.

This document is divided into four general sections. The first section is “General Regulations”, which deals with general procedures to be followed. The intent is to provide a guide, which will assure expeditious review of subdivision plans as well as the consideration of completed works, which are to be turned over to the Town for dedication.

The second portion of the booklet is entitled “Design" and provides a guide for Developers, engineers, and others involved in the preparation of plans for single units, subdivisions, and other developments.

The third portion of the booklet is entitled "Construction" and provides the construction specifications. Owners, Developers, and engineers bear the responsibility of requiring their contractors to familiarize themselves with these specifications and to carry them out during construction.

The last section of this booklet consists of “Standard Details” and Appendices. These documents are cross-referenced to basic material in the Design or Construction Sections and usually consist of amendments or modifications to information included therein.

General

Section 1 General Requirements

1.1 Sequence of Procedures - General

With residential development increasing at an accelerated pace it has become necessary to set up certain guidelines to assure that such development proceeds in an orderly but expeditious manner. To implement the procedures required by law and good planning, the Town has developed a Sequence of Procedures for Development in the Town of Oakfield that is enclosed herein. It is recommended that Developers and their engineers follow these standards for their own benefit in expediting approvals.

The "Sequence of Procedures" is a general outline only. Developers are required to retain competent engineering and legal counsel to deal with technical matters and provide the necessary detailed information. The first step in the process is to contact the Town Board for an informal discussion of procedures. The next step will be to come before the Code/Zoning Enforcement Officer and the Town Board for a sketch plan conference. This is usually the first opportunity the Town Board has to see how a particular parcel of land is proposed for development. This knowledge permits the Town Board to initiate studies to determine what problems it must consider in reviewing the project. Questions of traffic circulation, water supply, sanitary sewage collection and disposal, and drainage are some of the major items. Following this pre-preliminary discussion with the Town Board, the Developer can make application for an advertised formal preliminary hearing before the Planning Board.

It should be noted that it is the Developer's responsibility to provide the Code/Zoning Enforcement Officer with preliminary plans at least four weeks prior to the presentation of the plans to the Planning Board. This time schedule is necessary in order that an intelligent office and field investigation can be made relative to the proposed submittal and appropriate comments returned to the Developer's engineer for revision where necessary. In the same manner, it is required to present final plans two weeks prior to the formal hearing.

Having received the final approval for the development from the Planning Board, the Developer shall be responsible for obtaining the signatures of approval of the Genesee County Health Department, and any other appropriate officials representing the agency or authority providing water and sanitary sewage facilities. Easements and an engineer's estimate for the letter of credit or certified check amount shall all be approved as determined by the Town Board prior to obtaining the necessary signatures and filing the map.

No construction of utilities, as defined herein, shall be started without notifying the Code/Zoning Enforcement Officer, Highway Superintendent, and the appropriate utility agencies.

No building permit shall be issued by the Town until and unless a letter of credit or certified check, as determined by the Town Board, if required, of an amount, and in a form, satisfactory to the Town Attorney has been established, and until all easements have been approved by the Town Attorney and Town Board and filed and recorded. A sample of a letter of credit is illustrated in Appendix A.

A Town officer, employee, or agent responsible for accepting the construction for dedication may withdraw funds from the letter of credit upon certification that there is reasonable cause to utilize such funds. After appropriate resolution by the Town Board, removal and use of these funds can be used for the appropriate purpose.

The letter of credit amount shall include funds necessary for the costs incurred by the Town for inspection, Town Engineer's advisory services during construction, and surveys and testing necessary to assure completeness and satisfactory quality of the work. The Town would like to emphasize that they are interested in promoting successful and appropriate land development in the Town. The Town will encourage partnering among all parties in an effort to help defray some of the non-construction-related costs described above.

Section 2 Sequence of Procedures

2.1 Pre-Application

Developers shall contact the Code/Zoning Enforcement Officer for information and direction relating to site plan review, subdivision, building, sanitary and storm sewer installations, application for hearings, and related fees. Guidance for coordinating and presenting projects to Town officials and procedural matters relating to zoning and Town Planning Board review can be preliminarily discussed.

Where utilities are to be connected into the facilities of other agencies, such as water transmission mains or trunk sewers under the jurisdiction of others, electrical hookup under the jurisdiction of others, and gas service under the jurisdiction of others, the Developer and his engineer shall be responsible for contacting such agencies directly to determine such regulations as may be in effect and to determine the capacity of these facilities to handle the loadings to be imposed upon them by the new development.

2.2 Sketch Plan Conference

Developer presents plan to Town Board as a miscellaneous matter. Developer should be prepared to present a plan and related data to show how he/she intends to develop property and how it will relate to adjoining property. He/She should be prepared to answer questions relating to utilities, topography, and drainage.

The sketch/concept plan submission should include the following:

1. Written statement outlining the proposed project.

2. Location Plan showing the general location of the site with respect to existing and proposed streets, rights-of-way, easements, buildings, and other facilities and natural features.

3. Specific identification of all properties, subdivisions, and streets within five hundred (500) feet of the parcel.

4. General identification of all existing and any proposed new, upgraded, or extended utilities, including but without limitation, electricity, telephone, natural gas, petroleum, other liquid pipelines, cable television, water, sewage, storm water disposal, and drainage facilities in the area.

5. Identification of internal streets and traffic circulation patterns, if any, of the proposed development.

6. The location of all existing and proposed structures on the site and the designated uses for each.

7. Identification of existing zoning classification(s) of the property, of all adjacent properties, and any restriction on land use of the site.

8. Identification of the existing natural features on the site.

9. A copy of the appropriate USGS map (s).

No formal action shall be taken on the plan or the application at the time of the sketch plan conference. Following the conference, the Town Board may suggest changes, which in the opinion of the Board, would improve the site design concept.

2.3 Preliminary Plan Review

All applications for preliminary site plan approval shall be made in writing on the appropriate form. The Developer presents overall preliminary plan to Code/Zoning Enforcement Officer. If the appropriate environmental assessment form has not been previously submitted, it should be included in the preliminary plan submittal. The Planning Board shall also submit a copy of the site plan or preliminary plan as appropriate to the County Planning Agency for their review, as required by general municipal law, Section 239e and/or to others as directed by the Planning Board. Refer to Section 3, General Design Requirements, for detailed requirements.

At least two weeks prior to Planning Board meeting, Developer should request the Code/Zoning Enforcement Officer to place the Developer on the meeting agenda. An adequate number of copies of the plan shall be provided prior to the meeting.

The Planning Board may recommend, recommend with conditions or modifications, or not recommend the preliminary plan to the Town Board. The Town Board may also table the public hearing pending receipt of additional information or for other reasons as determined by the Board. Recommendations of the Planning Board and Town Engineer with respect to preliminary plan will be delivered to the Developer and his engineer.

2.4 Final Plan Review

After receiving preliminary recommendation, with or without modifications, from the Planning Board on a preliminary site plan and approval for all necessary permits and curb cuts from state and county officials, the applicant may prepare a final detailed site plan and submit it to the Town Board for approval. The final detailed site plan shall conform substantially to the preliminary site plan that has received preliminary site plan approval. It shall incorporate any revisions by the Town Board at the preliminary review.

In addition to final detailed site plans, the following additional information shall accompany an application for final site plan approval:

1. A record of application for and approval statue of all necessary permits from town, county, and state departments or agencies;

2. Submission of evidence that the State Environmental Quality Review Act (SEQRA) has been complied with;

3. An estimated project construction schedule;

4. Submission of all proposed easement agreements;

5. Submission of evidence of firm financial commitments for project construction and permanent financing for completion of the project;

6. Submission of evidence that all water, sewage, and storm water disposal and drainage facilities are in compliance with all applicable federal, New York State, Genesee County, and Town of Oakfield laws, ordinances, rules, regulations, orders, and permits;

7. A Stormwater Pollution Prevention Plan (SWPPP) meeting the requirements of NYSDEC when the project will result in the disturbance of more than one acre; and

8. Any other information or data deemed necessary by the Town/Planning Board.

If the final detailed site plan is substantially different from the approved preliminary plan, then the applicant shall present any modifications to the Town Board and shall notify the Town of its decision. Upon approval of the final site plan and payment by the applicant of all fees and reimbursable costs due to the Town, the Town Board shall endorse its approval on a copy of the final site plan. Town Board approval of a final site plan shall expire after one (1) year from the date of such decision, unless a building permit has been taken out within such time period for work indicated on the final site plan and site development and/or construction has begun as determined by the Town Board.

The Town Board may recommend, recommend with conditions or modifications, or not recommend the final plan. The Town Board may also reserve decision pending receipt of additional information or data.

2.5 Special Improvement Districts

In those projects that require the establishment or extension of a lighting, sanitary sewer, water, park, or other special districts, the following items must be completed by the Developer and submitted to the Code/Zoning Enforcement Officer and Town Clerk prior to obtaining the signature of the Town Board.

- ➔ A properly written metes and bounds description of each district;

- ➔ A listing of all parcels to be included; and

- ➔ A petition requesting that the Town Board creates or establishes the specific district or extension.

Once the Town Board has reviewed the petition and has determined that establishment of said district or extension is appropriate and in the interest of the public, a public hearing shall be called by the Town Board, consistent with the requirements of New York State Town Law, to hear any and all public input related to the same.

If approved, the Town Board will then act on the matter and form the special district.

2.6 Easements

It shall be the responsibility of the Developer to furnish, in the required format, all necessary easement documents. Easements may be obtained for such items as storm and sanitary sewers, water mains, sidewalks, dedicated streets, drainage, conservation areas, pedestrian access (trails), and cross access rights.

The Developer shall provide a properly written metes and bounds description of each easement to the Code/Zoning Enforcement Officer. A reduced scale drawing showing the location of all easements with relationship to property lines shall accompany these descriptions.

After a preliminary review of these documents by the Code/Zoning Enforcement Officer, the documents shall be transmitted to the Town Attorney for his final review.

In addition, the Developer shall provide the town a check in an amount to be determined by the Town Attorney to cover the cost of recording these documents in the County Clerk's Office by certified check, attorney check, or cash. All checks shall be made payable to the "Town of Oakfield."

These documents shall be recorded in the Genesee County Clerk's Office by the Town of Oakfield. Filing fees for the recording of easements and/or other documents shall be paid by the Developer. The aforesaid shall be on file with the Town prior to obtaining the signature of the Town Board.

2.7 Acceptance of Land to be Dedicated

The Developer shall be responsible for all properties to be dedicated to the Town of Oakfield until such time as the Town Board formally accepts said lands by Town Board resolution.

Prior to the acceptance of any properties to be dedicated to the Town of Oakfield, including but not limited to: roadways, sidewalks, storm sewers, sanitary sewers, water mains, detention ponds, recreational facilities, easements and special districts, all improvements and properties shall be completed to the satisfaction of the Town.

The Developer shall install concrete monuments at all intersections of new and existing roadways on lands to be dedicated to the Town of Oakfield, prior to acceptance of said land.

The Developer shall be responsible for all current taxes due on properties to be dedicated to the Town. Certificates from the Oakfield Town Tax Collector and the County Treasurer shall be obtained by the Developer and submitted with the offer of dedication of lands to the Town.

After lands to be dedicated have been prepared in a manner acceptable to the Town of Oakfield, the Developer may request, in writing to the Town Board, acceptance of said lands. Upon acceptance by the town, the funds retained in the Developer's Irrevocable Letter of Credit/cash deposit shall be returned.

The Developer shall pay the appropriate filing fees for all documents to be recorded by the Town's Attorney.

2.8 Recreation Facilities Regulations

Open space in development may be approved by the Town Board under Town Law, Incentive Zoning Law, or under the Zoning Ordinance of the Town of Oakfield. If the open space is suitable for a public neighborhood park, the recreation facilities should be accepted for dedication by the Town upon completion of construction according to the development specifications for recreation facilities.

If the open space is primarily for the common use of the residents of the development, the Town Board must determine at the time of subdivision and site plan approval whether ownership and maintenance are to be the responsibility of a single property owner as in the case of an apartment development, a homeowner's association composed of all property owners in the development or of a special park district as a condition of site plan approval.

Recreation areas in all residential zones are to be set aside as required by the Town Board and described by Zoning Ordinance of the Town of Oakfield as applicable and deemed appropriate by the Town Board.

Depending on the prospective residents and the total size of the development, the Town Board, at its discretion, can exempt or modify this requirement.

Specific recreation facilities to be constructed by the Developer shall be determined by the Town Board. The construction of the recreation facilities shall be completed prior to the receipt of a Certificate of Occupancy for any structures in excess of fifty (50) percent of the total homes for that particular section/phase.

All common land set aside for recreational facilities should be easily accessible through common walkways to all residents of the development and to the Town of Oakfield for maintenance. An adequate and clear right-of-way will be required for maintenance.

Watercourses and other environmental features where Town ownership is in the public interest should be maintained by the Town through ownership or easement. Some pond areas can be designed for recreation, as well as, drainage.

Open areas, which do not serve a public purpose and which are not suitable for common recreation land, should not be set aside as public or common land, but should be added to nearby lots. Conservation easements may be required to prohibit further development of environmentally sensitive areas.

The Town Board reserves the right to determine those parklands to be used for active recreational purposes and those to remain as passive recreational purposes. The Developer shall be required to install signs or other demarcation devices to delineate the limits of the parkland from residential lots.

2.9 Irrevocable Letter of Credit

Financial responsibility of the Developer shall be in the form of an Irrevocable Letter of Credit from a recognized banking facility within the State of New York or an escrow deposit with the Town of Oakfield in the form of cash, certified check, or cashier's check. Upon receiving approval of a particular subdivision section and/or site plan, the Developer's licensed professional engineer shall submit an "Estimate of Improvements". The Developer's engineer's estimate shall be reviewed and approved by the Town Board in writing. The Developer's Agreement, in the Town's standard format, and the Irrevocable Letter of Credit is required prior to the preconstruction meeting or the start of any work. An Irrevocable Letter of Credit shall be itemized in detail and shall consist of, but not limited to, the following minimum items:

A. Water Distribution System

1. Water piping
2. Hydrant assemblies
3. Valves
4. Water services
5. Restoration of surfaces
6. Testing
7. Road bore
8. Lawn restoration
9. Driveway restoration
10. Roadway restoration

B. Sanitary Sewer System

1. Sewer piping (including wye branches)
2. Sanitary manholes
3. Laterals
4. Pump stations (as applicable)

C. Storm Water Collection System

1. Storm sewer piping
2. Storm manholes
3. Catch basins
4. Yard inlets
5. End sections
6. Driveway culverts
7. Road culverts
8. Flushing of storm sewer

D. Roadways

1. Road excavation and boxout
2. Road base (including weep wedge and underdrain pipe)
3. Binder pavement
4. Top pavement
5. Concrete gutters/curbing
6. Sidewalks
7. Seeding within R.O.W.

E. Grading and Erosion Control

1. Sediment basins (installation and maintenance)
2. Silt fencing (installation and maintenance)
3. Drainage swales
4. Detention/retention ponds and appurtenances
5. Rock excavation/blasting
6. Re-vegetation of primary swales
7. Lot grading
8. Fill material
9. Dust control

F. Miscellaneous

1. Street lights
2. Street signs
3. Monuments
4. Plantings
5. Berms
6. Lawn restoration
7. Recreation facilities

G. Five percent (5%) Town inspection fee on total of items A to F

The detailed estimate shall be summarized as follows:

Construction Costs Sections A – F Subtotal
10% Contingency
Total Estimated Construction Cost
Record Plans
Owner's Guarantee (5% of total construction cost)
Inspection for Dedicated Facilities (5% of total construction cost)
TOTAL LETTER OF CREDIT AMOUNT

The developer's engineer's "Estimate of Improvements" shall be submitted to the Town Board together with a copy of the subdivision and/or site plan for approval.

The Irrevocable Letter of Credit document shall be in the Town's approved format. Attached to the Irrevocable Letter of Credit and made a part thereof shall be the Town's Agreement in the approved format (see "Exhibit A").

Such fees normally charged by the Town as recreation fees, building permit fees, and sewer connection fees are not covered under the Irrevocable Letter of Credit but must be paid to the Town prior to the issuance of a building permit.

The letter of credit shall be written so as to comply with the terms and conditions specified by the Town, as set forth in a specimen copy of a letter of credit that has been approved by the Town Attorney, which is shown in Appendix 1. Unless otherwise required by the Town, recreation fees and engineering review fees are not to be included in the letter of credit and must be paid to the Town prior to the issuance of a building permit or prior to establishing a date for a public hearing where necessary. In such instances where the appropriate Town authority required that the letter of credit include provision for engineering review fees and/or the cost of Town inspection of improvements to be dedicated, the said letter of credit shall expressly direct the bank holding said letter of credit to pay such engineering fees to the Town.

The inspection items shall include a sufficient allowance for Town inspection of facilities and improvements to be dedicated. All engineering services related to the construction stage that have not been paid from the letter of credit, shall be charged directly to the Developer. The Town shall not issue a Certificate of Occupancy until such charges have been paid to the Town.

The Town shall release from the letter of credit, upon satisfactory and approved installation of the sanitary and storm sewers, 60% of the money allocated for these items in the letter of credit. After approved lamping, testing, cleaning, and sealing of manholes, an additional 40% of the money set aside shall be released. Sewers may not be tested and lamped until the completion of rough road boxing, but shall be done prior to the placement of road materials. Any pipe repair work must be done in an approved manner by using acceptable patented repair sleeves or by removing and replacing damaged pipe. Repairs to sanitary sewers by using concrete patches or other inferior workmanship will not be permitted.

The contingency item (10%) is intended to cover unforeseen costs from any extras or changes in quantities or types of materials used on the project. The contingency amount can be used at the

Town's discretion to reimburse the inspection account or cover the cost of overruns that occur on the project.

The Owner's guarantee (5%) assures the Town of funds to cover the legal and engineering costs or other costs incurred from the transfer of the contract to another contractor for completion. This combined amount (15%) also constitutes a control figure which guarantees that certain items are completed, which include: survey monuments in place, as-built maps delivered, warranty bond established, final inspection completed and final acceptance by the Town of public improvements which have been made.

The letter of credit is to be renewed yearly. That is, renewal is required one year from the date the letter is established, and each year thereafter that the project is active. Prior to each renewal date, the Town Engineer shall review the costs requested in the letter. An increase in the letter of credit dollar amount may be required before renewal is permitted, to reflect current construction costs. The Developer must take this into account at each yearly review period.

On each construction statement seeking release of funds under the letter of credit, an amount equal to 10% of the work in place shall be retained to cover the cost of cleanup, manhole frame adjustments, finish grading, lateral staking, etc. In general, the 10% retainage shall be taken on sections: (A) water facilities, (B) sanitary facilities, (C) storm drainage and facilities, (D) grading, paving, and sidewalks, (E) erosion control (erosion and dust control, and siltation facilities), (F) miscellaneous (such items as landscaping). In general, no retainage is necessary for such miscellaneous items as engineering, inspection, mass grading, contingencies, as-built maps, and monumentation once these items have been completed.

2.10 Preparation of Record Plans

The Developer shall submit record plans prior to obtaining final approval of completed works.

2.11 Approval of Completed Works and Maintenance Bond

Developer is responsible for obtaining approval of completed works by appropriate Town officials and other agencies. Final approval of underground utilities may precede final approval of pavement and gutters if approved by Town and if warranted by appropriate warranty bond and/or the withholding of funds as established by Town Attorney.

Upon completion of the required work under the letter of credit, a maintenance bond shall be established. All maintenance bond amounts shall be for 10% of the original performance bond, but no maintenance bond shall be for an amount less than $5,000 (face value). If separate bonds are submitted, each will be a minimum of $5,000.00. If the entire project is not completed in a timely manner, the Town has the right to ask for subsequent extensions of the initial maintenance bonds.

Inasmuch as weather conditions dictate practicality of performance as well as accessibility for appropriate inspection of the improvements, all maintenance bonds shall commence no earlier than June 1 or later than October 1 and expire two (2) years thereafter.

Maintenance bonds need not be written to include all dedicated facilities and improvements in one bond. But no more than three (3) maintenance bonds for one subdivision section will be acceptable. If the Developer chooses, maintenance bonds may be established at the completion of the facilities or improvements listed below:

A. Water mains, hydrants, valves, services, etc.

B. Sanitary and storm sewers including pump stations, manholes, laterals, etc.

C. Roadway construction, including road foundation items, asphalt, gutters, and catch basins.

D. Drainage facilities such as detention ponds, major creek and ditch work, erosion control, etc.

2.12 Release of Warranty

It shall be the Developer's responsibility to notify the Town forty-five (45) days prior to the expiration of the warranty period. The Town will make a final inspection and establish a "punch list" of work to be corrected as part of the warranty. Developer shall make necessary repairs prior to completion of warranty period or warranty will be extended.

Developer to be responsible for having his licensed surveyor set street monuments prior to termination of warranty period. He shall advise the Town Engineer when these are set and have his surveyor available to point them out for final approval.

2.13 Preconstruction Meeting

Each development is required to schedule a preconstruction meeting prior to starting any work on the project, unless otherwise determined by the Town Board. The meeting shall be scheduled through the Code/Zoning Enforcement Officer. The Developer, or his engineer, is responsible for contacting all applicable utility agencies once a meeting date has been determined. The Developer, contractor, subcontractors, and design engineer shall be in attendance at the preconstruction meeting. No work on the project site can begin until after the meeting.

The Developer shall provide, at a minimum, the Town Oakfield with the following prior to scheduling the preconstruction meeting:

- ➔ Five (5) sets of project plans with all approval signatures
- ➔ Irrevocable Letter of Credit and executed Agreement
- ➔ Copies of all required insurance certificates; comprehensive and liability (minimum one (1) million and three (3) million respectively)
- ➔ All required easements and descriptions
- ➔ Copies of all permits from regulatory agencies (NYSDOT, NYSDEC, County Highway Department, County Health Department), and the Town of Oakfield
- ➔ Copy of the NOI required by the NYSDEC SPDES Permit

This meeting will cover specific details of the project, including, but not limited to the timetables for the development, special conditions, permit requirements, Town Policy, release of funds, erosion control measures, and all other topics of interest to this development.

Any questions or problems that may arise during construction should be referred directly to the Town Highway Superintendent.

The contractor and/or Developer shall obtain and have prior to the preconstruction meeting, a current Town of Oakfield "Design Criteria and Construction Specifications for Land Development" book. This book must be on the project site at all times during the course of construction.

2.14 Areas of Responsibility

The following describes the general areas of responsibility of the various Town, county, and state departments that participate in the review and approval of a project in the Town of Oakfield. This summary is provided to give the Developer an awareness of the parties involved in this process.

A. Supervisor and Town Board

- ✓ Supervisor is fiscal officer for release of Letter of Credit funds
- ✓ Review and consider dedication roads and other public facilities
- ✓ Review and consider special district requests
- ✓ Review and consider special permits
- ✓ Inspect all development sites subject to their approval
- ✓ Conduct public hearings on subdivisions and site plans
- ✓ Approve or deny applications and determine conditions of approval
- ✓ Grant conditional use permits for new development
- ✓ Supervisor signs all approved subdivision and site plans.
- ✓ Review and consider waivers from design criteria and construction specifications when warranted

B. Planning Board

- ✓ Review all development sites
- ✓ Conduct public informational meetings
- ✓ Provide recommendations to Town Board on applications and any waivers from design criteria and construction specifications

C. Town Engineer

When requested by the Town Board, the Town Engineer shall:

- ✓ Review road layout, site grading, and storm drainage
- ✓ Review all utilities and all matters relative to design criteria and construction specifications

- ✓ Recommend special conditions and modifications
- ✓ Review and approve the Developer's engineer's estimate of costs for improvements
- ✓ Review and approve Developer's request for release of funds from the Letter of Credit
- ✓ Periodic inspection of construction when requested by Town
- ✓ Make warranty inspection

D. Town Attorney

- ✓ Review all necessary legal documents of the formation of necessary improvement districts
- ✓ Review all necessary legal documents for dedication, easements, Letter of Credit and Surety Bond
- ✓ Record all required legal documents for dedication and easements

E. Town Highway Department

- ✓ Review and approve dedicated street design with Town Engineer
- ✓ Review and approve drainage plans with Town Engineer
- ✓ Inspect the construction of all dedicated street construction
- ✓ Inspect dedicated streets and drainage facilities prior to end of warranty period

F. Genesee County Health Department

- ✓ Review and approve plans for public water supply improvements
- ✓ Review and approve all on-site sewage disposal systems
- ✓ Realty subdivision approval as required

G. New York State Department of Environmental Conservation

- ✓ Review and approve plans for dedicated sanitary sewer improvements
- ✓ Review NOI for compliance with requirements of the SPDES General Permit for Stormwater Discharges from Construction Activity
- ✓ Issue permits required by NYS Environmental Conservation Law

Design

Section 3 General Design Requirements

3.1 General

The development of property shall conform to Subdivision of Land Regulations and zoning restrictions established by the Town. It shall also conform with all regulations established herein as well as to appropriate laws, rules, and regulations established by all governing bodies having or claiming jurisdiction over various phases of the development.

Where a conflict arises between these regulations and those of other agencies, the Developer shall make it known to the conflicting agencies the area of disagreement and endeavor to have such agencies resolve their differences before proceeding with development.

Though these standards have principally been developed to apply to subdivisions, they shall apply to other developments as well to the extent that the standards are applicable.

3.2 Basis of Design, General

The term "utilities" as used herein shall be defined as roads, drains, sewers, water mains, and appurtenances thereto which will, upon acceptance by the Town, be turned over to the Town or other public agency for maintenance and operation.

Utilities shall be designed to conform to the topography of the property and existing utilities on adjacent streets or property. Developers shall satisfy themselves by preliminary investigation, and consultation with appropriate Town officials, as to the adequacy of adjoining facilities upon which their property must rely for service, most particularly water mains, sewers, drains and culverts.

Developers bear the responsibility of providing sound engineering design of all utilities, subject to the approval of the Town. The design shall be prepared by a professional engineer licensed to practice in the State of New York, who shall have had experience in the design of such utilities. The design shall conform to the requirements set forth herein. A brief report describing the basis of design for the storm drainage, sanitary sewer and water lines shall be submitted with the preliminary and final plan submittal.

3.3 Submission of Plans and Pertinent Data

The Developer shall submit a sketch plan/concept plan, preliminary and final plans as outlined in the Sequence of Procedures in the front of this book, and as required by such other Town policy or local, State, or Federal laws and regulations as may be in force and as are applicable.

A. Engineer's Report

The applicant shall submit a report addressing the following minimum items for consideration by the Town of Oakfield:

- ➔ Description and design calculations for the storm water management system and water quality improvements;
- ➔ Description and design calculations for the water supply and fire protection system;
- ➔ Description of erosion control plans;
- ➔ Description and design calculations for the sanitary sewer disposal system, including capacity of downstream facilities;
- ➔ Description and design calculations for traffic generation from the site and the level of service for adjacent intersections, as required by the Town Engineer;
- ➔ Test pit results for rock and water table determination;
- ➔ Engineer's estimate for construction costs.

B. Required Drawings

In preparing the detailed subdivision (development) plans the Developer shall subdivide the project into three (3) major "sets" of plans as follows:

Subdivision Plat Record Plan
Subdivision Grading & Drainage Plan
Subdivision Utility & Street Plan

Submission requirements for other types of developments shall be in accordance with applicable ordinances.

Specifically, the drawings shall include, but not be limited to, the following:

1. Subdivision Plat Record Plan

   All maps must be prepared on such medium and be of such size as will be accepted by the County Clerk for filing, and shall be drawn at a minimum scale of 50' to 1" unless otherwise approved by the Code Enforcement Officer. Where more than one sheet is required to show the entire development, a key map showing all sections shall be provided. The following information shall be clearly shown:

   a. Title of the sheet, including name and address of the design engineer, Owner and Developer and all required signatures. (Where Developer or owner is a corporation, a statement of corporate ownership and officers shall be submitted to the Planning Board, at the preliminary stage).

   b. North point, graphic scale, and date.

   c. The boundaries of the subdivision and information to show the location of the subdivision in relation to surrounding property and streets, including names of owners of adjacent land or names of adjacent subdivision. In whatever manner that is practical, the subdivision boundary shall be referenced from two directions. The map shall contain a notation of the location and elevation of a benchmark referenced to USGS datum. All

plans should be tied into the NYS Plane Coordinate System using the NAD 83 datum. In the event that such monuments have been obliterated, the subdivision boundary shall be referenced to the nearest highway intersections or at least two previously established monuments of subdivisions of public lands. Any combination of types of reference ties may be accepted which would fulfill the requirement of exact measurements from the subdivision boundary to reference points previously established.

d. The location and widths of existing and proposed streets and events within the subdivision and the lines of existing or approved streets on adjoining properties. (Street name must be approved by the Town Board.)

e. The names of existing and proposed streets.

f. All maps shall show the location of existing buildings and septic systems within the limits of the map, with front, rear, and side setbacks from any lot line with dimensions thereof and all existing buildings outside the limits of the map, within one hundred feet (100') of any proposed street or any proposed lot line. All corner lots must show building location. Also setbacks for corner lots and exterior lots must be consistent with the current zoning ordinance.

g. The lines and dimensions of proposed lots, which shall be numbered and shall have their area in square feet indicated.

h. The lines and purposes of existing and proposed easements immediately adjoining and within the subdivision.

i. The lines and dimensions of all property which is offered, or to be offered, for dedication for public use, with the purpose indicated thereon, and of all property that is proposed to be reserved by deed covenant for the common use of the property owners of the subdivision.

j. The location of monuments to be placed within the subdivision.

k. The locations of any municipal and zoning boundary lines within the subdivision, including fire districts, school districts, and special use districts

l. Statements as to:

The zoning of the property within the subdivision.

Compliance of the proposed lots with zoning requirements. If any lots do not comply but are covered by zoning variances, the statement should include reference to such variance.

m. Certification by a licensed land surveyor as evidence of professional responsibility for the preparation of the plat and a place for the liber and

page where filed. In addition, a licensed professional engineer shall place his seal and signature on the plat map as evidence of professional responsibility for any engineering work also shown thereon.

n. Plans for each phase of the subdivision shall contain an overall plan showing layout of all proposed and existing lots associated with the project.

2. Subdivision Grading and Drainage Plan

This plan shall be on a separate sheet of the same size and scale as the plat and provide the following information:

a. The plan shall contain date, north arrow, and graphic seal.

b. Contours of existing grade at intervals of not more than 2'. Intervals of l' may be required depending on the character of the topography and lot sizes. A separate grading map will be required where the terrain is such to make it necessary. Contours to extend a minimum of 400' beyond property limits are required and up to 300’ beyond property limits including finished grade shall be provided upon request by the Town.

c. Approximate location of all adjacent and proposed buildings.

d. Number of each lot and area in square feet.

e. The location and grade of all driveways and roadways adjacent to the property under construction.

f. Location of all existing swales, creeks, ponds, drainage outlets, and other drainage structures with invert elevations.

g. Final grades and/or contours at intervals of not more than 2', lesser intervals may be required depending on topography, including the location of all swales, creeks, ponds, drainage outlets, and other drainage structures with invert elevations.

h. Location and means of controlling erosion within the project limits.

i. Slope stabilization details.

j. Flood hazard prevention, when applicable.

k. Storm water detention basins and ground recharge facilities.

l. Seal, signature, and address of the New York State licensed professional engineer responsible for the engineering work.

3. Subdivision Utility and Street Plans

This plan shall be on a separate sheet(s) of the same size and scale as the plat and provide the following details:

a. Seal and signature of the NYS licensed professional engineer responsible for the engineering work.

b. The plans shall show the plan of any water or sewer utilities (storm water and/or sanitary).

c. The map shall show the location, material, class, inverts, and size of existing sewers (storm water and/or sanitary) and appurtenances on the subject or adjoining property or into which any connection is proposed, including all appurtenances. The size, material, and location of catch basins and yard inlets should be provided.

d. The map shall contain date, north arrow, scale, tie to nearest generally known point, point of tangency, point of curvature, length of tangent, length of radius of curve and all angles or bearings for the proposed roadway and right-of-way.

e. The map shall show plans for highways, including concrete gutters, swales, curbing, stormwater sewer collection systems.

f. The map shall contain plans and profiles for highways, including storm water sewers, sanitary sewers and water supply system piping in accordance with accepted standards and specifications of the Town of Oakfield. The plans shall show monuments at each angle point on one (1) side of all highways in the subdivision, or as otherwise directed by the Town Engineer.

g. The map shall indicate the type, material, class, and size of all existing and proposed water mains and appurtenances.

h. The map shall show the hydrant flow data for existing water mains and the location of the nearest hydrant.

i. All plans shall be tied into the State Plane Coordinate System using the NAD 83 datum and New York State West zone coordinate system.

j. Other data or details pertinent to the project and/or as required by Planning Board, Highway Superintendent, Town Engineer, or the Town Board shall be included as part of the Subdivision Final Plans.

Section 4 Road, Street, and Pavement

4.1 General

Where a conflict arises between these regulations and those of other agencies, the Developer shall make known to the conflicting agencies the area of disagreement and endeavor to have such agencies resolve their differences before proceeding with development.

Though these standards have principally been developed to apply to subdivisions, they shall apply to other developments as well to the extent that the standards are applicable.

4.2 Basis of Design, General

The term "facilities" as used herein shall be defined as road or street improvement, gutters, sidewalk, and related improvements, which will, upon acceptance by the Town, be turned over to the Town for maintenance and operation.

Facilities shall be designed to conform to the topography of the property and existing utilities on adjacent streets or property. Developers shall satisfy themselves by preliminary investigation, and consultation with appropriate Town officials, as to the adequacy of adjoining facilities upon which their property must rely for service.

Developers bear the responsibility of providing sound engineering design of all facilities, subject to the approval of the Town. The design shall be prepared by a professional engineer licensed to practice in the State of New York, who shall have had experience in the design of such facilities. The design shall conform to the requirements set forth herein. A brief description describing the basis of design shall be included in the project engineering report and submitted with the preliminary and final plan submittal.

4.3 Proper Design

New facilities to be owned and maintained by the Town shall be designed by a professional licensed engineer to practice in New York State, in accordance with the requirements of this Design Criteria and Construction Specifications. For requirements not specifically stated in the document, the AASHTO publication A Policy on Geometric Design of Highways and Streets – 2011 or most recent revision shall apply. Plans and specifications shall be submitted to, and written approval shall be obtained from the Town and the NYS Department of Transportation, before initiating any construction. The design shall anticipate and allow for flows from all possible future extensions or developments within the immediate drainage area.

4.4 Street Arrangement

Street systems shall be designed with due regard to the needs for: convenient traffic access and circulation; traffic control and safety; pedestrian and bicycle circulation access for fire fighting and emergency vehicles, snow removal, and street maintenance equipment; and storm water drainage

and sewage disposal. Streets shall be designed to accommodate the prospective traffic, and so arranged as to separate through traffic from neighborhood traffic insofar as it is practicable.

The streets in contiguous subdivisions shall be coordinated so as to compose a convenient system. When a subdivision adjoins undeveloped land, the subdivision streets shall be laid out in a manner, which will provide suitable access and future street connection to the adjoining undeveloped land. Streets for this purpose shall be constructed to the subdivision boundary and temporarily dead-ended. Temporary dead end streets in excess of 200 feet shall be provided with a temporary turnaround. A temporary easement shall be provided to the Town for the turn around and shall remain in effect until such time as the street is extended. A notation to this effect shall be provided on the subdivision plat map. These same requirements shall apply at the discretion of the Town Board in those cases where the adjoining land is another section of the same subdivision, and which is not scheduled for development at the same time.

Streets shall be arranged to conform as closely as possible to the original topography, to minimize grading and disturbance of the existing physical characteristics of the site. The street shall not have steep grades or sharp curves. Building sites shall be constructed at or above the grade of the streets in as many locations as practical and should be a consideration for selecting the roadway alignment.

The suitability of a soil as a roadway subgrade is an important engineering consideration. The Town Board reserves the right to require the use of a geotextile filter fabric of a type appropriate for roadway bed containment, underdrain, or other intended use. Geotextiles which are on the current Approved List issued by the New York State Department of Transportation Materials Bureau or approved by the Town Engineer shall be acceptable.

Where a development abuts or contains an existing or proposed arterial street or other existing town, county or state highway the Town Board may require marginal access streets, reverse frontage with screen planting contained in a non-access reservation along the rear property line, deep lots with or without rear service alleys, or such other treatment as may be necessary for adequate protection of residential properties and to afford separation of through and local traffic.

Where a development borders or contains an existing or proposed railroad right-of-way or controlled access highway right-of-way, the Town Board may require a street approximately parallel to and on each side of such right-of-way, at a distance suitable for the appropriate use of the intervening land, as for park purposes in residential districts, or for business, commercial or industrial purpose in appropriate districts. Such distances shall also be determined with due regard for the requirements of approach grades and future grade separation.

4.5 Temporary Dead-end Streets

Where a street does not extend to the boundary of the subdivision and its continuation is not needed for access to adjoining property, it shall be separated from such boundary by a distance sufficient to accommodate a lot meeting the requirements of the Zoning Ordinance. Reserve strips of land shall not be left between the end of a proposed street and an adjacent piece of prop-

erty. However, the Town Board may require the reservation of an easement 30 feet wide for pedestrian traffic or utilities.

4.6 Standards for Street Design

Street design standards are provided for the following classifications of streets:

1. Non-dedicated private drive: defined as a privately owned drive serving a maximum of four housing units.

2. Parkway road: defined as a street serving a maximum of 12 housing units.

3. Minor street: defined as a street serving a maximum of 150 housing units.

4. Collector street: defined as a street serving over 150 housing units.

Typical sections for each of the street classifications are provided in the standard detail sheets, as well as typical restoration details for excavations in existing streets. All street construction or repair shall be designed in accordance with the standard details and the design criteria in Table 4.1.

4.7 Street Intersections

1. Intersections involving an arterial street shall be held to a minimum and spaced at least 1,320 feet apart. Intersections involving a collector street shall be a minimum of 880 feet apart. Intersections involving two minor streets shall be a minimum of 440 feet apart and shall not be cross (four cornered) intersections insofar as possible.

2. Within 50 feet of an intersection, streets shall be approximately at right angles and in no case shall the angle of intersection be less than 75 degrees. Minimum curb, pavement or gutter radii shall depend on the intersecting street types; and shall be as follows:

Collector with arterial:	35 feet
Minor with arterial:	35 feet
Collector with collector:	35 feet
Minor with collector:	30 feet
Minor with minor:	30 feet
Non-dedicated private drive with minor:	30 feet

TABLE 1
STANDARDS FOR STREET DESIGN

	Non-Dedicated Private Drive	Parkway Road	Minor Street	Collector Street
Minimum width of right-of-way	See Note 1	60 feet	60 feet	70 feet
Minimum width of pavement	See Note 2	22 feet	22 feet	24 feet
Minimum radius of horizontal curves, at street centerline	90 feet	100 feet	150 feet	300 feet
Minimum length of vertical curves	See Note 3	See Note 3	See Note 3	See Note 3
Minimum length of tangents between horizontal curves	NA	NA	100 feet	200 feet
Maximum grade	10%	10%	7%	6%
Minimum grade	0.5%	0.5%	0.5%	0.5%
Minimum sight distance, based on current AASHTO policy	NA	150 feet	200 feet	300 feet

(1) No R.O.W. for a single dwelling. 50 feet minimum for 2-4 dwellings.
(2) 11 feet for a single dwelling, 22 feet for 2-4 dwellings.
(3) The minimum length of vertical curves shall be based on current AASHTO policy covering, selection of vertical curve length based on stopping sight distance, passing sight distance, riding comfort, and headlight sight distance.

Access streets into the subdivision from an arterial street shall have a minimum curb radii of 40 feet. All property corners at street intersections shall be rounded with a minimum radius of 20 feet, or have comparable cutoffs or chords, as the Town Board sees fit. Within triangular areas formed by the intersecting street lines, for a distance of 75 feet from their intersection, and the diagonals connecting the end points of these lines, visibility for traffic safety shall be provided by exclusions of plantings or structures and regrading as necessary.

Grades within the intersection should not exceed 1%, while they should not exceed 1% for a distance of 50 feet from the intersection. From 50 to 100 feet, generally the grades should not exceed 3% and in no case shall they exceed 5%.

Triangles, circles, or other traffic channeling islands may be required at intersections where present or anticipated traffic conditions indicate their advisability for traffic control or safety in accordance with AASHTO or NYSDOT design standards.

4.8 Street Grading and Shoulders

Areas within street rights-of-way shall be graded as necessary to eliminate any slopes steeper than one foot vertical in three feet of horizontal distance. Street shoulders shall not exceed a slope of 10% as measured at a at right angle to the street centerline. Shoulders at least eight feet wide shall be provided on both sides of collector streets. Minor streets shall have a shoulder at least eight feet wide on one side of the street and at least four feet wide on the other. All other unpaved areas within the street right-of-way shall be treated with topsoil and seeded to grass except where noted.

4.9 Sidewalks

Concrete sidewalks shall be provided in locations where they are deemed by the Town/Planning Board to be appropriate and in the interest of public safety or convenience and in accordance with the typical road section detail.

4.10 Trees

The Developer shall take adequate measures to preserve desirable existing trees in suitable locations within the subdivision.

In general, the street right-of-way shall be cleared of existing trees, but occasional existing trees of unusual value may be preserved within the street right-of-way if approved by the Town Board. No new tree plantings are permitted within R.O.W.

4.11 Street Names and Signs

All streets shall be named, and such names shall be subject to the approval of the Town Board. Names shall be sufficiently different in sound and spelling from other street names in the Town and post offices contiguous to the Town to minimize confusion. A street which is a continuation of an existing street shall bear the same name. Relating street names to features of local historical, topographical, or other natural interest is encouraged. Signs shall be in accordance with the National Manual on Uniform Traffic Control Devices (MUTCD) for streets and highways and 17NYCRR Chapter V (New York State Supplement).

4.12 Monuments

Permanent survey monuments shall be set in the boundary of rights-of-way at intersecting streets, PC and PT of curves, though the P.I. of short curves may be used instead, where such is practical, at the discretion of the Highway Superintendent and/or the Town Engineer. Monuments shall be placed on one side of the street only and at only one corner of intersecting streets. Adjacent monumented points shall be intervisible.

Monument locations shall be shown on the subdivision plat; field notes of ties to monuments or a tie sheet shall be submitted to the Town Engineer after installation of monuments.

Monuments shall be of stone or concrete and not less than 4 inches in diameter or square, and not less than 42 inches long or from the top of underlying rock. Concrete monuments shall be reinforced with steel rods, and a plug, brass plate, or pin shall serve as the point of reference. If stone, a drilled hole shall serve as the point of reference and a magnetic rod or other suitable metal shall be placed adjacent to the monument to allow for recovery.

4.13 Street Improvements - General

In addition to the required improvements specifically referred to elsewhere in these regulations, subdivision plats and other developments shall provide for all other customary elements of street construction and utility service which may be appropriate in each locality as determined by the Town Board. Such elements may include, but shall not be limited to: street pavement, gutters, storm water, inlets, manholes, curbs, sidewalks, street lighting standards, water mains, fire hydrants, and sanitary sewers. Underground utilities within the street right-of-way shall be located as required by the Town Board, Highway Superintendent, and/or the Town Engineer, and underground service connections to the property line of each lot shall be installed before the street is paved. All street improvements and other construction features of the development shall conform to Town specifications which may be established from time to time and shall be subject to approval as to design, specifications, and construction by the Highway Superintendent.

A. Widening of Existing Street Right-of-Way

Where a subdivision or other development adjoins an existing street which does not conform to the right-of-way standards given in Table 1 entitled "Standards for Street Design" in these regulations, the Developer shall dedicate whatever additional right-of-way width is necessary to provide, on the development side of the normal street centerline, a width which is equal to at least one-half of the minimum standard width for the respective type of street.

4.14 Road Sections

The road sections provided in this manual shall be used for the various road sections allowed in the Town.

4.15 Non-Residential Subdivisions

Standards for roads in non-residential subdivisions and other developments with an internal circulation network shall be appropriate for the use intended (i.e. commercial, industrial). Non-residential roads proposed for dedication shall, as a minimum, consist of the materials and pavement thicknesses indicated on the detail for "Typical Collector Road". Developer's engineer shall submit pavement design calculations to the Town Engineer for review prior to final approval.

4.16 Highway Frontage

1. To promote and protect the public health, safety, and welfare it shall be the policy of the Town Board to control the number of entrances and exits onto and off from State, County, and Town highways.

2. This policy is adopted toward the end that safer highways shall result, more cohesive neighborhoods be developed, and abutting property owners shall not be unduly and unnecessarily inconvenienced in the future when it becomes necessary to widen highways to accommodate greater traffic flows.

3. To implement the policy described in paragraph 1, the Town Board shall from time to time, as part of the process of approving sketches, maps, plots, plats, or plans require that the applicant grant to the Town of Oakfield such easements as are required to provide access to contiguous properties onto a public highway via frontage or service roads, common driveway, or such other roadways as are required so that the number of entrances and exits onto and off from State, County, and Town highways are not increased.

4.17 Private Drives

Private drives are not normally encouraged in the Town of Oakfield. In the event one should be permitted, the following standards shall apply. The Town Board will review all private drives in relation to access, ability to support traffic loads, traffic circulation, drainage and maintenance. All private drives shall be named and marked with an approved sign for adequate identification for emergency and fire situations. The conditions and standards for private drives are as follows:

1. A private drive may serve a maximum of four housing units. The length of the drive may vary in length, but shall be designed for convenience to traffic, effective police and fire protection, safety, and ease of maintenance.

2. Right-of-Way

    a. A right-of-way for a single lot shall be at least 30 feet in width and shall be owned in fee by the lot owner.

    b. A right-of-way serving two, three or four lots shall be at least 50 feet in width and each owner shall own a fee interest in a part of said right-of-way that is at least 50 feet in width. Ownership of said 50-foot wide parcel may be in common with others.

3. Drainage Easements - shall be permanently reserved for the Town where road runoff must cross private property. Easement width is to be proposed by the Developer and approved by the Town Engineer.

4. Turning Radius - shall be a minimum of 20 feet to the inside radius or as required to safely turn the local emergency vehicles.

5. A turn around shall be provided at the end of each private drive, and shall be designed to accommodate emergency vehicles.

6. At the discretion of the Town Board, private drive design to serve a development may be submitted to the Town Engineer for review.

7. The owner shall cause to be recorded in the County Clerk's office a declaration of covenants, restrictions and easements in a form acceptable to the Town's Attorney, which shall, at a minimum, provide:

a. For reciprocal easements for use of said road of each owner of a lot in said subdivision.

b. For a declaration that the Town has no responsibility for the maintenance of said private road.

c. That maintenance of the road is to be paid for by the owners of the lots. "Maintenance" shall include normal upkeep reconstruction, drainage, snow plowing and any and all other costs which may be associated with such road.

d. That no certificate of occupancy can be issued until the road is installed in accordance with the above specifications and to the satisfaction of the Town Highway Superintendent, Town Engineer or a letter of credit is obtained.

e. Should a majority of the lot owners or prospective Developers of any of the lots desire to upgrade the road to Town specifications, and seek dedication, no lot owner sharing in the access agreement shall protest or impede the dedication by virtue of their access or ownership rights to the right-of-way.

8. See private drive detail drawing at rear of book.

Section 5 Storm Drainage Facilities

5.1 General

Where a conflict arises between these regulations and those of other agencies, the Developer shall make known to the conflicting agencies the area of disagreement and endeavor to have such agencies resolve their differences before proceeding with development.

Though these standards have principally been developed to apply to subdivisions, they shall apply to other developments as well to the extent that the standards are applicable.

5.2 Basis of Design, General

The term "facilities" as used herein shall be defined as storm drainage systems and appurtenances thereto, which will, upon acceptance by the Town, be turned over to the Town for maintenance and operation.

Facilities shall be designed to conform to the topography of the property and existing utilities on adjacent streets or property. Developers shall satisfy themselves by preliminary investigation, and consultation with appropriate Town officials, as to the adequacy of adjoining facilities upon which their property must rely for service.

Developers bear the responsibility of providing sound engineering design of all facilities, subject to the approval of the Town. The design shall be prepared by a professional engineer licensed to practice in the State of New York, who shall have had experience in the design of such facilities. The design shall conform to the requirements set forth herein. A brief description describing the basis of design shall be included in the project engineering report and submitted with the preliminary and final plan submittal.

5.3 Proper Design

New storm drainage facilities and extensions to, existing storm drainage facilities, and all extensions to owned and operated by the Town shall be designed by a professional licensed engineer to practice in New York State, in accordance with the provisions of this section. The design shall anticipate and allow for flows from all possible future extensions or developments within the immediate drainage area.

5.4 Submission of Plans and Pertinent Data

A. Basis of Design Report

The Basis of Design Report shall contain the following:

1. A brief description of the project.

2. A description and map (USGS) of the drainage area on-site and adjacent to the site from which stormwater flows into and through the project site.

3. A soils map, including, when appropriate, soil borings necessary for the design and construction of ponds and/or infiltration devices.

4. A drawing showing the 100 year floodplain where applicable.

5. A description of the engineering criteria used in the design of the project.

6. A description of the hydrologic considerations including:

   - ➔ Tributary drainage areas delineated on a map;
   - ➔ Calculated times of concentration;
   - ➔ Rainfall intensity;
   - ➔ Runoff coefficients;
   - ➔ Design flows;
   - ➔ A discussion of the pre- and post-development runoff conditions.

7. A summary with supporting calculations for the design of facilities to be constructed including but not limited to pipes, swales, drainage channels, ponds, and related facilities.

B. Plans and Support Documents

1. Plans of Sewers

   a. Detail Plans: Detail plans shall be submitted. Profiles should have a horizontal scale of not more than 50 feet to the inch and a vertical scale of not more than 10 feet to the inch. Plan views should be drawn to a corresponding horizontal scale to the profile. Plans and profiles shall show:

      1) Location of streets and sewers;

      2) Line of ground surface; size, material, and type of pipe; length between manholes; invert and surface elevation at each manhole; and grade of pipe between each two adjacent manhole (all manholes shall be numbered on the profile) and the elevation and location of the first floor shall be plotted on the profile of the sewer for all buildings to be served.

      3) Locations of all special features.

      4) All known existing structures and utilities, both above and below ground, which might interfere with the proposed construction, or particularly water mains and water supply structures, gas mains, sanitary sewers, and telephone and power conduits;

5) Detailed plans of all drainage provisions, proposed work, vegetative practices, erosion, and sediment control measures consistent with those practices recommended in the latest version of the New York State Guidelines for Urban Erosion and Sedimentation Controls;

6) Special detail drawings, made to a scale to clearly show the nature of the design, shall be furnished to show the following particulars:

a) All stream crossings and sewer outlets, with elevations of the stream bed and normal and extreme high and low water levels;
b) Details of all special sewer joints and cross-sections; and
c) Details of all storm sewer appurtenances such as manholes, inlets, etc.

2. Specifications

Complete technical specifications shall be submitted for the construction of sewers and all other appurtenances, and shall accompany or be part of the plans and details.

The specifications shall include, but not be limited to, all construction information not shown on the drawings which is necessary to inform the contractor in detail of the design requirements for the quality of materials, workmanship, and fabrication of the project.

The specifications shall also include: the type and size of pipe, construction materials; special filter materials, such as stone, sand, gravel, or slag; miscellaneous appurtenances; instructions for testing materials and equipment as necessary to meet design standards; and performance tests for the completed works and component units.

3. Revisions to Approved Plans

Any deviations from approved plans or specifications affecting capacity, flow, or point of discharge shall be approved, in writing, before such changes are made. Plans or specifications so revised should, therefore, be submitted well in advance of any construction work which will be affected by such changes to permit sufficient time for review and approval. Structural revisions or other minor changes not affecting capacities, flows, or operation will be permitted during construction without approval. "As-built" plans clearly showing such alterations shall be submitted at the completion of the work.

5.5 Purpose and Intent

It is the purpose and intent of this section to protect the Town and its residents from adverse effects of stormwater runoff caused by the modification of any existing drainage system during construction or development on one or more parcels of land.
The adverse effects may include but are not limited to the following:

- ➔ Increased rate of storm drainage runoff
- ➔ Soil movement and erosion
- ➔ Decreased water quality
- ➔ Sediment accumulation
- ➔ Decrease in soil absorption rate
- ➔ Decrease in existing water quality of creeks, streams, rivers and any other body of water within the Town
- ➔ Increase in peak flows, volume, velocity and water concentration
- ➔ Obstruction of creeks, streams, rivers, and any other body of water within the Town.

5.6 General Requirements

1. The design and construction of drainage systems shall be such that the natural watercourses traversing the development will be preserved wherever possible without adversely affecting the overall runoff rate, quantity, or water quality in addition to any improvements, existing or proposed buildings downstream or adjacent to the development. Off-site drainage water entering the development shall be received and discharged at locations and in a manner consistent with the natural drainage patterns. The discharge flow at the downstream area of the development shall be contained in drainage facilities so that the flow effect will be returned to predevelopment conditions prior to leaving the development area or in a reasonable distance.

2. Natural drainage patterns shall be preserved and is preferable to realigning, rechanneling streams or watercourses. No work shall be performed which directly or indirectly affects the natural patterns without the approval of the Town, County, State or Federal agency having jurisdiction.

3. No chemicals, fuels, lubricants, sewage or other pollutants shall be discharged into any drainage system.

4. Fill or refuse shall not be deposited on any wetland, floodplain or drainage system without the approval of the agency having jurisdiction.

5. No man-made structures shall block or restrict natural drainage patterns unless permitted by the Town and / or other Agencies having jurisdiction.

6. Surface drainage shall be maintained during construction to prevent soil and sediment from washing across or upon another property.

7. Drainage systems and stormwater sewer capacity shall be designed to handle the anticipated flows from the entire drainage basin when fully developed according to the existing zoning.

8. Sedimentation basins shall be employed as required by the Town and / or other Agencies having jurisdiction to prevent siltation of downstream facilities or natural water courses.

9. Surface waters and drainage shall not be altered or revised, except with approval of the Town, where identified as being significant source of groundwater replenishment for the purpose of a potable water supply.

10. The New York State Department of Environmental Conservation has been approved by the United States Environmental Protection Agency to administer its State Pollution Discharge Elimination System (SPDES) program. Any new development project which disturbs one acre or more is subject to the requirements of the New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activity Permit No. GP-0-10-001 or current revision. Evidence of compliance with the requirements of this permit must be submitted to the Town as a condition of Town approval.

5.7 Design of Drainage Systems

A. Hydrologic

1. The design of natural watercourse channels shall depend upon the drainage area according to the following table.

Design Return Intervals For Natural Watercourses

Drainage Area	Recurrence Interval
Above 20 sq. mi.	100 years
Between 4 and 20 sq. mi.	50 years
Less than 4 sq. mi.	25 years

2. Storm sewers and other hydraulic structures and channels shall be sized based upon a design flow with a minimum return interval of 10 years.

3. The capacity of a drainage channel within a development shall be based upon both the existing and anticipated rate of urbanization within the development watershed and the type of development possible. Wherever a development may be located within a watershed in the initial stages of development, the proposed

drainage system shall be designed to adequately pass the flows that would be generated from continued development within the watershed. Wherever a development is located within a watershed in the advanced stages of development the system shall be designed and constructed to pass the project design flow determined for the ultimate urbanization of the tributary watershed. Storage basins may be provided to increase the capacity of the drainage system and attenuate flows to downstream structures so that the capacities will not be exceeded.

a. Two types of drainage basins may be constructed. A detention basin, drained by gravity through a control-sized pipe located at the downstream end of the detention basin.
b. A retention basin allows for storage of stormwater runoff with release via evaporation or infiltration. Storage basins may be sized to accept excessive flow over and above the capacity of downstream drainage facilities and be used to improve flows through a proposed development or from a proposed development.
c. Parameters or rules regarding the stormwater discharge from a detention facility are as follows: The rate of discharge from a developed area shall not exceed the rate of discharge under the natural undeveloped conditions for all storm events.

4. For undeveloped areas of the tributary watershed, the percentage of surface classification shall be based upon land use, zoning and soil maps and correlated with projected land uses. Wherever a development watershed contains extensive permanent open land uses such as railroads, public parks, cemeteries and parkways such factors may be additionally considered in determining an appropriate coefficient of runoff.

5. The Hydrologic Design shall conform to the latest professional manuals, tables and figures dealing with the many facets of stormwater systems. A number of methods can be used to estimate volume and peak runoff rates such as the Rational Method, SCS TR-20, and SCS TR-55. Other methods are acceptable with proper documentation.

6. The rainfall-intensity curves included in Figures 1 and 2 may be used for computing anticipated rainfall. The coefficient of runoff for various surface types shall be selected from the following table:

TABLE 2
RUNOFF COEEFFICIENTS FOR VARIOUS SURFACES

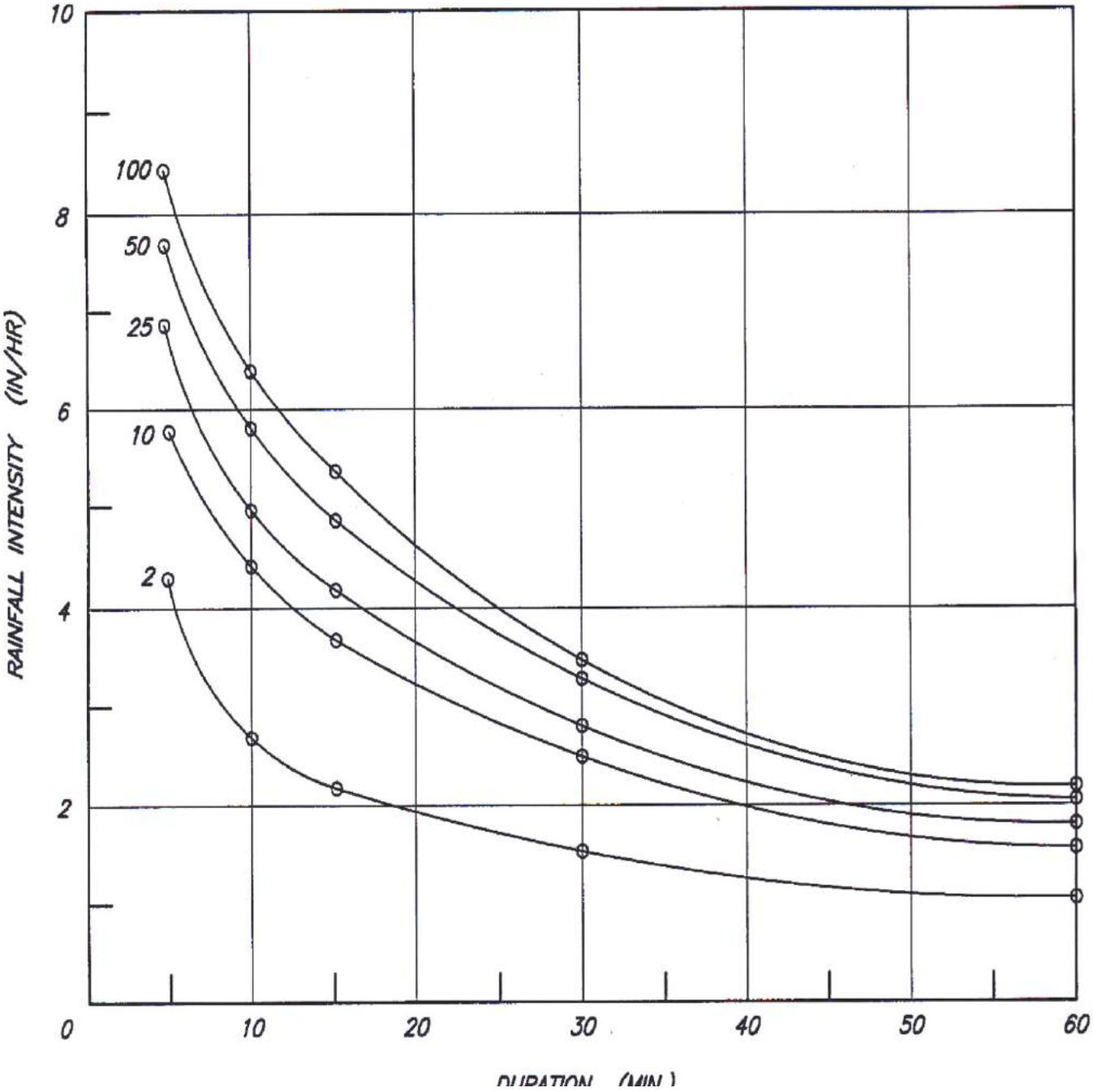
Description of Area	C
Watertight Roofs	0.70-0.95
Asphalt Concrete Streets	0.85-0.90
Paved Driveways and Walks	0.75-0.85
General Driveways and Walks	0.15-0.30
Lawns, Sandy Soil	
2% Slope	0.05-0.10
2-7% Slope	0.10-0.15
>7% Slope	0.15-0.20
Lawns, Heavy Soil	
2% Slope	0.13-0.17
2-7% Slope	0.18-0.22
>7% Slope	0.25-0.35

FIGURE 1

RAINFALL INTENSITY

STORM EVENT	DURATION				
	5 Min. (in inches)	**10 Min. (in inches)**	**15 Min. (in inches)**	**30 Min. (in inches)**	**60 Min. (in inches)**
2 yr.	4.32	2.76	2.2	1.56	1.03
10 yr.	5.88	4.44	3.68	2.48	1.58
25 yr.	6.84	5.04	4.16	2.88	1.86
50 yr.	7.68	5.60	4.88	3.28	2.08
100 yr.	8.40	6.42	5.32	3.48	2.17

FIGURE 2


10
8
6
4
2
0
100
50
25
10
2
RAINFALL INTENSITY (IN/HR)
10
20
30
40
50
60
DURATION (MIN.)

7. A coefficient of runoff of 0.20 is the maximum that shall be used for existing conditions. For residential subdivisions, the coefficient of runoff shall not be less than 0.40 minimum.

8. For developments that require a permit under the State Pollutant Discharge Elimination System General Permit for stormwater discharges, the following volume requirements must be determined and mitigated: Water Quality Volume, Channel Protection Volume, Overbank Flood Volume and Extreme Storm Volume. Please see the New York Stormwater Management Design Manual to determine where these conditions do not apply and / or contact the NYSDEC.

B. Hydraulic

1. Hydraulic Design – The hydraulic design shall be performed in accordance with the hydrologic criteria specified herein and in accordance with modern standard procedures, endorsed by the American Society of Civil Engineers. The ultimate stormwater control capacity volume shall be based upon the design recurrence interval with the discharge rate from the structure's outfall not exceeding the criteria set forth as follows:

   - ➔ Control of the peak discharge from the developed 1-year storm event to the 1-year predevelopment rate.
   - ➔ Control of the peak discharge from the developed 10-year storm event to the 10-year predevelopment rate.
   - ➔ Control of the peak discharge from the developed 100-year storm event to the 100-year predevelopment rate.

   In addition, for those sites that meet the State Pollutant Discharge Elimination System General Permit criteria for stormwater discharges, the Water Quality Volume shall be determined based on the 90% rule. That is the Water Quality Volume is designed to improve water quality sizing to capture and treat 90% of the average annual stormwater runoff volume. (Refer to New York Stormwater Management Design Manual for additional information.)

2. The outlet structure for the stormwater control facility shall uniformly regulate the discharge of stormwater runoff throughout all storm events. The design structure shall consistently control the difference between the pre- and post-development runoff for all storm events.

3. The hydraulic design shall conform to the latest professional manuals, tables and figures dealing with the many facets of stormwater systems, including water quality management measures as defined by the NYSDEC.

4. The hydraulic design of all closed drainage systems shall conform to the latest professional manuals that will substantiate and integrate proven hydraulic principals and basic assumptions. Open and closed drainage systems shall be designed

to provide complete drainage for all elements within the development (roadways, yards, open space, etc.). The size of the pipes with a closed drainage system shall be designed to provided capacity for a 10 year storm event and produce a minimum velocity of three (3) feet per second when flowing full. The minimum pipe size shall have a 12-inch diameter.

5. A detailed grading plan shall be provided with a contour interval suitable for the map scale. The map shall provide for surface drainage for all lots within the development and adjacent land.

C. Criteria

All catch basins, manholes, inlets and other items placed within a development shall conform to the standards approved by the Town. The structural design of all drainage items shall be subject to the approval by the Town and conform to the standard specifications adopted by the Town.

1. Channels – The minimum bottom width of channels shall be three feet. The creation of excessive number of curves in open channels shall be avoided to protect against excessive erosion. The Town reserves the right to require bank protection. Earth channels shall have a minimum side slope of one to three (1 vertical: 3 horizontal) or flatter, unless otherwise approved by the Town (or the Town's representative).

2. Enclosed conduits/drainage systems – Except for adequate natural watercourses, all storm drainage within the development shall be conveyed in a pipe system having an "N" value of 0.013 and a maximum pipe diameter of 48 inches. The Developer and their engineers bear the responsibility of providing technical design data in this regard and shall be submitted to the Town and/or their approval representative.

3. Drainage Systems – The minimum pipe size shall be 12 inches. An "N" of 0.013 shall be used for smooth pipe. No metal pipes shall be allowed. Manholes shall be provided at all grade and direction changes. The maximum space between drainage structures shall be 300 feet with the minimum cover of conduits as required by the specific manufacturer. Systems shall be designed using a straight-line grade and alignment between manholes.

4. Manhole tops shall be accurately designed to conform to finished grade.

5. All three-way manholes shall have a minimum diameter of 5 feet. The invert of a three-way manhole will have a minimum horizontal radius equal to one-half the diameter of the manhole for the branch flow. No "T" intersections will be allowed.

6. Developers and their engineers shall design the vertical control of the subdivision so that surcharge of storm drainage systems will not cause a backup or flooding of

cellars. This will require that cellars drains not be connected to the storm drainage system.

7. Storm drains conveying drainage along side lot lines shall extend to the rear lot line or to the main channel to which the drain discharging.

D. Stormwater Detention Basins

1. The Town has determined that stormwater detention/retention ponds are required to prevent downstream natural watercourses from being over taxed and prevent excessive erosion.

2. The stormwater control capacity volume shall be based upon the design recurrence interval with the discharge rate from the structure's outfall not exceeding the criteria set forth as stated above.

3. The Town reserves the right to establish other more restrictive parameters. For example, if the downstream area has been subjected to floods in the past, even while the upstream areas were not developed, and if the Town deems it desirable and appropriate to remedy this situation, they may, at the Town's discretion required an impoundment area of a size and type as well as storm sewers and culverts, which can assist in rectifying the downstream flooding situation. Downstream flooding may include flooded backyards or overtaxed downstream piping systems.

4. The following parameters shall be following regarding stormwater discharge:

    a. The rate of discharge from developed area shall not exceed the rate of discharge under natural undeveloped conditions for all storm events as defined above.

    b. The rate of discharge shall be reduced further if in the opinion of the Town, the downstream streams/channels would otherwise be subjected to potential overflow, erosion, or siltation as a result of runoff from the development.

    c. The Town reserves the right to request the Developer to improve swales, ditches, or channels immediately downstream of the development. The preservation and improvement of stream and channels downstream shall be permitted on a case-by-case basis for situations where downstream facilities are inadequate, or where a reduction in the rate of discharge is not practical. The Developer shall submit detailed information on proposed preservation and improvement methods.

    d. Engineering Procedures – Detention Basin Design – The following methods for detention basin hydrology calculations are acceptable for design: SCS TR-55 "Urban Hydrology for Small Watersheds", Rational Method

or Modified Rational Method, or SCS TR –20 "Project Formulation Hydrology". Other methods are acceptable with proper documentation. The following information shall be included in the design:

1) Inflow hydrograph shall be determined for pre-developed and post-developed conditions for each design storm.
2) The volume of storage shall be estimated based on design discharge rate.
3) Selection of the outlet structure that limits the discharge to the pre-developed rate or less for each design storm event.
4) The facility shall be designed in a manner that does not cause inundation upstream during the high water ponding levels.
5) The detention facility shall be provided with an emergency spillway capable of passing the 100-year storm event.
6) The downstream pathway of the detention facility and spillway shall be investigated to insure that the pathway has sufficient overflow capacity to prevent impacts on adjacent dwellings.
7) All ponds shall have trickle tube risers designed as follows:
    a) Minimum diameter of 36 inches.
    b) Maximum height of 6 feet.
    c) Riser shall be as high as outflow pipe.
    d) Trash rack shall be designed for placement on top of riser.
    e) Emergency spillway shall pass the 100-year storm event at a maximum flow depth of 0.5 feet.
    f) Rip-rap shall be provided as a lining for the emergency spillway.
    g) Top of berm shall be 1.5 feet above emergency spillway elevation.
    h) The bottom of the pond shall be sloped at a minimum of 0.50%.
    i) The pond berm shall consist of select fill (NYSDOT Item 203.05) as defined by NYSDOT 203-2 except that no material shall be larger than 4 inches in the maximum dimension, and shall be compacted in 6 inch layers in accordance with NYSDOT 203-3.12.
    j) Topsoil shall be removed prior to berm placement.
    k) Seepage collars or an approved equivalent method shall be used to prevent piping of water along the outside of the outflow pipe. A minimum of two seepage collars shall be provided around the outflow pipe.
    l) Maximum pond side slopes shall be 1V : 3H.
    m) Unusual topographic conditions may warrant changes in the pond geometry and discharge structure and should be approved by the Town.

5.8 Erosion and Sedimentation Control

In order to assure that the surrounding land and watercourses will not be subjected to siltation or erosion the Town shall require the Developer to follow certain guidelines. The following is a list of procedures that may be required:

1. Installing and maintaining temporary sedimentation basins at the point or points of stormwater discharge from the property.

2. The area of clearing and grubbing, excavation, borrow and embankment operations in progress shall commensurate with the Developers capability and progress in keeping the finished grading, mulching, seeding and other temporary and/or permanent control measures.

3. Provisions for temporary vegetation and/or mulching.

4. Provide provisions for adequate drainage facilities to effectively accommodate the increased runoff caused by changed soil and surface conditions.

5. Retain and protect existing natural vegetation.

6. Install permanent final vegetation and structures as soon as possible.

7. Provide adequate protective measures along steep slopes and along swales, ditches, etc.

8. Other procedures as defined in the New York Guidelines For Urban Erosion and Sedimentation Controls shall be required as defined by the Town or the Town's representative.

5.9 Water Quality

For those sites that meet the NYSDEC SPDES General Permit criteria for regulation of stormwater discharges, the stormwater management practices described in Chapter 7 of the 2010 New York State Stormwater Management Design Manual, or latest release, are acceptable to the NYSDEC for water quality treatment. The Town does not currently require that stormwater quality treatment practices in excess of those described in this section be implemented.

However, evidence of compliance with the requirements of the NYSDEC's SPDES General Permit must be submitted to the Town as a condition of Town approval.

5.10 Drainage Easements

1. Closed Drainage Systems – An easement of not less than twenty (20) feet in width shall be provided to contain the enclosed drainage system and provide working space for personnel and equipment for service of enclosed drainage system.

Easements shall be placed along or adjacent to lot boundary lines and in a straight alignment. Easements shall be indicated on a map of the development and designated as follows “Drainage Easement to the Town of Oakfield”.

2. Constructed Channels – Channels constructed within the a development shall have enough easement dedicated to contain the top width of the channel plus a minimum twenty-foot continuous work space along one side of the channel for channels less than twenty feet in width. For channel widths greater than twenty feet, the easement shall be provide for the top width of the channel as well as twenty foot work areas along both sides of the channel. Easements shall be indicated on a map of the development and designed as follows “Drainage Easement to the Town of Oakfield”.

5.11 Flood Hazard Prevention

Flood Hazard prevention shall include the control of soil erosion of land surface and drainage channels and the prevention of inundation and excessive ground water seepage by comprehensive site grading and the establishment of adequate elevations of buildings, building openings and roadways above the computed water levels of stormwater elements.

1. All proposed development within the Flood Hazard area defined by the Federal Emergency Management Agency (FEMA) shall comply with all regulations set forth by the Federal Insurance Administrator. In addition, all development must comply with the Town regulations.

2. Development within or adjacent to the floodplain shall comply with current Town zoning, ordinances and regulations. Particular attention shall be paid to the development in the vicinity of Oak Orchard Creek and its tributaries. No alteration of the existing characteristics of the areas shall take place without the specific approval of the Town as to the adequacy of the protective measures taken, in any, and the effects of such development on upstream and downstream reaches of the watercourse and adjacent properties.

Section 6 Sanitary Sewage Facilities

There are currently minimal sewage facilities in the Town. However, there may be additional facilities in the future, and the Developer shall justify that it is unreasonable to extend service to the proposed development at the time of approval.

6.1 General

Where a conflict arises between these regulations and those of other agencies, the Developer shall make known to the conflicting agencies the area of disagreement and endeavor to have such agencies resolve their differences before proceeding with development.

Though these standards have principally been developed to apply to subdivisions, they shall apply to other developments as well to the extent that the standards are applicable.

6.2 Basis of Design, General

The term "facilities" as used herein shall be defined as sanitary sewers and appurtenances thereto, which will, upon acceptance by the Town, be turned over to the Town for maintenance and operation.

Facilities shall be designed to conform to the topography of the property and existing utilities on adjacent streets or property. Developers shall satisfy themselves by preliminary investigation, and consultation with appropriate Town officials, as to the adequacy of adjoining facilities upon which their property must rely for service.

Developers bear the responsibility of providing sound engineering design of all facilities, subject to the approval of the Town. The design shall be prepared by a professional engineer licensed to practice in the State of New York, who shall have had experience in the design of such facilities. The design shall conform to the requirements set forth herein. A brief description describing the basis of design shall be included in the project engineering report and submitted with the preliminary and final plan submittal.

6.3 Proper Design

New sanitary sewers and all extensions to sanitary sewers owned and operated by the Town shall be designed by a professional licensed engineer to practice in New York State, in accordance with the Recommended Standards for Wastewater Facilities, as adopted by Great Lakes-Upper Mississippi River Board (GLUMRB) of State Sanitary Engineers (Ten State Standards) latest revision, and in strict conformance with the NYSDEC, before initiating any construction. The design shall anticipate and allow for flows from all possible future extensions or developments within the immediate drainage area.

6.4 Submission of Plans and Pertinent Data

A. Basis of Design Report

The Basis of Design Report shall contain the following:

1. Flow and Organic Load: The anticipated design average and design peak flows and waste load for the existing and ultimate conditions must be established. The basis of the projection of initial and future flows and waste load must be included and must reflect the existing, or initial service area, and the anticipated future service area.

2. Impact on Existing Wastewater Facilities: The impact of the proposed project on all existing wastewater facilities, including gravity sewers, lift stations, and treatment facilities must be evaluated.

3. Project Description: A written description of the project is required.

4. Drawings: Drawings identifying the site of the project and anticipated location and alignment of proposed facilities are required.

5. Engineering Criteria: Engineering criteria to be used in design of the project shall be included.

6. Site Information: Project site information should include topography, soils, geologic conditions, depth to bedrock, groundwater level, floodway or floodplain considerations, and other pertinent site information.

7. Alternative Selection: The reasons for selection of the proposed alternative, including any lift station sites, feasibility, and how the project fits into a long-term plan, should be discussed.

B. Plans and Support Documents

1. Plans of Sewers

   a. Detail Plans: Detail plans shall be submitted. Profiles should have a horizontal scale of not more than 50 feet to the inch and a vertical scale of not more than 10 feet to the inch. Plan views should be drawn to a corresponding horizontal scale to the profile. Plans and profiles shall show:

      1) Location of streets and sewers;

      2) Line of ground surface; size, material, and type of pipe; length between manholes; invert and surface elevation at each manhole; and grade of sewer between each two adjacent manhole (all manholes shall be numbered on the profile) and the elevation and location of the first floor shall be plotted on the profile of the sewer for all build-

ings to be served. The Engineer shall state that all sewers are sufficiently deep to serve all first floors;

3) Locations of all special features such as inverted siphons, concrete encasements, etc.

4) All known existing structures and utilities, both above and below ground, which might interfere with the proposed construction or require isolation setback, particularly water mains and water supply structures (i.e. wells, clear wells, basins), gas mains, storm drains, and telephone and power conduits;

5) Special detail drawings, made to a scale to clearly show the nature of the design, shall be furnished to show the following particulars:

a) All stream crossings and sewer outlets, with elevations of the stream bed and normal and extreme high and low water levels;
b) Details of all special sewer joints and cross-sections; and
c) Details of all sewer appurtenances such as manholes, lampholes, inspection chambers, inverted siphons, etc.

2. Plans of Sewage Pumping Stations

a. Detail Plans: Detail plans shall be submitted showing the following, where applicable:

1) Topography of the site;
2) Existing pumping station;
3) Proposed pumping station, including provisions for installation of future pumps or ejectors;
4) Elevation of high water at the site, and maximum elevation of wastewater in the collection system upon occasion of power failure;
5) Maximum hydraulic gradient in downstream gravity sewers when all installed pumps are in operation; and
6) Test borings and groundwater elevations.

b. Specifications

Complete technical specifications shall be submitted for the construction of sewers, wastewater pumping stations, and all other appurtenances, and shall accompany the plans.

The specifications accompanying construction drawings shall include, but not be limited to, all construction information not shown on the drawings

which is necessary to inform the builder in detail of the design requirements for the quality of materials, workmanship, and fabrication of the project.

The specifications shall also include: the type, size, strength, operating characteristics, and rating of equipment; allowable infiltration; the complete requirements for all mechanical and electrical equipment, including machinery, valves, piping, and jointing of pipe; electrical apparatus, wiring, instrumentation, and meters; operating tools, construction materials; special filter materials, such as stone, sand, gravel, or slag; miscellaneous appurtenances; instructions for testing materials and equipment as necessary to meet design standards; and performance tests for the completed works and component units.

c. Revisions to Approved Plans

Any deviations from approved plans or specifications affecting capacity, flow, operation of units, or point of discharge shall be approved, in writing, before such changes are made. Plans or specifications so revised should, therefore, be submitted well in advance of any construction work which will be affected by such changes to permit sufficient time for review and approval. Structural revisions or other minor changes not affecting capacities, flows, or operation will be permitted during construction without approval. "As-built" plans clearly showing such alterations shall be submitted at the completion of the work.

6.5 Design of Sewers

A. Details of Gravity Pipe Design

1. Minimum Size

No gravity sewer conveying raw wastewater shall be less than 8 inches (203 mm) in diameter.

2. Depth

Sewers should be sufficiently deep to receive wastewater from first floors or basements where practical, and to prevent freezing. Insulation shall be provided for sewers that cannot be placed at a depth sufficient to prevent freezing.

Consideration shall also be given to the relationship of house elevation to sewer elevation to assure the installation of laterals on at least a one percent (1%) grade (1/8-inch per foot) for 6-inch laterals and (2%) grade (1/4-inch per foot) for 4-inch laterals.

3. Buoyancy

Buoyancy of sewers shall be considered and flotation of the pipe shall be prevented with appropriate construction where high groundwater conditions are anticipated.

4. Slope

a. Recommended Minimum Slopes

All sewers shall be assigned and constructed to give mean velocities, when flowing full, of not less than 2.0 feet per second based on Manning's formula using an "n" value of 0.013. The following are the recommended minimum slopes which should be provided; however, slopes greater than these are desirable.

Sewer Size	Minimum Slope in Feet Per 100 Feet
8 inch	0.40
10 inch	0.28
12 inch	0.22
14 inch	0.17
15 inch	0.15
16 inch	0.14
18 inch	0.12
21 inch	0.10
24 inch	0.08
27 inch	0.067
30 inch	0.058
33 inch	0.052
36 inch	0.046
39 inch	0.041
42 inch	0.037

5. Minimum Flow Depths

Slopes slightly less than those recommended for the 2.0 feet per second velocity, when flowing full, may be permitted. Such decreased slopes will only be considered where the depth of flow will be 0.3 of the diameter or greater for design average flow. The Town will give written assurance to the appropriate reviewing agency that any additional sewer maintenance required by reduced slopes will be provided.

6. Minimize Solids Deposition: The pipe diameter and slope shall be selected to obtain the greatest practical velocities to minimize settling problems. Oversize sewers will not be approved to justify using flatter slopes. If the proposed slope is less than the minimum slope of the smallest pipe which can accommodate the design peak hourly flow, the actual depths and velocities at minimum, average, and

design maximum day and peak hourly flow for each design section of the sewer shall be calculated by the design engineer and be included with the plans.

7. Slope Between Manholes: Sewers shall be laid with uniform slope between manholes.

8. High Velocity Protection: Where velocities greater than 15 feet per second are attained, special provision shall be made to protect against displacement by erosion and impact.

9. Steep Slope Protection: Sewers on 20 percent slopes or greater shall be anchored securely with concrete, or equal, anchors spaced as follows:

    a. Not over 36 feet center to center on grades 20 percent and up to 35 percent;

    b. Not over 24 feet center to center on grade 35 percent and up to 50 percent; and

    c. Not over 16 feet center to center on grades 50 percent and over.

10. Alignment: Sewers shall be laid with straight alignment between manholes. Straight alignment shall be checked by either using a laser beam or lamping.

11. Changes in Pipe Size:

    When a smaller sewer joins a larger one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.

    Sewer extensions should be designed for projected flows even when the diameter of the receiving sewer is less than the diameter of the proposed extension at a manhole with special consideration of an appropriate flow channel to minimize turbulence when there is a change in sewer size.

12. Pipe Materials

    Any of the following generally accepted materials for sewers will be given consideration, but the material selected should be adapted to local conditions, such as: character of industrial wastes, possibility of septicity, soil characteristics, exceptionally heavy external loadings, abrasion, corrosion, and similar problems.

    All sewers shall be designed to prevent damage from superimposed live, dead, and frost induced loads. Proper allowance for loads on the sewer shall be made because of soil and potential groundwater conditions, as well as the width and depth of trench. Where necessary, special bedding, haunching and initial backfill, concrete cradle, or other special construction shall be used to withstand anticipated potential

superimposed loading or loss of trench wall stability. See ASTM D2321 or ASTM C 12 as appropriate.

For new pipe materials for which ASTM standards have not been established, the design engineer shall provide complete pipe specifications and installation specifications developed on the basis of criteria adequately documented and certified in writing by the pipe manufacturer to be satisfactory for the specific detailed plans.

a. Ductile Iron Pipe

1) Pipe
   a) Mechanical or push-on joints - AWWA C151, ANSI A21.51, Grade 60-42-10, standard laying lengths, except for closures and specials, shall be a minimum of 18'.
   b) Flanged joints - AWWA C115, ANSI 21.15.
2) Fittings - ANSI A21.10 (AWWA C110), MJ or MR as required, of suitable and equal strength as the pipe, lined and coated as specified below.
3) Joints
   a) Mechanical - AWWA C111.
   b) Push-On/AWWA C111, "Tyton" as manufactured by U.S. Pipe & Foundry Co., "Ball-Tite" as manufactured by Clow, or approved equal.
   c) Flanged - Specially designed long hub screw flanges, face drilled to ANSI B.16.1, Class 125 template for use with AWWA C110 fittings. Flanges shall be shop assembled. Pipe barrels, and pipe ends shall be refaced after assembly, plain face, smooth finish. All pipe threads shall be covered by the flange. Gaskets shall be factory cut, 1/16 inch thick, flat ring, cloth inserted rubber conforming to ANSI B16.21, 125 pound cast iron joint. Bolts shall be carbon steel, ASTM A307, Grade A, square head machine bolts with heavy steel hexnut. Bolt size and length shall conform to ANSI B16.1 for 125 pound cast iron joints, plain face, smooth finish.
   d) Mechanical, Restrained - AWWA C111, except, provide mechanical joint retainer gland with set screws in lieu of follower gland.
4) Class - Mechanical or push-on pipe shall be Class 51 or thicker. Flanged pipe shall be Class 53.
5) Lining
   a) Bituminous per AWWA C151.
   b) Cement Mortar with bituminous seal coat per AWWA C104.
   c) Coatings - Bituminous per AWWA C151.

b. Polyvinyl Chloride Pipe (PVC) Non-Pressure Piping (Gravity Sanitary Sewer)

1) Pipe and Pipe Fittings - Exterior Smooth Pipe

a) Acceptable Products - As manufactured by Certainteed, Johns-Mansville, Clow Corp., or approved equal.

b) Materials - PVC pipe and fittings to be used for gravity sewer shall fully conform to the requirements of ASTM D-3034 "Type PSM Poly (vinyl chloride) (PVC) sewer pipe and fittings", latest revision. Pipe and fittings shall also meet or exceed the requirements of Uni-Bell UNI-B-5 recommended standard for integral, gasketed joint PVC sewer pipe and fittings. Standard diameter ratios (SDR) shall be as shown on the Contract Drawings.

c) The pipe and pipe fittings shall also be made of PVC plastic having a cell classification of 12454-B, or 12454-C, or 13364-B as defined in ASTM D 1784.

d) The pipe shall not disintegrate or flake when tested (this does not replace any other testing) in accordance with ASTM D-2152.

e) The pipe shall meet impact resistance in accordance with ASTM D-2444.

f) The minimum pipe stiffness at 5% deflection shall be 46 psi when tested in accordance with ASTM D-2412.

g) Standard laying length shall be 20 feet. Random lengths of less than 20 feet may be utilized to make proper connections.

h) Pipe shall be green in color.

c. Joints

1) The pipe shall be joined with an integral bell, bell and spigot type rubber gasketed joint. Each integral bell joint shall consist of a formed bell complete with one or more rubber gaskets. Gaskets shall conform to ASTM D-1869 and ASTM F477. The gasket shall be locked securely in place by a groove formed in the bell to present displacement during assembly. The "locked-in" rubber seating ring shall also meet or exceed the requirements of ASTM D-3212 - Joints for Drain and Sewer Pipes Using Flexible Elastomeric Seals. Pipe with gaskets held in place by only glue will <u>not</u> be acceptable.

2) Each spigot end shall be clearly marked, for the entire circumference, indicating the proper distance of insertion into the adjoining bell end, such marking being placed so as to adequately allow for expansion and contraction of the pipeline over the full range of temperature fluctuations which may occur in the final installation. The sealing ring shall be the only element depended on to make the joint flexible and watertight.

3) Joint lubricant shall be as recommended by the manufacturer.

d. PVC Laterals

1) Materials
   a) Polyvinyl Chloride Pipe: Polyvinyl chloride pipe and fittings shall have bell and spigot joints with flexible elastomeric gaskets for short-side laterals. Long-side lateral joints can be glued. SDR-21 pipe and fittings shall conform to ASTM D2241, with joints conforming to ASTM D3139 and F477.

e. Miscellaneous Materials

1) Caps and Plugs
   a) Watertight, of similar manufacturer and producing the same joint conditions as the pipe on which the cap or plug is placed.
2) Bulkheads
   a) Watertight brick masonry, 8-inch thick minimum.
3) Foundation Materials
   a) Gravel or crushed stone bedding shall be as detailed.
   b) Select earth backfill shall be as detailed.
4) Pipe Adapters: Join pipes of different materials with adapters specifically manufactured for that purpose. Where dissimilar materials join, such that galvanic action may produce corrosion, provide dielectric couplings to preclude damage to the materials.
5) Stubs: Of the same material as the pipe, 5 feet long. Plug the stubs with suitable, approved plugs or caps specifically made for the purpose. Plugs and caps shall be watertight and installed so as to be readily removable without damage to the pipe when future connections are made.

B. Details of Pressure Pipe Design

1. Velocity and Diameter

At design pumping rates, a cleansing velocity of at least 2 feet per second should be maintained. The minimum force main diameter for raw wastewater shall be 4 inches.

2. Air and Vacuum Relief Valve

An air relief valve shall be placed at high points in the force main to prevent air locking. Vacuum relief valves may be necessary to relieve negative pressures on force mains. The force main configuration and head conditions should be evaluated as to the need for and placement of vacuum relief valves.

3. Termination

Force mains should enter the gravity sewer system at a point not more than 2 feet above the flow line of the receiving manhole.

4. Pipe and Design Pressure

Pipe and joints shall be equal to water main strength materials suitable for design conditions. The force main, reaction blocking, and station piping shall be designed to withstand water hammer pressures and associated cyclic reversal of stresses that are expected with the cycling of wastewater lift stations. Surge protection chambers should be evaluated.

5. Design Friction Losses

a. Friction losses through force mains shall be based on the Hazen and Williams formula (utilizing a "C" factor) or other acceptable methods.

b. Maximum Power Requirements

1) When initially installed, force mains will have a significantly higher "C" factor. The effect of the higher "C" factor should be considered in calculating maximum power requirements and duty cycle time to prevent damage to the motor.

6. Identification: Where force mains are constructed of material which might cause the force main to be confused with potable water mains, the force main shall be appropriately identified.

7. Ductile Iron Pipe and Fittings

a. All pipe and fittings shall be of good quality, strong, of even grain, and soft enough to permit drilling and cutting. Each pipe shall be free from any defects which would make it unfit for the use intended. All pipe shall be straight and be a true circle in section with concentric inner and outer surfaces. Pipe to be cut during installation shall be fully gauged for field cutting. Pipe metal shall be made without any admixture of cinder iron or other inferior material.

b. Pipe shall be ductile iron pipe conforming to the requirements of ANSI A21.51 (AWWA C151). Pipe class thickness shall be Class 52.

c. Fittings shall be gray iron or ductile iron fittings conforming to the requirements of ANSI/AWWA C110. Fittings shall equal or exceed the requirements of the main pipe and shall have a rated working pressure of 250 psi.

d. Pipe and pipe fittings shall be cement-mortar lined (double thickness) in accordance with the requirements of ANSI/AWWA C104/A21.4, with an asphalt coating on the outside of the pipe.

e. Joints shall be rubber gasket push-on, mechanical joint anchoring, or flange joint type. All joints shall conform to the requirements of ANSI/AWWA C111/A21.11. Electrical conductivity for push-on joints shall be maintained by the use of bronze wedges (two per joint for pipe sizes up to 12-inch diameter; four per joint for all other pipe sizes). Rubber gaskets shall be used on mechanical joints.

f. Underground pipe shall have an external polyethylene encasement tube with taped joints.

8. Polyvinylchloride (PVC)

a. Materials: Polyvinyl chloride pipe and fittings shall have bell and spigot joints with flexible elastomeric gaskets. SDR-35 pipe and fittings shall conform to ASTM D3034 Type PSM or ASTM F679 with joints conforming to ASTM D3212 and F477.

b. Reference: ASTM D1785 (current year) Pipe; ASTM D1787 (current year) Material.

c. The manufacturer's and supplier's certification that all materials furnished have passed the acceptance tests listed in the appropriate specifications shall be furnished.

C. Details of Manhole Design

1. Location: Manholes shall be installed at the end of each line, at all changes in grade, size, or alignment, at all intersections, and at distance not greater than 300 feet maximum. Cleanouts may be used only for special conditions and shall not be substituted for manholes nor installed at the end of laterals greater than 150 feet in length.

2. Drop Type

a. A drop pipe shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert shall be filleted to prevent solids deposition.

b. Drop manholes should be constructed with an outside drop connection.

c. Due to the unequal earth pressures that would result from the backfilling operation in the vicinity of the manhole, the entire outside drop connection shall be encased in concrete.

3. Diameter: The flow channel straight through a manhole should be made to conform as closely as possible in shape, and slope to that of the connecting sewers. The channel walls should be formed or shaped to the full height of the crown of

the outlet sewer in such a manner to not obstruct maintenance, inspection, or flow in the sewers. When curved flow channels are specified in manholes, including branch inlets, minimum slopes should be increased to maintain acceptable velocities.

4. Bench

   a. A bench shall be provided on each side of any manhole channel when the pipe diameter(s) are less than the manhole diameter. The bench should be sloped no less than 1/2 inch per foot (4 percent). No lateral sewer, service connection, or drop manhole pipe shall discharge onto the surface of the bench.

   b. The invert of a three-way manhole shall have a minimum horizontal radius equal to one-half (1/2) the diameter of the manhole for the branch flow connection. No tee intersections will be permitted.

5. Watertightness

   a. Manholes shall be of the precast concrete or poured-in-place concrete type. Manhole lift holes and grade adjustment rings shall be sealed with non-shrinking mortar.

   b. Inlet and outlet pipes shall be joined to the manhole with a gasketed flexible watertight connection or any watertight connection arrangement that allows differential settlement of the pipe and manhole wall to take place.

   c. Watertight manhole covers are to be used wherever the manhole tops may be flooded by street runoff or high water.

6. Inspection and Testing

   The Developer's specifications shall include a requirement for inspection and testing for watertightness or damage prior to placing into service.

D. Inverted Siphons

Inverted siphons should have not less than two barrels, with a minimum pipe size of 6 inches. They shall be provided with necessary appurtenances for maintenance, convenient flushing, and cleaning equipment. The inlet and discharge structures shall have adequate clearances for cleaning equipment, inspection, and flushing. Design shall provide sufficient head and appropriate pipe sizes to secure velocities of at least 3.0 feet per second for design average flows. The inlet and outlet details shall be so arranged that the design average flow is diverted to one barrel, and so that either barrel may be cut out of service for cleaning. The vertical alignment should permit cleaning and maintenance.

E. Location of Sewers in Streams

1. Cover Depth

The top of all sewers entering or crossing streams shall be at a sufficient depth below the natural bottom of the stream bed to protect the sewer line. In general, the following cover requirements must be met:

a. One foot of cover where the sewer is located in rock;

b. Three feet of cover in other material. In major streams, more than three feet cover may be required; and

c. In paved stream channels, the top of the sewer line should be placed below the bottom of the channel pavement.

Less cover will be approved only if the proposed sewer crossing will not interfere with the future improvements to the stream channel. Reasons for requesting less cover shall be provided in the Design Report.

2. Horizontal Location

Sewers located along streams shall be located outside of the stream bed and sufficiently removed there from to provide for future possible stream widening and to prevent pollution by siltation during construction.

3. Structures

The manholes or other structures shall be located so they do not interfere with the free discharge of flood flows of the stream.

4. Alignment

Sewers crossing streams should be designed to cross the stream as nearly perpendicular to the stream flow as possible and shall be free from change in grade. Sewer systems shall be designed to minimize the number of stream crossings.

F. Protection of Water Supplies

When wastewater sewers are proposed in the vicinity of any water supply facilities, requirements of the GLUMRB "Recommended Standards for Water Works", latest edition, should be used to confirm acceptable isolation distances in addition to the following requirements:

1. Cross Connections Prohibited

There shall be no physical connections between a public or private potable water supply system and a sewer, or appurtenance thereto which would permit the passage of any wastewater or polluted water into the potable supply. No water pipe shall pass through or come into contact with any part of a sewer manhole.

2. Relation to Water Works Structures

   a. While no general statement can be made to cover all conditions, it is generally recognized that sewers shall meet the requirements of the NYSDOH with respect to minimum distances from public water supply wells or other water supply sources and structures.

   b. All existing waterworks units, such as basins, wells, or other treatment units, within 200 feet of the proposed sewer shall be shown on the engineering plans.

   c. Soil conditions in the vicinity of the proposed sewer within 200 feet of waterworks units shall be determined and shown on the engineering plans.

3. Relation to Water Mains

   a. Horizontal and Vertical Separation

      1) Sewers shall be laid at least 10 feet horizontally from any existing or proposed water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10-foot separation, the NYSDEC may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the sewer closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the water main is at least 18 inches above the top of the sewer.

      2) If it is impossible to obtain proper horizontal and vertical separation as described above, both the water main and sewer must be constructed of slip-on or mechanical joint pipe complying with public water supply design standards of the NYSDOH and be pressure tested to 150 psi to assure watertightness before backfilling.

   b. Crossings

      1) Sewers crossing water mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to maintain line and grade.

2) When it is not possible to obtain proper horizontal and vertical separation as stipulated above, one of the following methods must be specified.

a) The sewer shall be designed and constructed equal to water pipe and shall be pressure tested at 150 psi to assure water tightness prior to backfilling.

b) Either the water main or the sewer line may be encased in a watertight carrier pipe which extends 10 feet on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be of materials approved by the NYSDOH for use in water main construction.

G. Design of Wastewater Pumping Stations

1. General

a. Instructions and Equipment

1) Wastewater pumping stations and portable equipment shall be supplied with a complete set of operational instructions, including emergency procedures, maintenance schedules, tools and such spare parts as may be necessary.

b. Flooding

Wastewater pumping station structures and mechanical equipment shall be protected from physical damage by the 100-year flood. Wastewater pumping stations should remain fully operational and accessible during the 25-year flood. Regulations of state and federal agencies regarding floodplain obstructions shall be considered.

c. Accessibility and Security

The pumping station shall be readily accessible by maintenance vehicles during all weather conditions. The facility should be located off the traffic way of streets and alleys. Security fencing and/or access hatches with locks shall be provided.

d. Grit

The design of the wet well and pump station piping shall receive special consideration to avoid operational problems from the accumulation of grit.

2. Design

The following items should be given consideration in the design of wastewater pumping stations:

a. Type

Two types of wastewater pumping stations will be considered acceptable: submersible and suction lift stations.

b. Structures

1) Equipment Removal

Provision shall be made to facilitate removing pumps, motors, and other mechanical and electrical equipment.

2) Access and Safety Loadings

a) Access

Suitable and safe means of access for persons wearing self-contained breathing apparatus shall be provided to wet wells.

3) Buoyancy

Where high groundwater conditions are anticipated, buoyancy of the wastewater pumping station structures shall be considered and, if necessary, adequate provisions shall be made for protection.

c. Pumps

1) Multiple Units

Multiple pump units shall be provided. Where only two units are provided, they shall be of the same size. Units shall have capacity such that, with any unit out of service, the remaining units will have capacity to handle the design peak hourly flow.

2) Pump Openings

Pumps handling raw wastewater shall be capable of passing spheres of at least 3 inches in diameter. Pump suction and discharge openings shall be at least 4 inches in diameter.

3) Electrical Equipment

Electrical systems and components (e.g. motors, lights, cables, conduits, switchboxes, control circuits, etc.) in raw wastewater wet

wells, or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present, shall comply with the National Electrical Code requirements for Class I Group D, Division 1 locations. In addition, equipment located in the wet well shall be suitable for use under corrosive conditions. Each flexible cable shall be provided with a watertight seal and separate strain relief. A fused disconnect switch located above ground shall be provided for the main power feed for all pumping stations. When such equipment is exposed to weather, it shall meet the requirements of weatherproof equipment NEMA 3R or 4. A 110 volt power receptacle to facilitate maintenance shall be provided inside the control panel for lift stations that have control panels outdoors. Ground fault interruption protection shall be provided for all outdoor outlets.

4) Intake

Each pump shall have an individual intake. Wet well and intake design should be such as to avoid turbulence near the intake and to prevent vortex formation.

5) Pumping Rates

The pumps and controls of pumping stations should be selected to operate at varying delivery rates. Insofar as is practicable, such stations should be designed to deliver as uniform a flow as practicable in order to minimize hydraulic surges. The station design peak hourly flow capacity shall be determined and should be adequate to maintain a minimum velocity of 2 feet per second in the force main.

d. Controls

Controls should be so located as not to be unduly affected by turbulent flows entering the well or by the turbulent suction of the pumps. Provision shall be made to automatically alternate the pumps in use.

e. Valves

1) Suction Line

Suitable shutoff valves shall be placed on the suction line of suction lift pumps.

2) Discharge Line

a) Suitable shutoff and check valves shall be placed on the discharge line of each pump. The check valve shall be located between the shutoff valve and the pump. Check

valves shall be suitable for the material being handled and shall be placed on the horizontal portion of discharge piping except for ball checks, which may be placed in the vertical run. Valves shall be capable of withstanding normal pressure and water hammer.

b) All shutoff and check valves shall be operable from the floor level and accessible for maintenance. Outside levers are recommended on swing check valves.

f. Wet Wells

1) Size

The design fill time and minimum pump cycle time shall be considered in sizing the wet well. The effective volume of the wet well shall be based on design average flow and a filling time not to exceed 30 minutes unless the facility is designed to provide flow equalization. The pump manufacturer's duty cycle recommendations shall be utilized in selecting the minimum cycle time. When the anticipated initial flow tributary to the pumping station is less than the design average flow, provisions should be made so that the fill time indicated is not exceeded for initial flows.

2) Floor Slope

The wet well floor shall have a minimum slope of 1 to 1 to the hopper bottom. The horizontal area of the hopper bottom shall be no greater than necessary for proper installation and function of the inlet.

3) Air Displacement

Covered wet wells shall have provisions for air displacement such as an inverted "j" tube or other means which vents to the outside.

g. Safety Ventilation

1) General

Adequate ventilation shall be provided for all pump stations.

2) Electrical Controls

Switches for operation of ventilation equipment should be marked and located conveniently. All intermittently operated ventilation equipment shall be interconnected with the respective lighting sys-

tem. Consideration should be given also to automatic controls where intermittent operation is used. The manual lighting ventilation switch shall override the automatic controls.

3) Fans, Heating, and Dehumidification

The fan wheel shall be fabricated from non-sparking material. Automatic hearing and dehumidification equipment shall be provided.

4) Wet Wells

Wet well ventilation may be either continuous or intermittent. Ventilation, if continuous, should provide 12 complete air changes per hour; if intermittent, at least 30 complete air changes per hour. Air shall be forced into the wet well by mechanical means rather than exhausted from the wet well. Portable ventilation equipment shall be provided for use at submersible pump stations and wet wells with no permanently installed ventilation equipment.

5) Flow Measurement

Suitable devices for measuring wastewater flow shall be provided at all pumping stations.

6) Water Supply

There shall be no physical connection between any potable water supply and a wastewater pumping station which under any conditions might cause contamination of the potable water supply.

H. Suction Lift Pump Stations

1. Pump Priming and Lift Requirements

a. Suction-lift pumps shall be of the self-priming or vacuum-priming type. Suction-lift pump stations using dynamic suction lifts exceeding the limits outlined in the following sections may be approved upon submission of factory certification of pump performance and detailed calculations indicating satisfactory performance under the proposed operating conditions. Such detailed calculations must include static suction-lift as measured from "lead pump off" elevation to center line of pump suction, friction, and other hydraulic losses of the suction piping, vapor pressure of the liquid, altitude correction, required net positive suction head, and a safety factor of at least 6 feet.

b. The pump equipment compartment shall be above grade and shall be effectively isolated from the wet well to prevent the humid and corrosive

sewer atmosphere from entering the equipment compartment. Wet well access shall not be through the equipment compartment and shall be at least 24 inches in diameter. Gasketed replacement plates shall be provided to cover the opening to the wet well for pump units removed for servicing. Valving shall not be located in the wet well.

2. Self-Priming Pumps

Self-priming pumps shall be capable of rapid priming and repriming at the "lead pump on" elevation. Such self-priming and repriming shall be accomplished automatically under design operating conditions. Suction piping should not exceed the size of the pump suction and shall not exceed 25 feet in total length. Priming lift at the "lead pump on" elevation shall include a safety factor of at least 4 feet from the maximum allowable priming lift for the specific equipment at design operating conditions. The combined total of dynamic suction-lift at the "pump off" elevation and required net positive suction head at design operating conditions shall not exceed 22 feet.

3. Vacuum-Priming Pumps

Vacuum-priming pump stations shall be equipped with dual vacuum pumps capable of automatically and completely removing air from the suction-lift pump. The vacuum pumps shall be adequately protected from damage due to wastewater. The combined total of dynamic suction-lift at the "pump off" elevation and required net positive suction head at design operating conditions shall not exceed 22 feet.

4. General

Submersible pumps and motors shall be designed specifically for raw wastewater use, including totally submerged operation during a portion of each pumping cycle and shall meet the requirements of the National Electrical Code for such units. An effective method to detect shaft seal failure or potential seal failure shall be provided.

5. Pump Removal

Submersible pumps shall be readily removable and replaceable without dewatering the wet well or disconnecting any piping in the wet well.

6. Electrical

a. Power Supply and Control

Electrical supply, control, and alarm circuits shall be designed to provide strain relief and to allow disconnection from outside the wet well. Terminals and connectors shall be protected from corrosion by location outside the wet

well or through use of watertight seals. If located outside, weatherproof equipment shall be used.

b. Controls

The motor control center shall be located outside the wet well, be readily accessible, and be protected by a conduit seal or other appropriate measures meeting the requirements of the National Electrical Code, to prevent the atmosphere of the wet well from gaining access to the control center. The seal shall be so located that the motor may be removed and electrically disconnected without disturbing the seal.

c. Power Cord

Pump motor power cords shall be designed for flexibility and serviceability under conditions of extra hard usage and shall meet the requirements of the National Electrical Code standards for flexible cords in wastewater pump stations. Ground fault interruption protection shall be used to de-energize the circuit in the event of any failure in the electrical integrity of the cable. Power cord terminal fittings shall be corrosion resistant and constructed in a manner to prevent the entry of moisture into the cable, shall be provided with strain relief appurtenances and shall be designed to facilitate field connecting.

7. Valves

Valves required shall be located in a separate valve pit. Valve pits may be dewatered to a wet well through a valved drain line. Check valves that are integral to the pump need be located in a separate valve pit, provided that the valve can be removed from the wet well in accordance with paragraph H.1.b.

I. Alarm Systems

Alarm systems shall be provided for pumping stations. The alarm shall be activated in cases of power failure, drywell sump and wet well high water levels, pump failure, unauthorized entry, or any cause of pump station malfunction. The alarm shall be telemetered to the Town during normal working hours and to the home of the responsible person(s) in charge of the lift station during off-duty hours. Audio-visual alarm systems with a self-contained power supply may be acceptable in some cases in lieu of the telemetering system outlined above, depending upon location, station holding capacity and inspection frequency.

J. Emergency Operation

1. Objective

The objective of emergency operation is to prevent the discharge of raw or partially treated wastewater to any waters and to protect public health by preventing back-up

of wastewater and subsequent discharge to basements, streets, and other public and private property.

2. Emergency Pumping Capability

Emergency pumping capability is required unless on-system overflow prevention is provided by adequate storage capacity. Emergency pumping capability may be accomplished by connection of the station to at least two independent utility substations, or by provision of portable or in-place internal combustion engine equipment which will generate electrical or mechanical energy, or by the provision of portable pumping equipment. Such emergency standby systems shall have sufficient capacity to start up and maintain the total rated running capacity of the station. Regardless of the type of emergency standby system provided, a riser from the force main with rapid connection capabilities and appropriate valving shall be provided for all lift stations to hook up portable pumps.

3. Emergency High Level Overflows

For use during possible periods of extensive power outages, mandatory power reductions, or uncontrollable emergency conditions, consideration should be given to providing a controlled, high-level wet well overflow to supplement alarm systems and emergency power generation in order to prevent backup of wastewater into basements or other discharges which may cause severe adverse impacts on public interests, including public health and property damage. Where a high level overflow is utilized, consideration shall also be given to the installation of storage/detention tanks, or basins, which shall be made to drain to the station wet well. Where such overflows affect public water supplies or other critical water uses, the regulatory agency shall be contacted for the necessary treatment or storage requirements.

4. Equipment Requirements

a. The following general requirements shall apply to all internal combustion engines used to drive auxiliary pumps, service pumps through special drives, or electrical generating equipment:

1) Engine Protection

The engine must be protected from operating conditions that would result in damage to equipment. Unless continuous manual supervision is planned, protective equipment shall be capable of shutting down the engine and activating an alarm on-site. Protective equipment shall monitor for conditions of low oil pressure and overheating, except that oil pressure monitoring will not be required for engines with splash lubrication.

2) Size

The engine shall have adequate rated power to start and continuously operate under all connected loads.

3) Fuel Type

Reliability and ease of starting, especially during cold weather conditions, should be considered in the selection of the type of fuel.

4) Engine Ventilation

The engine shall be located above grade with adequate ventilation of fuel vapors and exhaust gases.

5) Routine Start-up

All emergency equipment shall be provided with instructions indicating the need for regular starting and running of such units at full loads.

6) Protection of Equipment

Emergency equipment shall be protected from damage at the restoration of regular electrical power.

b. Engine-Driven Pumping Equipment

Where portable engine-driven pumps are used, the following requirements in addition to general requirements shall apply:

1) Pumping Capacity

Engine-driven pumps shall meet the design pumping requirements unless storage capacity is available for flows in excess of pump capacity. Pumps shall be designed for anticipated operating conditions, including suction lift if applicable.

2) Operation

The engine and pump shall be equipped to provide automatic start-up and operation of pumping equipment. Provisions shall also be made for manual start-up.

3) Portable Pumping Equipment

Where part or all of the engine-driven pumping equipment is portable, sufficient storage capacity with alarm system shall be provided

to allow time for detection of pump station failure and transportation and hookup of the portable equipment.

c. Engine-Driven Generating Equipment

Where permanently-installed or portable engine-driven generating equipment is used, the following requirements shall apply.

1) Generating Capacity

a) Generating unit size shall be adequate to provide power for pump motor starting current and for lighting, ventilation, and other auxiliary equipment necessary for safety and proper operation of the lift station.
b) The operation of only one pump during periods of auxiliary power supply must be justified. Such justification may be made on the basis of the design peak hourly flows relative to single-pump capacity, anticipated length of power outage, and storage capacity.
c) Special sequencing controls shall be provided to start pump motors unless the generating equipment has capacity to start all pumps simultaneously with auxiliary equipment operating.

2) Operation

Provisions shall be made for automatic and manual start-up and load transfer unless only manual start-up and operation is justified. The generator must be protected from operating conditions that would result in damage to equipment. Provisions should be considered to allow the engine to start and stabilize at operating speed before assuming the load.

3) Portable Generating Equipment

Where portable generating equipment or manual transfer is provided, sufficient storage capacity with alarm system shall be provided to allow time for detection of pump station failure and transportation and connection of generating equipment. The use of special electrical connections and double throw switches are recommended for connecting portable generating equipment.

5. Independent Utility Substations

Where independent substations are used for emergency power, each separate substation and its associated transmission lines shall be capable of starting and operating the pump station at its rated capacity.

Section 7 Water Supply

7.1 General

Where a conflict arises between these regulations and those of other agencies, the Developer shall make known to the conflicting agencies the area of disagreement and endeavor to have such agencies resolve their differences before proceeding with development.

The supplier of potable water in the Town of Oakfield is the Village of Oakfield. The Developer should determine the requirements of the Town of Oakfield related to the design, approval, and construction of water main and appurtenances in the Town of Oakfield. The Town of Oakfield will not grant final site plan approval until approval of the proposed water facilities is obtained from the Genesee County Department of Health.

Though these standards have principally been developed to apply to subdivisions, they shall apply to other developments as well to the extent that the standards are applicable.

7.2 Basis of Design, General

The term "facilities" as used herein shall be defined as water distribution mains and appurtenances thereto which will, upon acceptance by the Genesee County Department of Health and the Town of Oakfield, be turned over to the Town of Oakfield for maintenance and operation.

Facilities shall be designed to conform to the topography of the property and existing utilities on adjacent streets or property. Developers shall satisfy themselves by preliminary investigation, and consultation with appropriate Town officials, as to the adequacy of adjoining facilities upon which their property must rely for service.

Developers bear the responsibility of providing sound engineering design of all facilities, subject to the approval of the Town. A professional engineer licensed to practice in the State of New York shall prepare the design and shall have had experience in the design of such facilities. The design shall conform to the requirements set forth herein. A brief report describing the basis of design shall be included in the project Design Report.

7.3 Proper Design

New water distribution main and all extensions to water mains owned and operated by the Town of Oakfield shall be designed by a professional engineer licensed to practice in New York State, in accordance with the Recommended Standards for Water Works, as adopted by Great Lakes-Upper Mississippi River Board (GLUMRB) of State Sanitary Engineers (Ten State Standards), latest revision, and in strict conformance with all requirements of the New York State Department of Health (NYSDOH). Plans and specifications shall be submitted to, and written approval shall be obtained from the Town of Oakfield and the Department of Health, before initiating any construction. The design shall anticipate and allow for water demands from all possible future extensions or developments within the immediate service area.

7.4 Submission of Plans and Pertinent Data

A. Engineer's Report

In addition to the requirements of the Town of Oakfield and Genesee County Department of Health, an engineer's report for water works improvements shall be submitted to the Town and Town Engineer. The report shall, where pertinent, present the following information.

1. General information, including

    a. description of the existing water works and sewerage facilities,

    b. identification of the municipality or area served,

    c. name and mailing address of the owner or official custodian.

2. Extent of water works system, including

    a. description of the nature and extent of the area to be served,

    b. provisions for extending the water works system to include additional areas,

    c. appraisal of the future requirements for service, including existing and potential industrial, commercial, institutional, and other water supply needs.

3. Alternate plans

    Where two or more solutions exist for providing public water supply facilities, each of which is feasible and practicable, discuss the alternate plans. Give reasons for selecting the one recommended, including financial considerations, and a comparison of the minimum classification of water works operator required for operation of each alternative facility.

4. Soil, groundwater conditions, and foundation problems, including a description of

    a. the character of the soil through which water mains are to be laid,

    b. foundation conditions prevailing at sites of proposed structures,

    c. the approximate elevation of ground water in relation to subsurface structures.

5. Water use data, including

   a. a description of the population trends as indicated by available records, and the estimated population which will be served by the proposed water supply system or expanded system,

   b. present water consumption and the projected average and maximum daily demands, including fire flow demand (see paragraph A.6.),

   c. present and/or estimated yield of the sources of supply,

   d. unusual occurrences.

6. Flow requirements, including

   a. hydraulic analyses based on flow demands and pressure requirements,

   b. fire flows, when fire protection is provided, meeting the recommendations of the Insurance Services Office or other similar agency for the service area involved.

B. Plans And Support Documents

Plans submitted to the Town shall contain all information required by the Town of Oakfield and the Department of Health. The Town Board will rely on the review and approval of these agencies in completing its review and approval.

C. Revisions To Approved Plans

Any deviations from approved plans or specifications affecting capacity, hydraulic conditions, operating units, the functioning of water treatment processes, or the quality of water to be delivered, must be approved by the Town of Oakfield before such changes are made. Revised plans or specifications should be submitted in time to permit the review and approval of such plans or specifications before any construction work, which will be affected by such changes, is begun.

D. Additional Information Required

The Town may require additional information, which is not part of the construction drawings, such as head loss calculations, proprietary technical data, copies of deeds, copies of contracts, etc.

7.5 Design of Water Mains

The design of water mains shall be in accordance with the requirements of the Town of Oakfield, NYS Department of Health, and Ten States Standards.

7.6 Individual Well Water Supply

Considerable judgment is required to select a suitable location for a well. In general, wells should be located away from sources of possible contamination. Sources of contamination include, but are not limited to sewage disposal systems, barnyards, compost piles, floodplains, highways, railroads, landfills, outcroppings of consolidated water bearing formations, etc.

Well location and design shall conform to the requirements of the County and State Health Departments and the additional requirements as listed:

1. Rural Water Supply by the NYS Department of Health.

2. A well shall be developed from a water bearing formation at a depth greater than 20 feet below the ground surface, have a sustained yield of not less than five gallons per minute, and provide a pressure of at least 20 psi at ground level at the entry point into the house.

3. Plans shall indicate that wells shall be sampled for adequate quantity and quality of potable water before a Certificate of Occupancy is issued.

4. Additional testing and supplemental information may be requested by the Planning Board as it deems necessary for cases which involve questionable quality, quantity, or location of well water supply (i.e. bacteriological, microbiological, chemical, physical, radiological for quality testing, and yield-drawdown-recovery testing for quantity, etc.).

Section 8 Miscellaneous

8.1 Accommodations for House and Lot Storm Drainage

A. Finished ground level adjacent to house foundation walls shall be, where practical, a minimum l'- 0" higher than the edge of pavement for standard subdivision development. In one or two lot subdivisions where front lot setbacks exceed 150' and/or where natural drainage characteristics would be better utilized by draining away from the street, this requirement may be waived. Provisions shall be made for draining positively the surface of each lot by proper grading and the construction of swales, ditches, or drains. These items shall receive the same careful design attention as the street drainage system.

B. Provisions shall be made for disposing of roof and cellar drainage into the street drainage system. The Developer and his engineer, however, must design and provide that cellar floors will be at an elevation higher than the pavement to permit the street drainage system to run fully surcharged without causing backup or flooding in the cellars; in lieu of this the Developer may provide for (and so indicate or state on his plans) that cellars shall be drained with sump pumps and appropriate check valves.

C. In special conditions, where topography permits or dictates, cellar drainage may be conveyed to main drainage swales where it can be deposited if no nuisance will be caused or created to abutting or downstream property owners. In such instances the cellar floor shall be so designed as to be above the level of the project design flood to assure no backup or flooding of the cellar.

D. Dry wells for disposing roof drainage shall be used where storm sewers are not available. The Developer shall size the facility using minimum 10-year storm. See the typical dry well design for disposing roof drainage detail at end of specifications.

E. No laundry, sanitary, or kitchen wastes shall be discharged to a storm drainage system. Further, no drain connections from garages or driveways shall be permitted to enter drainage swales where soap suds and detergents from car washing operations could cause a nuisance to abutting or downstream property owners.

F. Storm drain laterals to have outside clean-out (see detail at end of specifications).

8.2 Easements

A. It shall be the responsibility of the Developer to furnish easements to the Town, as required, for the installation and permanent operation of drains, sewers, mains or access roads where required.

B. These easements shall be prepared prior to the approval of the detailed plan and be so written as to be contingent upon the Town's approval of said plan. Developers bear the

responsibility for preparation of the easement maps and assuring their transfer to the Town and recording in the County Clerk's Office.

C. The Town reserves the right to require easements for anticipated future utilities where in the opinion of the Town Board and/or the Town Engineer such easements are justified by the estimated rate of growth of the area in question.

D. Easements across lots or centered on rear or side lot lines shall be provided for utilities where necessary and shall be at least 20 feet in width. Where multiple utilities are present, the easement may be changed to 30 feet. Easements along common property lines may be split evenly between lots.

Construction

Section 9 General Construction Requirements

9.1 General

A. Purpose

The purpose of these specifications is to assure that facilities, which are to be turned over to the Town for maintenance shall be so constructed as to cause a minimum of maintenance and a maximum of benefit to the Town. They shall, therefore, be strictly adhered to. Failure of the Developer, his agents, employees, or subcontractors to comply shall be considered sufficient cause by the Town to not accept the streets and utilities or any portion thereof for dedication until all work is satisfactory.

B. Inspection

All construction shall at all times be subject to inspection by the Town Board, their agents, representatives, and authorized employees. Such inspectors may stop the work when the work or materials do not meet these specifications, or when circumstances are such that continuance of that particular phase of the work would not be in the best interests of the Town.

Costs incurred for inspection services for dedicated and Town related facilities shall be borne by the Developer, and sufficient funds shall be part of the letter of credit.

Failure of the Town, the Town Engineer, their agents, employees or representatives, to reject improper work or inferior material during construction shall not be construed as, nor imply, final acceptance. If subsequent inspection, operation, or circumstances cause defects to become evident, the Developer shall make, or cause to be made, such cuts or other exposures of the work as may be required to determine cause of such defects. Such defects shall then be corrected to the satisfaction of the Town at the expense of the Developer.

C. Responsibility for Work

The Developer is solely responsible to the Town for proper construction of facilities. It will normally be of benefit to both the Developer and the Town to have Town representatives deal directly with the Developer's contractors where such are employed, both as a matter of expediency and to avoid needless liaison. However, such action shall not be construed as relieving the Developer of his prime responsibility to the Town.

D. Safeguarding Existing Utilities, Other Property and Persons

The Developer, or his contractor where work and responsibility has been so delegated, shall locate all existing sewers, water mains, underground conduits, gas mains or other utilities in the work area prior to commencing operations. Appropriate utility officials shall receive prior notice of intent to start construction, and their recommendations and orders shall be followed.

Care shall be taken to protect persons and property, as well as avoid potentially hazardous conditions or nuisances. The Developer and his contractor shall comply with all stipulations of the Occupational Safety and Health Act of 1970 and all revisions and amendments thereto.

E. Warranty of Work and Materials

The Developer shall warrant all work performed and materials furnished against defect, failure, inadequacy, or breakage for a period of two years from the date of final acceptance of the work by the Town Board. Money for warranty shall be deposited with the Town prior to the acceptance of the work. In the event of such defect, failure, inadequacy, or breakage during said warranty period, the Developer shall make the necessary repairs or replacements within two days of the mailing of written notice by the Town Board or their Engineer. Amount of Maintenance Bond required by the Town shall be 10% of the original letter of credit but no maintenance bond shall be for an amount less than $5,000.

Should the Developer fail, neglect, or refuse to so comply within the specified time, the Town shall make the necessary repairs or replacements, for the account of the Developer, and deduct all costs therefore from the monies or securities being held by the Town to ensure compliance during the warranty period.

F. Stakeout

All construction work shall be properly staked-out by qualified personnel in accordance with the approved plan. Such stake-out shall be in sufficient detail to ensure correct elevations of tops of structures, proper crowns, slopes, and alignments.

Where pavement base courses or subgrades are left unfinished during the winter, they shall be restaked in the spring and regraded accordingly.

G. Protection of Incomplete Works

Where work is left incomplete, because of weather or other reasons, it shall be protected. Road beds shall be left well drained. Water mains and sanitary sewers (and storm drains where applicable) shall be so protected that surface water, mud, silt, and debris cannot enter. Sewer laterals, water services, and valves shall be suitably marked with stakes, and shall be protected.

H. Final Drawings

Prior to acceptance of the facilities by the Town, the Developer shall submit a Record Plan. This plan shall be drawn to scale and shall indicate by dimensions, angles and distances, as applicable, the location of sewer and drain Y-branches, laterals, manholes, catch basins, hydrants, valves, and curb shut-offs. Sufficient information must be provided to allow any buried facilities to be located. The Plan shall show easements and dedicated roadways.

Individual water service and sewer lateral location cards shall be provided for each lot or building in the development. Developer shall contact appropriate water or sewer agency for detailed requirements.

Record plans shall be submitted to the Town on a reproducible "mylar" or equivalent.

I. Full Completion of Work and Cleanup

Prior to acceptance of the facilities by the Town, the Developer shall fully complete the work and leave the site in a neat and orderly condition. Slopes, drainage ways and other graded areas shall be fully stabilized by planting grass or other vegetation or by such means acceptable to the Town.

Grading between adjacent lots as well as between lots and the street area shall have a continuity without abrupt changes in elevation or unfinished ground surface.

All areas shall be so graded that run-off from higher elevation lots does not create a nuisance on lower elevation lots. To this extent lots shall normally be graded to drain front-and-back with street gutters taking the front drainage and shallow swales taking the back-lot-line drainage.

Valve boxes, manhole covers and curb shut-off boxes shall be left at a proper elevation.

J. Permits

The Developer shall obtain from the proper authorities all necessary permits for building or blasting; or construction work within public streets.

Section 10 Road, Street, and Pavement

10.1 Materials - General Requirements

All materials used in the work shall meet the requirements as specified, unless the same are altered by specific requirements under any itemized specification or by modifying notes shown upon the approved plans. In the absence of any specific reference to specifications, the material to be incorporated into any project, and the work to be performed are intended to conform to the current edition of the NYSDOT Standard Specifications – Construction and Materials in effect at the time the project is approved by the Planning Board. Unless otherwise specifically stated, any reference to NYSDOT requirements shall mean the May 1, 2008 edition or most recent revision, as determined by the Town Engineer.

10.2 Basis of Construction

In order to assure the structural integrity of the sub-grade and foundation course, the following general rules shall apply:

1. Underground utilities shall be constructed outside the pavement area.

2. Where crossover trenches are required for utility services, the trenches shall be backfilled with the excavated material, if acceptable and approved by Town, or with suitable granular material approved for use by the Town. Material shall be thoroughly compacted with vibrating tamping equipment.

   DEVELOPERS NOTE THAT THIS INCLUDES CROSS-OVERS FOR GAS MAINS AND OTHER UTILITIES AND SERVICES.

3. After properly shaping and obtaining approval of the subgrade, the foundation course may be placed. The entire foundation course - out to out - must be thoroughly compacted.

4. Foundation courses for permanent roads must not be used for access roads in wet weather, or at such times when the sub-grade could become "pumped" into the foundation course.

5. Where pavements must be placed in an embankment condition the entire height of embankment must be constructed with the use of standard and appropriate compaction equipment. This equipment shall consist of sheepsfoot rollers, vibratory roller or similar equipment. Entire embankment area shall be compacted to 95% modified AASHTO density. If required by the Town, the Developer shall provide results of certified compaction tests undertaken by a competent soils testing laboratory.

6. Geotextile filter fabric, if required by the Town, shall be protected from exposure to sunlight during transportation and storage. After preparing the surface and plac-

ing the geotextile in accordance with the manufacturer's recommendations, it shall be covered as soon as practical within a period of two weeks. Geotextiles appropriate for the intended use which appear on the New York State Department of Transportation Materials Bureau approved list or approved by the Town Engineer shall be acceptable.

10.3 Roadway Excavation

Material from clearing and grubbing and the removal of sod and topsoil shall be stored for later use, or placed in the embankment beyond the pavement limits as directed by the Town Engineer. All stumps, brush, trees, and other rubbish shall be disposed of in a manner satisfactory to the Town and/or the NYS Department of Environmental Conservation.

10.4 Preparing Road Subgrade

A. Work

The contractor shall excavate for the base, pavement and gutters to the designed subgrade elevation and 6" wider on each side than the designed pavement and gutter width as shown on the "Typical Road Section" of the Construction Plans and as indicated in the following specifications.

B. Method

1. The subgrade shall be excavated or "boxed" following the depth and alignment of the stakes established by the Developer's licensed land surveyor or engineer for this purpose. These stakes shall be at intervals of not more than 50' and at 25' in areas on grades of less than 0.5%.

2. After being excavated to the proper depth the subgrade shall be graded and crowned one quarter (l/4") of an inch to each foot of width on each side of centerline, allowing for extra 3' x 8" wedge excavation as shown on "Typical Road Section".

3. Where a subgrade area is defined work shall be performed in accordance with the requirements of NYSDOT 203-3.11.

4. It shall be the contractor's responsibility to properly place and compact all materials in the road section, and to correct any deficiencies resulting from insufficient or improper compaction of such materials throughout the contract period. The contractor shall determine the type, size and weight of compactor best suited to the work at hand, select and control the lift (layer) thickness, exert proper control over the moisture content of the material, and other details necessary to obtain satisfactory results.

5. The subgrade shall be compacted thoroughly with a 10 ton smooth steel wheel roller or smooth drum vibratory compactor and shall meet the following criterion:

   a. Smooth steel wheel rollers shall be considered as primary compactors on layers whose maximum thickness, after compaction, is eight (8) inches. When so used, the roller shall have a nominal gross weight of not less than 10 tons, exert a minimum force of not less than 300 pounds-per-inch-of-width of the compression roll faces, and a minimum of 8 passes shall be applied over each lift with the roller operating at a speed not exceeding 6 feet per second. When the contractor employs smooth steel wheel rollers exclusively for surface compaction, leveling or finishing operations on lifts previously compacted by other types of primary compactors, the above restrictions shall not apply. This applies to non-vibratory rollers or vibratory rollers operated in the static mode only.

   b. Vibratory compactors primarily develop compactive effort from the vibrations created and is classified for use according to the developed compactive force rating per linear inch of drum width. Vibratory compactors shall be confined to equipment which operates at not less than 1100, nor more than 1500 vpm and capable of developing a minimum dynamic vibration force of 27,000 lbs. at the operating frequency.

   c. The Town reserves the right to perform density tests at any time. When tests are performed, the results shall indicate that not less than 90 percent of Standard Proctor Maximum Density is attained in any portion of an embankment, or 95 percent in a subgrade area.

   d. Whenever the contractor's operations do not conform to the above criteria, the Town will prohibit placement of an overlying lift until the contractor takes effective corrective action.

6. When the Town Engineer determines that density tests are necessary, the Developer shall provide a qualified testing firm to perform such tests and provide assistance including but not limited to excavation and backfill of test pits and holes.

7. Damage to any compacted lift at any time during the course of construction such as rutting under the loads imposed by earth moving equipment, shall be fully repaired by the Developer at his own expense prior to placement of any overlying materials.

8. Compactor types other than those classified above, may be employed by the contractor, subject to approval by the Town Engineer of the proposed minimum applied effort (minimum number of passes and travel speed) and maximum lift thickness. Such approval by the Town Engineer will be based upon the results of appropriate on-site field tests.

10.5 Road Base

A. Work

The contractor shall furnish, place and compact a base course in conformance with the lines, grades, thicknesses and "Typical Road Section" shown on the plans and in accordance with NYSDOT Specifications Section 304 for option A, B, or C.

B. Material

The material shall meet the material specification for base course NYSDOT Item 304.15.

C. Method

At least 14 days prior to performing the work, the contractor shall notify the Town Engineer in writing which base course he intends to use and is subject to the Town Engineer's approval prior to placement.

The base material shall be placed on a graded, crowned and compacted subgrade, free of ruts and disturbed earth as follows:

1. After proper rolling and grading of the subgrade, the 3' x 8" wedge is to be filled with No. l and No. 2 crushed stone.

2. The base shall be placed and graded, maintaining the specified crown of one-quarter inch (l/4") per foot. Uncontrolled spreading from piles dumped on grade may result in segregation and will not be permitted. This course shall not be placed in excess of 500 linear feet without compacting. Lines and grades shall conform to the "Typical Road Section".

3. Compaction of the selected base course in accordance with standard practices outlined in NYSDOT 203-3.12. If subsequent paving operations are delayed once the base course has been placed, and the base has been disturbed by frost action, the contractor shall recompact the base as directed by the Town Engineer or Highway Superintendent.

4. The movement of traffic over the final surface of the base may be permitted at locations and designated by, and under such restrictions as ordered by the Town Engineer or Highway Superintendent, provided such movements take place prior

to the final finishing of this course to the specified tolerance. Movement of construction equipment on this course may be permitted at locations designated, and under such restrictions, as ordered by the Town Engineer or Highway Superintendent provided the material shall be placed and maintained at least 2 inches above the final surface course. The protective layer will be removed and the surface course prepared and compacted to the specified tolerance.

5. Tolerance after compaction shall not extend more than 1/4 inch above or below true grade.

6. Special care shall be given during this operation to protect concrete gutters from being scraped by the grader blade, or damaged by roller wheels. Good compaction shall be obtained next to the gutter.

10.6 Construction of Concrete Gutters

A. Work

The contractor shall furnish and place Portland cement concrete gutters as shown on the plans and in accordance with the thickness and cross section as shown on the "Typical Road Section" and as stated in the following specifications.

B. Material

The material shall conform to New York State Department of Transportation standard specification for conventionally formed concrete gutter, NYSDOT 624-2.02 or machine formed concrete gutter, NYSDOT 624-2.05. Class A concrete shall be used for conventionally formed concrete gutter and shall meet the following mix criteria:

606 lbs/cy cement
36.2 % sand of total aggregate solid volume
CA2 coarse aggregate type gradation
0.46 water/cement ratio by weight
6.5% air content
2½ to 3½-inch slump range

Class I concrete shall be used for machine formed concrete gutter and shall meet the following mix criteria:

640 lbs/cy cement
41.0% sand of total aggregate solid volume
CA2 coarse aggregate type gradation
0.44 water/cement ratio by weight
6% air content
½ to 1½-inch slump range

C. Method

The concrete gutters shall be constructed of the shape shown on the "Typical Road Section" and shall conform to the lines and grades shown on the plans and as approved by the Town.

Standard 6-inch steel forms shall be used and set to the grade and alignment by stakes established by the project engineer for this purpose. These stakes shall be set at intervals of not more than 50', and not more than 25', in flat areas on grades of less than 0.5%. The base that these forms are set upon shall be graded to obtain a full 6" of concrete particularly under the invert. This base material between forms shall be compacted by mechanical means preferably a vibra-tamper. These forms shall be oiled before the pouring of concrete.

Concrete gutter shall be constructed in 8 foot sections with a 1/8 inch steel separation placed between sections. Steel separation plates will be removed as the concrete hardens; or the gutter may be constructed in alternate sections if 24 hours is allowed to elapse before the construction of intermediate sections. All construction joints shall be poured full with asphalt cement meeting the requirements of NYSDOT Material Designation 702-0700.

To ensure positive flow the gutter shall be screeded longitudinally with a suitable straight edge. The screed shall be worked laterally; i.e., parallel with the centerline of the gutter from the invert of the gutter to the outer edges. This process shall be done at the appropriate time during the setting of the concrete. When gutters are installed by this "hand method" special attention should be given to the "spading" of the concrete along the sides of the forms.

The gutter may also be installed by use of an approved gutter machine (such as a Dotmar Gutter Machine) using the proper screed to form the invert shown on "Typical Road Section", and equipped with a vibrator attachment.

Concrete gutter shall be constructed in accordance with NYSDOT 609-3.04 "Cast-In-Place Concrete Curb and Curb & Gutter" except that construction joints shall be placed at 8 foot intervals contraction joints shall be 1/8"-1/4" wide and to a depth of 1 1/2". If sawcut, this must be done within eight hours of placement.

For either method selected, tolerance shall be limited to 1/4" within established grade and 1/2" within the established line.

At the appropriate time the concrete shall be broomed lightly with a fine-bristled broom and edged with a proper metal edging tool. This brooming is to fill small voids thus making it unnecessary to do an excessive amount of floating and troweling which brings too much water to the surface causing spalling of the finished concrete in the future.

The forms shall not be removed until the concrete is sufficiently "set" to prevent chipping of the edges. The gutter shall be backfilled as soon as possible to prevent undermining of

the gutter in case of precipitation. The gutters shall be protected from traffic for a sufficient length of time to avoid damage to them.

D. Cold Weather Concreting

Concrete gutters shall not be installed while there is frost in the ground. Gutters installed in the cold weather shall be suitably covered by straw, hay or other means to prevent freezing.

E. Wet Weather Concreting

Concrete gutters shall not be installed where there is water laying between the forms or where the gravel is soft from rain. Gutters installed (unavoidably) during a rainstorm shall be covered by a waterproof material immediately.

F. Curing

Gutters shall be sprayed the same day the finishing is completed with a Gutter Curing Agent applied per the manufacturer's recommendations, and cured in accordance with NYSDOT 502-3.11.

10.7 Bituminous Concrete Pavement

A. Work

The contractor shall furnish and construct a two-course bituminous concrete pavement laid to conform to the required thickness and cross section as shown on the plan and on the "Typical Road Section" and as further described in the following specifications.

B. Material

The material shall conform to the NYSDOT, Standard Specifications for Construction and Materials. Upon request the contractor shall furnish the Engineer in writing the source of the material. Materials shall be in accordance with NYSDOT Section 402-Hot Mix Asphalt (HMA) Pavements.

C. Method

Before starting the laying of the asphalt pavement the base shall be graded and compacted between the concrete gutters. Also, manholes should be adjusted to the proper grade to meet the crown and slope of the finished pavement.

Each course will be placed in accordance with the requirements of NYSDOT 402-3. Compaction may be achieved using Option A, Three Roller Compaction Train or Option B, Vibratory Compaction.

All raking shall be done by skilled help to maintain a smooth and uniform finish at intersections, curves and around manholes, valve boxes, etc.

Before placing of the top course, the binder shall be cleaned of mud, dust and debris, and shall be inspected by the Town Highway Superintendent. The Highway Superintendent shall require application of a tact coat at a rate of 0.1 gallon per square yard before placing the top course. Any depressions or settlements in the binder shall be repaired by shimming before placing the top course. Shim material shall meet the requirements of NYSDOT Section 402-3.05 for NYSDOT Hot Mix Asphalt, True and Leveling Course. Tack coat shall meet the requirements of NYSDOT Section 702, Table 702-8. Application of the tack coat shall be done in accordance with NYSDOT Section 407 Tack Coat, and in a manner that causes the least inconvenience to traffic and prevents tracking of the bituminous material.

Protection of new pavement shall be provided until properly set. This protection is necessary on subdivisions where the traffic is mostly by cars starting and stopping or by heavy trucks.

The finished pavement shall be level or within 1/4" above the concrete gutters, at no time shall it be lower than the gutter.

10.8 Double Bituminous Surface Treatment (Private Drives Only)

A. Work

This work shall consist of the construction of a double course bituminous surface treatment in accordance with these specifications and in substantial conformance with the limits shown on the plans or established by the Engineer.

B. Materials

The bituminous material required for the surface treatment course shall meet the requirements of NYSDOT Material Designation 702-3101.

The aggregates for surface treatments shall be crushed stone, crushed gravel or crushed slag meeting the requirements of NYSDOT section 703-02, Coarse Aggregates. In addition, any aggregate used for surface treatments on pavement shall not contain more than 5% chert. The required aggregates sizes for the double course bituminous surface treatment is as follows:

The aggregate size for the first (base) course shall be No. 1 and the second (surface) course shall contain aggregate size No. 1A.

C. Method

1. Weather Limitations. Bituminous material shall not be applied on a wet surface, when the air temperature is below 50^{o}F or greater than 95^{o}F unless otherwise

permitted, or when weather conditions would prevent the proper construction of the surface treatment.

2. Equipment. The following equipment shall be required:

A bituminous material distributor
A pneumatic rubber tire roller
An aggregate spreader
A drag boom

A bituminous material distributor shall be so designed, equipped, maintained and operated so that the bituminous material at even heat can be applied uniformly on variable widths of surface up to 15 feet at readily determined and controlled areas from 0.05 to 2.0 gallons per square yard, with uniform pressure, and with an allowable variation from any specified rate not to exceed 0.02 gallons per square yard. Distributor equipment shall include tachometer, accurate volume measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. Distributors shall be equipped with a power unit for the pump, and full circulation spray bars adjustable laterally and vertically.

The distributor and/or transport shall be equipped with a sampling valve so designed and installed to be non-clogging and safe. The type of valve and its general location shall be according to written instructions by the NYSDOT. When samples are taken through such valves, they are considered representative of all material in the tank.

The pneumatic rubber tire roller shall be self-propelled and have oscillating wheels with smooth-tread tires. The tire or contact pressure shall be specified by the design engineer. The roller shall be operated at a maximum speed of 5 miles per hour.

The aggregate spreader shall produce a uniform spread of aggregate meeting the required application rates. The spreader shall meet the approval of the Town.

3. Preparation of Surface. The surface shall be free from irregularities to provide a reasonably uniform surface to receive the treatment. Areas which are stable and firm and require one inch or less in thickness to patch or shape the surface may be patched with surface treatment materials. Unstable corrugated areas shall be removed and replaced. Areas requiring replacing, patching or shaping in excess of 1 inch in thickness shall be constructed with materials approved by the Town.

Manhole covers, Drop Inlets, Catch Basins, Curb, and any other structure within the roadway area shall be protected against the application of the surface treatment materials.

4. Applying Bituminous Material. Bituminous material shall be applied at the following application rates in Table 3 and by means of a pressure distributor in a

uniform, continuous spread over the section to be treated and within the temperature range specified. The distributor shall be moving forward at proper application speed at the time the spray bar is opened. Any skipped areas or deficiencies shall be corrected. Junctions of spreads shall be carefully made to assure a smooth riding surface.

The length of spread of bituminous material shall not be in excess of that which trucks loaded with cover coat material can immediately cover or which can be satisfactorily compacted.

The spread of bituminous material shall not be more than 6 inches wider than the width covered by the cover coat material from the spreading device. Under no circumstances shall operations proceed in such a manner that bituminous material will be allowed to chill, set up, dry, or otherwise impair retention of the cover aggregate.

The distributor, when not spreading, shall be parked so that the spray bar or mechanism will not drip bituminous material on the surface of the traveled way.

5. Application of Cover Aggregate. Immediately following the application of the bituminous material, cover aggregate shall be spread at the following application rates in Table 3 for the indicated aggregate unless otherwise directed by the Town.

   Spreading shall be accomplished in such a manner that the tires of the trucks or aggregate spreader at no time contact the uncovered and newly applied bituminous material.

   Immediately after the cover aggregate is spread, any deficient areas shall be covered by additional material. If the application of the aggregate cover by the spreader is not uniform, the Engineer may order the Contractor to use a drag broom before rolling. Pneumatic tire rolling shall begin immediately and shall be continued until a minimum of three complete coverages are obtained.

   Any free bituminous material on the surface caused by a deficient amount of cover aggregate shall be covered in such a manner so as not to displace imbedded material. Excess material shall be swept from the entire surface. The surface shall be swept at the time determined by the Engineer.

6. Opening to Traffic. Unless otherwise specified, the highway shall be kept open to traffic at all times. Traffic shall be discontinued on the lane being surface treated; and as soon as the final layer is applied and rolled, controlled traffic may be permitted thereon. Traffic shall be maintained at a speed not to exceed 15 miles per hour for two to four hours after rolling. The Town shall determine the time and the method of traffic control.

TABLE 3
APPLICATION RATES

	Bituminous Material Gallons/Square Yard	**Aggregate Lbs./Square Yard**
1st Course (base, No. 1 crushed stone	.50 - .75	25 – 35
2nd Course (surface, No. 1A crushed stone)	.25 - .40	15 - 25

Sufficient time shall elapse between the completion of the bituminous base course and the placing of the surface course so that the bituminous material in the base course has time to cure.

10.9 Maintenance of Roadway

The Developer shall be responsible for maintaining and protecting the roadway and temporary cul-de-sac and/or turn around during the warranty period. If subsequent subdivision sections are built utilizing the roadway for access and/or haul road during construction, then the Developer shall be responsible for special maintenance provisions. These provisions could be placing or replacing topping, periodic cleaning and flushing of the road surface and repair of any structural damage. The Developer shall submit a schedule of his proposed "road maintenance program" to the Town indicating how the roadway will be maintained, a timetable for the proposed maintenance and an estimate of cost. This schedule shall be reviewed and approved by the Town and shall become part of the project work. The approved estimated amount for maintenance shall be included in the letter of credit.

10.10 Temporary Turnarounds

In areas where a temporary turnaround is proposed, the applicant shall provide sufficient details on the plan showing the road section, dimensions of the roadway and the materials proposed. The turnaround shall comply with materials shown on the "Typical Road Section", except asphalt top course may be omitted. Developer shall provide cost in the letter of credit to cover the cost of the proposed temporary construction.

The turnaround shall be built to accommodate the largest Town Highway Department Plow Truck and/or the largest Fire Truck operated by the Town Fire Department or by a Mutual Aid Fire Department.

10.11 Private Drives

A. Other Than Single Family Driveways

1. The minimum width of the traveled way for a single lot is to be 11'. Maximum percent of grade 10%.

2. The minimum width of the traveled way for two, three or four lots is to be 22'.

3. Drive subgrade (native earth beneath road base) to be shaped to a crown and compacted, to prevent ground water from becoming trapped in the road base.

4. Drive base to consist of a minimum of 9" of crushed stone meeting NYSDOT Item 304.15 and thoroughly compacted.

5. Drive-side swales are to be provided. Swale inverts to be at least 10" lower than road subgrade. Swales are to be graded to a minimum slope of 1% to provide positive drainage to the nearest watercourse. Swale side slopes to be graded to at least 1 vertical to 3 horizontal slope and seeded to provide a healthy growth of grass.

6. If required by the Code/Zoning Officer or the Town Board, upon completion of private drive construction, the Developer's engineer shall submit written certification that the road was constructed in accordance with the approved plans and to the specifications of the Town of Oakfield.

7. See private drive detail drawing at rear of book.

8. Private drives and single family driveways in excess of 500' shall be provided with a permanent turn around for emergency vehicles.

10.12 Single Family Driveways

See Driveway Entrance Section Detail at end of book.

Section 11 Storm Drainage

11.1 Catch Basin Construction

A. Work

The Developer shall build catch basins as shown on the "Catch Basin Detail" and according to the following specifications.

B. Material

Galvanized reticuline frame and grate fabricated as indicated on NYSDOT standard sheet 655-04 or as manufactured by Borden Metal Products or equivalent. Galvanized reticuline frame and grade sizes shall be as follows:

NYSDOT #1 – 23-15/16" x 27-1/2" frame – 22-11/16" x 26-1/2" grate: To be used under normal conditions unless otherwise specified. To be used on a catch basin built with inside dimensions of 18" x 24".

NYSDOT #9 – 28-15/16" x 27-1/2" frame – 27-11/16" x 26-1/2" grate: To be used where specified under special conditions and in lawn area where required. To be used on catch basins built with inside dimensions of 24" x 24".

Precast concrete catch basins may be used at contractor's option. The catch basin shall, as a minimum, be constructed at 3,500 psi air entrained concrete, 5" reinforced walls, 6" reinforced base. All catch basins shall include a 4" drain pipe on three sides as shown on the standard detail.

C. Method

The catch basin shall be built on a foundation of 3,500 psi concrete.

Three (3) 4-inch diameter perforated PVC pipe shall be placed to provide "weep drainage". (See catch basin detail.)

The blocks shall be built to a height to allow for 8" of concrete cap between the last row of blocks and the bottom of frame and grate as part of the concrete apron.

Before pouring the concrete apron, the frame shall be adjusted on catch basin wall to allow a l-l/2" drop from invert of gutter to top of grate (except under special conditions). This drop shall be formed gradually in the invert.

The catch basin shall be provided with #1 and #2 crushed stone around the exterior, extending from the bottom of the catch basin to the top of the masonry wall on a 2-on-l slope. This stone shall be compacted before pouring of the concrete apron.

The inside of the catch basin shall be painted with one (1) coat of Koppers bitumastic 300M or approved equal. The lateral pipe leading from the catch basin to the storm manhole shall be encased in #1 and #2 crushed stone and extending to the top of the trench. This pipe shall be smooth interior corrugated polyethylene pipe.

11.2 Construction of Storm Drains

A. Storm Water Sewer Pipe

Storm water sewer pipe shall be built of smooth interior corrugated polyethylene pipe.

The pipe shall be selected as to proper strength classification by the Developer's licensed professional engineer and shall be stated on the plans. Height of cover, nature of foundation soil, type of bedding and trench width shall be considered in specifying the pipe.

Developer shall be responsible for providing extra strength bedding, cradle or encasement if the design conditions cannot be met in the field. Whenever the storm sewer is under the road, the Town requires that the Developer's engineer specify the correct class for H-20 loading at the sewer depth.

B. Special Construction

Other types of sewer pipe may be used to meet unusual construction conditions when approved by the Town Engineer. Concrete encasement or cradle for the sewer may be required where excessive loads are expected, particularly in shallow trenches or where subsoil conditions are unsatisfactory.

C. Manholes and Catch Basins

The materials used in the construction of manholes and catch basins shall conform to the details as shown on the Standard Details included hereinafter. Connecting pipe between catch basins shall be a minimum 8" diameter and from catch basin to sewer manhole shall be a minimum 12" diameter.

D. Special Structures

Detailed plans for the construction of storm sewer pump stations, box culverts, headwalls, bridges, erosion control structures, any necessary special manholes or catch basins, etc. shall be submitted to the Town Engineer for his approval prior to construction.

E. Handling Pipe

All pipes and fittings shall be handled carefully. Pipes and fittings shall not be dumped or dropped while unloading or during emplacement in the trench.

F. Stockpiling Pipe

The Developer shall take all necessary precaution to insure the stability of any stockpile or individual length of pipe that is stored. Pipe stored along a road or sidewalk shall be placed so that it does not create a safety hazard or impair the free flow of traffic.

G. Fitting and Cutting Pipe

The joint surfaces of all pipes and fittings shall be clean, and shall fit together to form a tight joint. When setting pipe the workmanship and tools used shall be such that the quality and strength of the pipe is not impaired.

H. Joints

PVC plastic drain pipe and fittings shall be joined as recommended by the pipe manufacturer. Smooth interior corrugated polyethylene pipe joints shall meet the requirements of NYSDOT Section 706-12.

All joints shall provide a secure pipe connection.

I. Line and Grade

All pipe shall be laid true to line and grade with bells upstream and shall have a full, firm and even bearing. Boulders or other natural obstructions shall not be considered cause for varying from true line and grade.

J. Trenches

Any suitable excavation methods may be used but storm sewer trenches shall be confined to the smallest area practical for proper construction. Hand methods shall be employed where it is deemed necessary by the Town Engineer to preserve trees or protect existing structures. All necessary precautions shall be taken when blasting to confine flying stone or debris and to protect and prevent damage to adjacent structures. Where necessary, sheeting and/or bracing shall be used to provide support and stability to the trench walls. Unless otherwise directed, sheeting and bracing shall be removed as the trenches are backfilled.

K. Barricades

All open excavations shall be completely surrounded with barricades, fenced and illuminated at night.

L. Spoil

All spoil material to be removed from the site shall be noted on the plans and appropriate permits granted for its temporary off-site stockpiling or disposal. Excavated material unsuitable for backfill or topsoil shall be removed from the site of the work as it is

excavated. Excavated material that is to be used for backfill shall be placed in spoil banks located on only one side of the trenches or pits and at least two (2) feet away from the excavation wall. These spoil banks shall be located where they will not interfere with the work, or contribute an overload to the wall of the excavation. Where necessary, the excess material shall be removed to some other place and brought back when required.

M. Drainage

Necessary precautions shall be taken at all times to prevent the flooding of adjacent property. Drainage ditches, necessary relocation of stream channels, or other positive means of diverting and/or controlling the water shall be employed. No water shall be drained into a pipe or trench under construction. Water shall not be allowed to accumulate in the trenches but shall be drained or pumped away from the work to established drainage channels.

N. Pipe Installation

The pipe shall be set carefully to line and grade. At the contractor's option an industrial laser specifically made for pipe laying operations may be used to establish line and grade. The contractor shall closely follow all manufacturer's recommendations with regard to maintaining accuracy.

O. Earth Foundation

Where pipe is installed on native earth the trench bottom shall be bedded as specified under Section 11.2 “P.” and “Q.” Low areas shall be filled with suitable crushed stone. Where rock in either ledge or boulder formation is encountered, it shall be removed below grade and replaced with suitable sand or crushed stone as shown on the construction details. Where a firm foundation is not encountered at the grade established due to soft, spongy or other unstable soil, (unless other special construction methods are called for on the plans) all such unstable soil, under the pipe and for a width of at least one diameter on each side of the pipe, shall be removed and replaced with suitable crushed stone or other approved suitable material properly compacted to provide adequate support for the pipe line.

P. Bedding - Hand Backfilling

Storm sewer shall be constructed using stone bedding as specified and shown on the detailed drawings. Additional earth shall be added and tamped alongside the pipe until the top of the pipe is reached. Both the pipe tamp and flat-bottomed tamp shall be used for this operation. When the top of the pipe is reached, an additional 9"-12" of earth shall be placed over the pipe by hand. The material shall be free of stones or rocks. The hand backfill shall follow closely behind pipe laying to prevent damage to or movement of the pipe by cave-in of the trench walls.

Q. Backfill

Following the hand operation, backfill may be machine placed providing extreme care is used. Backfill shall be made to existing grade and left in a neat and uniform condition. Excess earth shall be windrowed over the trench area. Where the trench passes under a ditch, stream, swale, or drainage way, the backfill shall be left in such a manner as to allow proper drainage as well as duplicate conditions as they existed prior to construction. The surface must be entirely free of lumps of earth, stones and debris. Adjacent roadways shall be swept clean of all rubbish and flushed with water if necessary. Shoulders of highways which have been cut shall be carefully shaped and consolidated by tamping or rolling.

R. Cradle

Where called for on the plans or as ordered by the Town to meet field conditions, pipe shall be installed on cradles. The Town will determine at the time of construction whether a dry or plastic mix will be used at any particular location depending upon trench conditions. The cradle shall be constructed of l:2-l/2:5 concrete, with commercial type l Portland Cement and clean, hard aggregate. Cradle material shall be placed to the width shown on the plans, or as ordered by the Town, and to an elevation l/4 up the side of the pipe. The pipe shall be laid in a channel formed in the material by means of a round-pointed shovel. High points and low spots shall be corrected and the pipe firmly bedded to line and grade and jointed. Additional cradle material shall then be added and tamped along the haunches of the pipe and subsequently shaped to the top of the pipe as shown on the Detail. "Safety cover" of 9"-12" of earth shall then be placed and backfill made as required under Section 11.2 “Q”.

S. Protection of Existing Sewers

Care shall be taken at all times to avoid entrance of mud and water to existing sewers. When connecting to an existing manhole, the connection shall be tightly plugged until completion of the work. At that time, the plug shall be removed and the accumulated water and mud pumped out of the manhole under the supervision of the Town. The cost of any necessary cleaning or flushing of existing facilities caused by failure to comply with this specification or for other reasons will be borne by the Developer.

T. Protection of New Work

At the end of each working day (or any other time of work stoppage), the upstream end of the pipe shall be tightly plugged to prevent entrance of mud, silt, or muddy water.

U. Construction Under Adverse Conditions

No pipe shall be laid during adverse weather conditions. In no case shall pipe be laid in water. In cases where storm sewers are being installed in wet conditions or below the groundwater table so that installed pipes become submerged overnight, sufficient back fill shall be placed to prevent the pipe becoming buoyant.

V. Conflicting Pipe Lines & Other Utilities

No existing pipe line, conduit, cable, pole, guy wire or other utilities or portion thereof shall be moved without the consent of the Agency operating such utility. Any necessary changes in line and grade of the new pipe line shall be made only with the consent of the Town.

W. House Laterals

House laterals may extend to the R.O.W. line and shall daylight to allow for overland flow prior to entering the storm sewer for each lot. These laterals shall be constructed with the same care as street sewers. The storm water laterals shall be 6-inch diameter and shall be installed on a minimum slope of l/8" per foot. Laterals shall be firmly bedded in #1 or a blend of #1 and #2 crushed stone bedding meeting the requirements of NYSDOT Section 703-02. They shall be laid true to line and grade, and the bedding material shall be tamped under the pipe and alongside the haunches to provide full bedding and lateral support for the entire length of the pipe. The interior of each pipe shall be cleaned before adding the next length of pipe. Laterals shall be installed at depths not greater than 10'.

A record shall be kept of the location of all laterals and this information shall be shown on the Record Plans.

Storm Sewer Lateral Material

Pipe shall be 6-inch diameter and one of the following:

1. Poly Vinyl Chloride (PVC) Pipe SDR-21 with push on neoprene gaskets ASTM D-2241

2. Smooth interior corrugated polyethylene pipe.

Section 12 Sanitary Sewer Facilities

12.1 Gravity Sewer

A. Pipe Installation

1. Standards

   a. Installation specifications shall contain appropriate requirements based on the criteria, standards, and requirements established by industry in its technical publications. Requirements shall be set forth in the specifications for the pipe and methods of bedding and backfilling thereof so as not to damage the pipe or its joints, impede cleaning operations and future tapping, nor create excessive side fill pressures and ovalation of the pipe, nor seriously impair flow capacity.

2. Preparation

   a. The alignment and subgrade of all trenches and excavations shall be determined from survey bench marks and overhead grade lines or laser beam method at the Developer's option. The Developer shall check and be responsible for the survey control data before making use of it. The Developer shall preserve all benchmarks and maintain a complete and accurate record of the final sewer and structure locations with respect to the survey control data. The Developer shall set the sewer grade line which shall be maintained throughout.

3. Trenching

   a. The width of the trench shall be ample to allow the pipe to be laid and jointed properly and to allow the bedding and haunching to be placed and compacted to adequately support the pipe. The trench sides shall be kept as nearly vertical as possible. When wider trenches are specified, appropriate bedding class and pipe strength shall be used.

   b. In unsupported, unstable soil, the size and stiffness of the pipe, stiffness of the embedment and insitu soil and depth of cover shall be considered in determining the minimum trench width necessary to adequately support the pipe.

   c. Ledge rock, boulders, and large stones shall be removed to provide a minimum clearance of 6 inches below and on each side of all pipe(s).

   d. The work shall be performed by acceptable construction. Excess excavated earthen materials shall be stockpiled on-site in a manner and location

acceptable to the Town. Material such as excavated asphalt shall be disposed of off-site in conformance with applicable legal requirements. Disposal sites must be approved by the Town and NYSDEC. Materials for reuse on the project shall be stockpiled in an approved designated area adjacent to the work site.

e. Provide adequate temporary crossovers for pedestrian and vehicular traffic, including temporary gravel drives, guard rails, lamps, flags; remove same when necessity for such protection ceases.

f. Protect trees indicated to remain in place by means of wrapping, banding, guys, or other methods, as required.

g. Pipe trenching, building foundations, and structural undercuts: under normal conditions, the excavation shall be vertical open cut from the ground surface. Tunneling beneath trees and certain surface structures may be required.

h. Bottom of excavations shall be finish graded by hand methods to receive bedding. The stone bedding shall be placed, compacted, and trimmed by hand to ensure the grade as necessary or as detailed.

4. Methods of Control for Excavations and Grading

a. The Developer shall be responsible for the proper layout of utilities, structures, and drainage. He shall maintain adequate stakeout control for inspection of the work and to accurately complete construction.

b. The alignment and depth of subgrades of all pipe trenches shall be determined by overhead grade lines or laser at Developer's option, installed and maintained by his surveyor.

5. Limit of Excavation for Pipelines

a. Trenches shall be excavated as shown on the Standard Details.

6. Limit of Excavation for Structures

a. Excavations for structures and facilities shall be of sufficient size to give suitable room for proper construction procedures and no larger.

7. Limit of Excavation for Removal or Abandonment of Materials

a. Excavations for the removal of any materials shall be of sufficient size to properly complete the work and no larger.

8. Excavations Below Subgrade

a. Whenever excavations are carried beyond or below the lines and grade shown, all such over excavation shall be backfilled with special backfill (Type B) Crushed Stone (#1 and #2) 50-50 mix, concrete or other materials as directed by the Town.

b. In case earth materials encountered at subgrades are not suitable, the Developer shall immediately notify the Town and shall excavate from the limiting subgrades shown or specified, to such new lines and grades, as will be ordered. Excavation below subgrade shall be done only upon express orders of the Town.

c. All material which slides, fails, or caves into the established limits of excavations due to any cause whatsoever, shall be removed and disposed of by the Developer. It is the Developer's responsibility to make all excavations safe for ongoing construction.

B. Backfill

1. Natural Materials Defined

a. Common Earth - shall mean sand, loam, clay, gravel, or similar materials free from debris, frozen materials, organic materials, or other deleterious material, and containing some rock fragments, stones, and pebbles, not exceeding 12 inches in their largest dimension and site excavated material approved by the District.

b. Select Earth - shall mean sand, silt, select granular material and similar material free of clay, loam, organic material, debris, frozen material or other deleterious material and stone with any linear dimension greater than three (3) inches.

c. Topsoil - shall be the surface layer of soil with no admixtures or material toxic to plant growth. Care should be taken to limit the amounts of subsoil refuse, roots, branches, and other debris mixed with the topsoil during stripping and stockpiling.

1) Imported topsoil shall meet the following requirements:

a) The pH of the material shall be between 5.5 and 7.6.

b) The organic content shall be not less than 2% or more than 20%.

c) Gradation

Sieve Size	% Passing By Weight
2"	100%
1"	85 - 100%
1/4"	65 - 90%
#200	20 - 80%

The Developer shall be responsible for amending imported topsoil with approved materials and by approved methods to meet the above specifications, at no additional cost to the District. The material shall be stockpiled and tested prior to use on the project.

d. Rock - shall comprise solid rock in the original bed or in well defined ledges, and which can only be removed by continuous blasting and/or jack hammering. It shall include boulders or detached pieces of rock two cubic yards or greater in size.

e. Loam - shall be defined as a soil mixture consisting of the following proportions:

Sand	30 - 50%
Silt	30 - 50%
Clay	0 - 20%

2. Granular Items Defined

The various types of backfill material specified below shall be used, where specified on the drawings.

a. Type A - Material shall be clean and sound and shall be either, gravel, screened gravel or crushed stone. It shall consist of 100% by weight passing a 1-1/2 inch square opening, not more than 90% by weight passing an inch square opening and not more than 10% by weight passing 1/4" square opening.

b. Type B - Material shall be clean, sound, crushed stone of uniform quality. It shall be a 50-50 mixture of NYSDOT size designation #1 and #2 stone as per NYSDOT Standard Specifications Section 703-02 latest revision.

c. Type C - Material shall be clean, sound, crushed stone of uniform quality. It shall meet the gradation of #1 stone as per NYSDOT Standard Specifications Section 703-02 latest revision.

d. Type D - Material shall consist of washed coarse sand having the following gradation by weight.

% Passing	Sieve
100	3/8 inch
90-100	No. 4
80-100	No. 8
50-85	No. 16
25-60	No. 30
10-30	No. 50
2-10	No. 100

e. Type E - Material shall meet the requirements of Item 304.05 as defined in the NYSDOT Standard Specifications latest revision.

f. Type F - Material shall meet the requirements of Item 304.04 as defined in the NYSDOT Standard Specifications latest revision.

g. Type I - Material shall meet the requirements for select granular fill Item 203.07 as defined in the NYSDOT Standard Specifications latest revision.

h. Type J - Material shall be a clean, sound, screened stone (Pea-Stone) of uniform quality. It shall meet the gradation of #1A stone as per NYSDOT Standard Specifications Section 703-02 latest revision.

i. Type K - Material shall be a clean, sound, washed gravel of uniform quality. It shall consist of 100% by weight passing a 1-1/2 inch square opening, 90-100% by weight passing a 1 inch square opening and not more than 5% by weight passing a 1/2 inch opening.

j. Type L - Granular undercut backfill material shall meet the following gradation:

% Passing	Sieve
90-100%	3 inch
40-70%	1/4 inch
15-30%	# 40
10-25%	#100
0-20%	#200

3. General Requirements

a. All excavations shall be backfilled to the original surface of the ground or to such other grades as may be shown, specified, or directed. Backfilling

shall be done with suitable excavated materials as shown on the Standard Details and satisfactorily compacted.

b. Undercut backfill shall meet the gradation specified under Type L granular material and shall be placed in lifts not to exceed 12 inches in depth.

c. Excavated material considered by the Town to be unsuitable for backfilling shall not be used, and shall be stockpiled or removed from the site according to the following:

1) Unsuitable material shall fall into two specific categories. The first shall be that material which would be unsuitable under any circumstances. Material containing humus, spongy material, roots, stumps, muck, peat, and any other objectionable material. This material shall be disposed of in an approved spoil area.

2) The second category shall consist of material that which is unsatisfactory for backfill because of its moisture content at the time of excavation. This material shall be stockpiled in approved areas on the Project site. This stockpiled material, when satisfactory for backfill, shall be used in other areas lacking backfill or appropriately disposed of.

d. The Town shall be the sole judge of what constitutes unsuitable material and into which category it falls. Any deficiency in backfill shall be made up in spoil, if suitable, or by acceptable imported material.

e. When it is necessary to haul material over the streets or pavements, the Developer shall provide suitable tight vehicles so as to prevent deposits on the streets or pavements. In all cases where any materials are dropped from the vehicles, the Developer shall clean up the same as often as directed and keep the crosswalks, streets, and pavements clean and free from dirt, mud, stone, and other hauled material.

f. As required the Developer may add sufficient water during compaction to assure a complete consolidation of the material.

g. The Developer shall make up any settlement of trenches or embankments with suitable material and stabilize.

4. Backfilling of Trenches

a. All pipes shall be protected from lateral displacement and possible damage resulting from backfill operations through, impact or unbalanced loading, by maintaining the pipe adequately embedded. Except where detailed or due to subsoil conditions that require the use of concrete cradle encasement, all pipe embedment shall be placed so as to insure adequate lateral and vertical stability of the installed pipe during pipe jointing and backfill

operations. A sufficient amount of the specified pipe backfill material to hold the pipe in rigid alignment shall be uniformly deposited and thoroughly compacted below, on each side, as well as above each pipe laid in accordance with the limits as shown on the Standard Details.

b. Pipe backfill materials placed any point below an elevation of 12 inches above the top of the pipe barrel shall be placed and compacted in layers not to exceed 6 inches in uncompacted depth and shall be done simultaneously and uniformly on both sides of the pipe to the limits as shown on the Standard Details. All such materials shall be graded in the trench with hand tools in such a manner that they will be placed uniformly alongside the pipe. The remainder of the trench shall be backfilled with material as shown on the standard details. In grassed areas, this remaining backfill shall be suitable excavated material and shall not exceed 12-inch lifts after compaction. When placed under pavement, utilities, and other structures this remaining backfill shall be select granular material. Each layer shall be thoroughly compacted to prevent settlement.

c. Where trenches are constructed in, near, or across roadway ditches or other water courses, the backfill shall be protected from surface erosion.

d. Trucks or other heavy equipment shall not be operated over pipelines until a minimum of 24 inches of backfill above the crown of the pipe has been placed and properly compacted.

5. Backfilling Around Structures

Prior to backfilling, a minimum of seven (7) days cure time shall elapse from the placing of cast-in-place concrete. In no case shall backfill materials be allowed to fall directly on a structure or to damage the structure or its protective coatings. Backfill around structures shall be deposited in horizontal layers not more than 9 inches in thickness and shall be compacted by tamping to prevent settlement. Backfill shall be brought up evenly on all sides of structures so as not to subject the structure to unequal loadings.

6. Stone Backfill

a. Place stone fill in a manner so as to produce a reasonably well graded section. The placed stone surface shall be chinked with smaller stones to form a uniformly filled condition.

b. Placing stones in layers or dumping by methods likely to cause segregation of the various sizes is not permitted. Obtain the desired distribution of the various sized stones by selectively loading, controlled dumping of successive loads or by other approved mechanical means.

c. Completely fill voids with fine stone. Rearranged stones by mechanical equipment or by hand to the extent necessary to obtain a reasonably well grade distribution.

7. Preparation of Pavement Subgrades

a. Prior to placement of fill, the embankment foundation shall be thoroughly inspected by the Town. If in the opinion of the Town, the embankment foundation is not adequate to support pavement the embankment foundation shall be proofrolled by a roller or loaded ten wheeler to the satisfaction of the Town. Any loose, soft, wet, frozen, organic, or otherwise unsuitable material shall be removed.

b. Shape the entire subgrade to the required line, grade, and cross slope. Remove any protruding stones larger in diameter than 5 inches and fill the resulting depressions with an approved material.

c. Roll the subgrade surface with a roller weighing not less than 10 tons and achieve the required compaction densities specified. If during construction, the Developer allows the subgrade to become wet and rutted, reshape, aerate, recompact subgrade, as required. Compact the entire width of the area to receive pavement and shoulders. Where subgrade failures occur due to rolling, thoroughly roll and compact these areas until no further consolidation is apparent.

d. When pavements cannot be placed immediately after the preparation of the subgrade, the entire, subgrade area shall be restricted to construction traffic until subbase materials can be placed.

e. After rolling, the finished subgrade shall not vary more than 0.05 feet from the established grade and cross slope.

f. Do not disturb the finished subgrade by traffic or other operations and protect and maintain in a satisfactory condition until the overlaying granular materials are placed.

8. Shoring

a. Steel Sheet Piling

1) Steel sheeting shall be of the continuous interlocking type. Rolled corners and structural materials shall be of structural grade steel.

2) Steel sheeting shall be sound and shall conform with ASTM DES: A328, with a minimum thickness of 3/8 inch. The Developer shall submit design plans for steel sheeting installation for the Town to review prior to use. The design plans shall be stamped by a professional engineer licensed to practice in New York State and shall be

designed in conformance with the current requirements of OSHA Safety and Health Standards (29 CFR 1926) and latest revisions.

b. Timber and Lumber for Sheeting

1) Timber and lumber includes all dimensions and structural grades used for shoring, sheeting, and bracing. It shall be of the grade, species and dimensions required, shown or specified.

2) All timber and lumber shall be hardwood free from shakes, wanes, unsound knots and decay and shall be smoothed and squared throughout its length. Structural grade lumber shall meet the requirements of ASTM DES: D-245. Stress grade lumber and fastenings shall also conform to the "Natural Design Specifications for Stress Grade Lumber and Its Fastenings." All lumber shall be new, unless the use of second-hand lumber is specifically approved prior to its use by the Town. All timber sheeting and bracing shall conform with National Design Specifications for Stress Grade Lumber of a minimum fiber stress of 1200 lbs. per square inch.

3) All timber sheeting design shall be stamped by a professional engineer licensed to practice in New York State. All sheeting shall be designed in conformance with the current requirements of OSHA Safety and Health Standards (29 CFR 1926) and latest revisions.

c. General Installation Requirements

1) The Developer shall furnish, place, and maintain sheeting, bracing and shoring as may be required to support excavation walls and prevent any earth movement which could damage pipe or to avoid delay of the work, to reduce the width of excavation required, or to maintain a safe and adequate working condition. The Developer shall furnish and install timber or steel sheeting in locations as required. Such sheeting shall include anchorage structures and connecting materials and all necessary appurtenances, whalers, deadman anchors, walling strips, and caps to provide a complete job.

2) The Developer shall be responsible for the adequacy of all sheeting and bracing used and for all damage to persons or property resulting from improper quality, strength, placing, maintenance and removal.

3) All sheeting and bracing shall be furnished and installed by the Developer in accordance with the minimum standards set forth by the Occupational and Safety and Health Administration (OSHA).

All sheeting shall be adequate and conform to current requirements of OSHA (29 CFR 1926) and latest revisions.

4) The Developer shall submit details of the timber or steel sheeting proposed for use for the information of the Town.

5) At the Developer's option, a "safety shoring shield" may be used instead of temporary sheeting and bracing. The height and length of shield are determined by trench conditions.

6) All excavations within ten (10) feet of any utility line shall be braced or sheeted if the invert of the pipe being installed is more than five (5) feet below that of the existing utility line. It shall be the responsibility of the Developer to prevent damage to or displacement of utilities.

7) If, in the judgment of the Town, the sheeting or supports furnished are inadequate or unsuited for the purpose, the Town may order such sheeting or bracing to be replaced or additional sheeting and bracing to be installed. Detailed sheeting designs stamped by a NYS Professional Engineer may be required to be submitted by the Developer to determine the adequacy of submitted shoring plans. Any design costs and resulting installations of sheeting and bracing ordered and so installed for such purpose shall be furnished and installed at the expense of the Developer.

8) Whether or not the Town orders any additional sheeting or bracing to be installed or unsuitable sheeting or bracing to be replaced, the Developer shall be solely responsible for adequacy of all sheeting and bracing.

9. Compaction

a. Utilize the proper compaction methods and equipment to suit the soils and conditions encountered.

10. Laboratory Test Reports

a. As a minimum, the laboratory maximum density testing reports shall contain the following:

1) Laboratory's name.
2) Date, time, and specific location from which sample was taken and name of person who collected the sample.
3) Moisture - Density Curve plotted on graph paper to as large a scale as is practical with all points used to derive the curve being clearly visible.

4) Designation of the test method used.
5) The optimum density and moisture content.
6) A description of the sample.
7) The date the test was performed and the person who performed the test.
8) The project name, identification, and Developer's name.
9) The signature of a responsible officer of the testing laboratory certifying to the information contained in the report.

b. As a minimum, the field compaction density testing reports shall contain the following:

1) Laboratory's name.
2) Date, time, depth, and specific location at which the test was made and the person's name who performed the test.
3) Designation of the test method used.
4) Designation of the material being tested.
5) Test number.
6) In place dry density and moisture content.
7) Optimum density and moisture content.
8) Percentage of optimum density achieved.
9) The project name, identification, and Developer's name.
10) The signature of a responsible officer of the testing laboratory certifying to the information contained in the report.

11. Performance

a. Compaction densities shown are percentages of the maximum density obtainable at optimum moisture content as determined by ASTM D1557.

b. Moisten or dry each layer of material to achieve optimum moisture content. Compact each layer of material to the following required densities:

Location	Percentage of Modified Proctor Test Density
Under concrete slab, foundations, and footings	95%*
Backfill at Structures	95%
Undercut Backfill	95%
Embankments	95%
Paved Areas	95%
Impervious Barriers	95%
Trench Backfill Under Traffic Areas (Including sidewalks) Non-Traffic areas	 95% 90%
*100% for granular material if specified	

12. Field Quality Control

    a. The testing laboratory shall perform a laboratory maximum density test for each type of soil proposed for use or encountered in the work. Determine optimum moisture content in accordance with ASTM D1557.

    b. The Town will designate the time, date, and exact location of all field compaction density tests. Field density tests may be ordered by the Town at their discretion in accordance with the following average frequencies:

    c. Under Structures, Foundations, Slabs, and Footings: One test for every 100 square foot area of each lift of compacted fill or backfill.

    d. Trenches: One test for each foot of backfill at intervals of approximately 200' along each trench.

13. Field density and moisture testing shall conform to the requirements of ASTM D1556 (sand cone) or D2922 and ASTM D3017 (nuclear density). Soils shall be described in accordance with ASTM D2488, Visual-Manual Procedure.

C. Installation of Ductile Iron, and PVC Pipe - General

1. All sanitary sewer shall be laid in an embedment of granular material. The select backfill material shall be thoroughly compacted by hand and extend a minimum of 6" above the top of the pipe.

2. Pipe subgrade preparation shall be performed immediately prior to installing the pipe in the trench. All trench bottoms shall be graded to provide uniform and continuous bearing and support on solid and undisturbed ground for the entire length of pipe.

3. Each bell hole shall be excavated immediately prior to laying the pipe so that no part of the pipe bell or coupling will be in contact with the trench bottom or granular fill thereon.

4. All trenches shall be so graded that the spigot end of the pipe will be accurately centered in the adjacent pipe bell when laid, without raising the pipe off the trench bottom. Regrading of the trench bottom which is too high will be permitted. Correction of a subgrade that is too low shall be done only by placing and compacting approved granular bedding material over the entire width of the trench and regrading.

5. Pipe shall be laid from the downstream end. All pipes shall be laid to the line and grade shown on the plan unless otherwise directed.

6. No pipe shall be laid in water or when weather and trench conditions are unsuitable for pipe laying.

7. Before lowering and while suspended, the pipe shall be inspected for defects. Any defective, damaged, or unsound pipe shall be rejected. All foreign matter such as dirt shall be removed from the inside of the pipe before it is lowered to this position in the trench. The pipe and accessories shall be kept clean during and after laying. The open ends of pipelines shall be closed by test plugs or other suitable means at all times when pipe laying is not in progress. Pipeline materials shall be carefully handled and not dropped or dumped.

8. The cutting of pipe for inserting fittings or closure places shall be done in a neat and workmanlike manner without damage to the pipe or lining. In general, pipe shall be laid with bell ends facing in the direction of laying. Pipes shall be furnished in standard laying lengths. Random short lengths shall be used only as required to connect manholes. These short lengths for manholes shall not exceed 6'-0" in length.

9. Jointing shall be accomplished in strict accordance with manufacturer's recommendations. Lubricant used at the joint shall be water soluble, non-toxic, non-supporting of bacteria growth and have no deteriorating effects on the pipes or gaskets. Solvent for pipe jointing shall be as recommended by the manufacturer of the pipe.

10. Push-on joints shall be assembled in full accordance with the manufacturer's instructions and the following procedures:

    a. The inside of the bell and spigot ends of the pipe to be joined shall be cleaned and washed thoroughly with soapy water until free from sand, dirt, and foreign material.

    b. The joint gasket shall be inserted in the bell with the groove over the head in the bell gasket seat.

    c. A film of special lubricant shall be applied to the entire gasket face on the inside of the bell.

    d. The spigot end of the joining pipe shall be set in the bell until the spigot touches the gasket.

    e. The pipe shall be pushed or jacked into the bell only as far as the reference marks provided on the spigot indicate.

    f. When necessary to cut push-on joint pipe in the field, the outside edge of the cut end shall be conditioned for use by filing or grinding a small taper at an angle of 30 degrees.

    g. All defective push-on joints shall be re-assembled and the defective material shall be discarded.

D. Lateral Construction

1. Prefabricated wye connections to the main shall be utilized for laterals.

2. The Developer shall install the lateral in a trench that is perpendicular to the sewer. The invert elevation of the lateral shall be set such that at the face of the house foundation, the invert is a minimum of 2 feet below the finished floor.

3. A cleanout shall be installed.

4. Wye connections and ends of laterals shall not be backfilled until a record has been made by the Developer of the "as-built" location of each.

5. All joints shall be installed, made up, and inspected in accordance with approved printed instructions of the manufacturer. Joint tolerances shall be specified in ASTM D3139 and F477 for polyvinyl chloride pipe.

6. The manufacturer shall test and furnish test certificates covering all pipe supplied under this contract conforming to the test requirements as specified in ASTM D2241 for polyvinyl chloride pipe.

7. All pipe shall be cut by approved power saws which will produce a clean, true cut, free from irregularities and a smooth end at right angles to the axis of the pipe. All cut ends shall be beveled. No other method of pipe cutting will be accepted.

8. All pipes and fittings shall be handled carefully in loading and unloading. They shall be lifted by hoists and lowered on skidways in such a manner as to avoid shock. Derricks, ropes, or other suitable equipment shall be used for lowering the pipe into the trench. Pipe and fittings shall not be dropped or dumped.

9. Each pipe and fitting shall be inspected before it is lowered into the trench. The interior of the pipe and all joint surfaces shall be thoroughly cleaned and shall thereafter be maintained clean. Care shall be taken in applying soap to facilitate joining of pipe sections. Soap shall be used sparingly. All pipe shall be laid true to line and grade with bells upstream and shall have a full, firm, even bearing. No length of pipe shall be laid until the previous length has sufficient backfill material placed and compacted about it to secure it firmly in place to prevent any disturbance. The open ends of pipe shall be securely plugged whenever pipe laying is not in progress. Under no conditions shall pipe be laid in water, and no pipe shall be laid when trench or weather conditions are unsuitable for such work. Pipe and fittings shall be selected so that there will be as small a deviation as possible at the joints and so that inverts present a smooth service. Pipe and fittings, which do not fit together to form a tight joint, will be rejected.

10. Where an existing pipe or duct crosses the trench at an elevation which conflicts with the proposed grade for the new lateral, either the grade for the new lateral shall be changed or the existing pipe shall be relocated. The new lateral shall have

a clearance from the existing pipe of not less than six (6) inches. The space between the two (2) pipes shall be solidly filled with compacted sand. Before the trench is refilled, the existing pipelines shall be permanently supported as required by the Agency operating such pipelines.

11. Any section of the lateral that is found defective in material, alignment, grade, joints, or otherwise shall be satisfactorily corrected by the Developer.

12. The connecting fitting between new and existing laterals shall be a coupling conforming to ASTM C425, using an elastomeric sleeve, corrosion-resistant shear collar and tension bands and tightening mechanism.

E. Construction of Sewers Crossing Streams

1. Materials

Sewers entering or crossing streams shall be constructed of high density polyethylene (HDPE) with fused joints; otherwise they shall be constructed so they will remain watertight and free from changes in alignment or grade. Material used to backfill the trench shall be sand, washed gravel, or other materials which will not readily erode, cause siltation, damage pipe during placement, or corrode the pipe.

2. Siltation and Erosion

Construction methods that will minimize siltation and erosion shall be employed. The design engineer shall include in the project specifications the method(s) to be employed in the construction of sewers in or near streams. Such methods shall provide adequate control of siltation and erosion by limiting unnecessary excavation, disturbing or uprooting trees and vegetation, dumping of soil or debris, or pumping silt-laden water into the stream. Specifications shall require that cleanup, grading, seeding, and planting or restoration of all work areas shall begin immediately. Exposed areas shall not remain unprotected for more than seven days.

F. Testing of Sanitary Sewers and Appurtenances

1. General

a. Upon completion of construction of the sanitary sewer, the Developer shall clean and flush all pipes. The system shall be left free of all stones, sand, silt, or mortar projections. The benches and inverts of manholes and bottoms of inlets shall have all mortar dropping chipped away to leave a smooth, clean surface.

b. All materials flushed from the sanitary sewer shall be intercepted and removed to prevent the materials from entering the existing sanitary sewer system.

c. The Developer shall supply all materials, equipment, and labor as required to test the gravity mains, manholes, and appurtenances in accordance with the provisions of these specifications.

d. The sanitary sewer shall be inspected and a video tape recording shall be created and this tape shall be given to the Town.

2. Test for Displacement of Gravity Sewers

a. Sewers shall be checked to determine whether any displacement of the pipe has occurred. The test will be as follows: The test shall be conducted after the final backfill has been in place at least 30 days. No pipe shall exceed a deflection of 5%. If the deflection tests are to be run using a riding ball or mandrel, it shall have a diameter equal to 95% of the inside diameter of the pipe. The test shall be performed without mechanical pulling devices.

3. Leakage and Leakage Tests

a. Upon completion of construction and backfilling of sewer appurtenances all pipelines shall be thoroughly flushed out with water and prior to acceptance, the entire system, including manholes shall be inspected and tested. Test section shall be no greater than 300 feet in length.

b. The tests for watertightness shall be made by the Developer. The Developer shall furnish the necessary facilities for making the tests and determining groundwater conditions at the time of the test.

4. Hydrostatic-exfiltration and infiltration tests shall be conducted for a minimum test period of 24 hours.

a. Exfiltration (Gravity Sewer Lines)

1) Where no groundwater exists at the time of the tests, the sewers, manholes, and house connections shall be subjected to an internal water pressure test to the extent deemed necessary to determine their watertightness.

2) The lower end of the section shall be tightly plugged and the line filled with water. The line shall be vented to allow the air to escape from the pipe and the water level shall be brought to a point two feet above the crown of the pipe at its upper end at a manhole. The two foot head of water at the upper end shall be maintained for at least one hour.

b. Infiltration (Gravity Sewer Lines)

1) Infiltration test shall be made in groundwater conditions as a check for watertightness of the sewers after backfilling has been completed and sufficient time has elapsed to permit the groundwater to rise to its normal level.

2) The test shall be made by using approved low head measuring weirs placed at the lower ends of the sections to be tested or by other approved methods. The Developer shall erect a temporary bulkhead to shut off flow from above the section being tested, and shall provide pumps downstream of the measuring device to keep the system drained for the period of the test.

c. Allowable Leakage (Gravity Sewer Lines)

1) The maximum allowable leakage in the sewer lines shall be 100 gal./mile/24 hours per one inch of internal diameter of the sewer.

2) Any section of sewer piping which does not meet the specified leakage test shall be repaired by the Developer.

3) Low Pressure Air Acceptance Test (Gravity Sewer Lines)

a) Air pressure tests shall be run following the guidelines of Uni-Bel (UNI-B-6-98) "Recommended Practice: For Low Pressure Air Testing of Installed Sewer Pipe".

b) All branch fittings and ends shall be securely plugged to withstand the internal test pressures. The section of line being tested shall also be securely plugged at each manhole. All stoppers shall be adequately branched when required.

G. Video Taping Sanitary Sewer System

1. The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case will the television camera be pulled at a speed greater than 30 feet per minute. Manual winches, power winches, TV cable, and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line.

2. When manually operated winches are used to pull the television camera through the line, telephones or other suitable means of communication shall be set up between the two manholes of the section being inspected to ensure good communications between members of the crew.

3. The importance of accurate distance measurements is emphasized. Measurement for location of defects shall be above ground by means of a meter device. Mark-

ing on the cable, or the like, which would require interpolation for depth of manhole, will not be allowed. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape, or other suitable device, and the accuracy shall be satisfactory to the Town.

4. Documentation of the videotaping shall be as follows:

   a. Television Inspection Logs: Printed location records shall be kept by the Developer and will clearly show the location in relation to an adjacent manhole of each lateral wye and any problem point observed during inspection.

   b. Videotape Recordings: The purpose of tape recording shall be to supply a visual and audio record of areas of the lines that may be replayed. Videotape recording playback shall be at the same speed that it was recorded. Slow motion or stop-motion playback features may be supplied at the option of the Developer. Title to the tape shall remain with the Developer, however, the Developer shall provide to the Town a complete set of tapes and logs at the completion of the inspection.

12.2 Pressure Sewer Pipe Installation

A. General

1. Pipe and fittings shall be handled in such a manner that the coating and lining are not damaged during their delivery, storage, or installation. Pipe with damaged coatings or linings shall be repaired or replaced by the Developer.

2. All pipe shall be cut accurately to size and installed without forcing. Pipe shall be installed so that it can expand or contract without damage. Pipes shall be carefully fitted to the equipment and care shall be used not to force either the pipe or equipment into place. After the piping has been placed, the equipment shall be again checked for level and alignment.

3. Whenever valves or other equipment are located in or connected to a pipeline, the connections must be such that the valves or equipment can be removed without disturbing the rest of the pipeline.

4. Flanged pipes shall be fitted together using best quality cloth inserted rubber, full faced, minimum 1/8" thick gaskets, and bolts tightened evenly.

5. The trench shall be excavated to the required alignment and width, and to a depth that will assure a minimum cover of 4.5 feet over the top of the pipe after construction has been completed. The Developer shall dewater the trench and keep it free of water at all times.

6. Where the trench bottom is determined to be unstable, the Developer shall remove all unsuitable material to the width and depth ordered by the Town. Unsuitable

material shall be disposed of by the Developer and shall be replaced with a material ordered by the Town.

7. When rock is encountered, all rock shall be removed to provide a minimum clearance around the pipe exterior of 12 inches along the sides of the pipe and 6 inches along the bottom of the pipe.

8. Pipe and fittings shall be installed in accordance with the requirements of ANSI/AWWA C600 and according to manufacturer's latest printed instructions. No plugging, filing, burning in or welding of pipe will be allowed.

9. All tees, elbows, bends, and plugs shall be solidly braced to prevent any deflection due to thrust pressure. Bracing shall be accomplished with the use of cast-in-place concrete between the fittings and undisturbed soil.

B. Bedding and Backfill

1. Pipe bedding and cover shall be to six inches (minimum) on each side of the pipe, from six inches below the bottom of the pipe to six inches above the top of the pipe. All pipe bedding and cover shall be compacted according to the requirements of these specifications. Bedding shall provide a solid bearing through the entire pipe length.

2. The pipe trench shall be backfilled with the materials indicated in these specifications and on the Standard Details.

3. The Developer must take appropriate measures to prevent dirt, debris, and surface and ground water from entering the pipe. Unconnected pipe ends shall be plugged with a watertight plug at the close of each day's work; whenever work is discontinued for any length of time; or when laying conditions indicate that foreign matter may enter the pipe.

C. Testing – Sewer Force Mains

1. The Developer shall conduct a pressure test in the main after all appurtenances required in the work for the section to be tested are installed. The pressure test shall be witnessed by a Town representative.

2. The pressure test shall be done in accordance with the requirements of Section 5 of ANSI/AWWA C600.

3. The section of pipe to be tested shall be filled with water and all air shall be expelled from the pipe. The Developer shall make all taps, as necessary, for releasing all of the air and for all test purposes as may be required. Taps may be installed during the laying of the main.

4. For the pressure test, the Developer shall raise the water pressure (based on the elevation at the lowest point of the section under test and corrected to the gauge location) to a minimum pressure of 150 pounds per square inch gauge.

5. The required pressure shall be maintained for an uninterrupted period of two hours. Unless otherwise noted, the volume of water required to maintain the specified pressure as measured shall not exceed the limits determined by the following formula as defined in Section 5 of ANSI/AWWA C600:

$$L = \frac{SD\sqrt{P}}{148{,}000}$$

in which L is the allowable leakage in gallons per hour; S is the length of pipe tested in feet, D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test in pounds per square inch gauge.

6. If a section should fail to pass the pressure test, the Developer shall do everything necessary to locate, uncover, and replace any defective material or work. Repeated tests and repairs shall be made until the section passes the specified tests.

12.3 Manhole Installation

A. Precast Circular Manhole Sections

1. Precast grade rings, riser bases, and risers shall be circular in cross section and precast tops shall be of the eccentric cone type unless the depth of manhole prohibits its use. In those instances flat slab tops shall be used. The flat slab shall be reinforced to withstand AASHTO H20-44 concentrated wheel loadings.

2. All precast sections shall conform to ASTM C-478 construction and minimum dimension criteria. Riser sections shall be of maximum practicable length to attain the specified grade elevation with the minimum number of joints and the shortest possible chimney.

3. All concrete shall be made with Type II Portland Cement.

4. Precast reinforced bases shall be integrally cast with wall riser conforming to ASTM C-478 with a minimum 3,500 psi concrete.

5. Openings in precast riser sections to receive pipes shall be accurately cast, both vertically and circumferentially. Where openings are incorrectly cast, the riser section shall be removed from the project site and replaced with a satisfactory base.

6. Provide adequate lifting anchors on each precast section.

B. Joints

1. Joints shall be formed with male and female ends so that when assembled, a continuous and uniform manhole without appreciable irregularities in interior wall surfaces will be completed.

2. O-ring seals shall conform to ASTM C-443.

3. Permissible variations are as follows:

   a. Internal dimensions - not more than one percent.

   b. Wall thickness - not more than 5% or $\pm$3/16 inch whichever is greater.

   c. Length of two opposites sides - not more than 5/8 inch.

   d. Length of section - not more than 1/2 inch in any one section.

4. Seal all manhole section joints with flexible joint sealant which shall be "Kent Seal No. 2" by Hamilton-Kent, Butyl-Tite by Blue Ridge Rubber Company or approved equal.

C. Manhole Steps

1. Manhole steps shall be installed by the precast manhole manufacturer and integrally cast into the precast riser sections.

2. Manhole steps shall be provided and shall be designed for a concentrated live load of 300 lbs. The steps shall be manufactured of a material which is resistant to highly corrosive conditions. The steps shall be constructed of a minimum 1/2" grade 60 steel reinforcement imbedded in copolymer polypropylene plastic.

3. Steps shall be embedded in the wall sections of a minimum of 3 inches and project a minimum clear distance of 4 inches from the points of embedment.

4. The minimum centerline width of rungs shall be 13 inches.

5. Steps in riser and conical sections shall be aligned in each section so as to form a continuous ladder with rungs equally spaced vertically in the assembled manhole at a maximum distance of 12" apart. The lowest rung shall be within 18" of solid footing (e.g. structure bench) upon which the person descending the rungs would normally step. The uppermost rung shall be set within 18" of the rim of the structure frame to act as a handhold. If this rung must be set in the brick chimney, it shall set so as to extend 3" from the face of the brick to facilitate easy passage. Make every effort to locate rungs on a wall with no pipe penetrations.

6. Steps shall be as manufactured by Kistner Model No. PS2-PFS or approved equal.

D. Brick

Sewer brick - ASTM C32, Grade SS, first quality sound, hard burned brick, regular and uniform in shape and size and of compact texture.

E. Mortar

1. Conform to ASTM C270, Type M or S.

2. Mix in a suitable mixer or watertight mixing box. Thoroughly mix dry materials and then add sufficient water to bring the mixture to a workable consistency. The use of mortar that has begun to set, and the retempering of the mortar, are prohibited.

3. Water shall be clean, fresh, and potable.

4. Antifreeze compounds and liquids are not permitted in mortar.

F. Hydraulic Cement

"Sikaplug" by Sika Chemical Corp., "Waterplug" by Standard Dry Wall Products, Inc., or approved equal.

G. Manhole Covers, Grates, and Frames

1. All manhole frames, grates, and covers shall be iron castings conforming to ASTM A48, Class 30. They shall be true to pattern in form and dimensions, free from pouring faults, sponginess, cracks, blow holes and other defects. Casting shall have boldly filiated angles and the airs shall be sharp and perfect. After casting and prior to shipping, smooth and clean all surfaces by sand blasting. Castings shall be factory coated with coal tar pitch varnish. Castings shall be thoroughly shop coated with one coat of Koppers Super Service Black or coal tar enamel or asphalt base bituminous material with a minimum dry thickness of 12 mils.

2. All frames, grates, and covers must conform to these specifications as to quality, strength, thickness of metal and finish. Covers shall be furnished with lettering on face and as shown on the Standard Details. All castings shall be designed to sustain AASHTO H20-44 wheel loadings.

3. Fabricate all frames, grates, and covers so that covers and grates fit in any position without rocking. Mill horizontal fitting surfaces to a true and even surface to insure uniform bearing. Units and portions of units shall be interchangeable.

4. All sanitary manhole covers shall be solid and provide a non-penetrating pickhole for lifting. The covers shall have a non-skid surface and shall have raised lettering of 2" or more in size (cast into the cover). On the covers the following shall be clearly printed: "SANITARY". Acceptable frame and cover shall be Neenah R-1726-A, Syracuse Casting 1032 or approved equal.

H. Sanitary Pipe Connections to New Manholes

1. A gasket shall be cast into the manhole wall for sanitary manholes to assure a watertight connection with the attached pipe. The gasket shall meet the requirements of ASTM C-923.

2. Gasket shall be "A-Lok" by A-Lok Products, Inc., of Tullytown, PA or approved equal.

I. Concrete Bench Walls/Cast-in-Place Concrete

1. Concrete for bench walls and inverts shall be Type A as specified.

Class of Concrete	Max. Gal. of Water Per Sack of Cement	Min. Bags of Cement Per C.Y. of Concrete	Min. Strength 28 Days Lbs. per Sq. In.	Max. Slump in Inches
A	5.5	5.75	4,000	4

2. Inverts (Channels and Benching) - Construct inverts to the general configuration shown on the Standard Details and more specifically, to conform to the following requirements:

   a. Construct channels to produce free, uniform, unobstructed, and non-turbulent flows, without ponding, from each inlet pipe to the outlet pipe, and in a manner which will not produce free-falls, splashing or spraying onto structure benches or walls.

   b. Completed inverts shall allow for easy, visual observations into pipes and readily permit the insertion of pipe plugs and cleaning equipment.

   c. The bottom half of all channels shall be smooth semi-circles. When all pipes entering and leaving the structure are the same size, the radius of each channel semi-circle shall equal the radius of the pipes. When there are only two pipes connected to the structure, and the outlet pipe is larger than the inlet pipe, the channel shall uniformly increase in cross section across the full width of the structure so that the radius of the channel semi-circle varies from the radius of the smaller pipe at the inlet to the radius of the larger pipe at the outlet. When two or more pipes enter a structure and the outlet is larger than either inflowing pipe, the primary channel shall uniformly increase in cross section across the full width of the structure and the secondary channel(s) shall maintain the cross section of the secondary pipe(s). Construct inverts for other combinations of pipes and pipe sizes along these lines.

   d. Construct inverts with curves of the longest possible radii, tangent to the centerline of the pipes.

e. Construct the benching by solidly filling in the area between the channel and the structure walls. Slope the top surface of the benching towards the channel, at a pitch of approximately ½-inch/foot so that the liquid on the bench will easily drain into the channel. Provide as much bench area as is possible for standing on and make surface slightly roughened to attain a skid resistant finish.

f. Where the top of benching intersects the channel, the resulting edge shall be rounded to a radius of approximately 1/4" - 3/4". Where channels meet to form an acute angle, provide a rounded intersection with a radius of about 1".

3. Penetrations Through Concrete - Only where absolutely necessary, penetrations shall be made through concrete by core drilling or by other approved means which will produce a hole in the minimum possible size and in a manner which will not affect the structural integrity of the concrete. After inserting the item which is penetrating the wall, carefully and neatly fill the annular spaces with hydraulic cement.

J. Cleanout Frame and Cover

Frames and covers for cleanout inspection ports shall be cast iron with blind pick hole meeting ASTM A48 Class 30 or better. The top surface shall have a non-skid surface and shall bear the title "SANITARY". The frame and covers shall be as manufactured by Syracuse Castings model 4155 or approved equal.

K. Orientation of Covers, Grates, and Rungs

1. General - The intent of this paragraph is to provide guidance in the selection of the location of the frame and cover. The location should provide for the safety of all, during and after construction of the work, provide for convenient ingress and egress, and minimizes adverse visual impacts. Orient the location of covers and steps by using the following criteria, with precedence given in the order presented.

2. Safety - Give primary concern to safety considerations for providing convenient access to structure interiors.

3. Covers and Pavements - To avoid future problems with snow removal or street cleaning, orient covers to lie completely outside of paved surfaces, including walks and roadways. If this cannot be accomplished, locate cover completely in pavement. Covers partially in pavement are not permitted without the prior approval of the Town. When covers occur in paved areas, locate entirely within a single traffic lane and as near to the edge of pavement as is possible, but no closer than 8" from the edge of pavement. Frames and covers shall be located below finished grade of finished surface, minimum of ¼-inch.

4. Ingress/Egress - Coupled with the above, convenient and safe access to within the structure must be evaluated. Coordinate cover location with pipe openings, structure benches and inverts, safety landings and the like. Make every effort to locate steps on a wall with no pipe penetrations and, where steps are not specified to be provided, consideration shall be given to the safest means of seating the feet of ladders which will be used for access to structure interiors.

5. Non-compliance - Non-compliance with the requirements of this paragraph may result in Town's disapproval of the entire structure. When requested, the Town will assist in determining the optimum location of covers, grates, and rungs.

L. Construction of New Manholes and Structures

1. Precast Bases: Place stone bedding, level, and tamp firmly in place. When absolutely necessary, pea stone may be used for minor grade adjustments in the stone bedding, but the depth shall not exceed 3/4". Carefully lower precast base in place, taking extra care not to shift the stone bedding, and align all openings with the pipes to be connected. Leveling of the base by tamping or pounding on the top of the precast product is prohibited. If base is not level, lift it out, readjust stone bedding, and reset base. Continue this procedure until base is level.

2. Precast Risers and Top Sections: Thoroughly clean all joints of precast sections and install jointing material. Carefully set precast sections in place, making sure that jointing material is not displaced and that a good seal is attained. Fill all lifting holes with hydraulic cement.

3. Filling Precast Section Joints: Fill interior and exterior joints with hydraulic cement. Cover inside and outside of joint with two coats of Koppers Bitumastic Super Service Black Coal Tar or approved equal.

4. Inverts: Inverts built upon precast base shall be constructed of concrete brick, half sections of sewer pipe or be cast in place. Care shall be exercised in forming inverts to give proper slope and shape to each channel. Bench walls shall be constructed of sewer brick and bench filled with concrete. Bench walls shall be carried a minimum of one brick course above top of highest pipe entering the manhole. Slope the top surface of the benching towards the channel as a pitch of approximately 1/2"/ft.

5. Roof Slabs

    a. Slab shall be formed to fit into ends of vertical pipe and shall have full bearing for its entire circumference. The slab shall be set in bed of cement mortar.

    b. Opening diameter shall match manhole casting inside base diameter.

    c. The location of center of opening for frame and cover shall be 1'-6" from inside of manhole wall unless otherwise noted.

6. Chimneys

   a. Precast grade rings set in mortar shall be used to bring manhole frames to grade, maximum 8" height for grade ring.

7. All manhole frames shall be set in mortar and concrete fill placed around the outside and kept 2" below the top of the frame.

8. The Developer shall be responsible for maintaining and keeping all manholes clean and free of debris until completion of the project.

M. Connection to Existing Sanitary Manholes

1. Where noted, the Developer shall make connection to existing manhole. The use of excessive force or blunt instruments is prohibited in installing the pipe into the existing wall. If a stub exists and matches the size of the new sewer, the Developer shall connect to the stub. The stub to manhole connection should be checked and repaired if damaged or in poor shape. If stub does not match the size of the new sewer, the stub shall be removed and the new sewer shall be inserted into the manhole.

2. In making the connection to existing manhole(s), it shall be the Developer's responsibility to dewater the structure in order to make the connection.

3. The manhole shall be visually inspected by the Town for tightness of fit at all new joints.

N. Installation of Precast Manholes

1. Precast Bases: Place stone bedding, level, and tamp firmly in place. When absolutely necessary, pea stone may be used for minor adjustments in final leveling, but the depth shall not exceed 3/4". Carefully lower precast base in place, taking extra care not to shift the stone bedding, and align all openings with the pipes to be connected. Leveling of the base by tamping or pounding on the top of the precast product is prohibited. If base is not level, lift it out, readjust stone bedding, and reset base. Continue this procedure until base is level.

2. Precast Risers and Top Sections: Thoroughly clean all joints of precast sections and install jointing material. Carefully set precast sections in place, making sure that rubber gasket jointing material is not displaced and that a good seal is attained. Fill all lifting holes with hydraulic cement.

O. Testing

1. Completed sanitary manholes only shall be subject to vacuum tests. The inlet and outlet pipe for the manholes shall be plugged with a plug that allows no leakage.

2. The test head shall be placed inside the 24-inch opening and the seal inflated in accordance with the manufacturer's recommendations.

3. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches. The manhole shall pass the test if the time is greater than the following:

Diameter of Manhole	Time (seconds)
48"	60
60"	75
72"	90

4. If the manhole fails the initial test, necessary repairs shall be made. Retesting shall proceed until satisfactory results are obtained.

5. Equipment: NPC manhole vacuum tester, as manufactured by NPC Systems, Inc. of Worcester, MA or approved equal.

6. All structures, manholes, and drop inlets shall be visually inspected for tight joints and neat workmanship. The flow lines in a structure shall be smooth and neat.

P. Rejection and Repair

1. Manhole sections shall be subject to rejection on account of failure to conform to any of the specification requirements. In addition, individual sections of manhole sections may be rejected because of any of the following:

   a. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.

   b. Defects that indicate imperfect proportioning, mixing, and molding.

   c. Surface defects indicating honeycombed or open texture.

   d. Damaged or cracked ends, where such damage would prevent making a satisfactory joint.

   e. Any continuous crack having a surface width of 0.01 inch or more and extending for a length of 12 inches or more.

2. Manhole sections may be repaired if necessary, because of occasional imperfections in manufacture or accidental injury during handling and will be acceptable if the repairs are sound and properly finished and cured and the repaired manhole sections conform to the requirements of this specification.

Q. Marking and Painting

1. Name and trademark of the manufacturer shall be clearly marked on each manhole section.

2. Marking shall be indented into the manhole bases, risers, and top sections or shall be painted thereon with waterproof paint.

3. The precast manufacturer shall apply one coat (12 mils minimum per coat) of bitumastic coal tar to all internal areas of all precast sections used for sanitary manholes in accordance with the paint manufacturer's instructions. This material shall be Koppers Super Service Black or approved equal.

4. Immediately after installation is completed, the Developer shall touch up all marks, scars, and imperfections found and paint all interior surfaces not factory coated with two coats of coal tar, Koppers Super Service Black or approved equal.

5. Cover inside and outside of joints all around with flexible joint sealer and two (2) coats of Koppers Super Service Black or approved equal.

Section 13 Water Supply

13.1 Water Mains and Appurtenances

A. Excavation, Grading, and Shoring

1. General: The Developer shall verify that points of connections to existing pipes have been excavated and the Town of Oakfield has issued an authorization to proceed with the work as shown, or with modifications. The installation of water mains and appurtenances will be in accordance with the requirements of the Town of Oakfield Water Code. The Town of Oakfield's interest in the proper installation of water mains is related to the protection of other public facilities being installed as part of the project that will be dedicated to the Town of Oakfield.

2. Under normal conditions, the excavation shall be vertical open cut from the ground surface. Tunneling beneath trees and certain surface structures may be required.

3. Bottom of excavations shall be finish graded by hand methods to receive bedding. The stone bedding shall be placed, compacted, and trimmed by hand to ensure the grade as necessary or as detailed.

B. Storage and Handling

1. Stockpiling of earth spoil or excess earth material on the site or storage of excavated materials for reuse shall be done in a manner which will not hinder the progress of the work; cause any nuisance; or cause spillage or tracking of materials from the transporting vehicle onto public highways or cause an inconvenience to adjacent property owners.

2. Obstruction of roads, driveways, sidewalks, or interference with drainage along gutters, ditches, or drainage channels with stored material is not permitted.

3. Promptly remove materials not specified to be stored or reused. Burning of materials at the site is not permitted. Such materials shall be disposed of off-site in conformance with applicable legal requirements.

4. Topsoil suitable for final placement and grading shall be excavated and stockpiled on-site for future use. The stockpile shall be well-shaped and graded in order to shed water and to avoid contamination by other granular or earth materials temporarily stockpiled on-site.

C. Job Conditions

1. Keep graded surfaces well drained, but avoid erosion. Do not place earth fill on wet grade, in water, or over ice or snow.

2. Filling with frozen materials or when materials already in place are frozen, is not permitted.

3. Provide and maintain suitable temporary crossings over open ditches when required to maintain access.

4. The Contractor shall be responsible for all damage or injury done to pipes, structures, pavement, property or person as a result of excavations required to complete the work.

5. When excavating in or adjacent to the traveled portion of highways, take whatever measures are necessary to protect the road surfaces from becoming undermined.

D. Methods Of Control For Excavations And Grading

1. The Developer shall be responsible for the proper layout of utilities, structures, and drainage. He shall maintain adequate stakeout control for inspection of the work and to accurately complete construction.

E. Limit Of Excavation For Pipelines

1. Trenches shall be excavated as shown on the Contract Drawings.

F. Limit Of Excavation For Structures

1. Excavations for structures and facilities shall be of sufficient size to give suitable room for proper construction procedures and no larger.

G. Site Grading

1. Prior to start of work, the Developer shall verify that all boundaries of temporary and permanent easements and property lines are clearly marked in the field so that the work will not violate these boundaries.

2. The Developer shall verify the locations and character of structures, underground lines, and subsurface conditions and verify that the described work will not adversely affect them.

3. The Developer shall dispose of excess suitable excavated material on-site.

4. Subgrade surfaces shall drain, be compacted, and well graded.

H. Storage Of Materials

1. All excavated materials shall be stored in locations so as not to endanger the work, and so that easy access may be had at all times to all parts of the excavation. Stored materials shall be kept neatly piled and trimmed, so as to cause as

little inconvenience as possible to other Contractors on site or to adjoining property owners.

2. Topsoil suitable for final grading shall be removed and stored on-site separately from other excavated material.

13.2 Pipe and Structure Backfill

A. General

1. Provide and maintain suitable temporary crossings over open trenches where necessary to maintain access.

2. Any backfill material over trenches that settle and/or erode during a period of two (2) years after the date of final acceptance shall be repaired by the Developer upon receipt of written notice from the Town.

3. The Developer shall take precautions to protect from harm the work of other contractors on site, existing facilities, as well as adjacent property. The Developer shall be responsible for all damage or injury done to pipes, structures, pavement, property or persons due to improper placing or compacting of backfill. The Developer shall repair such damaged property or item to the satisfaction of the property owner, public agency having jurisdiction and/or Town at no additional cost.

4. When it is necessary to haul material over the streets or pavements, the Developer shall provide suitable tight vehicles so as to prevent deposits on the streets or pavements. In all cases where any materials are dropped from the vehicles, the Developer shall clean up the same as often as directed and keep the crosswalks, streets, and pavements clean and free from dirt, mud, stone, and other hauled material.

5. Flagmen, guards, barricades, lights, services, and other items needed for the protection of persons and property shall be furnished and maintained by the Developer in accordance with MUTCD/NYSDOT standards.

6. The Developer shall remove any waste material or other debris that has accumulated as a result of the work of this section and dispose in conformance with applicable legal requirements.

7. The various types of backfill material to be utilized on-site are specified below and shall be used as described unless specifically shown otherwise on the drawings.

8. Mechanical, vibratory, pneumatic tampers or other method as approved by the Town of Oakfield shall be required.

9. Water in sufficient quantity may be required to assure compaction.

10. Lift thickness, and the compactive capabilities of the equipment used, shall be continually monitored by the Developer to obtain the compaction efforts required for all materials used for backfill.

B. General Backfilling Requirements

1. The Contractor shall be responsible for providing all necessary fill materials.

2. All excavations shall be backfilled to the original surface of the ground. Backfilling shall be done with suitable excavated materials satisfactorily compacted.

3. Excavated material unsuitable for backfilling shall not be used, and shall be stockpiled or removed from the site according to the following:

    a. Unsuitable material shall fall into two specific categories. The first shall be that material which would be unsuitable under any circumstances. Material containing humus, spongy material, roots, stumps, muck, peat, and any other objectionable material. This material shall be disposed of in an approved off-site spoil area.

    b. The second category shall consist of material which is unsatisfactory for backfill because of its moisture content at the time of excavation. This material shall be stockpiled in approved areas on the Project site. This stockpiled material, when satisfactory for backfill, shall be used in other areas lacking backfill.

4. As required, sufficient water may be added during compaction to assure a complete consolidation of the material.

5. The Developer shall make up any settlement of trenches or embankments with suitable material and stabilize at no additional cost to the Town. This work shall be performed promptly.

C. Settlement

1. Repair to proper grade any settlement of slab, pavement, utility structure, lawn, etc. adversely affected by settlement within two (2) years after final acceptance at no expense to Town.

Section 14 Miscellaneous Construction

14.1 General Grading, Trimming, Seeding, and Related Work

A. General

1. The Developer shall generally maintain the project in a neat and nuisance free condition. Cellar excavations and trenches shall not be left open for prolonged periods or be allowed to fill with water and thereby create a hazard.

2. Where open storm drainage ditches or swales are constructed the side slopes and bottom shall be neatly graded and left in a clean condition. Side slopes shall be topsoiled, and seeded with perennial rye grass.

3. Vacant, unsold lots shall not be used as a depository for scrap lumber, excess earth, or trash.

B. Establishment of Turf

The seeding and care of lawn areas is an important feature of a well developed landscape. The soil shall be properly prepared with applicable fertilization and liming procedures. Suitable grasses or grass mixtures shall be selected for the appropriate environmental conditions as listed below:

1. Non-Lawn Areas

   All disturbed open and wooden areas, on slopes of less than one (1) vertical to four (4) horizontal, shall be treated with a mixture of starter fertilizer and seed by the hydraulic method. Seed shall be applied at the rate of 4-5 pounds of pure live seed per 1,000 sq. ft. Fertilizer shall be applied as specified elsewhere in this Section. Topsoil shall be suitable for use in seeding and shall contain no material toxic to plant growth. It shall be placed to a depth of 4" compacted thickness.

Seed Mix
Low Maintenance, Droughty, or Shady Areas

Species	P.C.S.	Max. Weed Seed
65% Red Fine Fescue	90%	.50%
10-20% Perennial Rye	85%	.50%
Remainder Kentucky Blue Grass Blend	85%	.50%

P.C.S.: Percent pure Crop Seed

2. Grass and Planted Areas

Grass and planted area shall be designated as all other areas not specified as Sloped, Wooded or Open Areas and shall include lawn areas. All work in connection with the restoration of grass and planted areas shall be performed by an experienced landscape contractor.

Seed Mix
Low Maintenance, Higher Maintenance, Lawn Area

Species	P.L.S.	Max. Weed Seed
80% Kentucky Blue Grass	85%	0.50%
20% Perennial Rye	85%	0.50%

P.L.S.: Percent pure Live Seed

3. Sloped Areas

All disturbed areas having a slope of one (1) vertical to four (4) horizontal or greater shall be regraded as required to match existing adjacent surfaces and planted with crown vetch or equivalent ground cover.

Recommended Seed Mix

	Weight	Proportionate By Purity	Germination
Coronilla varia Crown Vetch (Penngift)	1/3	95%	80%
Pennlawn Creeping Red Fescue Lolium multiflorum	1/3	95%	85%
Rye grass, domestic	1/3	98%	90%

C. Procedure

1. The grading of areas shall include the removal of loose or unstable stones, rock or other debris. Piles of soil or other material shall be leveled to fill small gullies, pits and ruts and to secure a smooth bed free from local humps, ridges, or depressions. The construction site shall have adequate topsoil (minimum 4 inches) to provide for the growing and maintenance of turn in a normal and reasonable manner.

2. All disturbed areas shall be treated with a mixture of fertilizer, lime and seed by the hydraulic method. On the areas apply the following quantities per acre, measured on basis of true slope face:

	Per 1000 SF	Per Acre
Water, gallons	25	1,000
Seed mixture, pounds	1 ½	60
Limestone, pounds	70	3,000
Fertilizer mix, pounds	25	1,000

Fertilizer Mixture: Use 1/2 by weight of Type 1 and Type 2

Type 1	5-10-10
Type 2	Uremite or Mitroform or Borden's 38 or equivalent

3. Mulch shall consist of timothy hay, mixed clover and timothy hay, natice or agricultural grasses, wheat or oats straw. Salt hay or other saline grasses are not acceptable. Material shall be well seasoned before baling and shall contain less than twenty percent (20%) moisture by weight. It shall be free from mature seed-bearing stalks or roots of prohibited or noxious weeds. In addition, the mulch shall not contain the stems of tobacco, soybeans, and other coarse or woody materials.

4. Inoculant for treating leguminous seeds shall be a pure culture of nitrogen-fixing bacteria selected for maximum vitality, and the ability to transform nitrogen from the air into soluble nitrates and deposit them in the soil. Inoculants shall consist of pure bread cultures and shall not be used later than the date indicated on the container or specified. Apply at three times normal rate recommended for hand application of seed. Keep inoculant cool until time of use.

5. Mulch, exclusive of straw, shall be placed over slope areas after seeding has been performed. It shall be placed uniformly in a continuous blanket at the rate of two (2) tons per acre. Asphaltic emulsion as specified shall be used uniformly over and through the mulch at a rate not less than 100 gallons per acre when required to anchor mulch. All mulch shall be placed within forty-eight (48) hours after seeding or planting.

   A mechanical blower may be used to apply mulch material, provided the machine has been specifically designed and approved for this purpose. Machines which cut mulch into short pieces shall not be permitted.

D. Maintenance

The contractor shall, during the construction and prior to acceptance, properly care for all areas mulches, performing all mulching operations necessary to provide protection and establish growth on the treated areas. Mulch which becomes displaced shall be reapplied at once, together with any necessary reliming, refertilizing, reseeding; all at no expense to the Town.

E. Guarantee

All work shall be guaranteed for a minimum one (l) year period from the date of initial acceptance of the work. Initial acceptance shall be made at the time that a vigorous healthy stand of grass has been established as determined by the Town. During the guarantee period the contractor shall replace without charge all seeding, sod and plants that are dead, are in an unhealthy or unsightly condition in the opinion of the Town. Final acceptance shall be acknowledged after seeded and sodded areas and plantings have been in place for one (l) year in a vigorous healthy condition. The guarantee period shall end at that time.

14.2 Trees

A. Existing Tree and Plant Material

All existing desirable trees and plant material to remain on the site shall be indicated on the approved landscape plan, together with additional tree and plant material to be planted.

All trees to remain shall be properly trimmed of deadwood, weak, broken, or unhealthy branches and limbs. Any trees to remain which are damaged during construction shall be repaired or ones of equal value substituted. Before construction begins, barricades shall be placed around trees to remain.

All undesirable tree and plant material must be removed as directed by the Town.

B. New Trees

Trees shall be provided on the plans in locations as directed by the Highway Superintendent where screening, shading, or recreational qualities are desired.

Except for screening purposes, trees will generally be allowed for dedicated open space, and easement areas, subject to approval by the Highway Superintendent.

Trees shall be free of disease, insect pests, eggs, or larvae.

Trees which have been damaged by abrasion of the bark, sunscald, disfiguring knots, or fresh cuts on limbs over 1¼" which have not completely calloused will be rejected.

Trees shall not have crooked or multiple leaders.

Size of trees to be provided shall have a minimum of 1½ caliper measured 6 inches above the natural ground line on the trunk.

Balled and burlapped trees shall be rejected if the ball is cracked or broken prior to or during the process of planting.

All new tree and plant material is to be planted with appropriate material for adequate growth, guyed, staked, fertilized, and mulched. All newly-planted materials shall be watered in a proper and normal way.

When trenching occurs near a tree during construction, the tree shall be pruned and fertilized on that side.

C. Replacement

The contractor shall replace, without cost to the Town, and as soon as weather conditions permit and within a specified planting period, all dead plants and all plants not in vigorous, thriving condition. The plants shall be free of dead or dying branches and branch tips, and shall bear foliage of a normal density, size and color. Replacements shall closely match adjacent specimens of the same species. Replacements shall be subject to all requirements stated in this specification.

The contractor shall make all necessary repairs due to plant replacements. Such repairs shall be done at no extra cost to the Town.

The guarantee of all replacement plants shall extend for an additional period of one year from the date of their acceptance after replacement. If replacement plant material is not acceptable during or at the end of the said extended guarantee period, the Town may elect subsequent replacement or credit for each item.

D. Final Inspection and Final Acceptance

At the end of the guarantee period, the Town shall inspect all guaranteed work for final acceptance upon written request of the Developer. The request shall be received at least ten (10) business days before the anticipated date for final inspection.

Upon completion and reinspection of all repairs or renewals necessary, in the judgment of the Town Engineer at that time, the Engineer shall certify in writing to the Town as to the final acceptance of the work.

14.3 Portland Cement Concrete Sidewalk

A. General

The contractor shall construct a portland cement concrete sidewalk with the dimensions and to the lines and grades shown on the plans, in accordance with these specifications, or as directed by the Town.

B. Materials

The materials shall conform to the following specifications:

Concrete materials shall meet requirements of NYSDOT Section 501.

Class "A" concrete shall be the standard unless slip form paving will be used in which case Class "C" concrete will be the standard material. The following tables indicate mix criteria.

TABLE 4
COARSE AGGREGATE GRADATIONS

Sieve Sizes	**Type CA 1 General Limits % Passing**	**Type CA2 General Limits % Passing**
1½ inch	---	100
1 inch	100	93 – 100
½ inch	90-100	27 - 58
¼ inch	0 - 15	0 - 8

All concrete shall contain a water reducing admixture. (Follow manufacturer's recommendations.)

Mixing water shall be fresh, clean, and free from injurious amounts of alkali, organic matter, or other injurious substances.

Admixtures – Air-entraining admixtures shall conform to specifications for air-entraining admixtures for concrete (ASTM C-260)

Water reducing admixtures and retarding admixtures shall conform to specifications for chemical admixtures for concrete (ASTM C-494)

Storage of Materials - Cement and aggregates shall be stored in accordance with ACI 318 and ACI 614.

WWF6x6 - W3xW3 Reinforcing Mesh - Welded wire mesh shall conform to ASTM specification A-185. Prior to placing reinforcing mesh, all grease, dirt, mortar, excessive mill scale, injurious rust and any other foreign substance must be removed from the mesh. A WWF6x6-W6xW6 mesh shall be used in all driveway locations.

The mesh reinforcement shall be placed in the position indicated and within the allowable tolerances specified. Before concrete is placed, all reinforcement shall be securely fastened and supported with approved metal chairs or other approved devices.

TABLE 5
CONCRETE MIX CRITERIA

Concrete Class	Cement lbs/cy	Sand % Total Agg. (solid volume)	Water/ Cement (weight)	Air Content %	Slump Range (ins.)	Type of Coarse Aggregate Gradation	Primary Use
A	606	36.2	0.46	6.5	2 ½ - 3 ½	CA 2	General purpose structural
C	605	35.8	0.44	6.5	1 ½ - 2 ½	CA 2	Pavement: slipform paving, form paving
D	725	45.8	0.44	7.5	2 ½ - 3 ½	CA 1	Thin structural applications
E	648	35.8	0.44	6.5	3-4	CA 2	Structural slabs and structural approach slabs
F	716	34.6	0.38	6.5	2-3	CA 2	High early strength for pavement or structural slabs
G	727	45.0	0.45	6.0	6-7	CA 2	Tremie
H	675	40.0	0.44	6.5	3-4	CA 2	Pumping applications
I	640	41.0	0.44	6.0	½ - 1 ½	CA 2	Slip forming highway median barriers
J	680	45.8	0.44	6.0	½ - 1 ½	CA 1	Slip forming structural median barriers, parapet walls and curbs

NOTE: The criteria are given for design information and the data is based on fine aggregate fineness modules of 2.80. The mixture proportions shall be determined using actual conditions for fineness modulus and bulk specific gravities (saturated surface dry for aggregates). The proportions shall be computed to NYSDOT written instructions.

All concrete shall have a minimum compressive strength of 3,500 psi at 28 days.

Slump range of concrete shall not exceed 2-1/2" at point of discharge.

C. Concrete Mixing

Hand and on-site and mixing will not be permitted. Approved transit mixers may be used with the following qualifications.

1. The water shall be added to the mix at the site of the work and not more than 10 minutes prior to discharging the concrete into the forms.

2. Mixing time shall be at least five minutes.

3. Not more than 10 minutes shall elapse between placing of consecutive batches, unless an expansion joint is placed to separate concrete from consecutive batches.

4. Mixers shall be thoroughly cleaned after each batch. They shall not be cleaned in the street or on lawns along the site of the work.

5. The company furnishing the concrete in the transit mixers shall furnish the Town a letter signed by a responsible official of the company certifying that the materials and proportioning conform to this specification.

6. No re-tempering of concrete shall be permitted.

D. Subgrade Preparation

After preparing the site the contractor shall remove subsoil to the subgrade elevation. A string line shall be placed along the side of the cut in order to maintain proper grade and alignment.

Tree roots shall be neatly cut and trimmed at least 2 inches below and to the side of the "boxed-out" sub-grade.

Contractor bears the responsibility of contacting appropriate water and gas utility companies in order to have curb shut-offs staked out prior to starting the work.

Where fill material is required to meet the proper grade it shall consist of select fill (NYSDOT Item 203.06).

E. Crushed Stone Base

The contractor shall install a washed #l & #2 crushed stone base course (NYSDOT Item 623.12) that has a total compacted thickness of 6 inches. This base course shall be placed under all proposed concrete sidewalks and shall be compacted as approved by the Town.

F. Form Work And Concrete Placement

Metal or wood forms of a type satisfactory to the Town shall be placed upon the base course. They shall be set true to line and grade. Sufficient form pins and other braces shall be used to prevent movement during concrete placement or finishing. Forms shall have a height equal to the full depth of the walk.

A "scratch-plate" shall be employed by the contractor in fine grading to assure full depth of concrete walk. Before placing concrete, the forms and base course shall be thoroughly wetted.

Concrete may be placed directly in the forms from the chutes of transit mixers, placing it as neatly as possible to its final position.

Concrete shall be thoroughly spaded and worked along both sides of forms in order to get a dense mortar finish along both sides of the walk.

Concrete shall be placed to an elevation slightly higher than the top of the forms. It shall be worked with hand shovels in order to obtain a dense, well-consolidated mix.

If slip form paving is the preferred method for construction, then concrete shall meet the requirements of NYSDOT Class "C" concrete and sidewalk will be constructed in accordance with the Standard Detail. Slip form pavers shall meet the equipment criteria of NYSDOT 502-2.04.A.

G. Finishing And Curing

After placing and leveling-off the concrete to an elevation slightly higher than the forms it shall be rough screeded with a heavy screed riding on the forms. Excess concrete shall be continually removed from in front of the screed to prevent its raising up.

After rough screeding, a second pass shall be made to remove any transverse indentations caused by the rough screeding. Following this the surface shall receive a light broom finish. The broom shall be moist, but not dripping wet. It shall be clean and free of dirt or hardened cement particles which would mark the surface. The sidewalk shall be edged with a proper metal edging tool.

Curing shall be accomplished by placing curing paper as soon as concrete is sufficiently hardened. Colorless membrane waterproofing may be substituted if approved by the Town representative. Curing paper shall be brought down over the edge of the forms and the edges fully buried in earth in order to hold it in place and seal the air space under the paper. Curing shall continue for three days.

H. Joints

Full-depth joints shall be placed as shown on the plans using l/8" steel plate (or an approved equal) for the full depth of the joint. After concrete has sufficiently set-up this plate shall be removed. In addition to the full-depth joints, dummy transverse joints (scoring) shall be formed every 5' using a "deep-edge" tool. Both longitudinal edges shall be finished in a similar manner.

I. Convenience of Property Owners

The contractor shall do the following:

Provide an access ramp over the walk for each establishment until concrete is sufficiently hardened.

J. Testing

Consistency of each mix will be determined by the Town in the field, depending upon the effect provided by the ingredients. At the request of the Town, the Developer will arrange for a qualified testing laboratory to perform on-site slump and air entrapment testing and to obtain cylinders for compression testing. Any batch that does not fall within the specified range of slumps shall be rejected by the Town and removed from the site of the work.

K. Batching

All concrete will be batched from a NYSDOT accepted automated plant. Batch plants shall be accompanied with a ticket showing weights of ingredients in loads. The Town is to get a copy of the ticket at time of delivery.

L. Final Trim, Seeding, and Clean-up

After the curing period the contractor shall carefully remove the forms.

14.4 Sediment and Dust Control

A. General

Sediment and erosion control facilities are to be constructed as required in the New York State Department of Environmental Conservation's SPDES General Permit for Stormwater Discharges from Construction Activity, Permit No. GP-0-10-001. These requirements are as described in the "New York State Stormwater Management Design Manual" and the "New York Guidelines for Urban Erosion Control". A Stormwater Pollution Prevention Plan (SWPPP) meeting these requirements must be prepared and submitted to the Town prior to the Planning Board approval. A Notice of Intent (NOI) meeting the same requirements must be submitted to NYSDEC and the Town prior to the start of construction.

B. Sequence of Work

The construction of sediment interceptor, entrapment, and settling facilities shall be undertaken, completed, and approved prior to any other work of a construction nature taking place on the project. No other stripping of vegetation or other ground cover, earth movement, trenching or excavation, shall be commenced until, in the judgment of the Town the sediment control facilities are complete, adequate and operable.

C. Scope of Facilities

The facilities shall consist of sediment interceptor swales, sediment sinks/settling ponds and ancillary features required by the design and subdivision plans approval process, together with such directives as the Town may, from time to time, issue in order to improve performance or to adjust for changes in the Developer's construction sequence or procedures, or to correct for partial or total failure or loss of efficiency of the facilities.

D. Performance

It is the intention to retain on-site all products of erosion caused by disturbance and/or removal of vegetation or other ground cover. The basic concept is to utilize interceptor swales at the base, or downhill limit, of disturbed areas, draining to temporary sediment sinks/settling basins, to which location the storm drain systems shall also temporarily drain until such time as the land development project has been sufficiently restored with ground cover as to prevent soil erosion.

Further, the intent is to retain gross soil particles on-site, and to minimize, to the standard permitted by the state-of-the-art, the passage of colloidal particles into the natural waters of the Town. Because of the wide range of partially or totally uncontrollable variables during the land development (the worst return-frequency storm, the area of stripped ground cover, the presence or absence of completed storm drain systems, the amount of sediment stored in the sink at any given time, the variation in soil texture, or the presence of saturated or frozen ground, for example) each sediment sink/entrapment facility shall include a filter fabric barrier to protect the discharge.

Performance shall be measured by the ability of the facility to pass all runoff through the filter fabric at all times during construction.

It is the responsibility of the Developer adequately to maintain the filtering integrity of the facility and to repair or replace it when required.

Degenerating efficiency as evidenced by holes, rips, or tears in the fabric, or failure of the settling pond to drain after a storm because of filter fabric blinding, or the presence of highly turbid water downstream of the fabric, shall be considered cause for repair and or replacement.

E. Ancillary Sediment Control Features

In order to extend the longevity of the sediment sink facility, thereby minimizing the maintenance costs of filter fabric replacement and interim excavation of the sediment sink, the Town encourages the use of ancillary sediment control features throughout the land development project. These suggested methods are encouraged:

1. Minimize the area of stripped ground cover at any one time.

2. Provide hydraulically placed mulch of the "mat" type on raw areas that must be exposed for extended periods.

3. Place firmly anchored and embedded straw bales or filter fabric barriers in areas of concentrated run-off, such as at culvert and catch basin inlets, and in swales, in an effort to reduce soil transport reaching the settling pond.

4. Wherever possible, leave temporary buffer strips of original ground cover vegetation to act as soil migration retardant.

5. Use "Soil Saver" jute mush along swales or other areas where runoff rates are of sufficient quantity or velocity as to cause additional erosion.

6. Restore ground surface protection as soon as possible by utilizing hydraulically-placed mulch of the "mat" type.

F. Termination of Facilities

The judgment as to the appropriate time of termination of facilities rests with the Town, whose decision shall be final and binding.

The primary performance criteria used in making the determination will be the quality of the runoff from the development entering the sediment settling facility. When, in the judgment of the Town, the ground cover in the land development project has been sufficiently restored such that runoff through the swales and storm drain system is relatively soil-free, permission may be granted to divert flow through the permanent storm water detention pond or such other drainage systems as are described on the approved plans.

The Developer and his engineer are reminded that dependence on siltation facilities from one construction season to the next greatly increases the statistical possibility of storms of greater intensity, resulting in greater runoff and erosion with subsequent possible overtaxing or failure of the facility. Therefore, expeditious restoration of ground cover, or temporary protection of soil surface is strongly encouraged.

G. Dust and Mud Control

Recognizing that removal of vegetation, dry conditions, and periodic high winds cause nuisance dust movement the Developer shall take such steps as are necessary to avoid

nuisance and damage to abutting properties and occupants Such steps may include, but not be limited to, wetting-down exposed soil areas, mulching, and re-vegetating disturbed areas.

Further, the Developer is responsible for minimizing "tracking" of mud onto existing roads. Roads shall be scraped and broomed clear of mud at the end of each working day as required.

The Town reserves the right to include in the letter of credit an allowance to cover the estimated cost of such dust-and-mud control.

A stabilized construction entrance will be required to reduce the tracking of sediment onto public rights-of-way or streets. If necessary, wheels may be washed to remove sediment when a sediment basin and proper drainage is provided.

14.5 Lighting

A. General

The Developer may provide adequate street lighting and fixtures at the locations shown on the plans and as directed by the Town Board.

The Town Board shall require the installation of street lights at all intersections by the Developer.

B. Materials

Wiring, light poles, lights and foundations shall meet N.E.C. and the National Board of Fire Underwriters standards.

The Developer shall provide the lighting plan, design standards and specifications prepared in conjunction with the Electrical Power Corporation having jurisdiction in the service area. The lighting plan shall address the reasons for the selection of the lighting style and type, and shall describe the extent to which surrounding properties may be afflicted. Mitigations to reduce off-site glare and illuminescence be required.

The capital cost, maintenance and cost for electrical energy shall be described in detail as part of the lighting plan.

C. Guarantee

The Developer, as part of the lighting plan, shall include a cost estimate for the proposed work and include the cost in the letter of credit.

D. Site Location

The lighting utility shall be located within the roadway in accordance with "Typical Road Section."

Appendices

Appendix A

Irrevocable Letter of Credit

Date

IRREVOCABLE LETTER OF CREDIT (number)

Town of Oakfield
3219 Drake Street
Oakfield, New York 14125

You are herewith authorized to draw on us for the account of:

(Developer/Owner)
(Address)

Up to an aggregate amount of USD $_____.

Available by your draft(s) at sight for costs relating to the development, excavation, and construction, including water and sewer services, of the (project name), Town of Oakfield, County of Genesee, State of New York. When such invoice(s) has been approved for payment by the Town Supervisor of the Town of Oakfield, and an officer of (owner) and upon and after signed acceptance of the work in connection with the costs of said construction. Upon payment of said drafts under Letter of Credit (No.), said Letter of Credit will be reduced in principal by the amount of the drafts under Phase One, Phase Two, etc. . . . . and acceptance of completion.

This Letter of Credit and the liability of the (Financial Institution, Address) hereunder is conditioned upon the filing of the subdivision map in the Genesee County Clerk's office with the approval of all required public authorities endorsed thereon.

In the event the work herein contemplated has not been accepted by your official on or before (Date), you are authorized to draw on us for such amount of the unused portion of this Letter of Credit as may be necessary in the judgment of the appropriate official of the Town of Oakfield, for the completion for the improvements herein contemplated.

Except as noted, a draft(s) must be accompanied by copies of the contractor's invoice(s) with the approval of the Town Engineer of the Town of Oakfield and an officer of the (Developer/Owner).

A draft(s) drawn under this credit must bear upon their face the clause: "Drawn under the Letter of Credit #_____ dated _____." Advice of each draft must be sent to us.

The amount of any draft under this credit must, concurrently with negotiation, be endorsed on the reverse thereof and the presentation of any draft shall be a warranty by you that such endorsement has been forwarded as herein required.

This credit must accompany any draft which exhausts this credit and must be surrendered concurrently with the payment of such draft.

We hereby agree with the drawers, endorsers, and bonafide holders of drafts drawn and negotiated under and in compliance with the terms of the credit that they shall be duly honored on due presentation to us.

This Letter of Credit is subject to the Uniform Customs and Practice for Documentary Credits (2007 Revision) International Chamber of Commerce Publication No. 600.

Very truly yours,

(Financial Institution)

Appendix B

Engineer's Estimate of Probable Cost

for Letter of Credit

TOWN OF OAKFIELD
ENGINEER'S ESTIMATE OF PROBABLE COST FOR LETTER OF CREDIT

NAME OF SUBDIVISION
DATE OF ESTIMATE

DESCRIPTION	ESTIMATE OF COST			
	Unit	Estimated Quantity	Unit Price	Cost
Water Distribution System				
Total Water Distribution System				
Sanitary Sewer System				
Total Sanitary Sewer System				
Stormwater Collection System				
Total Stormwater Collection System				
Grading, Paving and Sidewalks				
Total Grading, Paving and Sidewalks				
Erosion Control				
Total Erosion Control				
Miscellaneous				
Total Miscellaneous				
CONSTRUCTION COST-TOTAL ALL SECTIONS				
10% CONTINGENCY				
TOTAL ESTIMATED CONSTRUCTION COST				
NECESSARY STAKEOUT				
RECORD PLANS				
OWNER'S GUARANTEE (5% TOTAL CONSTRUCTION COST)				
INSPECTION OF DEDICATED FACILITIES (5% TOTAL CONSTRUCTION COST				
OTHER ITEMS REQUIRED BY TOWN OF OAKFIELD				
TOTAL LETTER OF CREDIT AMOUNT				

Appendix C

Sample Statement of

Completed Construction

SAMPLE STATEMENT OF COMPLETED CONSTRUCTION

Page__of __
Statement No,___
Date:_____

Project: _____
Owner:_____
Contractor: _____
Engineer: _____

Description	Unit	Est. Quantity	Unit Price	Letter of Credit Value	Quantity This Period	Value This Period	Quantity To Date	Value to Date	Quantity Remaining	Value Remaining
Subtotal by Section										

SAMPLE STATEMENT OF COMPLETED CONSTRUCTION

Page__of __
Statement No,___
Date:_____

Project: _____
Owner:_____
Contractor: _____
Engineer: _____

Description	Unit	Est. Quantity	Unit Price	Letter of Credit Value	Quantity This Period	Value This Period	Quantity To Date	Value to Date	Quantity Remaining	Value Remaining
TOTAL ALL SECTIONS										
10% Contingency										
Stakeout										
Record Plans										
5% Owners Guarantee										
5% Inspection										
TOTAL AMOUNT										

AMOUNT DUE THIS STATEMENT

APPROVED:

Developer's Engineer

Date

Developer

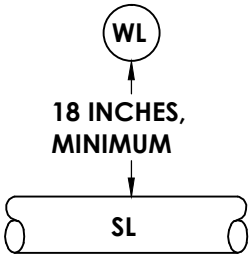
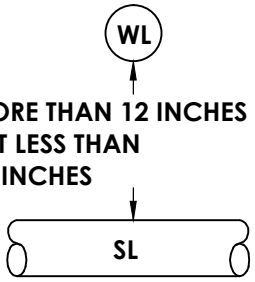
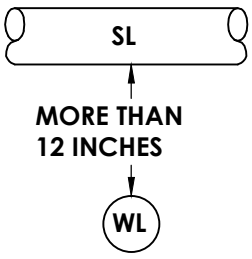
Date

Town Representative/Engineer

Date

Standard Details

WATER LINE-SEWER LINE CROSSING PROVISIONS

SITUATION	SCHEMATIC	REQUIREMENTS
I WATER LINE ABOVE SEWER LINE		
II WATER LINE ABOVE SEWER LINE		A) WATER LINE AND SEWER LINE SHALL BE ONE FULL LENGTH CONTERED AT CROSSING, WHEN POSSIBLE. B) WHEN BOTH WATER LINE AND SEWER LINE ARE NEW, SLEEVE SEWER LINE WITH STEEL CASING FOR FULL LENGTH OF PIPE AT CROSSING. --OR-- WHEN ONE LINE IS EXISTING, SLEEVE PIPE BEING INSTALLED WITH STEEL CASING FOR ONE FULL LENGTH OF PIPE.
III SEWER LINE ABOVE WATER LINE		A) WATER LINE AND SEWER LINE SHALL BE ONE FULL LENGTH CENTERED AT CROSSING, WHEN POSSIBLE. B) SLEEVE SEWER LINE WITH STEEL CASING FOR ENTIRE LENGTH OF PIPE (EACH SIDE OF CROSSING). C) PROVIDE CRADLE OF CONCRETE OR CRUSHER RUN STONE (SEE TRENCH SECTION DETAIL THIS SHEET) FOR WATER LINE AND SEWER LINE FOR ENTIRE LENGTH OF PIPE EACH SIDE OF CROSSING.

SANITARY SEWER / WATER MAIN CROSSING DETAIL

N.T.S.

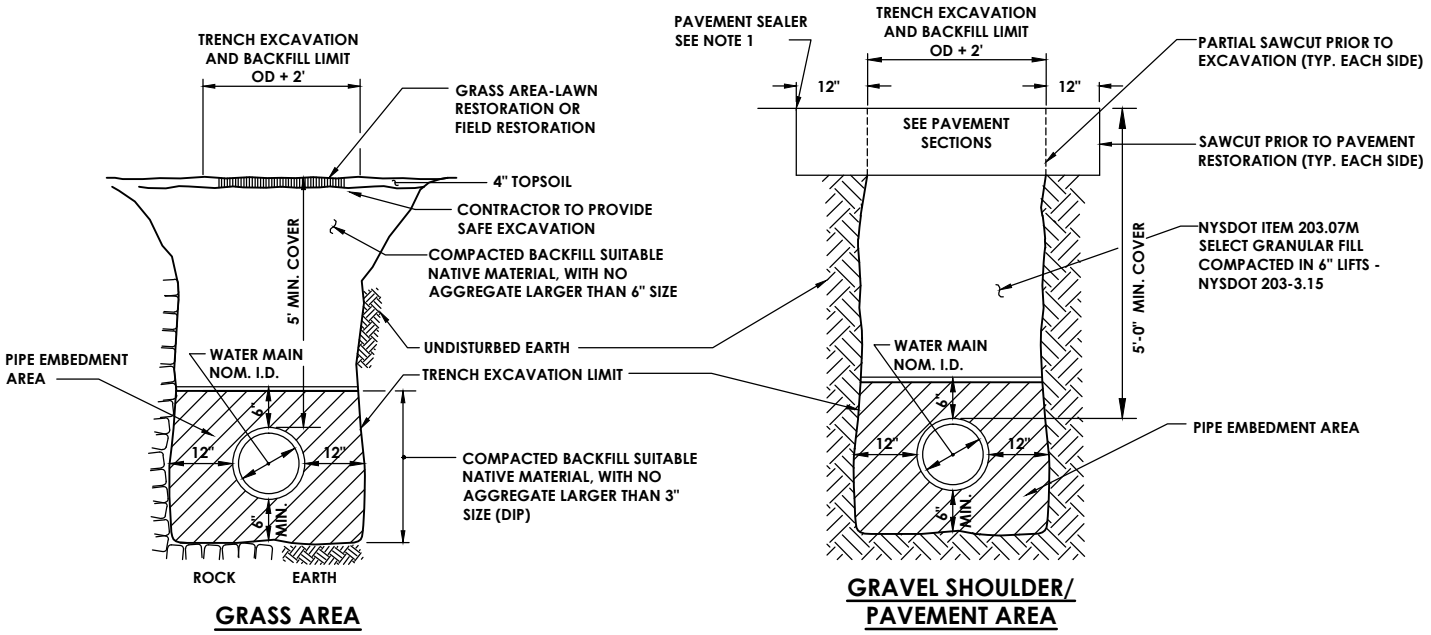
TOWN OF OAKFIELD

MISCELLANEOUS DETAILS

SANITARY SEWER/ WATER MAIN CROSSING DETAIL

APRIL 2013

DRAWING M-01



PIPE EMBEDMENT REQUIREMENTS

	PAVEMENT & SHOULDER AREAS	LAWN & FIELD AREAS
WATER MAIN		
DUCTILE IRON PIPE	NYSDOT ITEM 203.07M SELECT GRANULAR FILL	COMPACTED NATIVE MATERIAL NO AGGREGATE LARGER THAN 3"*
PVC PIPE	NYSDOT #1A SCREENED GRAVEL OR CONCRETE SAND NYSDOT SPECIFICATION SECTION 703-07	NYSDOT #1A SCREENED GRAVEL OR CONCRETE SAND NYSDOT SPECIFICATION SECTION 703-07
SANITARY SEWER		
PVC PIPE	NYSDOT #1A SCREENED GRAVEL OR CONCRETE SAND NYSDOT SPECIFICATION SECTION 703-07	NYSDOT #1A SCREENED GRAVEL OR CONCRETE SAND NYSDOT SPECIFICATION SECTION 703-07
STORM SEWER		
ALL PIPE MATERIALS	NYSDOT #2 COARSE AGGREGATE	NYSDOT #2 COARSE AGGREGATE

* IN ROCK AREAS USE NYSDOT ITEM 203.07M SELECT GRANULAR FILL

PIPE TRENCH DETAIL

N.T.S.

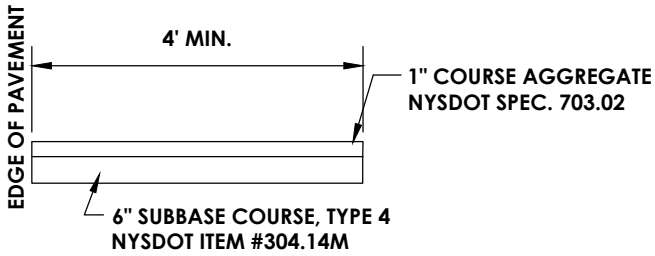
TOWN OF OAKFIELD

MISCELLANEOUS DETAILS

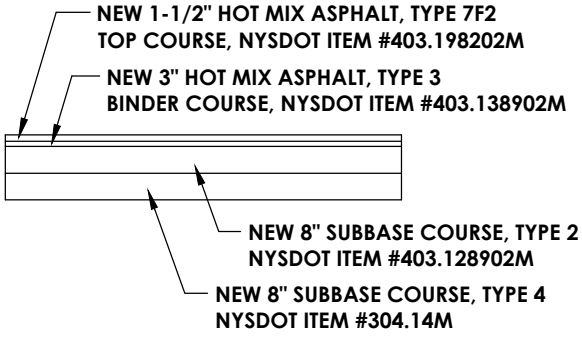
PIPE TRENCH DETAIL

APRIL 2013

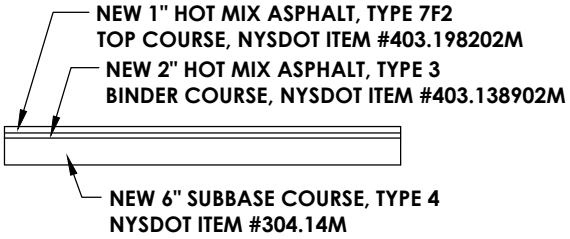
DRAWING M-02



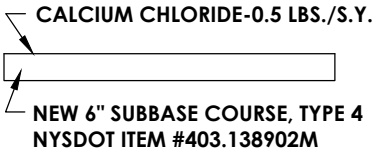
ALTERNATE GRAVEL SHOULDER SECTION



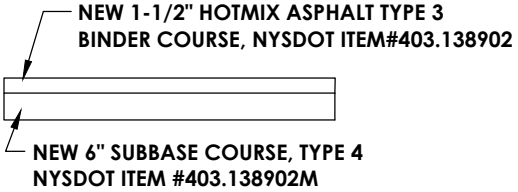
ROAD AND SHOULDER SECTION



ASPHALT DRIVEWAY SECTION



GRAVEL DRIVEWAY SECTION



TEMPORARY PAVEMENT REPAIR

NOTES:

1. **ALL NON-STATE ROADWAYS WHICH ARE DISTURBED SHALL BE REPLACED WITH THE "ROAD AND SHOULDER" SECTION UNLESS OTHERWISE APPROVED BY TOWN.**
2. **ALL SEAMS BETWEEN EXISTING AND NEW ASPHALT SURFACES SHALL BE SEALED WITH ASPHALT FILLER CORRESPONDING TO THE MATERIAL REQUIREMENTS OF NYSDOT MATERIAL DESIGNATION 702-0700 ASPHALT FILLER.**

ROAD, DRIVEWAY AND SHOULDER REPLACEMENT DETAILS

N.T.S.

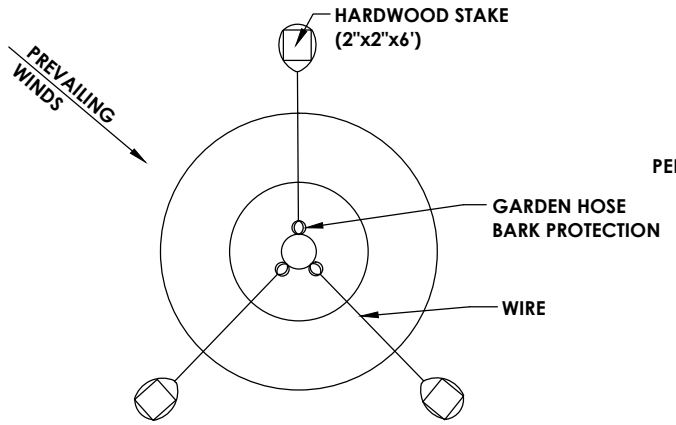
TOWN OF OAKFIELD

MISCELLANEOUS DETAILS

ROAD, DRIVEWAY AND SHOULDER REPLACEMENT DETAILS

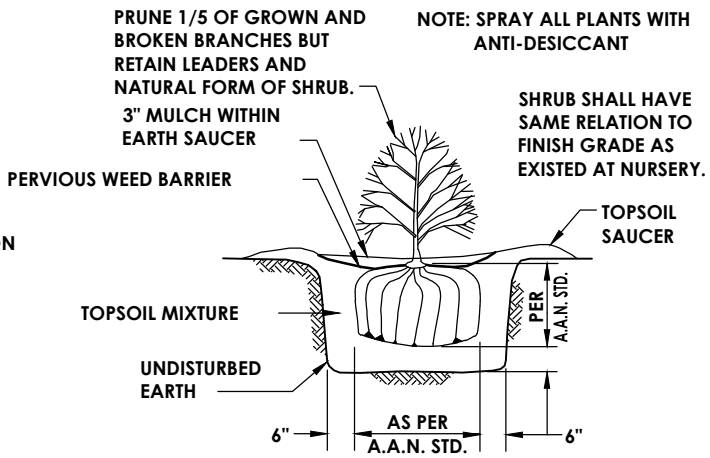
APRIL 2013

DRAWING M-03



TREE GUYING & STAKING DETAIL

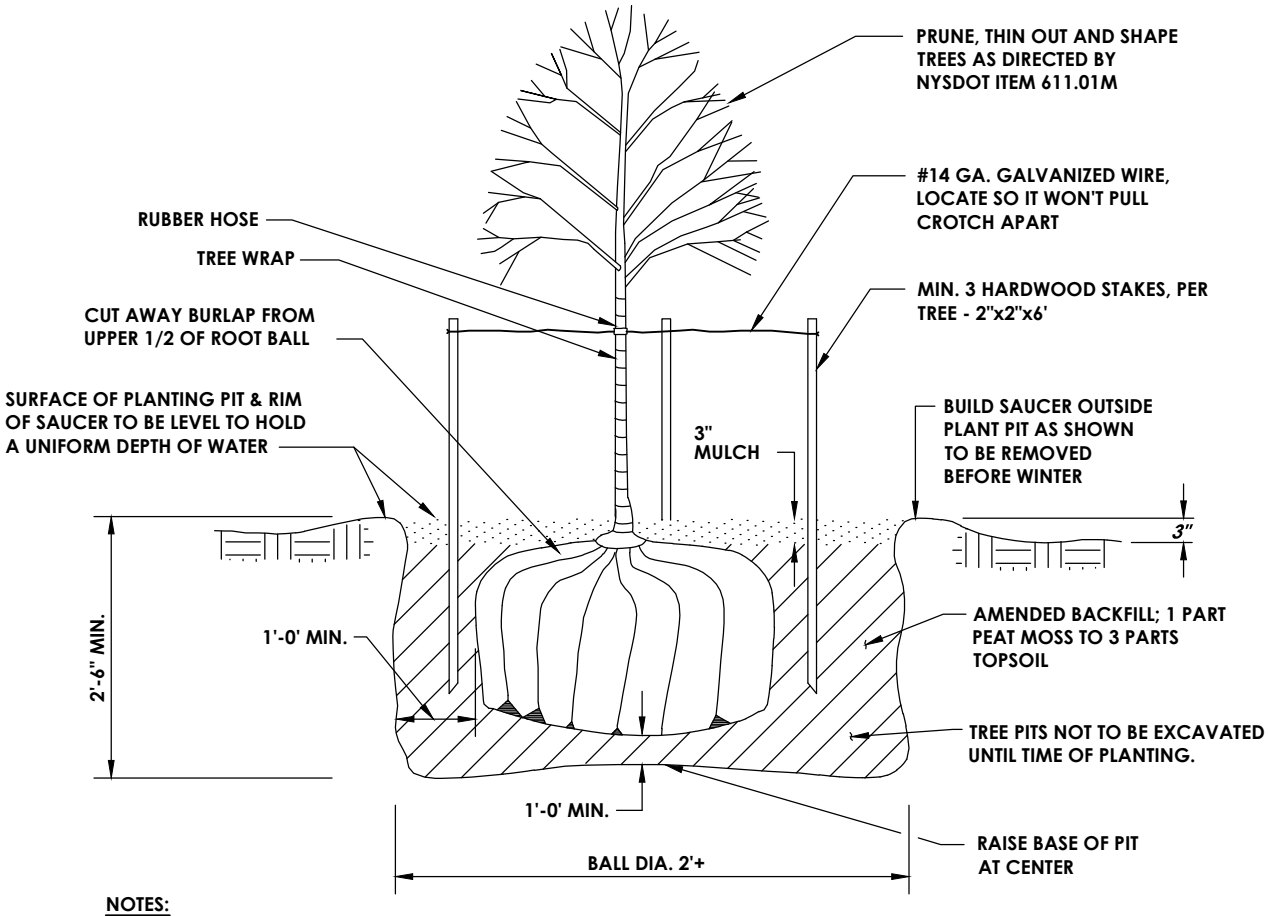
N.T.S.



SHRUB PLANTING DETAIL

N.T.S.

A.A.N. = AMERICAN ASSOCIATION OF NURSERYMEN, INC.



NOTES:

1. REMOVE STAKES, WIRE & HOSE AT THE END OF THE ONE YEAR MAINTENANCE AND GUARANTY PERIOD.

TREE PLANTING (IN LAWN AREA)

N.T.S.

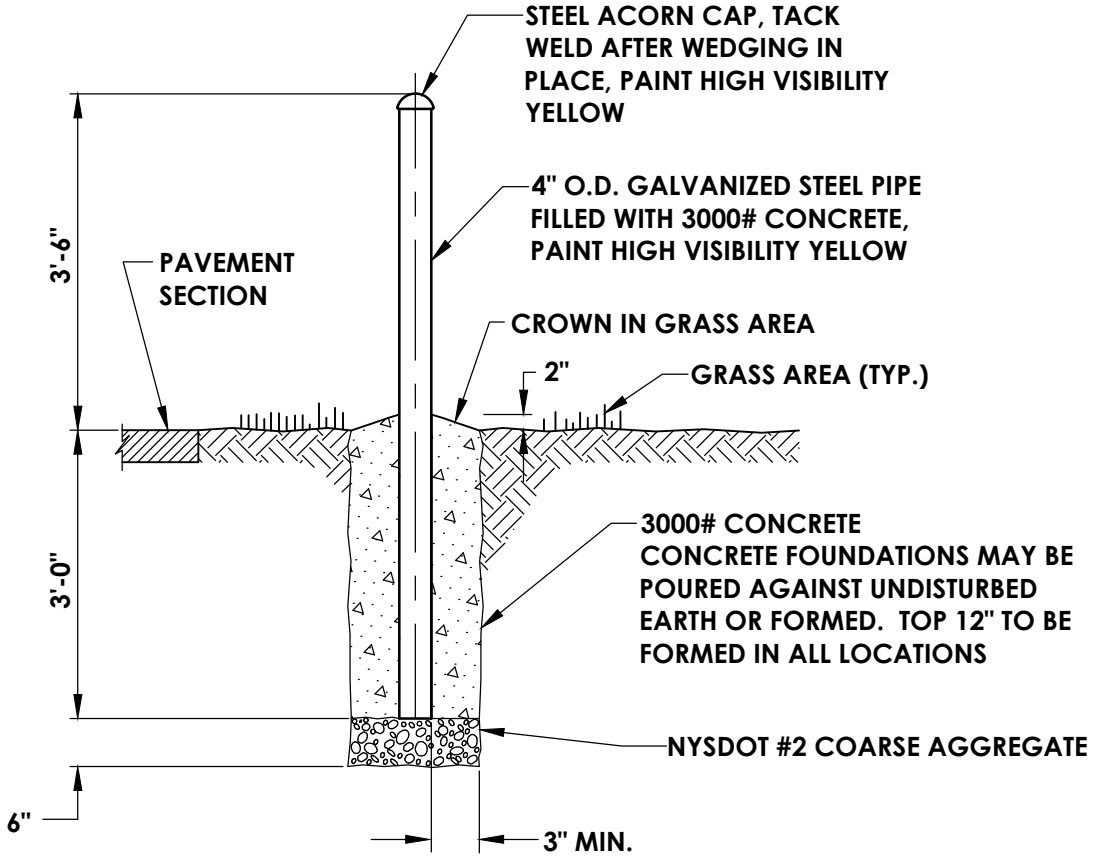
TOWN OF OAKFIELD

MISCELLANEOUS DETAILS

TREE PLANTING DETAIL

APRIL 2013

DRAWING M-04

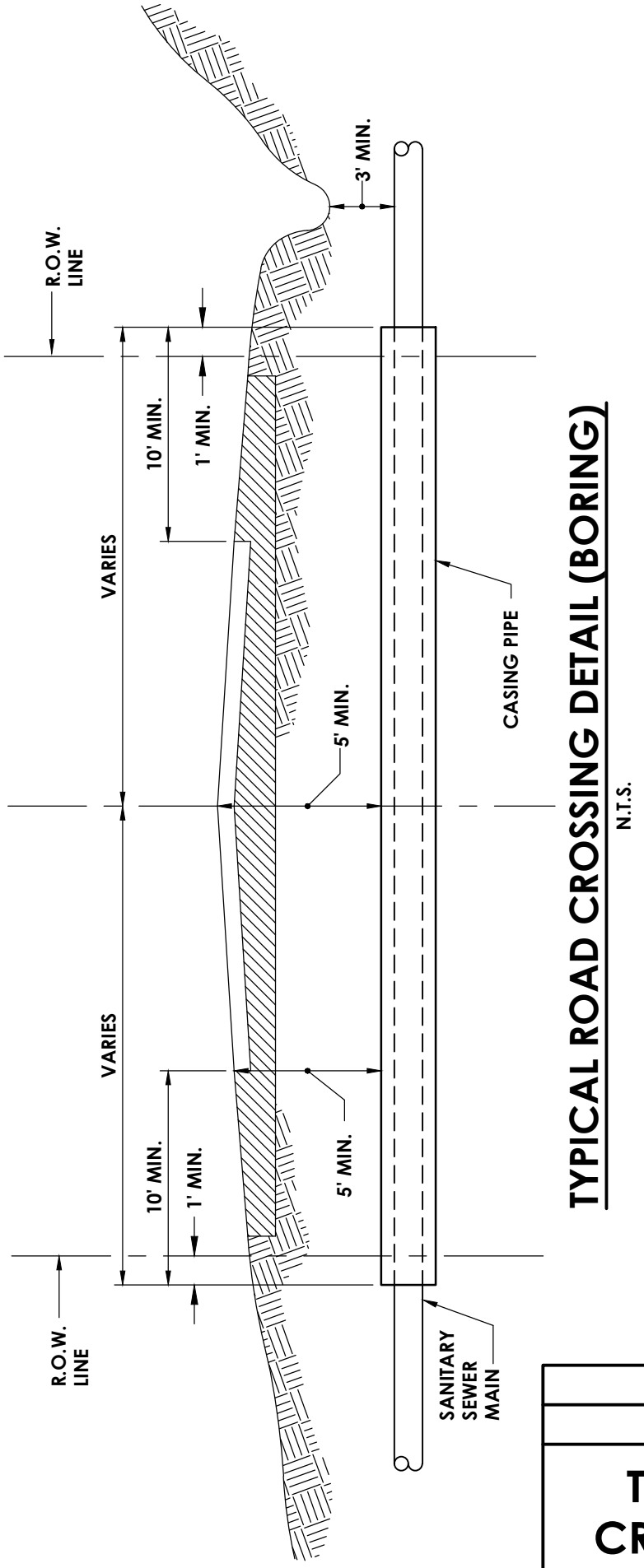


BOLLARD DETAIL

N.T.S.

TOWN OF OAKFIELD
MISCELLANEOUS DETAILS
BOLLARD DETAIL
DRAWING M-05

APRIL 2013



TYPICAL ROAD CROSSING DETAIL (BORING)

N.T.S.

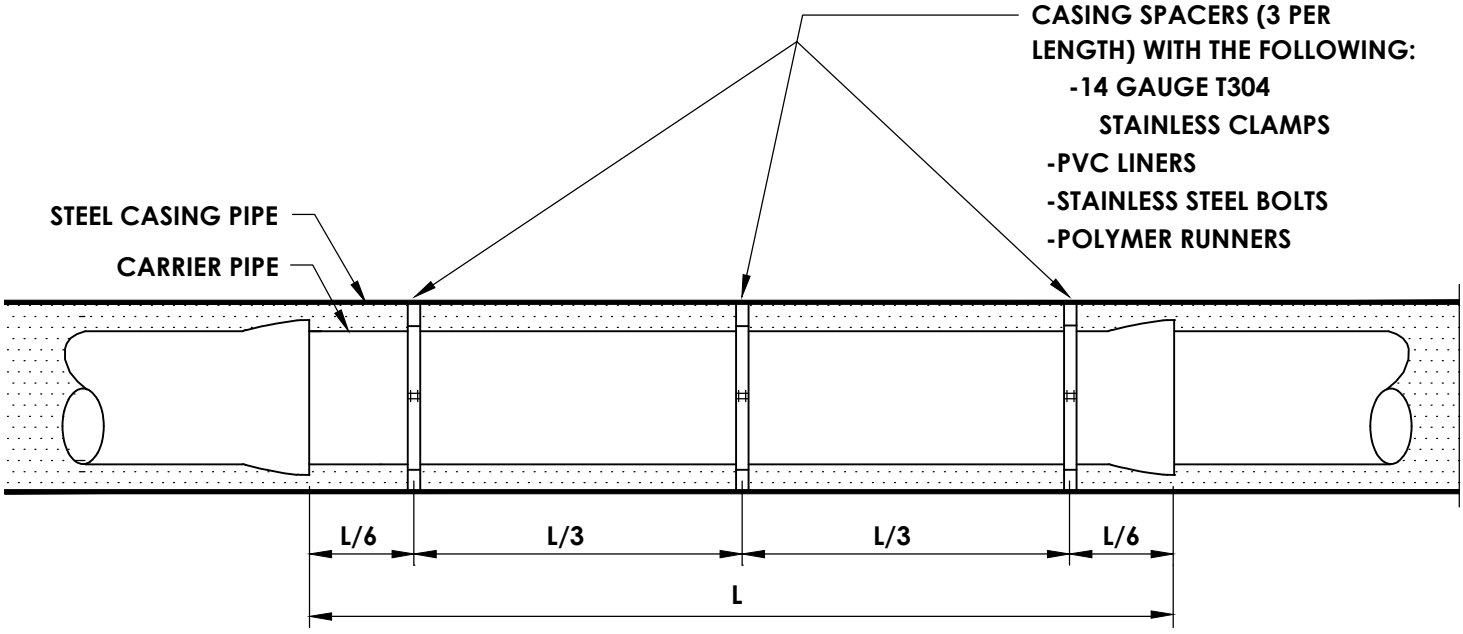
TOWN OF OAKFIELD

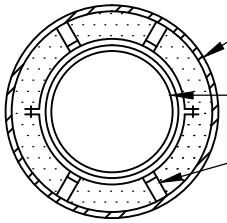
MISCELLANEOUS DETAILS

TYPICAL ROAD CROSSING DETAIL

APRIL 2013

DRAWING M-06





NOTES:

1) **FILL VOID WITH NYSDOT ITEM #204.02 CONTROLLED LOW STRENGTH MATERIAL (COMPRESSIVE STRENGTH: 50-100 PSI)**

TYPICAL CASING PIPE DETAIL

N.T.S.

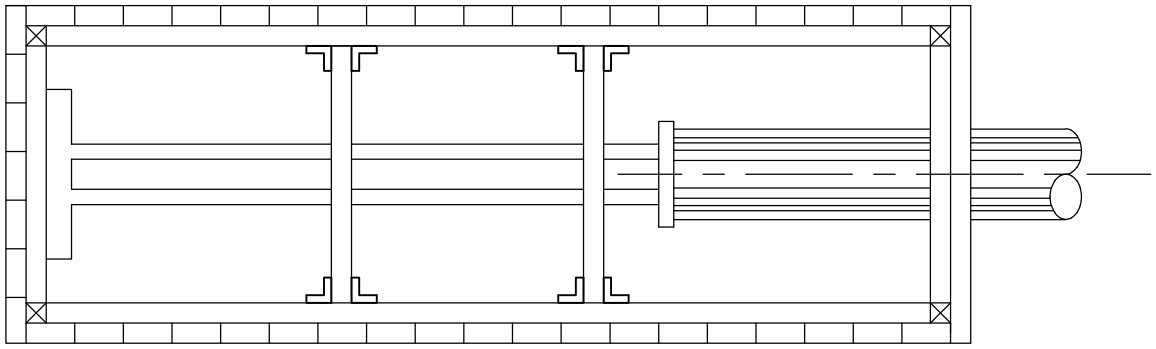
TOWN OF OAKFIELD

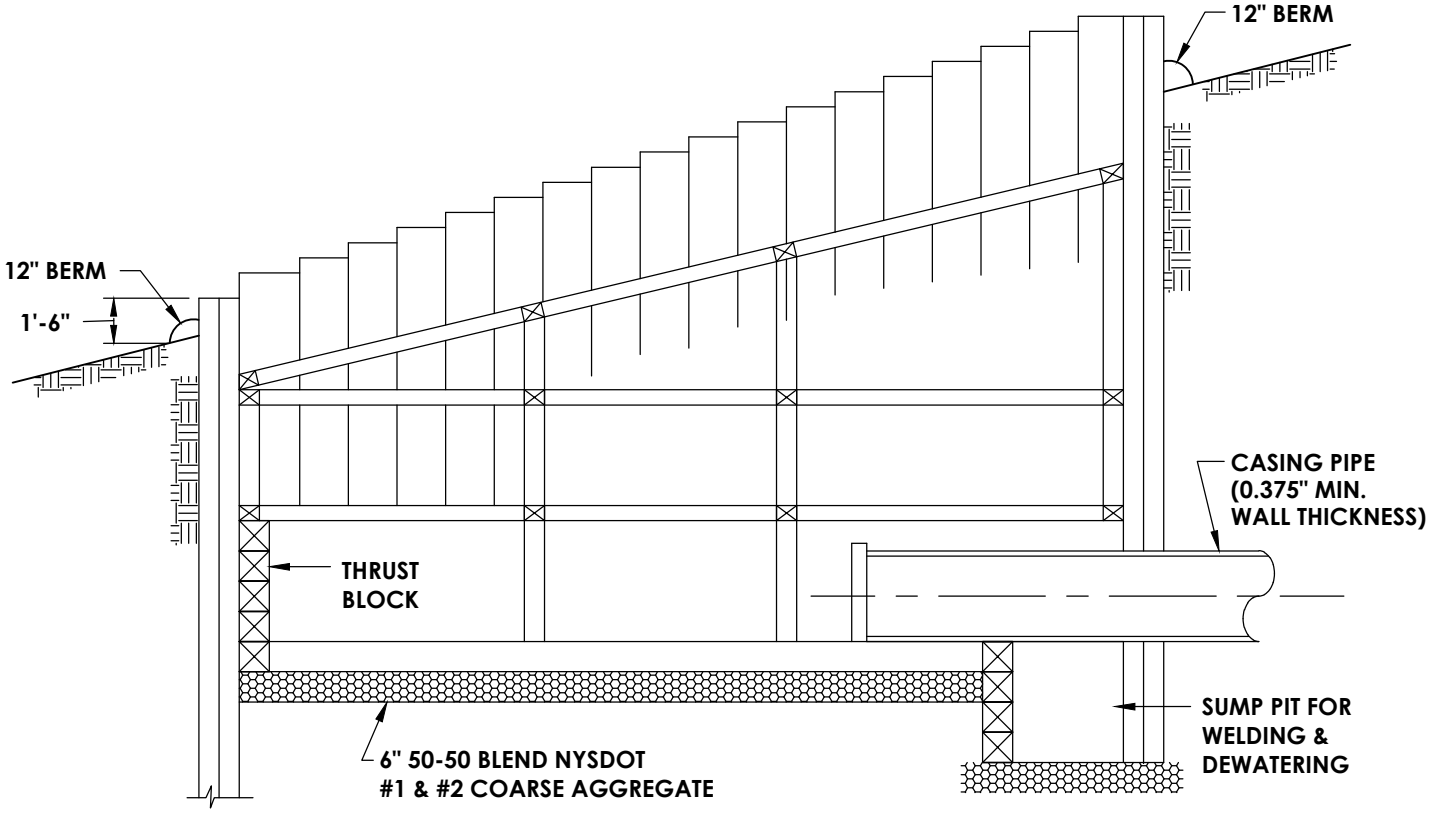
MISCELLANEOUS DETAILS

TYPICAL CASING PIPE DETAIL

APRIL 2013

DRAWING M-07





NOTE: 1. SHEETING IF NECESSARY, WILL BE AS REQUIRED BY N.Y.S.D.O.T., COUNTY, OR ANY LOCAL STATE, OR FEDERAL REGULATIONS.
2. 12" EARTH BERM TO BE PLACED AROUND SHEETING.

TYPICAL BORING PIT DETAILS

N.T.S.

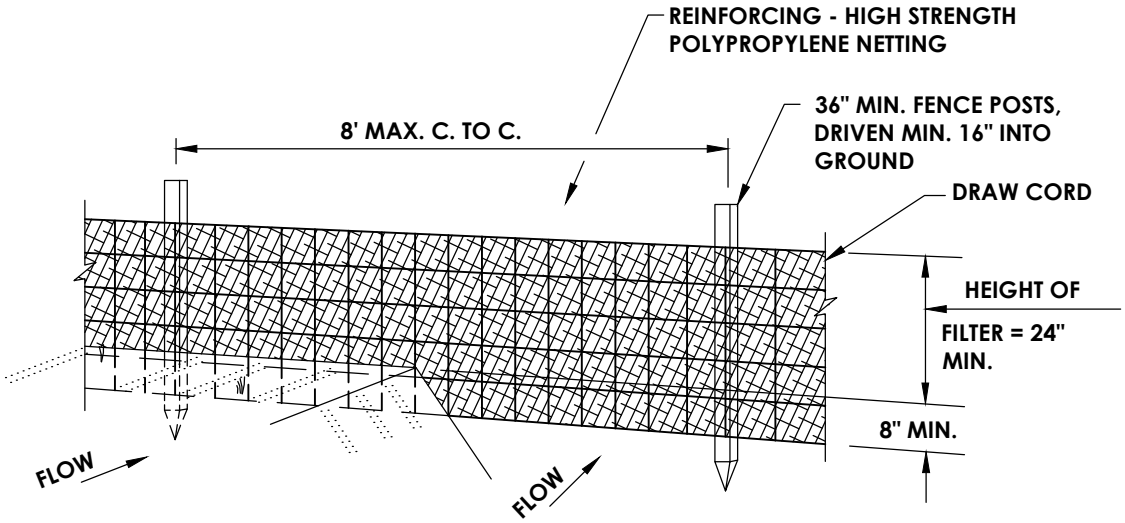
TOWN OF OAKFIELD

MISCELLANEOUS DETAILS

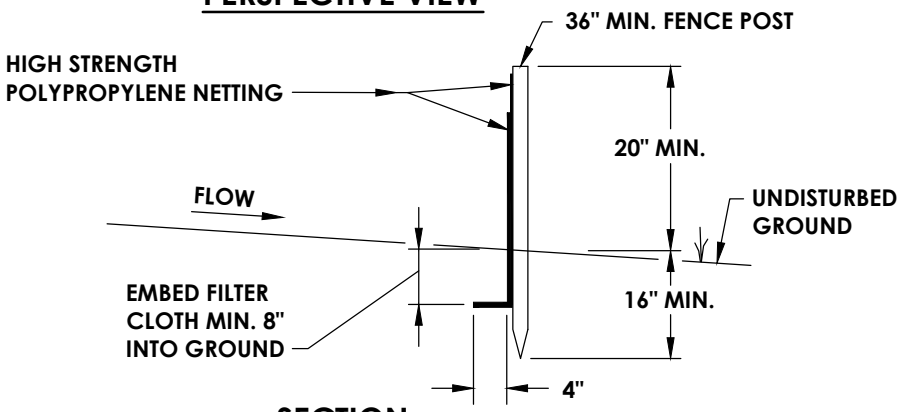
TYPICAL BORING PIT DETAILS

APRIL 2013

DRAWING M-08



PERSPECTIVE VIEW



SECTION

CONSTRUCTION NOTES FOR FABICATED SILT FENCE

1. SILT FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH TIES OR STAPLES.
2. FILTER CLOTH TO BE FASTENED SECURELY TO POLYPROPYLENE NETTING WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. NETTING MADE BE INCORPORATED INTO FILTER CLOTH.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

POSTS: STEEL EITHER T OR U TYPE OR 2" HARDWOOD.

FENCE: HIGH STRENGTH POLYPROPYLENE NETTING

FILTER CLOTH: MIRAFI 100X, STABILINKA T140N OR APPROVED EQUAL.

PREFABICATED UNIT: GEOFAB, ENVIROFENCE, OR APPROVED EQUAL.

SILT FENCE DETAIL

N.T.S.

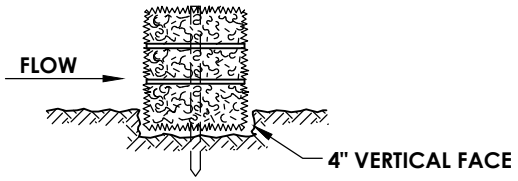
TOWN OF OAKFIELD

EROSION DETAILS

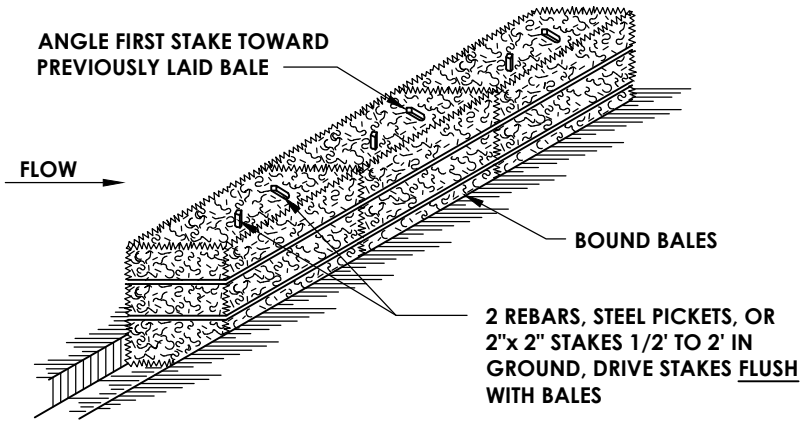
SILT FENCE DETAIL

APRIL 2013

DRAWING E-01



BEDDING DETAIL



ANCHORING DETAIL

NOTES:

1. **BALES SHALL BE PLACED AT THE TOE OF A SLOPE, CENTER-LINE OF A DITCH, OR AS ORDERED BY THE TOWN, AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.**

2. **EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.**

3. **EACH BALE SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR REBARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.**

4. **INSPECTION SHALL BE FREQUENT AND REPAIR/REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.**

5. **BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.**

STRAW BALE DIKE DETAILS

N.T.S.

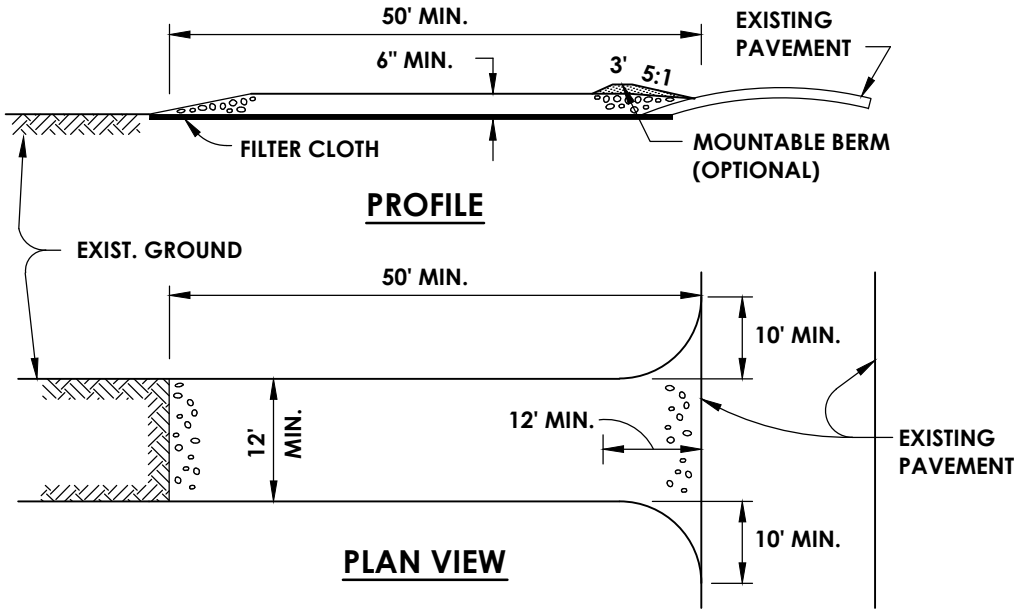
TOWN OF OAKFIELD

EROSION DETAILS

STRAW BALE DIKE DETAILS

APRIL 2013

DRAWING E-02



STABILIZED CONSTRUCTION ENTRANCE DETAIL

N.T.S.

CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN TWENTY-FOUR (24) FOOT IF TWO-WAY TRAFFIC OR THE ONLY ENTRANCE TO SITE.
5. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACTED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

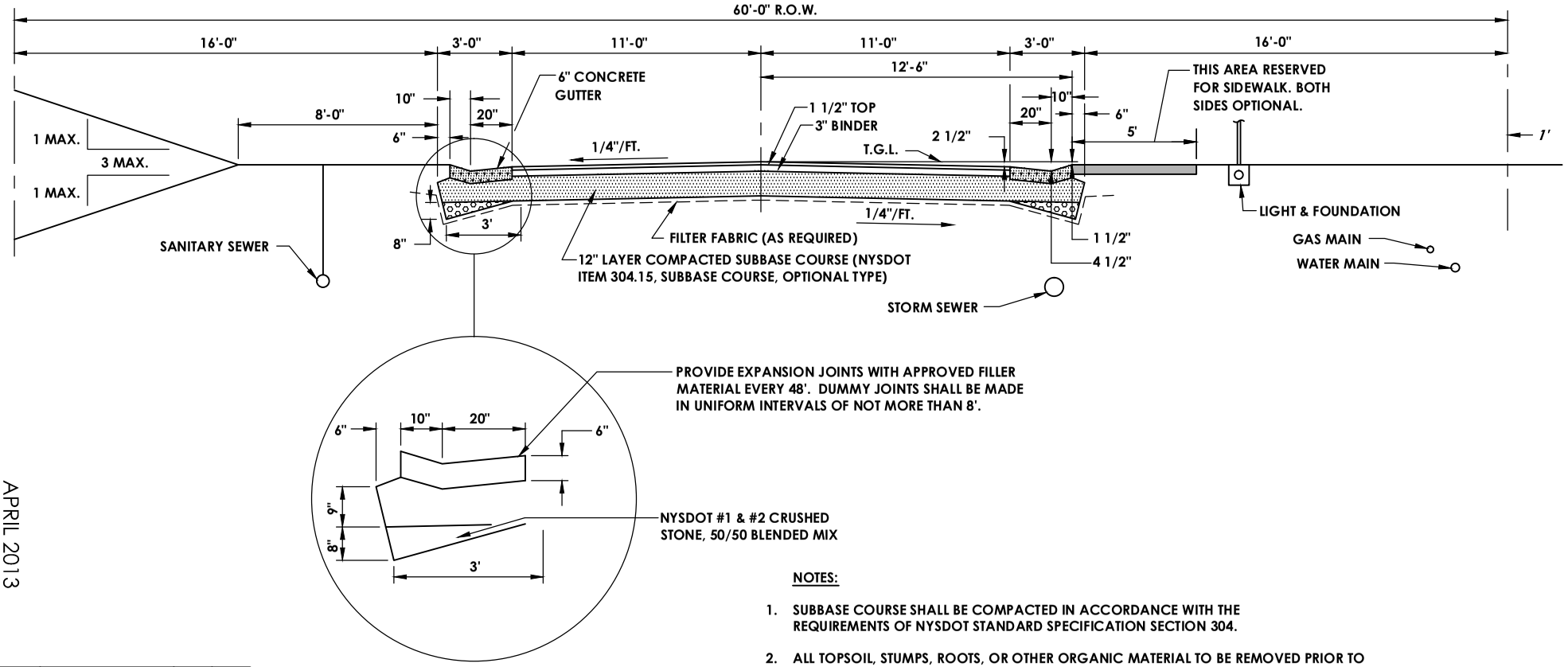
TOWN OF OAKFIELD

EROSION DETAILS

STABILIZED CONSTRUCTION ENTRANCE DETAILS

APRIL 2013

DRAWING E-03



APRIL 2013

NOTES:

1. SUBBASE COURSE SHALL BE COMPACTED IN ACCORDANCE WITH THE REQUIREMENTS OF NYSDOT STANDARD SPECIFICATION SECTION 304.
2. ALL TOPSOIL, STUMPS, ROOTS, OR OTHER ORGANIC MATERIAL TO BE REMOVED PRIOR TO PLACING FILL OR SHAPING ROAD BOX.
3. CONSTRUCTION SEASON FOR ROAD CONSTRUCTION SHALL BE FROM MAY 15th TO OCTOBER 15th.
4. ASPHALT CONCRETE SURFACE SHALL CONFORM TO NYSDOT SPECIFICATIONS, ITEM 403.138902M, HOT MIX ASPHALT, TYPE 3 BINDER COURSE, AND ITEM 403.198202M, HOT MIX ASPHALT TYPE 7F2, TOP COURSE. CONSTRUCTION SHALL BE IN ACCORDANCE WITH NYSDOT STANDARD SPECIFICATIONS FOR BITUMINOUS CONCRETE.
5. GUTTER CURING AGENT SHALL BE APPLIED THE SAME DAY THAT THE GUTTERS ARE CONSTRUCTED PER THE MANUFACTURER'S SPECIFICATIONS.
6. UTILITIES SUCH AS GAS, WATER MAIN, TELEPHONE, AND SANITARY SHALL BE SHOWN ON THE TYPICAL ROAD SECTION.
7. ALL UNPAVED AREAS WITHIN THE RIGHT-OF-WAY ARE TO BE TOPSOILED, FERTILIZED, AND SEEDED.
8. CONCRETE FOR CONCRETE GUTTER SHALL MEET THE REQUIREMENTS OF NYSDOT STANDARD SPECIFICATIONS SECTION 501 CLASS A FOR CONVENTIONALLY FORMED GUTTER OR CLASS I FOR MACHINE FORMED GUTTER. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF NYSDOT STANDARD SPECIFICATIONS SECTION 624.

MINOR ROAD SECTION

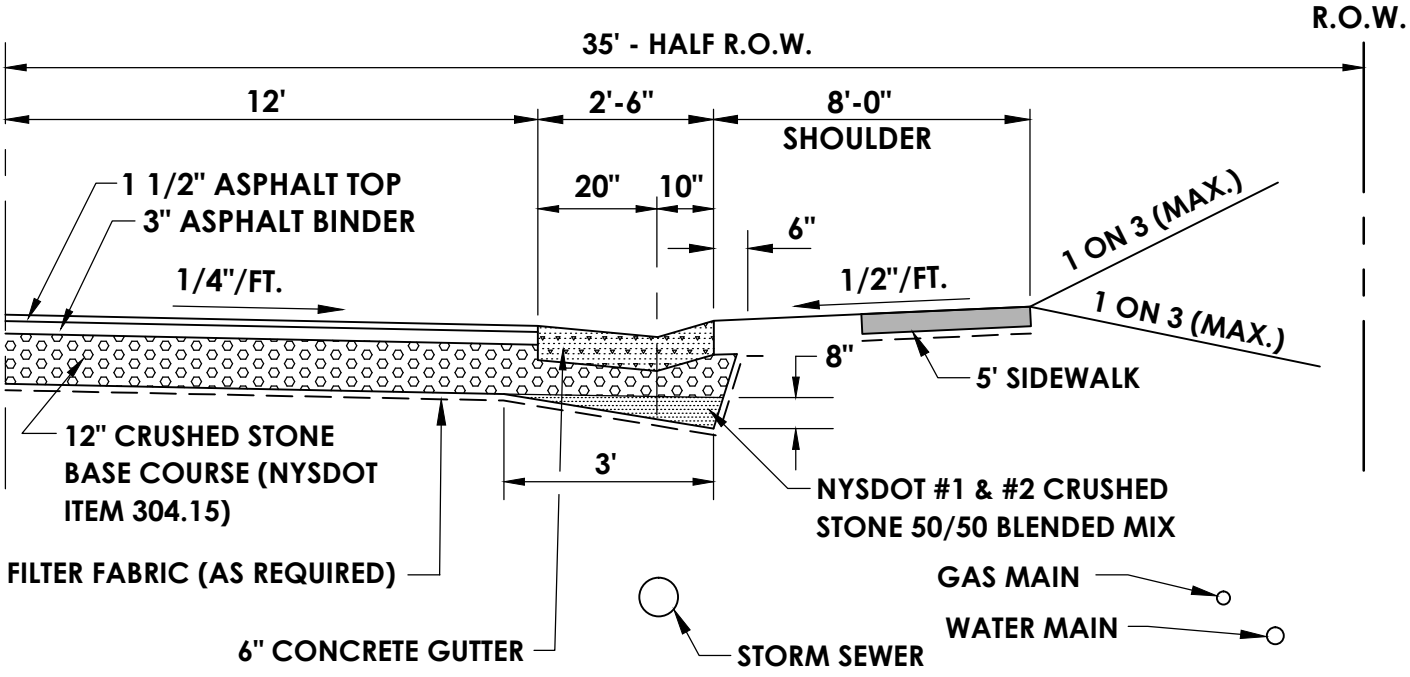
N.T.S.

MINOR & PARKWAY ROAD SECTION

TOWN OF OAKFIELD

HIGHWAY DETAILS

DRAWING H-01



NOTE:

1. **SIDEWALKS REQUIRED ALONG BOTH SIDES**
2. **UTILITIES SUCH AS GAS, WATER MAIN, TELEPHONE, AND SANITARY SHALL BE SHOWN ON THE TYPICAL ROAD SECTION**
3. **FOR GENERAL ROAD SPECIFICATIONS, SEE "MINOR ROAD SECTION"**

COLLECTOR ROAD

70' R.O.W.

N.T.S.

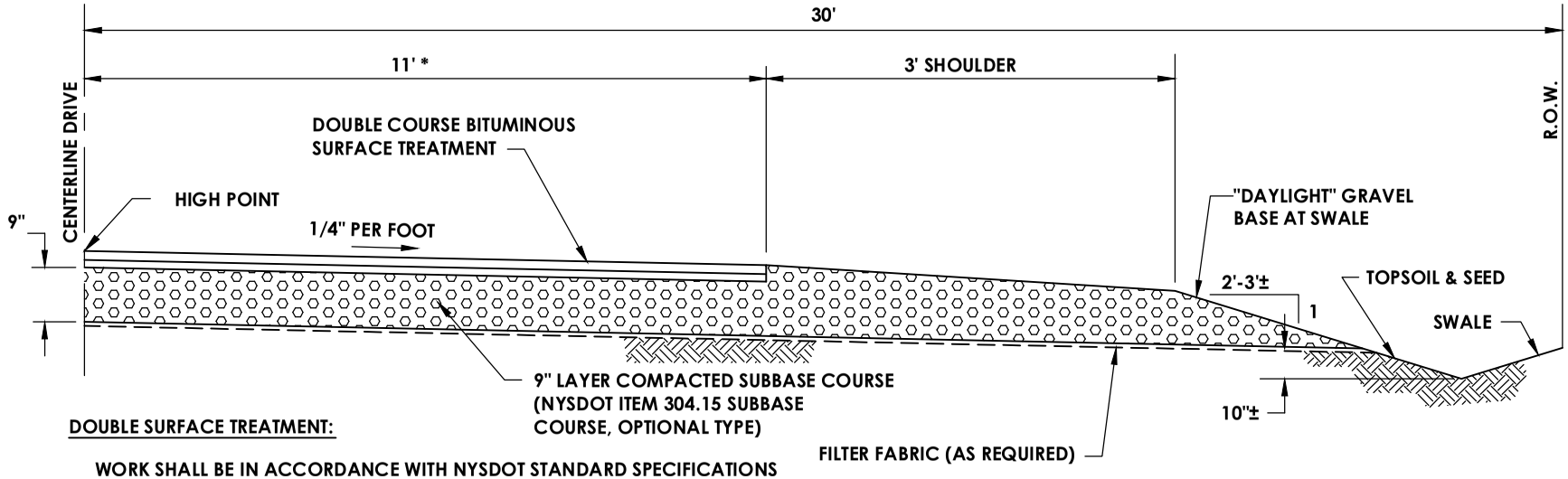
TOWN OF OAKFIELD

HIGHWAY DETAILS

COLLECTOR ROAD

APRIL 2013

DRAWING H-02



DOUBLE SURFACE TREATMENT:

WORK SHALL BE IN ACCORDANCE WITH NYSDOT STANDARD SPECIFICATIONS SECTION 410 EXCEPT AS NOTED BELOW:

	BITUMINOUS MATERIAL NYSDOT MATERIALS DESIGNATION 702-3101 GRADE RS-2 GAL./SQ. YD.	AGGREGATE SIZE	AGGREGATE RATE LB./SQ. YD.
FIRST COURSE	.50 - .75	#1	25 - 35
SECOND COURSE	.25 - .40	#1A	15 - 25

* 5'-6" WIDTH MINIMUM FOR A SINGLE UNIT, BITUMINOUS SURFACE TREATMENT OPTIONAL, NO R.O.W. REQUIRED.

PRIVATE DRIVE HALF SECTION 1-4 UNITS

N.T.S.

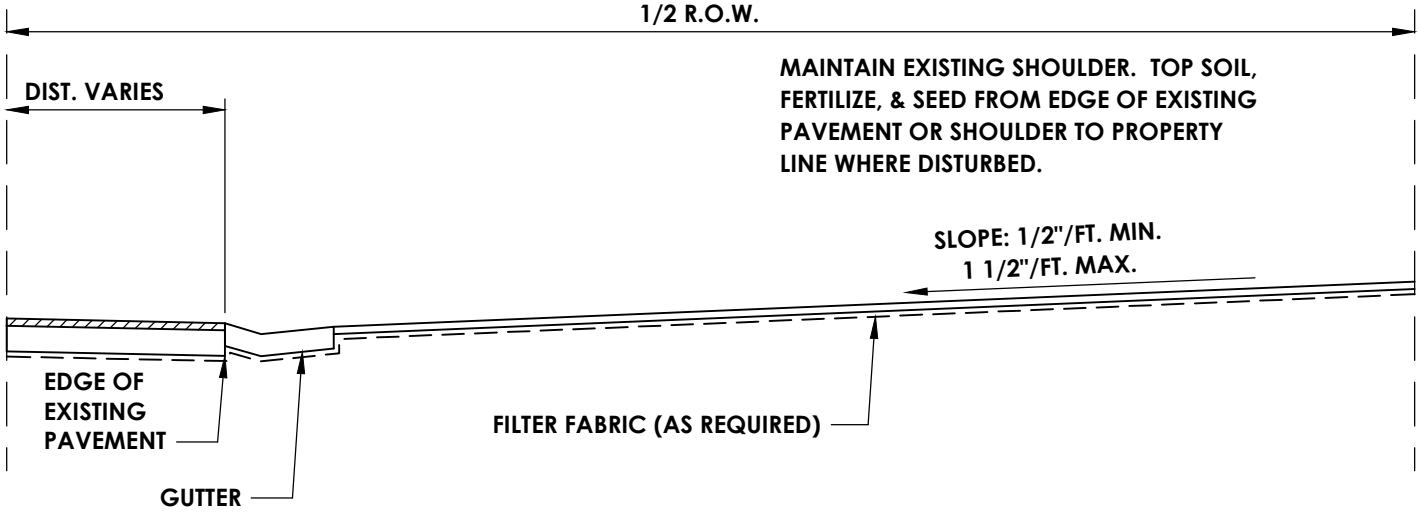
APRIL 2013

TOWN OF OAKFIELD

HIGHWAY DETAILS

PRIVATE DRIVE HALF SECTION 1-4 UNITS

DRAWING H-03



SECTION THROUGH EXISTING ROADWAY WITH GUTTER

TOWN TO CONTROL ALL SLOPES, DEPTHS, AND LOCATIONS.
PERMIT TO BE OBTAINED FROM HIGHWAY SUPERINTENDENT PRIOR TO CONSTRUCTION.

DRIVEWAY ENTRANCE SECTION

N.T.S.

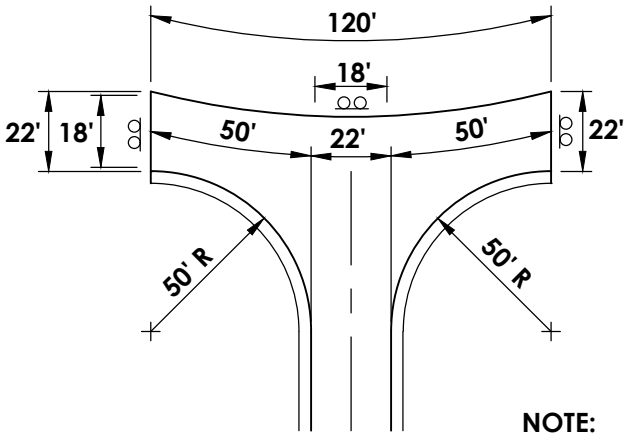
TOWN OF OAKFIELD

HIGHWAY DETAILS

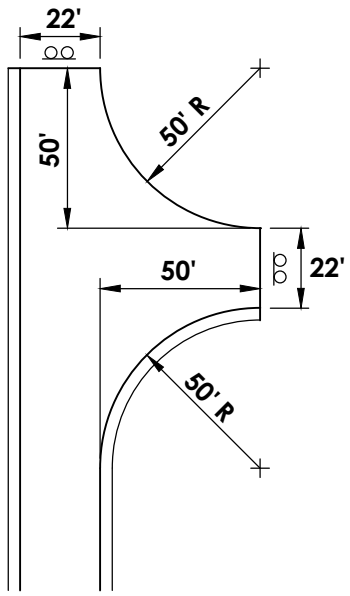
DRIVEWAY ENTRANCE SECTION

APRIL 2013

DRAWING H-04



DEAD END SIGNAGE IN ACCORDANCE WITH MUTCD/NYSDOT



NOTE:

1. **IN ALL CASES THE TURNAROUNDS ARE TO HAVE THE SAME R.O.W. WIDTH AS THE STREET ENTERING. R.O.W. TO EXTEND A MINIMUM OF 10' BEYOND PAVEMENT. NO PRIVATE DRIVEWAYS TO EXIT INTO OR WITHIN 20' OF TURNAROUND.**
2. **THE TURNAROUND SHALL BE BUILT TO ACCOMMODATE THE LARGEST TOWN HIGHWAY DEPARTMENT PLOW TRUCK AND/OR THE LARGEST FIRE TRUCK OPERATED BY THE TOWN FIRE DEPARTMENT OR BY A MUTUAL AID FIRE DEPARTMENT.**

TYPICAL TEMPORARY TURNAROUNDS

N.T.S.

TOWN OF OAKFIELD

HIGHWAY DETAILS

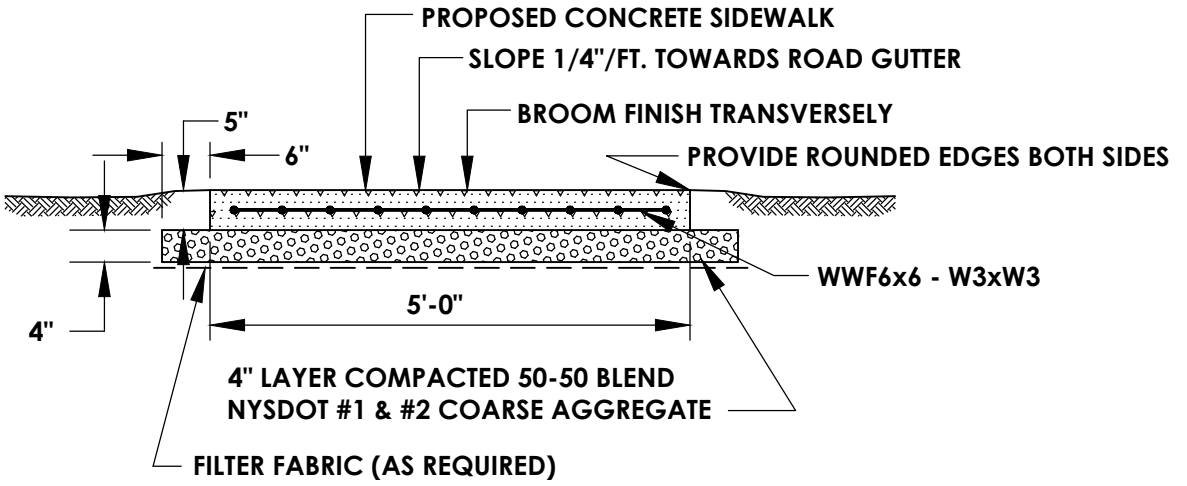
TYPICAL TEMPORARY TURNAROUNDS

APRIL 2013

DRAWING H-05

SEE TYPICAL ROAD SECTION FOR HORIZONTAL AND VERTICAL ALIGNMENT.

USE "ACCUSEAL" AS MANUFACTURED BY ALLERTON CHEMICAL COMPANY, "POLYCLEAR" AS MANUFACTURED BY THE UPCO COMPANY, OR APPROVED EQUAL.



CONVENTIONALLY FORMED CONCRETE SIDEWALK SHALL BE 3500 PSI, NYSDOT CLASS A, AIR ENTRAINED CONCRETE. MACHINE FORMED CONCRETE SIDEWALK SHALL BE 3500 PSI, NYSDOT CLASS C, AIR ENTRAINED CONCRETE.

FULL DEPTH EXPANSION JOINTS SHALL BE PROVIDED EVERY 25 FEET. DUMMY OR MARKED JOINTS SHALL BE 5' SPACING.

USE WWF6x6 - W6xW6 STEEL MESH AT ALL DRIVEWAY CROSSING.

TO FACILITATE THE MOVEMENT OF HANDICAPPED PERSONS, NEW SIDEWALK CONSTRUCTION SHALL INCLUDE PROVISIONS FOR RAMPS AT STREET INTERSECTIONS.

SIDEWALK SECTION

N.T.S.

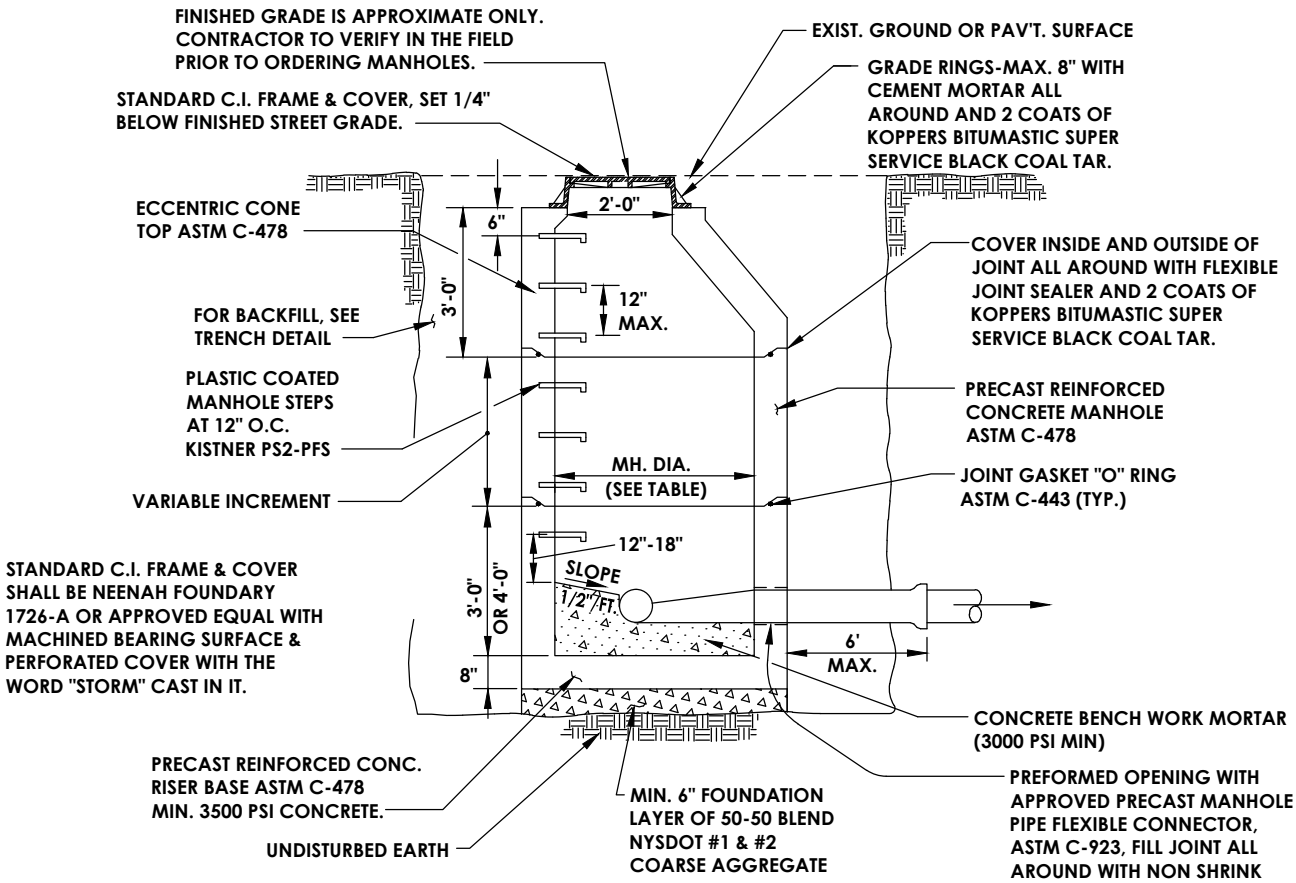
TOWN OF OAKFIELD

HIGHWAY DETAILS

SIDEWALK SECTION

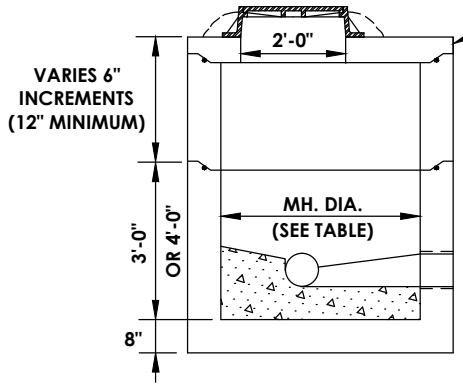
APRIL 2013

DRAWING H-06



ECCENTRIC CONE TOP

(FOR MANHOLES DEEPER THAN 7 FT.)



NOTES:

1. ALL DETAILS SPECIFIED HERE-ON APPLY TO BOTH TYPES OF MANHOLES.
2. WALL & SLAB THICKNESS=

MANHOLE DIA.	4FT.	5FT.	6FT.
TOP SLAB	6"	8"	8"
RISER WALL	5"	6"	7"
BOTTOM SLAB	8"	8"	8"

3. ALL COMPONENTS OF MANHOLES TO ACCOMODATE A.A.S.H.T.O. H20-44 CONCENTRATED WHEEL LOADING PLUS 30% IMPACT.
4. MORTAR SHALL BE 1 PART PORTLAND CEMENT, 1 1/2 PARTS CLEAN SAND.

PRECAST COVER SLAB

(FOR MANHOLES LESS THAN 7 FT. DEEP)

TABLE

SEWER SIZE	MANHOLE DIA. (MIN.)
12"	4'-0"
15"-36"	5'-0"
42"-48"	6'-0"

*** SPECIAL INVERT DETAIL MAY BE REQ'D. FOR 3 & 4 WAY MANHOLE CONFIGURATIONS.**

STANDARD STORM MANHOLES

N.T.S.

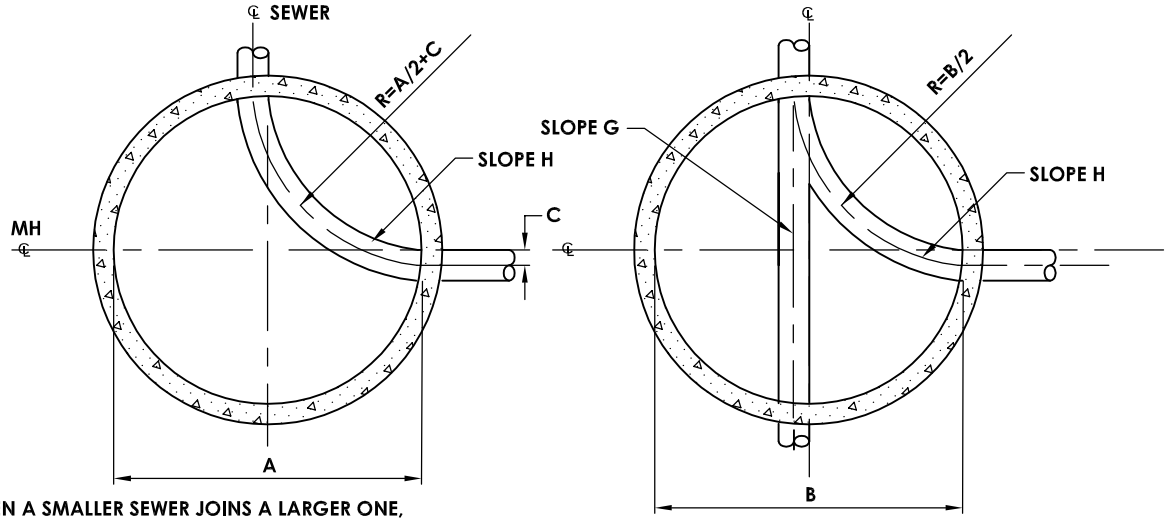
TOWN OF OAKFIELD

STORM SEWER DETAILS

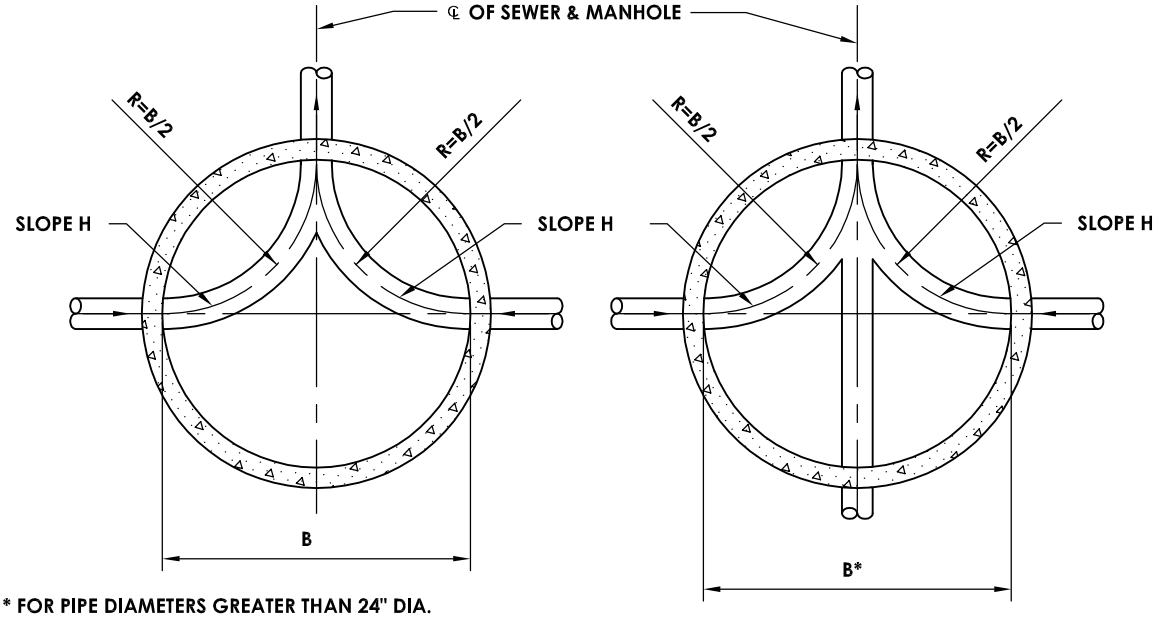
STANDARD STORM MANHOLE

APRIL 2013

DRAWING D-01



WHEN A SMALLER SEWER JOINS A LARGER ONE, THE TOP OF PIPE SHALL BE MATCHED AT THE SAME ELEVATION.



* FOR PIPE DIAMETERS GREATER THAN 24" DIA. DESIGN ENGINEER SHALL PROVIDE SPECIAL DESIGN DETAILS SHOWING MANHOLE SIZE, MATERIAL, INVERT, BENCH WALLS, & ANY OTHER PERTINENT FEATURES FOR TOWN ENGINEER APPROVAL.

MAX. PIPE DIA.		8"	12"	15"	18"	21"	24"	27"	30"	36"
DIMENSION	A	4'-0"	4'-0"	4'-0"	4'-0"	5'-0"	5'-0"	5'-0"	6'-0"	*
	B	4'-0"	5'-0"	5'-0"	5'-0"	5'-0"	*	*	*	*
	C	4"	6"	8"	9"	10"	12"	13.5"	15"	18"
	G	.05'	.05'	.02'	.02'	.02'	.02'	.02'	.02'	.02'
	H	.10'	.10'	.05'	.05'	.05'	.05'	.05'	.05'	.05'

STORM SEWER
STANDARD MANHOLE DIMENSIONS

N.T.S.

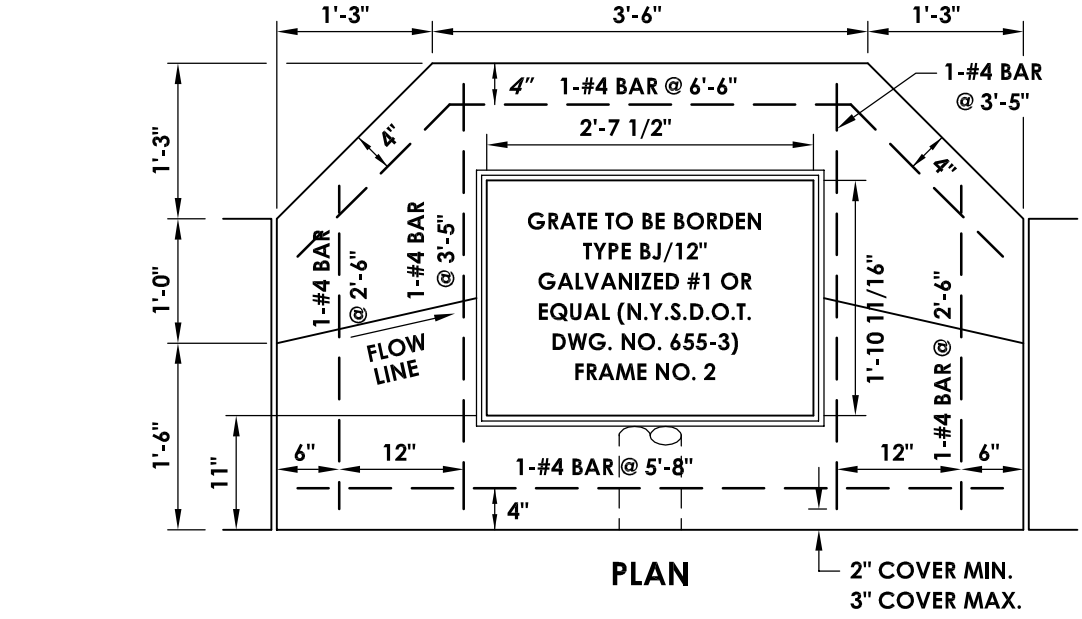
TOWN OF OAKFIELD

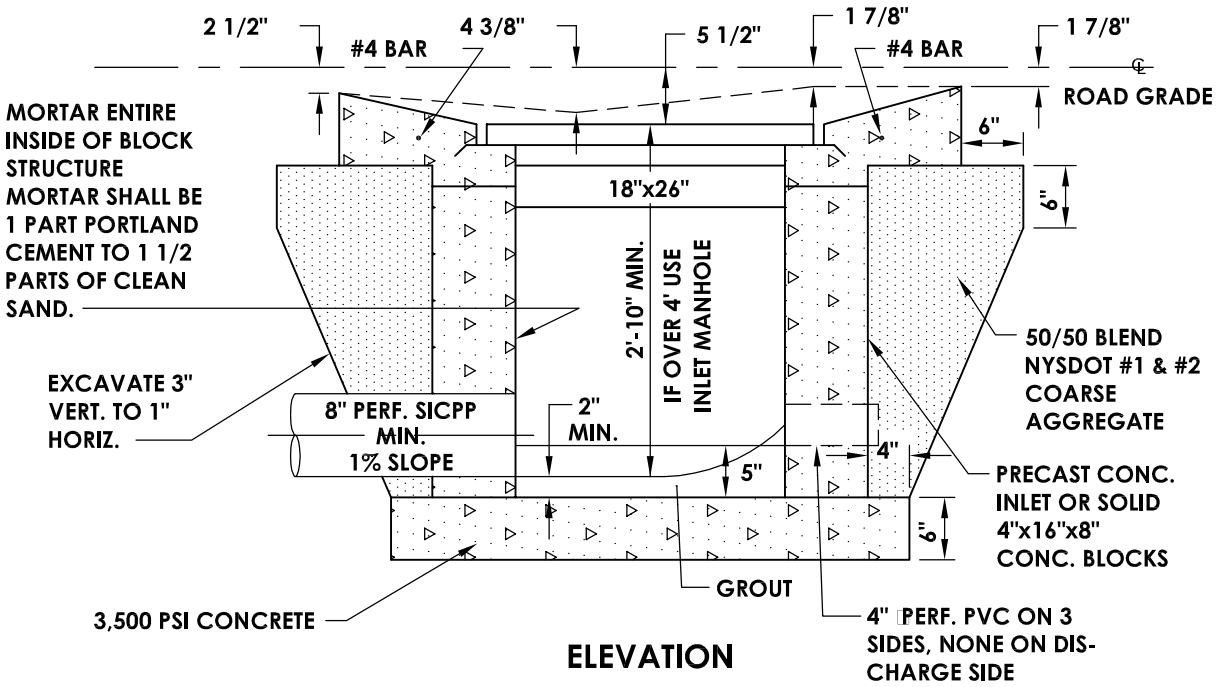
STORM SEWER DETAILS

STORM SEWER STANDARD MANHOLE DIMENSIONS

APRIL 2013

DRAWING D-02





STANDARD GUTTER INLET

N.T.S.

NOTES:

SET FRAME IN THE SAME CONCRETE AS ROADSIDE GUTTERS. FRAME AND GRATE TO BE BORDEN TYPE B/J 12" GALVANIZED #1 OR EQUAL. PAINT INSIDE AND OUTSIDE WITH 1 COAT OF KOPPERS BITUMASTIC #300M OR APPROVED EQUAL. PAINT BOTTOM OF CATCH BASIN WITH 2 COATS OF KOPPERS BITUMASTIC #300M OR APPROVED EQUAL.

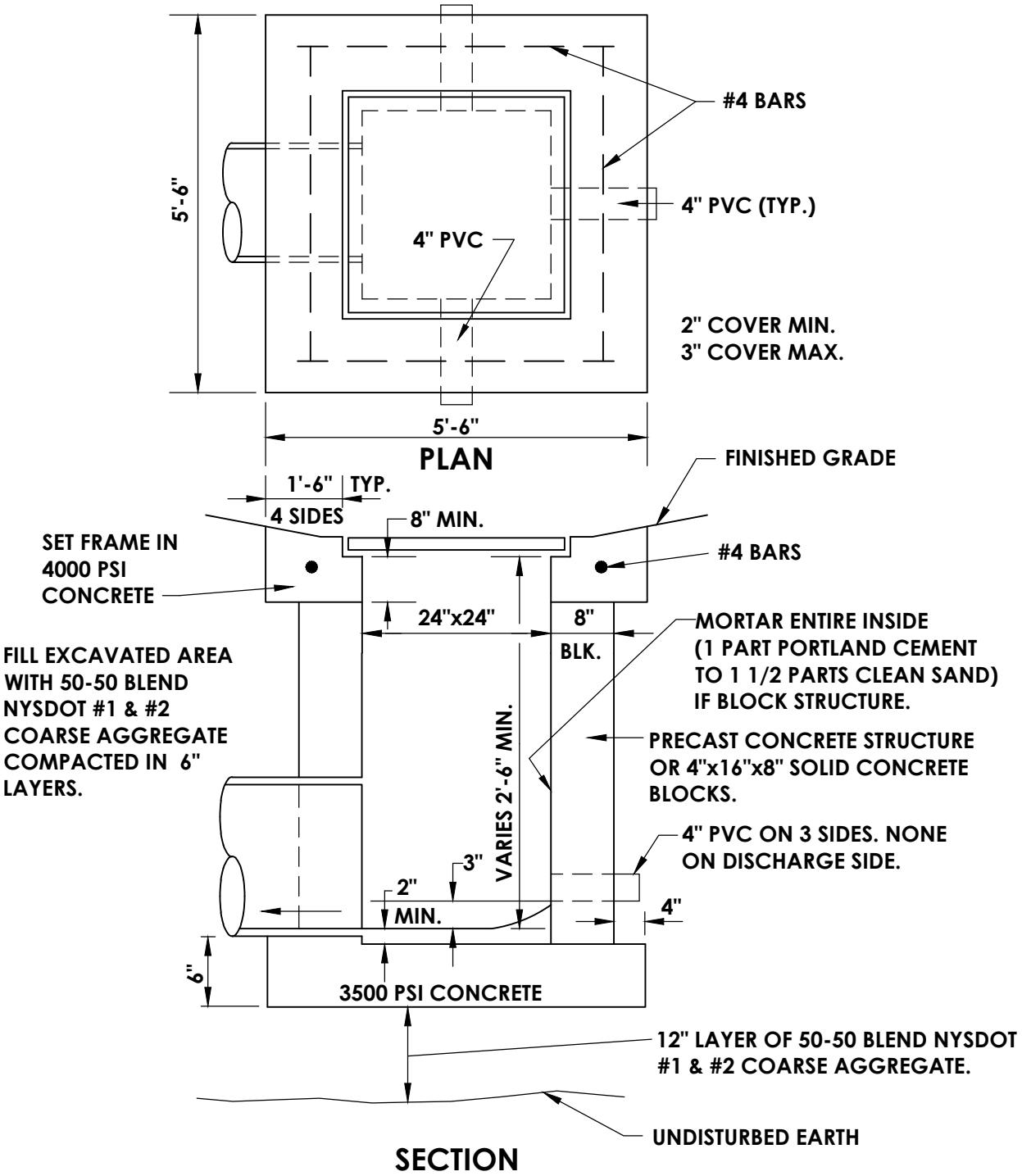
TOWN OF OAKFIELD

STORM SEWER DETAILS

STANDARD GUTTER INLET

APRIL 2013

DRAWING D-03



STANDARD YARD INLET

N.T.S.

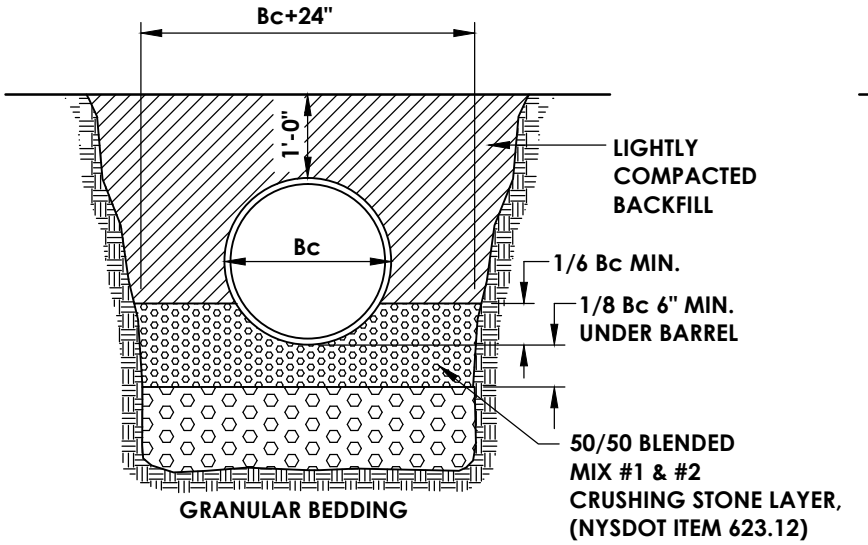
TOWN OF OAKFIELD

STORM SEWER DETAILS

STANDARD YARD INLET DETAIL

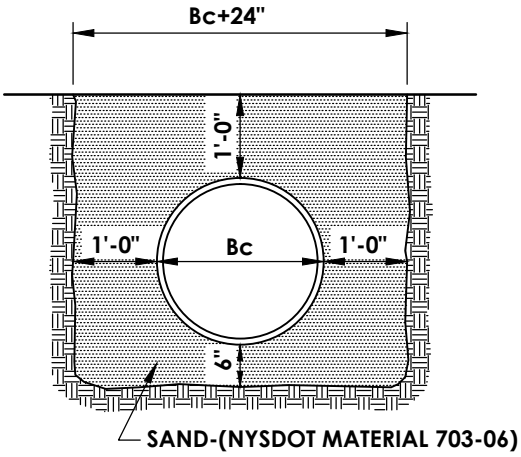
APRIL 2013

DRAWING D-04



IF GROUNDWATER IS ENCOUNTERED EXCAVATE TO A DEPTH TO OBTAIN A STABLE BOTTOM AND REPLACE WITH A WELL GRADED #3 & #4 CRUSHED STONE LAYER (NYSDOT ITEM 623.12)

FIGURE 1



SAND CUSHION* IN ROCK,
***-IF TRENCH CONDITION IS WET #1 & #2 CRUSHED OR WASHED STONE SHALL BE USED IN PLACE OF SAND. (NYSDOT ITEM 623.12)**

FIGURE 2

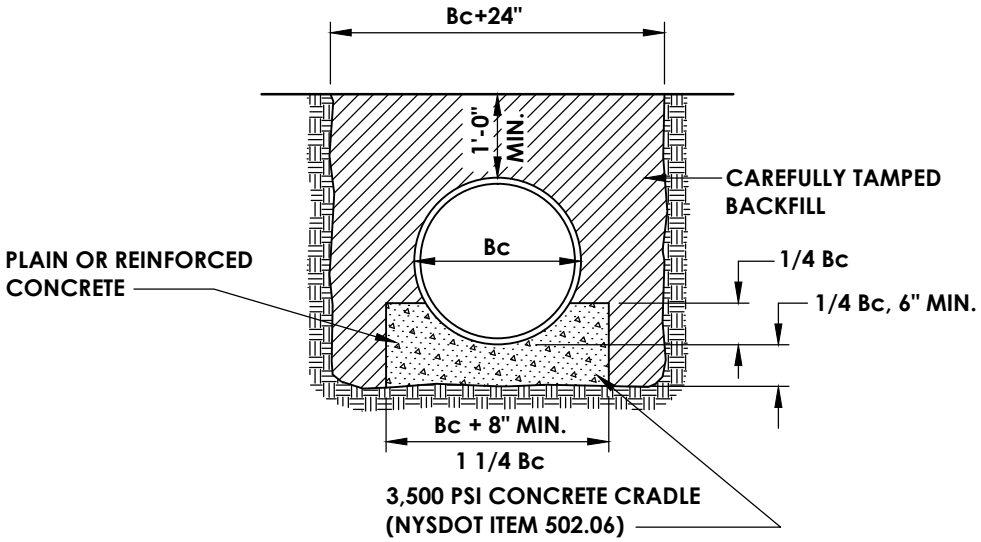


FIGURE 3

NOTE: SEE FIG. 1 FOR UNSUITABLE GROUND CONDITIONS.

SUPPORTING STRENGTH IN TRENCH CONDITIONS STORM SEWERS

N.T.S.

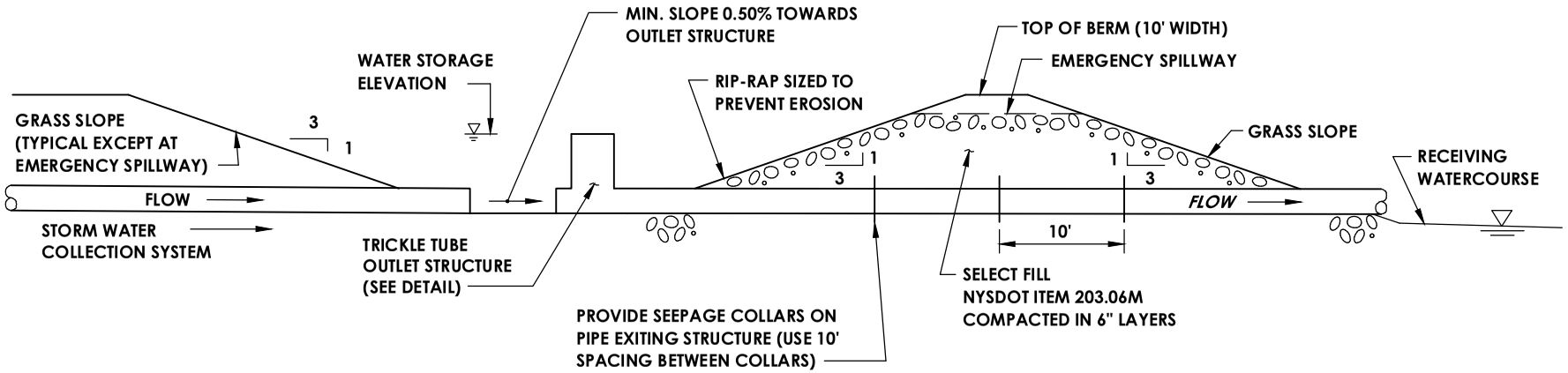
TOWN OF OAKFIELD

STORM SEWER DETAILS

SUPPORTING STRENGTH IN TRENCH CONDITIONS STORM SEWERS

APRIL 2013

DRAWING D-05



NOTE: REMOVE TOPSOIL PRIOR TO BERM PLACEMENT.

DETENTION AREA SECTION

N.T.S.

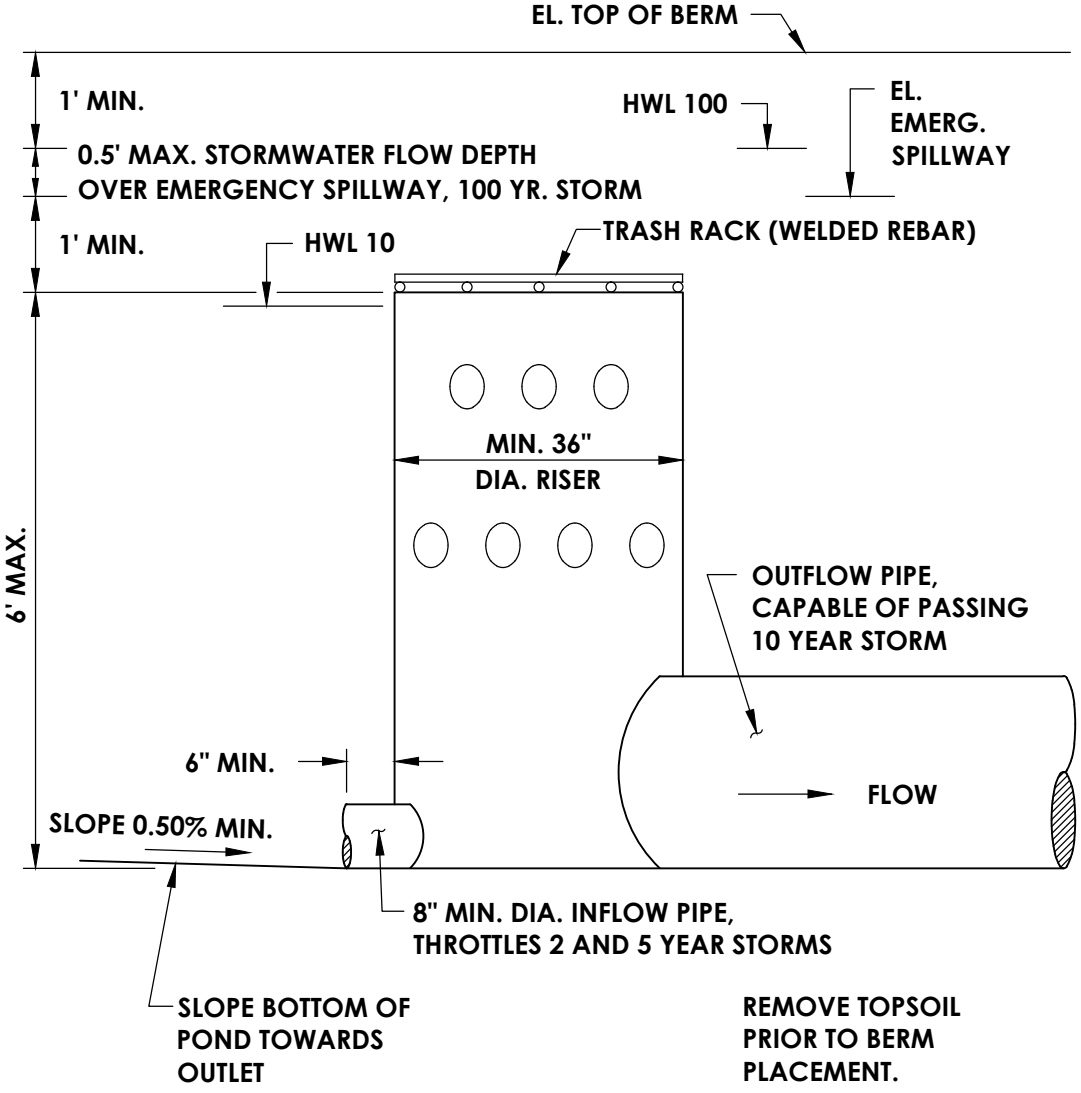
APRIL 2013

TOWN OF OAKFIELD

STORM SEWER DETAILS

DETENTION AREA SECTION

DRAWING D-06



TRICKLE TUBE OUTLET STRUCTURE

N.T.S.

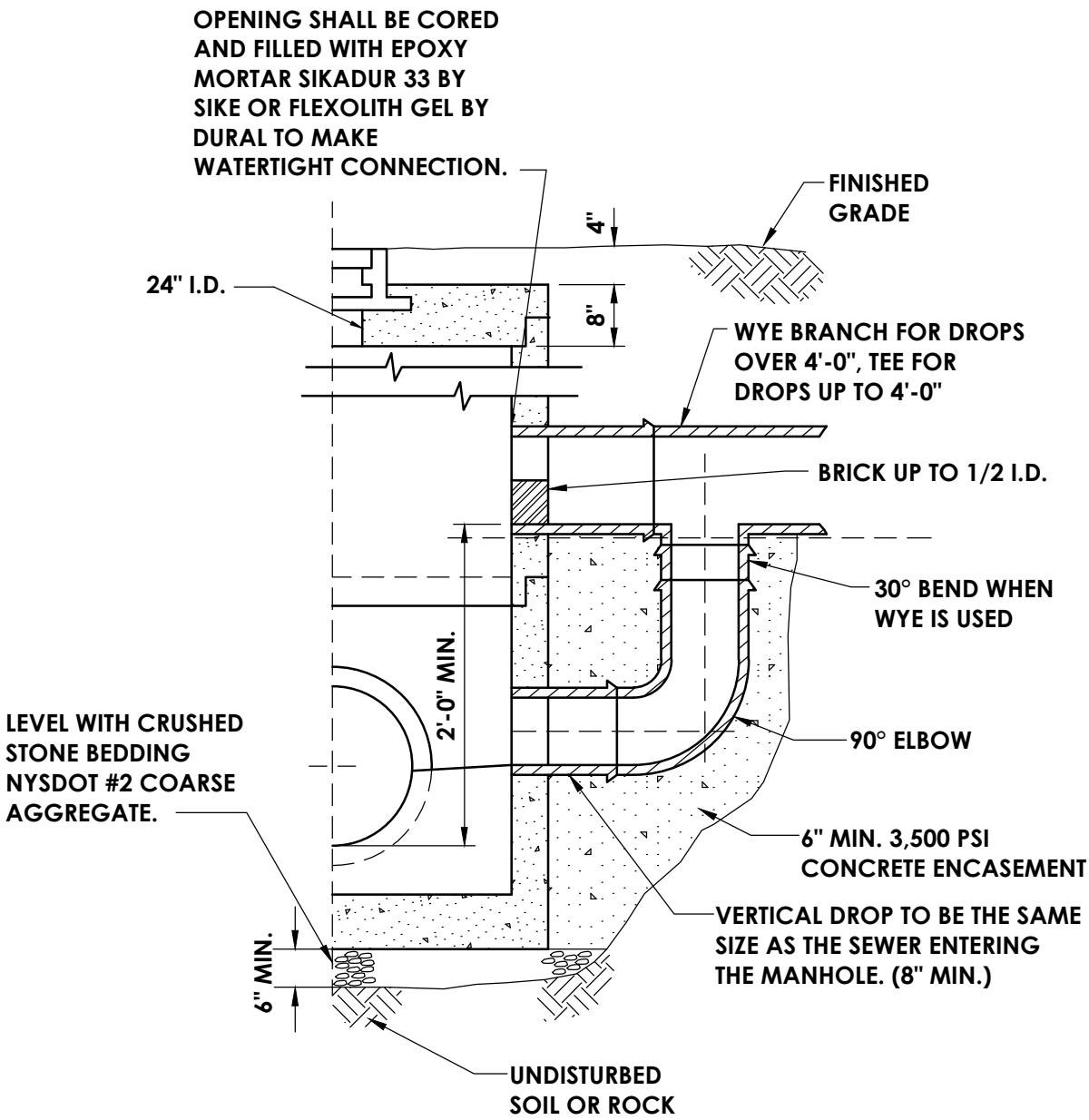
TOWN OF OAKFIELD

STORM SEWER DETAILS

TRICKLE TUBE OUTLET STRUCTURE

APRIL 2013

DRAWING D-07



SANITARY MANHOLE WITH OUTSIDE DROP CONNECTION

N.T.S.

TOWN OF OAKFIELD

SANITARY SEWER DETAILS

NEW SANITARY MANHOLE WITH OUTSIDE DROP CONNECTION

APRIL 2013

DRAWING S-01

MANHOLE NOTES:

1) STUBS 4' MAX. R.C.P., 1' MAX. ALL OTHER PIPE MATERIALS FROM OUTSIDE FACE.

2) USE TWO COATS OF SIKAGUARD NO. 62 BY SIKA OR DURALCOTE BY DURAL OR APPROVED EQUIVALENT FOR INTERIOR COATING OF BASE TO TOP OF HIGHEST PIPE. USE TWO COATS OF KOPPERS SUPER SERVICE BLACK OR APPROVED EQUIVALENT ON OTHER INTERIOR AND ALL EXTERIOR SURFACES,

3) ALL RISER JOINTS SHALL BE RUBBER RING GASKETS CONFORMING TO A.S.T.M. C443 WITH FLEXIBLE JOINT SEALER ON OUTSIDE OF JOINTS.

4) PIPE CONNECTIONS TO MANHOLE BASE SHALL BE DURA SEAL RUBBER GASKETS OR APPROVED EQUIVALENT FOR ALL OTHER PIPES.

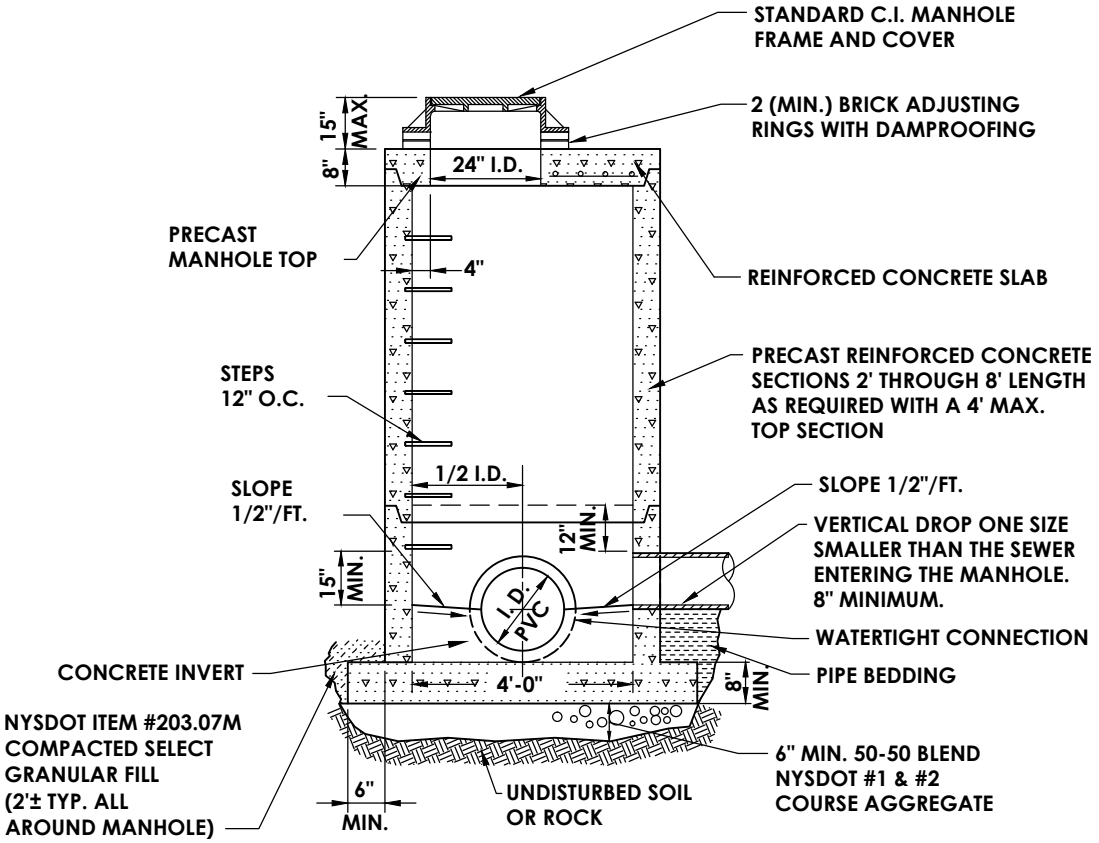
5) PRECAST BASES, RISER SECTIONS AND TOP SLABS SHALL CONFORM WITH A.S.T.M. C478.

6) CORED OPENINGS IN MANHOLE RISER SECTIONS SHALL BE NOT LESS THAN 6" FROM A RISER JOINT.

7) MANHOLE STEPS ARE REQUIRED FOR ANY STRUCTURE DEEPER THAN 4 FT. AND SHALL CONFORM TO N.Y.S.D.O.T. MATERIAL SPECIFICATION 725-02.01.

8) MANHOLE TOP SLABS, FRAMES AND COVERS SHALL BE DESIGNED FOR USE UNDER H-20 LOADING.

9) MANHOLE FRAMES AND COVERS SHALL BE NEENAH FOUNDRY NO. R-1726-A, SYRACUSE CASTINGS NO. 1032 OR AN APPROVED EQIVALENT.



PRECAST SANITARY MANHOLE

N.T.S.

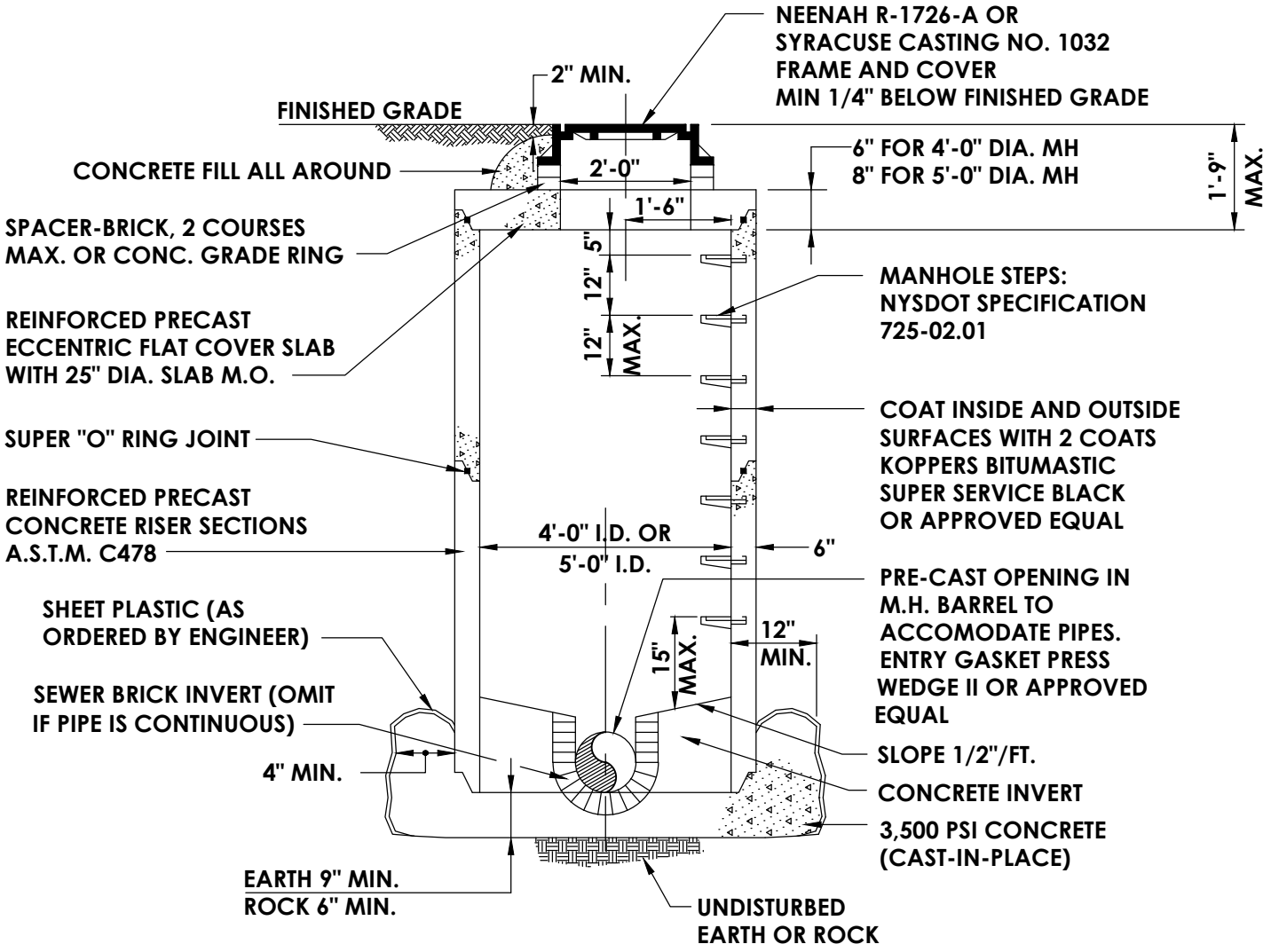
TOWN OF OAKFIELD

SANITARY SEWER DETAILS

PRECAST SANITARY MANHOLE

APRIL 2013

DRAWING S-02



NOTES: 1. ALL BRICK MASONARY UNITS SHALL BE ASTM DESIGNATION C-32 GRADE SS.

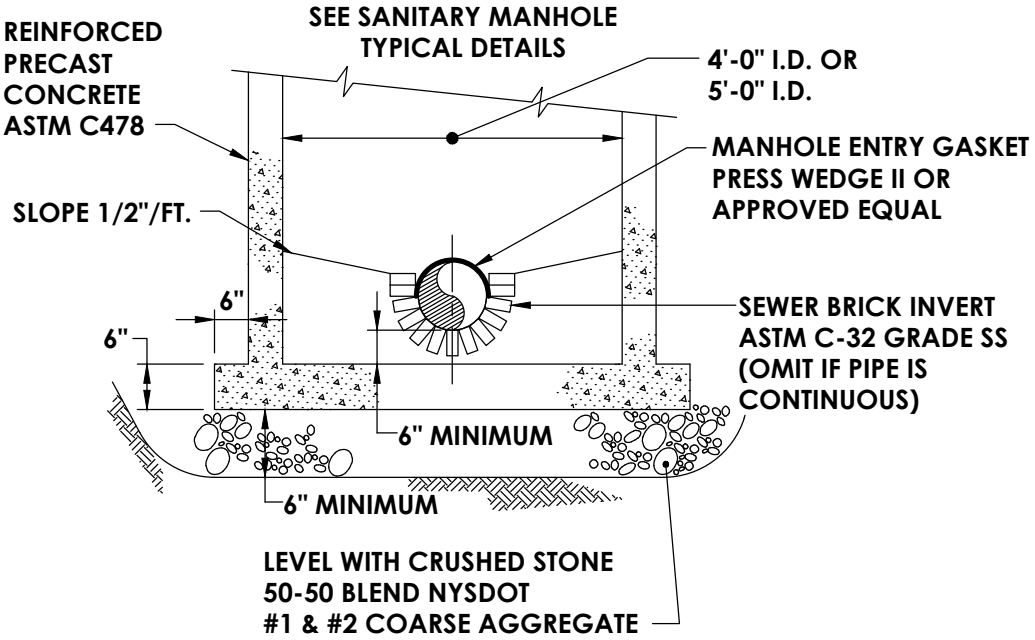
2. MANHOLES WITH OUTLET PIPES 12" DIA. AND LARGER SHALL BE 5'-0" DIA. MANHOLES WITH OUTLET PIPES LESS THAN 12" DIA. SHALL BE 4'-0" DIA.

CAST-IN-PLACE SANITARY SEWER MANHOLE DEPTHS BETWEEN 5'-3" AND 9'-0"

N.T.S.

TOWN OF OAKFIELD
SANITARY SEWER DETAILS
CAST-IN-PLACE SANITARY SEWER MANHOLE DEPTHS 5'-3" TO 9'-0"
DRAWING S-03

APRIL 2013



MONOLITHIC SANITARY SEWER MANHOLE BASE

N.T.S.

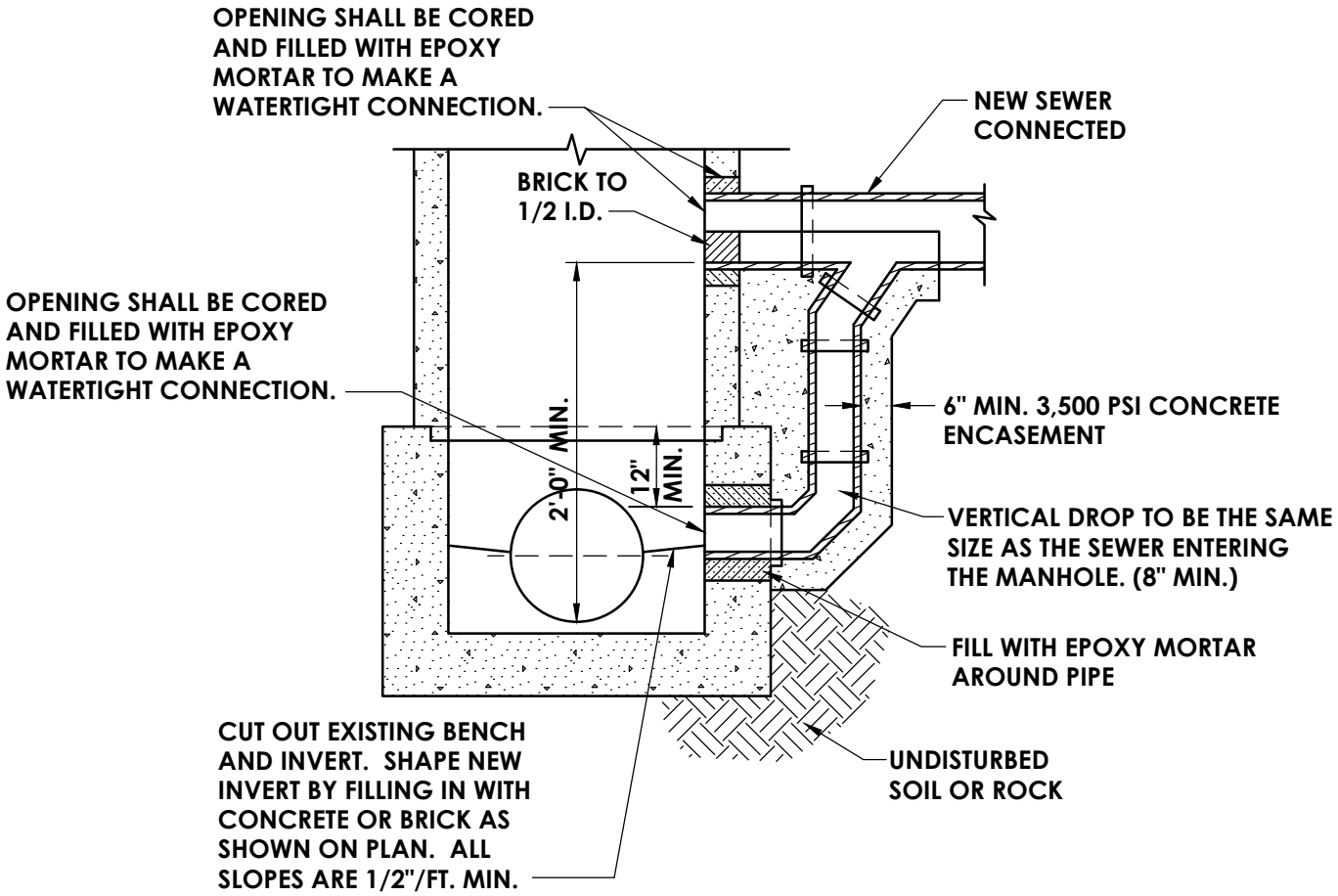
TOWN OF OAKFIELD

SANITARY SEWER DETAILS

MONOLITHIC SANITARY SEWER MANHOLE BASE

APRIL 2013

DRAWING S-04



NOTE:

1. **EPOXY MORTAR TO BE SIKADUR 33 BY SIKA OR FLEXOLITH GEL BY DURAL.**

EXISTING SANITARY MANHOLE WITH OUTSIDE DROP CONNECTION

N.T.S.

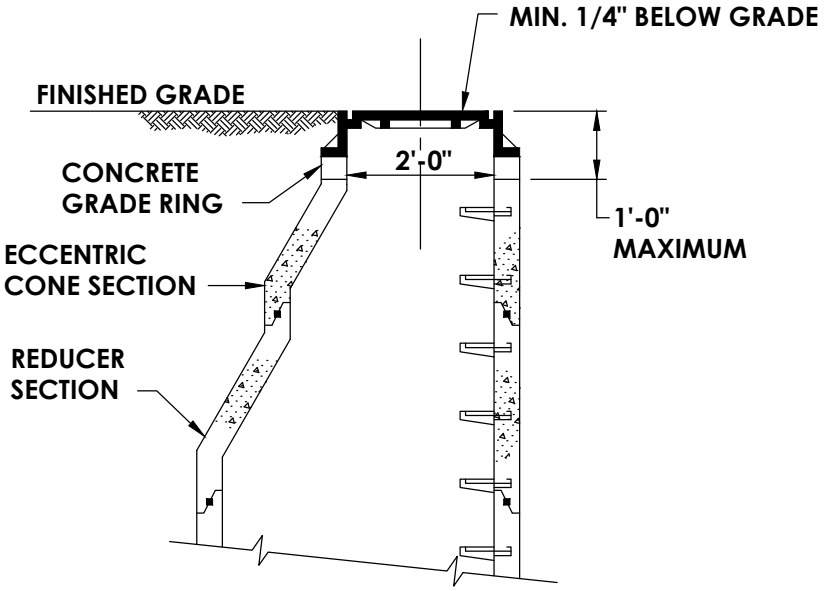
TOWN OF OAKFIELD

SANITARY SEWER DETAILS

EXISTING SANITARY MANHOLE WITH OUTSIDE DROP CONNECTION

APRIL 2013

DRAWING S-05



SANITARY SEWER MANHOLE DEPTHS GREATER THAN 9'-0"

N.T.S.

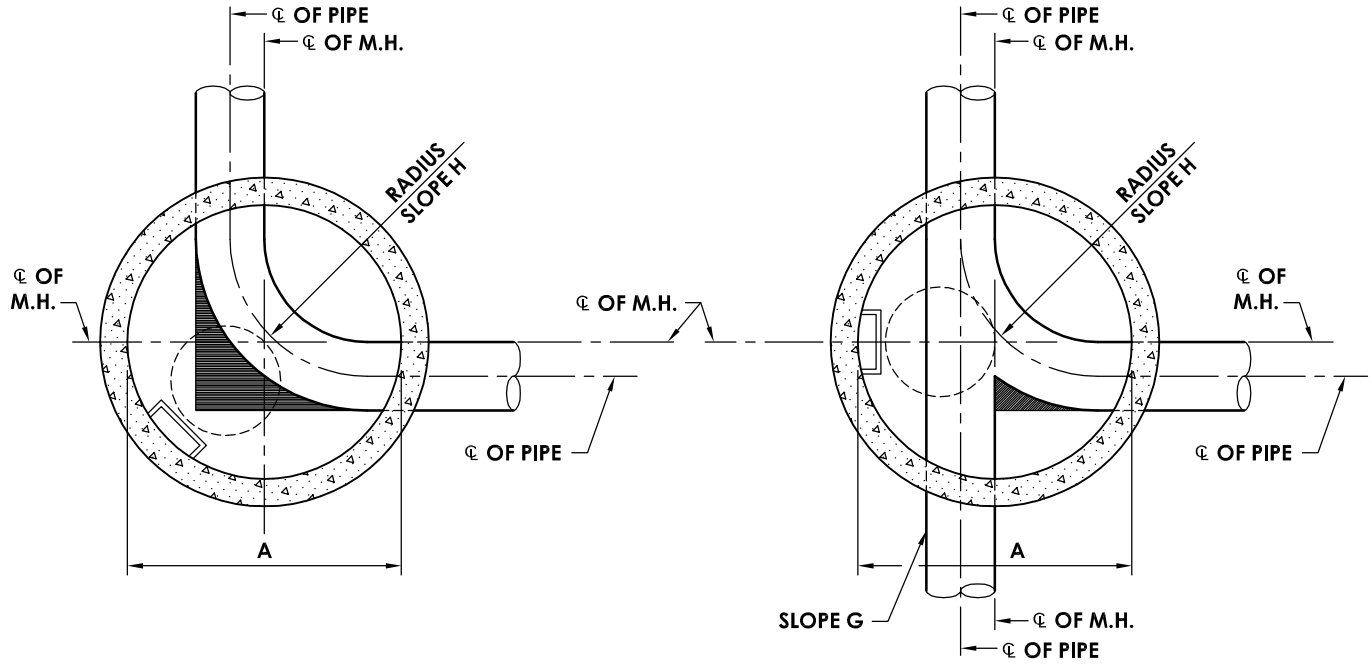
TOWN OF OAKFIELD

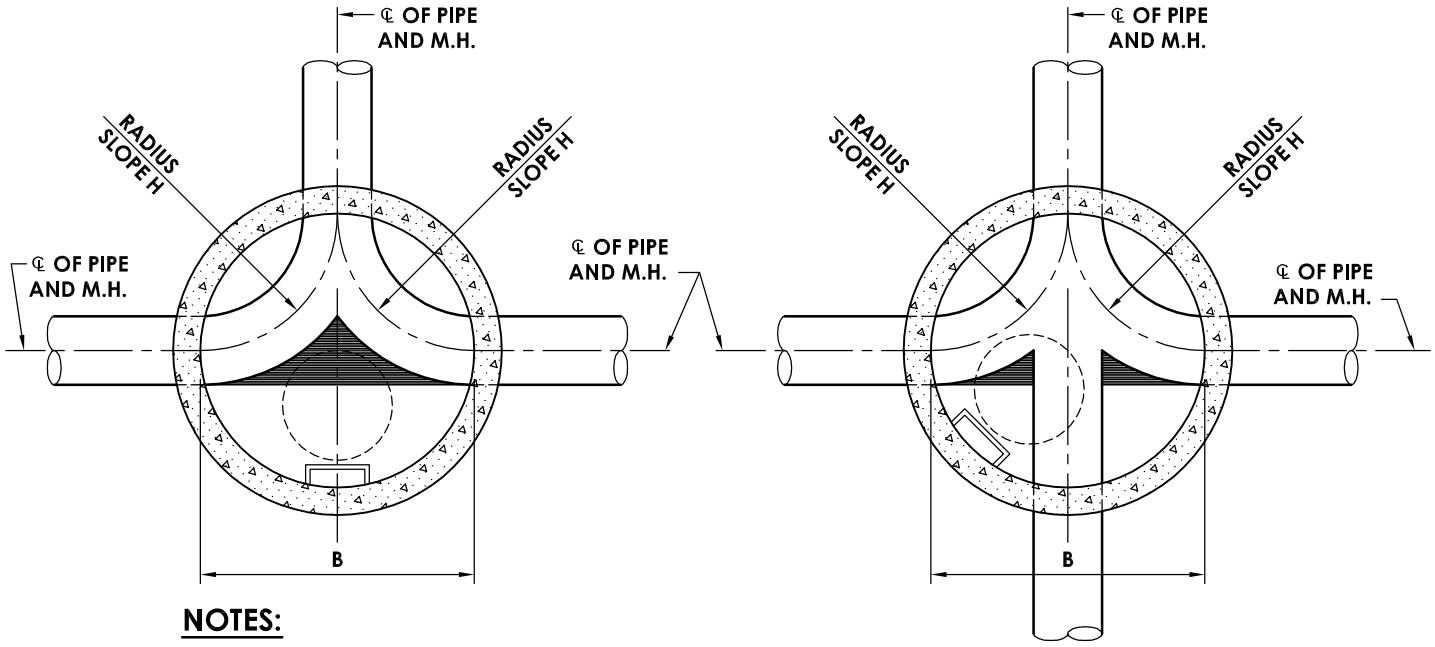
SANITARY SEWER DETAILS

SANITARY SEWER MANHOLE DEPTHS GREATER THAN 9'-0"

APRIL 2013

DRAWING S-06





NOTES:

1. BENCH CUT DOWN TO ℄ OF PIPE IN ALL SHADED AREAS.

SEWER PIPE DIA.		8"/10"	12"/15"
MANHOLE DIAMETER	A	4'-0"	5'-0"
	B	4'-0"	5'-0"
INVERT DIFF.	G	0.1'	0.1'
	H	0.1'	0.1'

STANDARD MANHOLE DIMENSIONS

N.T.S.

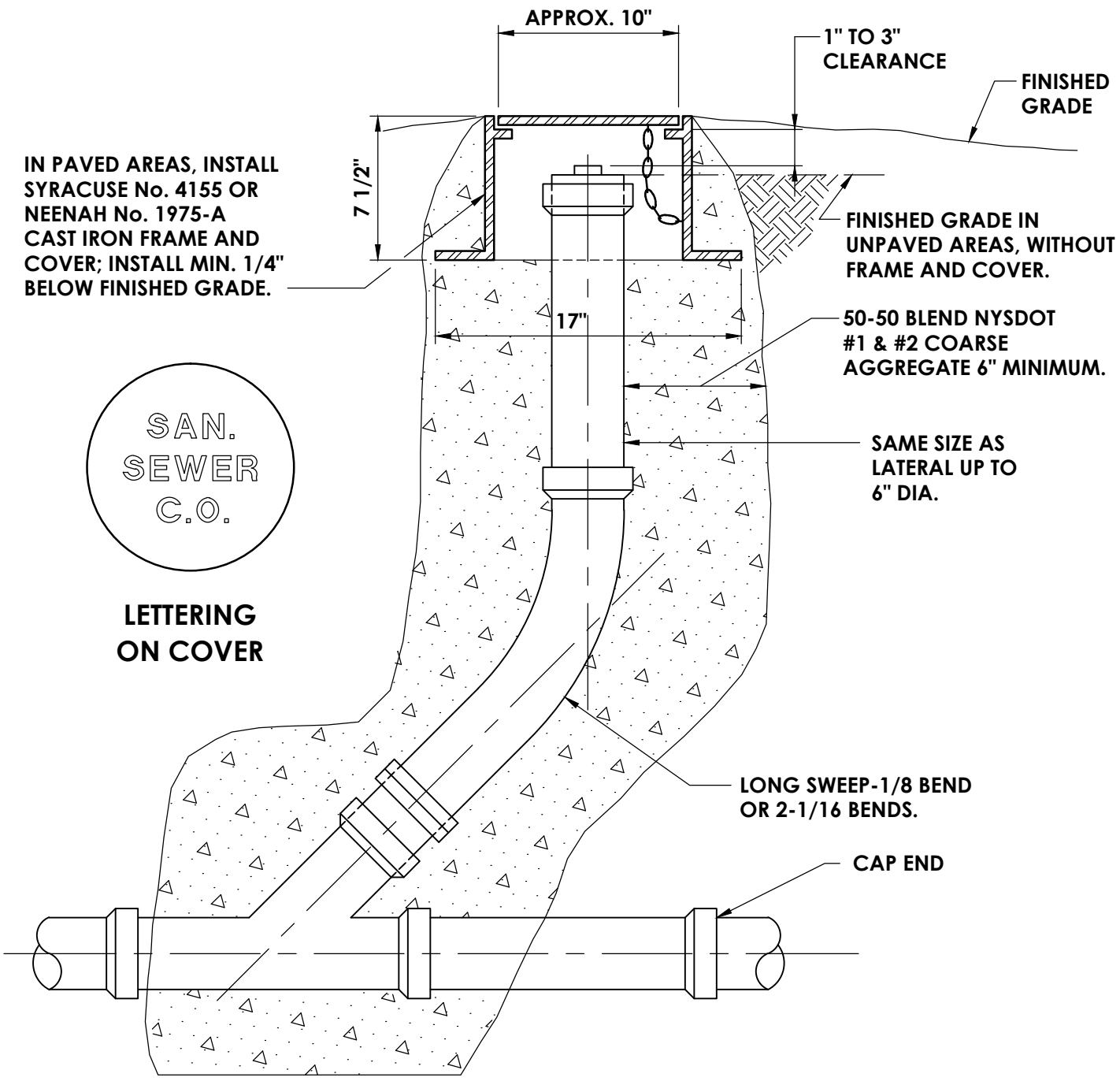
TOWN OF OAKFIELD

SANITARY SEWER DETAILS

STANDARD MANHOLE DIMENSIONS

APRIL 2013

DRAWING S-07



TYPICAL SANITARY CLEAN-OUT

N.T.S.

TOWN OF OAKFIELD

SANITARY SEWER DETAILS

TYPICAL SANITARY CLEAN-OUT

APRIL 2013

DRAWING S-08

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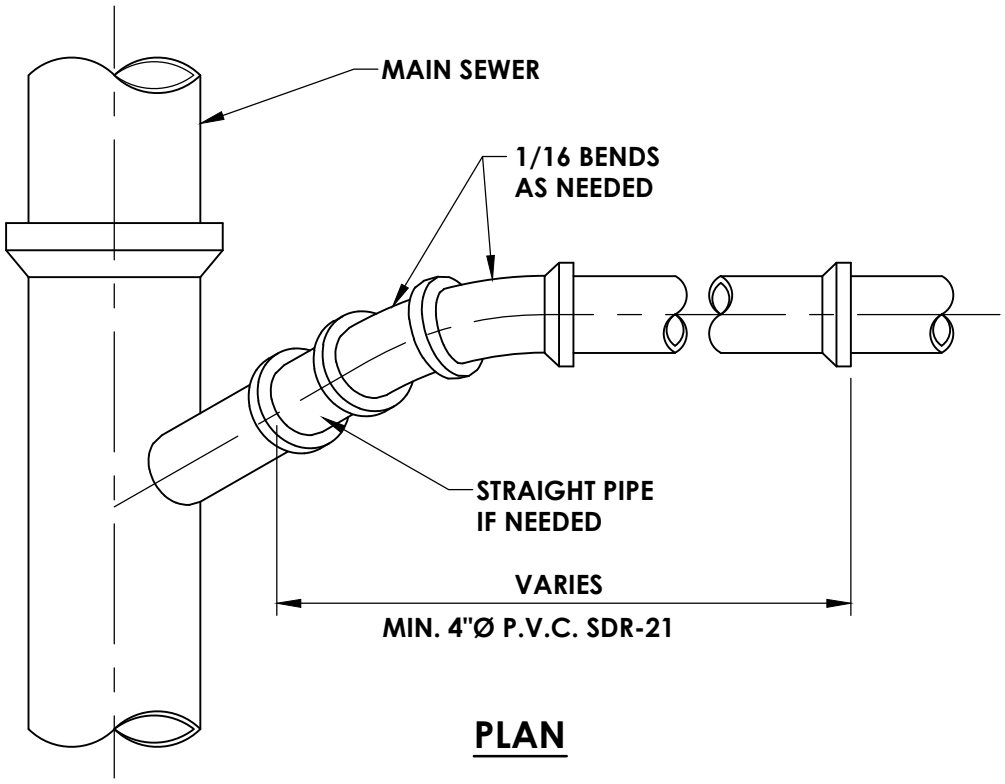

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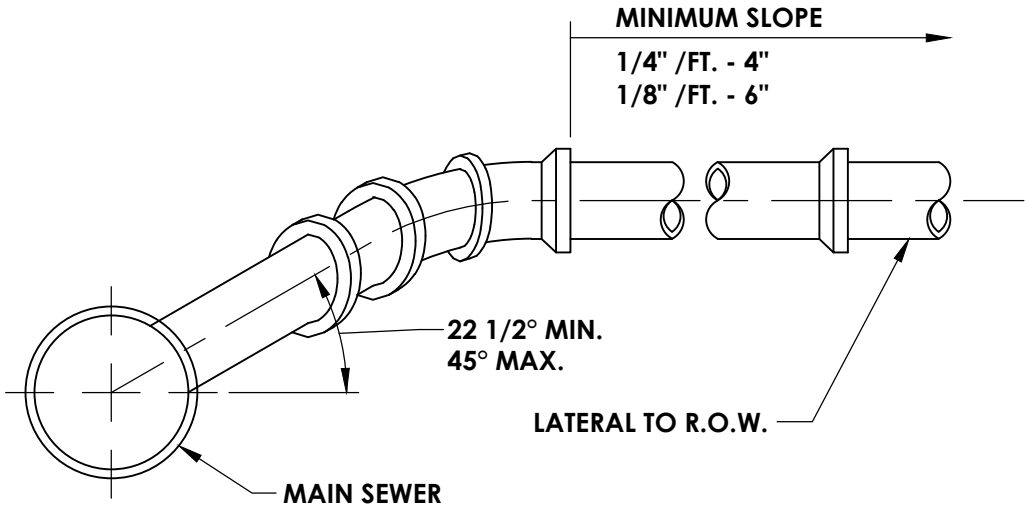


SECTION

WYE BRANCH CONNECTION

N.T.S.

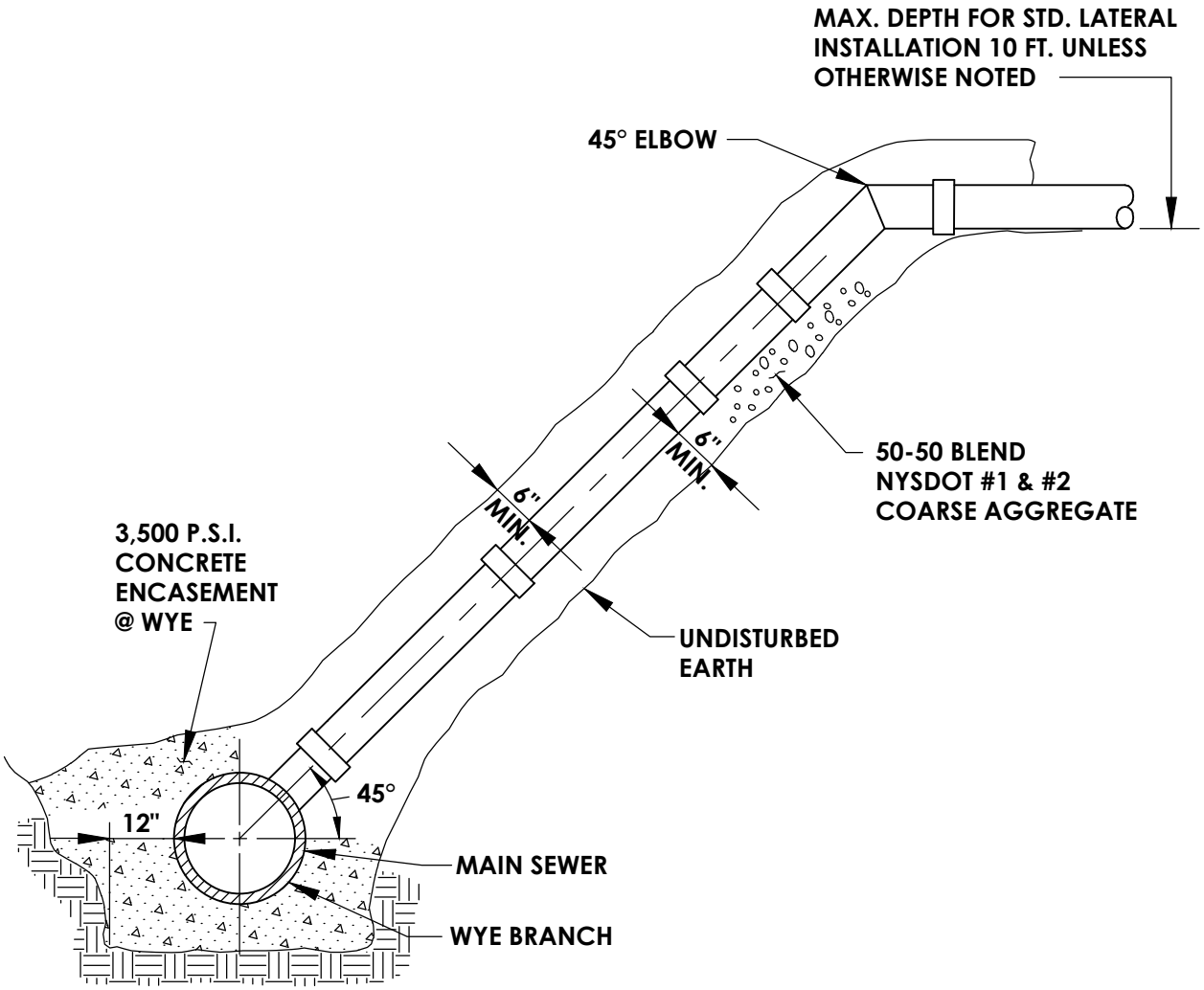
TOWN OF OAKFIELD

SANITARY SEWER DETAILS

WYE BRANCH CONNECTION

APRIL 2013

DRAWING S-09

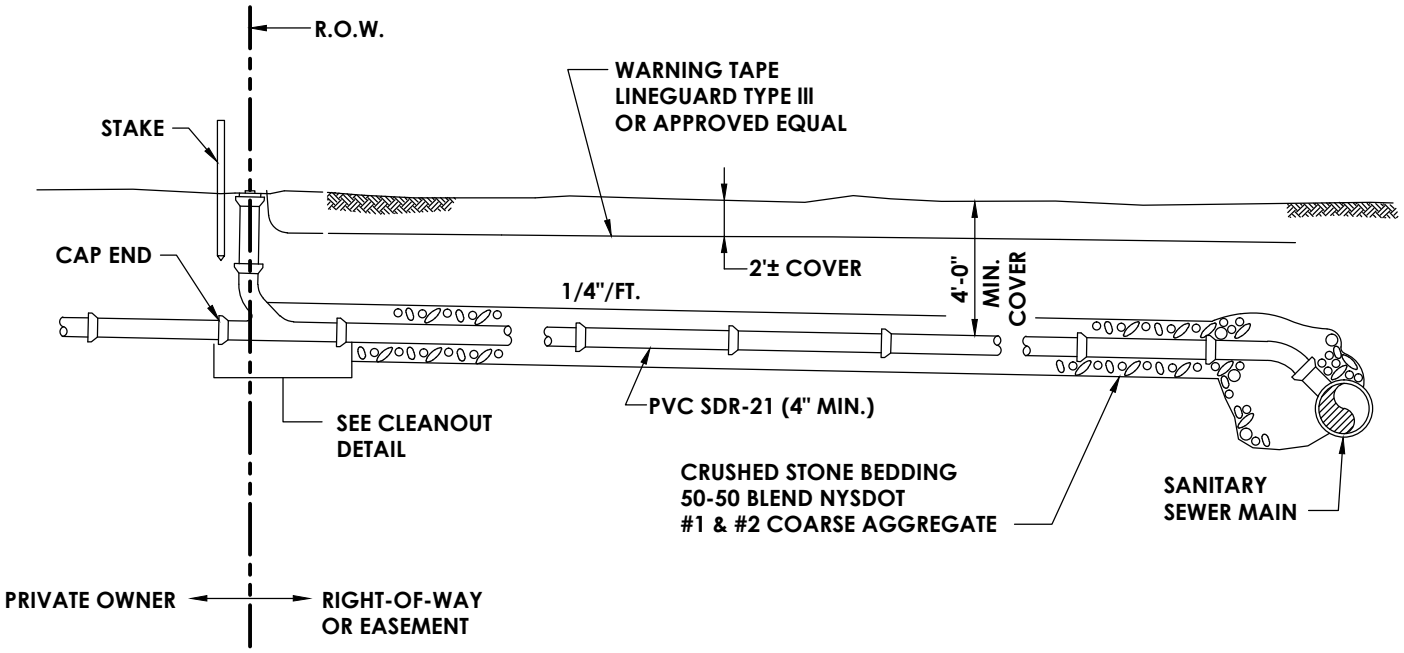


LATERAL RISER DETAIL

N.T.S.

TOWN OF OAKFIELD
SANITARY SEWER DETAILS
LATERAL RISER DETAIL
DRAWING S-10

APRIL 2013



TYPICAL SANITARY SEWER LATERAL

N.T.S.

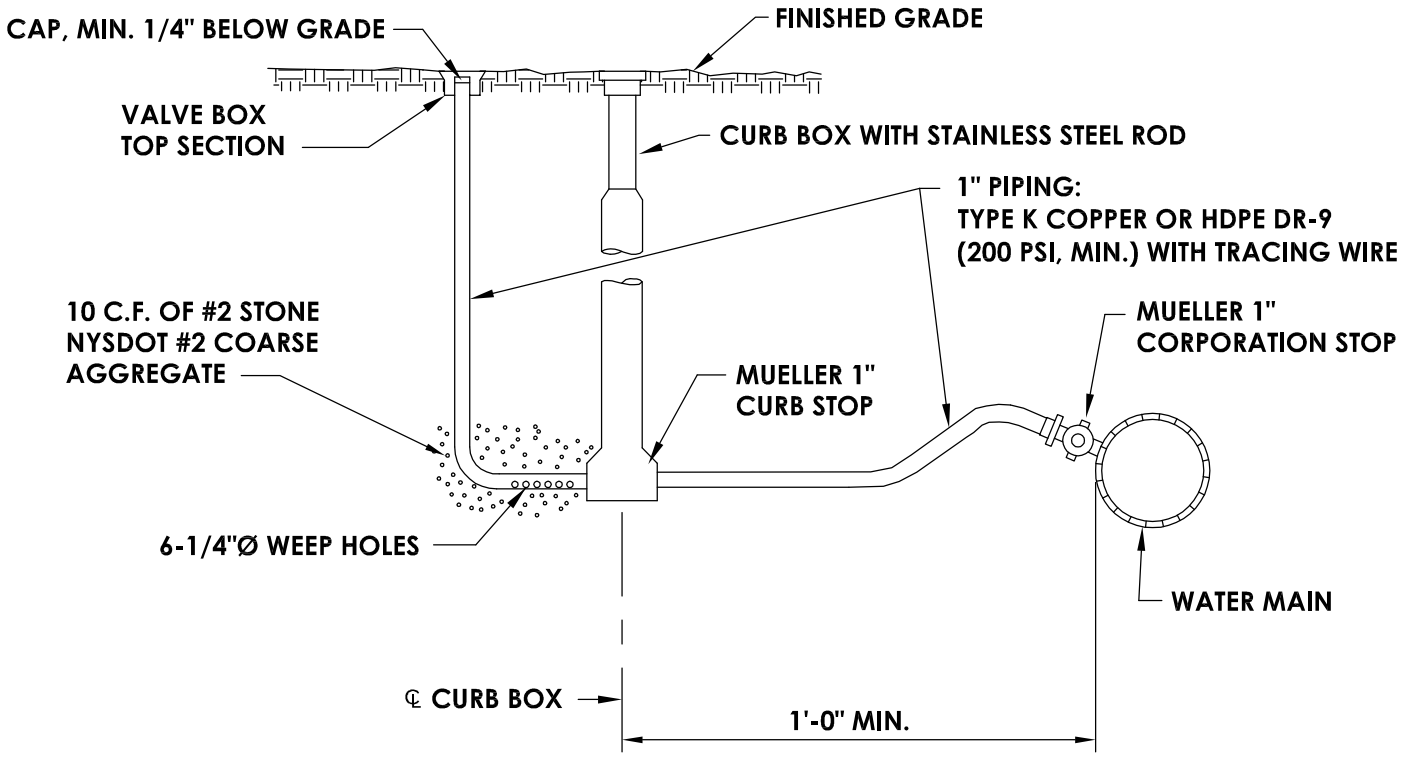
TOWN OF OAKFIELD

SANITARY SEWER DETAILS

TYPICAL SANITARY SEWER LATERAL

APRIL 2013

DRAWING S-11



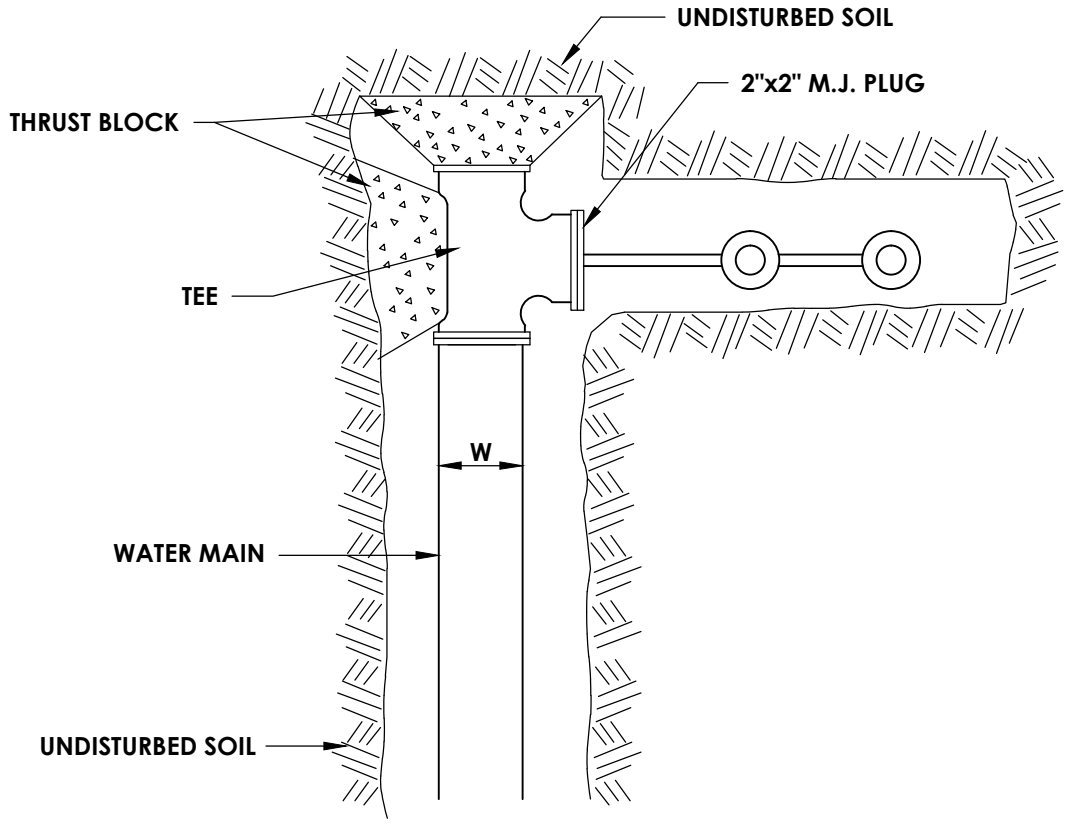
NOTE: SERVICE SADDLES SHALL BE USED ON ALL TAPS.

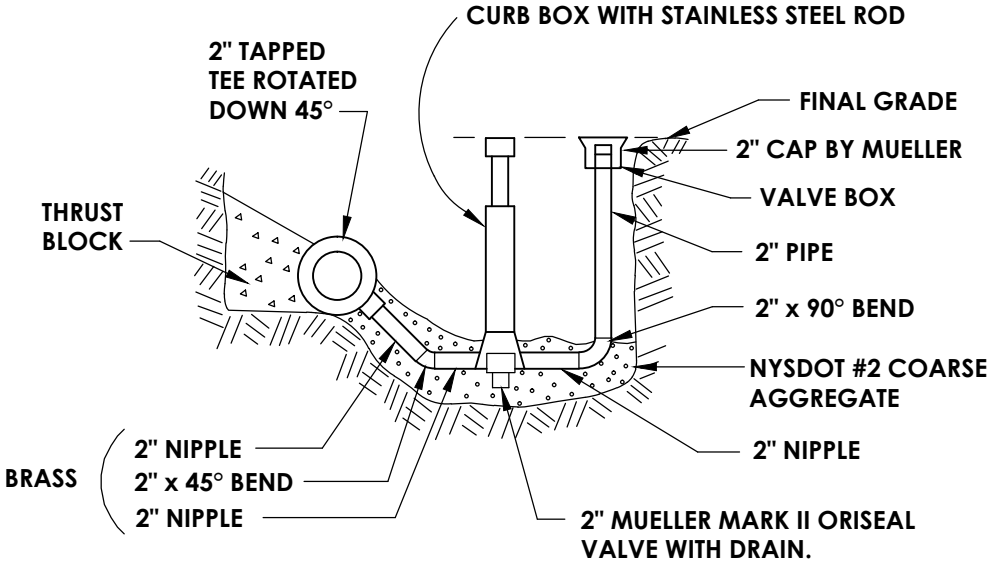
MANUAL AIR RELEASE

N.T.S.

TOWN OF OAKFIELD
WATER DETAILS
MANUAL AIR RELEASE
DRAWING W-01

APRIL 2013





NOTE: **A REDUCER SHALL BE UTILIZED ON 16" OR LARGER PIPE.**

2" BLOW-OFF AND THRUST BLOCK DETAIL

N.T.S.

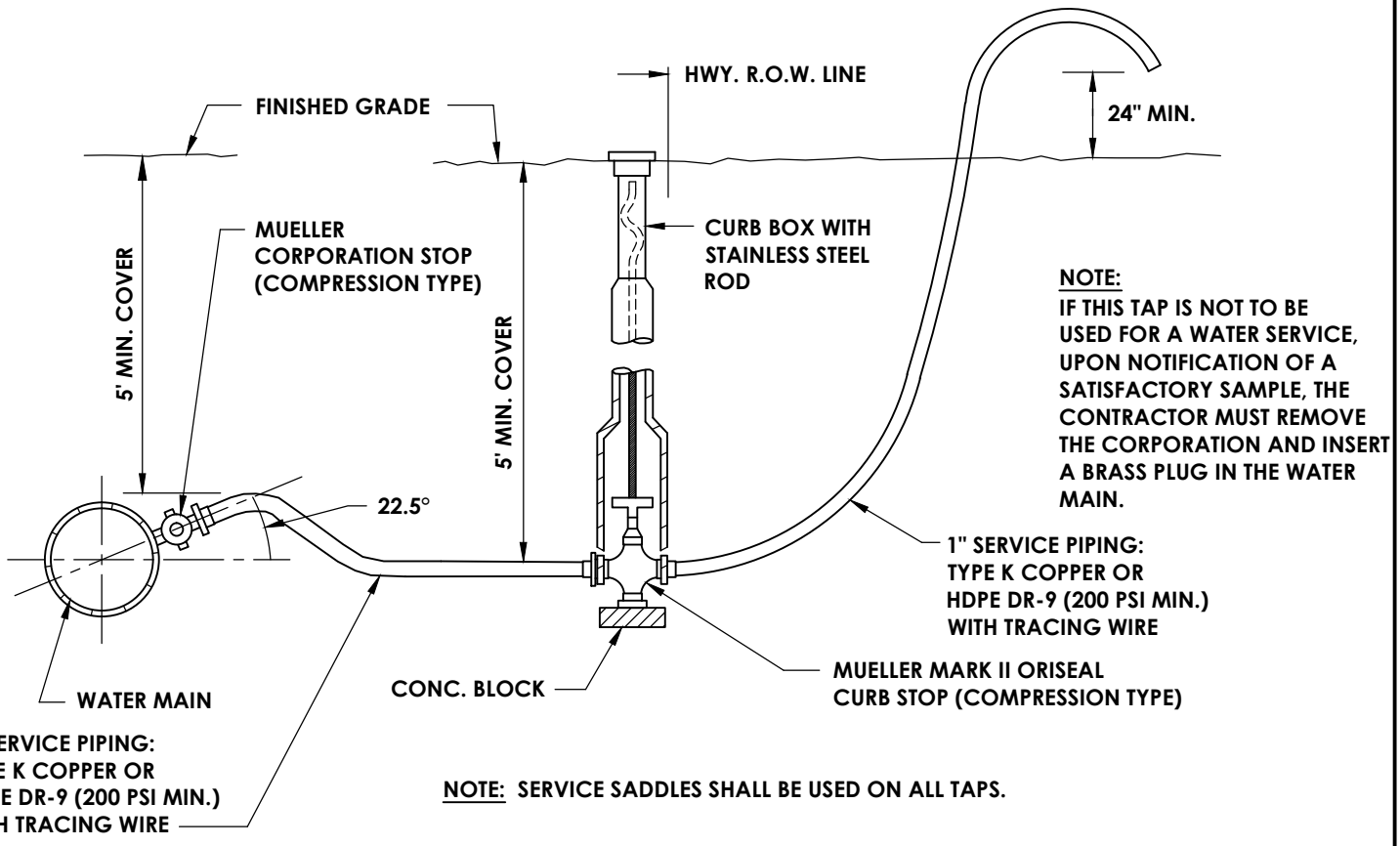
TOWN OF OAKFIELD

WATER DETAILS

2" BLOW-OFF AND THRUST BLOCK DETAIL

APRIL 2013

DRAWING W-02



NOTE: SERVICE SADDLES SHALL BE USED ON ALL TAPS.

TEMPORARY SAMPLING / DISINFECTION TAP

N.T.S.

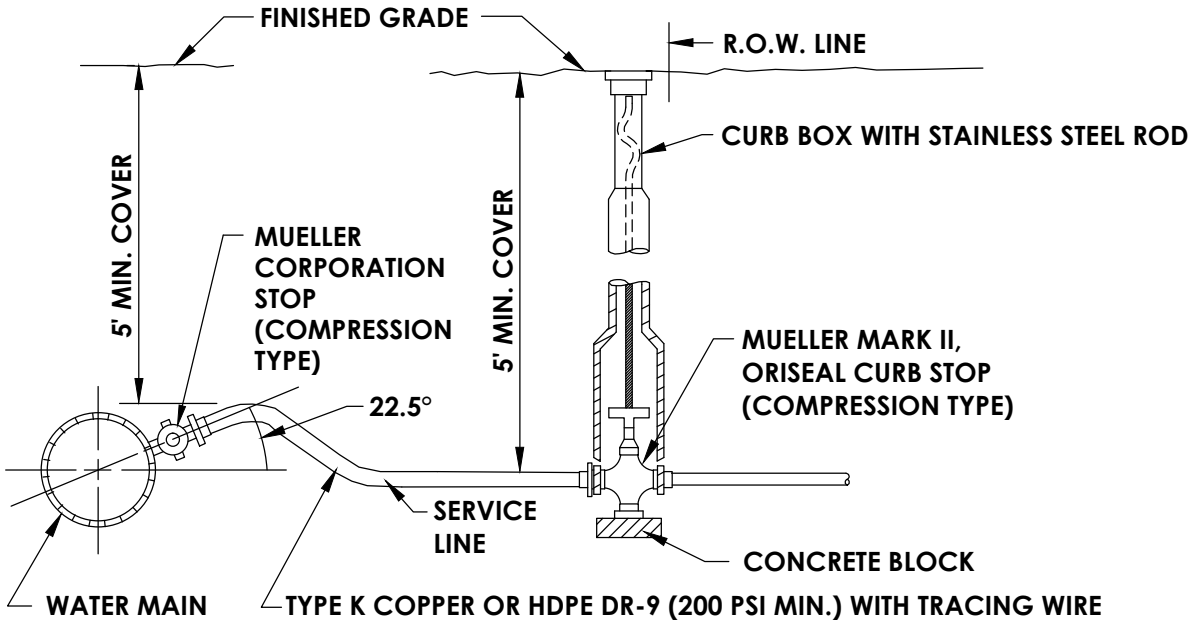
TOWN OF OAKFIELD

WATER DETAILS

TEMPORARY SAMPLING/ DISINFECTION TAP

APRIL 2013

DRAWING W-03



NOTES:

1. **FOR SERVICES 1 1/2" AND LARGER, USE BRASS 22 1/2° BEND WITH COMPRESSION COUPLING TO SERVICE LINE.**
2. **NO CURB BOXES SHALL BE LOCATED IN DITCHES OR DRAINAGE SWALES.**

SERVICE SADDLES SHALL BE USED ON ALL SERVICE TAPS.

TYPICAL WATER SERVICE

N.T.S.

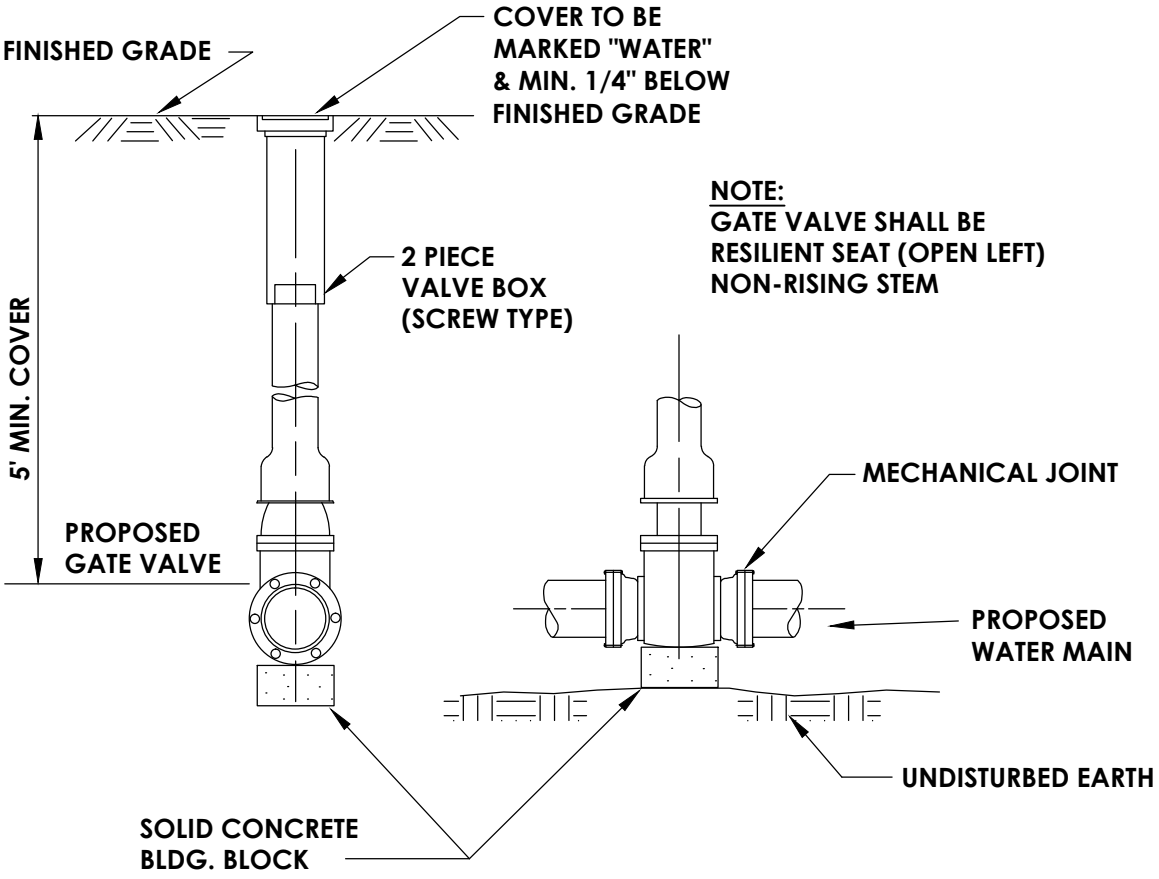
TOWN OF OAKFIELD

WATER DETAILS

TYPICAL WATER SERVICE

APRIL 2013

DRAWING W-04



NOTE:
THE VALVE BOX SHALL BE BACKFILLED SO THAT IT DOES NOT REST ON THE VALVE HOUSING.

GATE VALVE DETAIL

N.T.S.

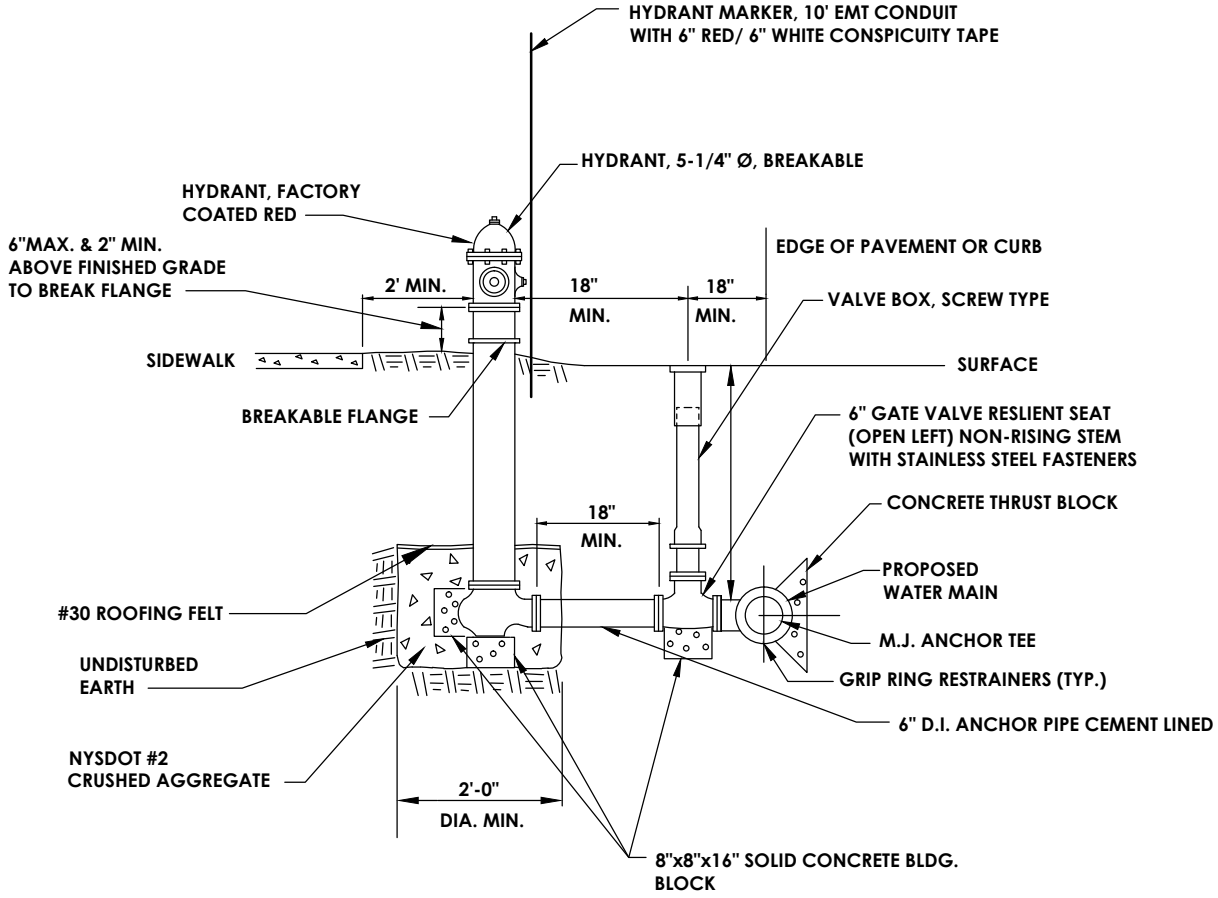
TOWN OF OAKFIELD

WATER DETAILS

GATE VALVE DETAIL

APRIL 2013

DRAWING W-05



NOTES:

1. HYDRANT WEEP HOLES SHALL NOT BE PLUGGED UNLESS GROUNDWATER IS ENCOUNTERED WITHIN 7 FEET OF FINISHED GRADE. IF HYDRANT WEEP HOLES ARE PLUGGED, PAINT PUMPER CONNECTION BLUE.
2. ALL FLANGES ON FIRE HYDRANT LEG SHALL BE MECHANICAL JOINT RESTRAINING TYPE OF FLANGES.
3. BARREL SHALL BE SINGLE PIECE PROVIDED TO MEET FIELD CONDITIONS AND THE MINIMUM AND MAXIMUM DIMENSIONS AS SHOWN ON THIS DETAIL.
4. HYDRANTS DESIGNATED AS BLOW OFF HYDRANTS SHALL HAVE THE TEE ROTATED 45 DEGREES DOWN FROM THE HORIZONTAL AXIS WITH APPROPRIATE FITTINGS AND APPURTENANCES PROVIDED.
5. ORIENTATION AND EXACT LOCATION TO BE DETERMINED BY ENGINEER.
6. EXISTING GRADE AT HYDRANT LOCATION SHALL BE MODIFIED AS NECESSARY TO MAINTAIN A MINIMUM ELEVATION DIFFERENCE FROM BREAKAWAY FLANGE TO EDGE OF PAVEMENT ELEVATION OF ±2 FEET. THIS INCLUDES CUTTING OR FILLING AS NECESSARY.
7. DIP FITTINGS AND VALVES SHALL BE WRAPPED WITH 2 MIL. THICK POLYETHYLENE, 2 FEET BEYOND END OF FITTING ON PVC PIPE, TO INCLUDE HYDRANT BURY.
8. ALL BOLTS AND NUTS SHALL BE FLUOROCARBON COATED.

FIRE HYDRANT ASSEMBLY

N.T.S.

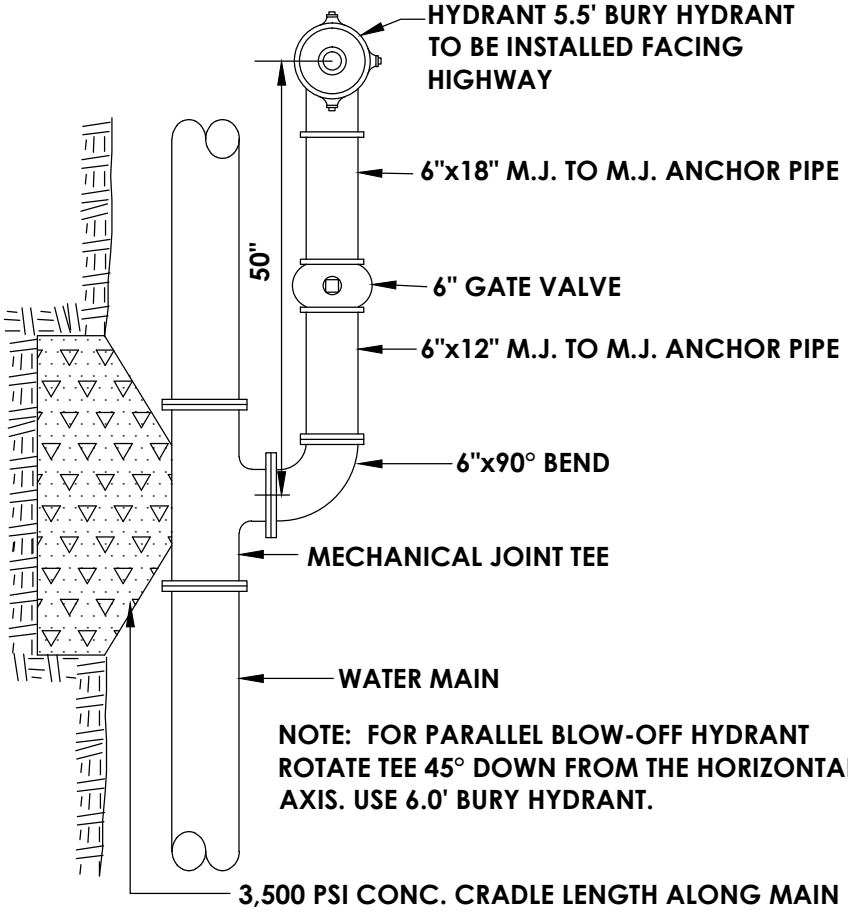
TOWN OF OAKFIELD

WATER DETAILS

FIRE HYDRANT ASSEMBLY

APRIL 2013

DRAWING W-06



PARALLEL HYDRANT ASSEMBLY DETAIL

N.T.S.

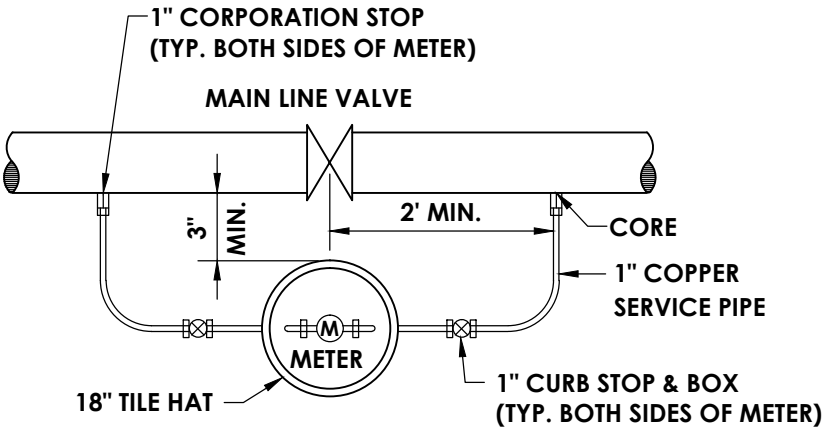
TOWN OF OAKFIELD

WATER DETAILS

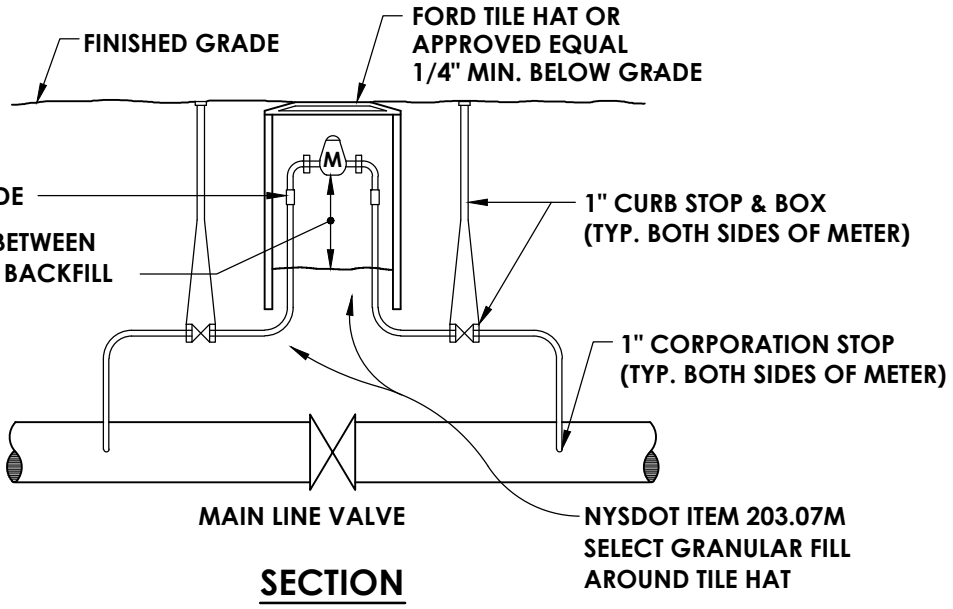
PARALLEL HYDRANT ASSEMBLY DETAIL

APRIL 2013

DRAWING W-07



PLAN



SECTION

TEST CONNECTION DETAIL

N.T.S.

TOWN OF OAKFIELD

WATER DETAILS

TEST CONNECTION DETAIL

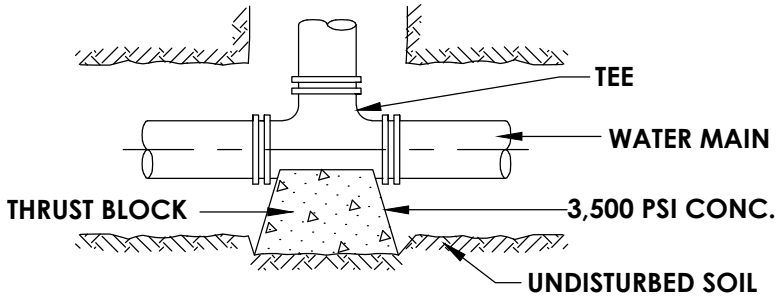
APRIL 2013

DRAWING W-08

MINIMUM AREA OF BEARING FACE OF CONCRETE THRUST BLOCK (IN SQ.FT.) BLOCKS TO BE POURED AGAINST UNDISTURBED SOIL						
PIPE SIZE	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	TEE/ T.S.&V.	PLUG
4",6"	6	3	3	3	4	5
8"	10	6	3	3	8	8
12"	19	7	4	3	10	16
16"	24	13	7	3	19	19

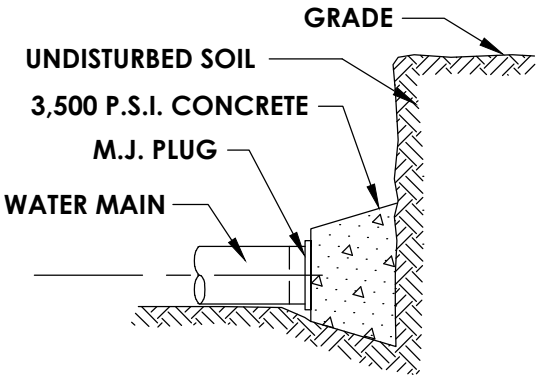
NOTES:

1. BLOCK HEIGHT (h) SHOULD BE EQUAL TO OR LESS THAN ONE-HALF THE TOTAL DEPTH TO THE BOTTOM OF THE BLOCK, (HT), BUT NOT LESS THAN PIPE DIAMETER (D).
2. BLOCK HEIGHT (h) SHOULD BE TWO TIMES THE BLOCK WIDTH (b).



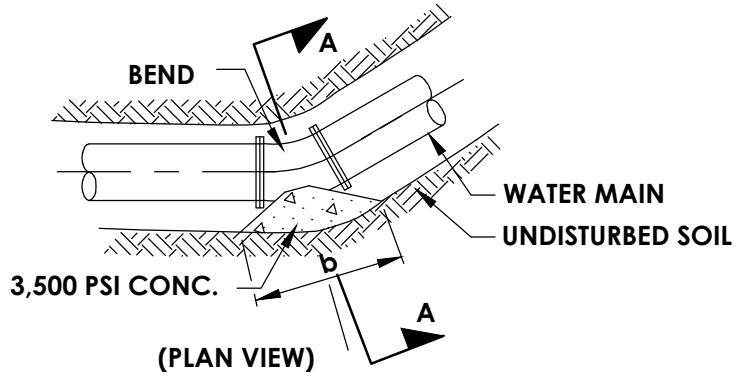
(PLAN VIEW)

THRUST BLOCK FOR TEE



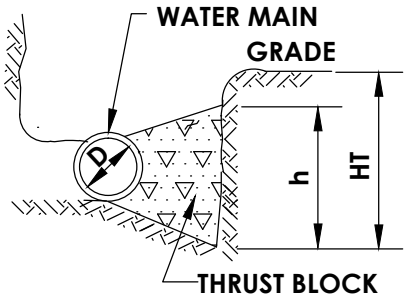
(ELEV. VIEW)

THRUST BLOCK FOR PLUG



(PLAN VIEW)

THRUST BLOCK AT BENDS



(ELEV. VIEW)

SECTION A-A

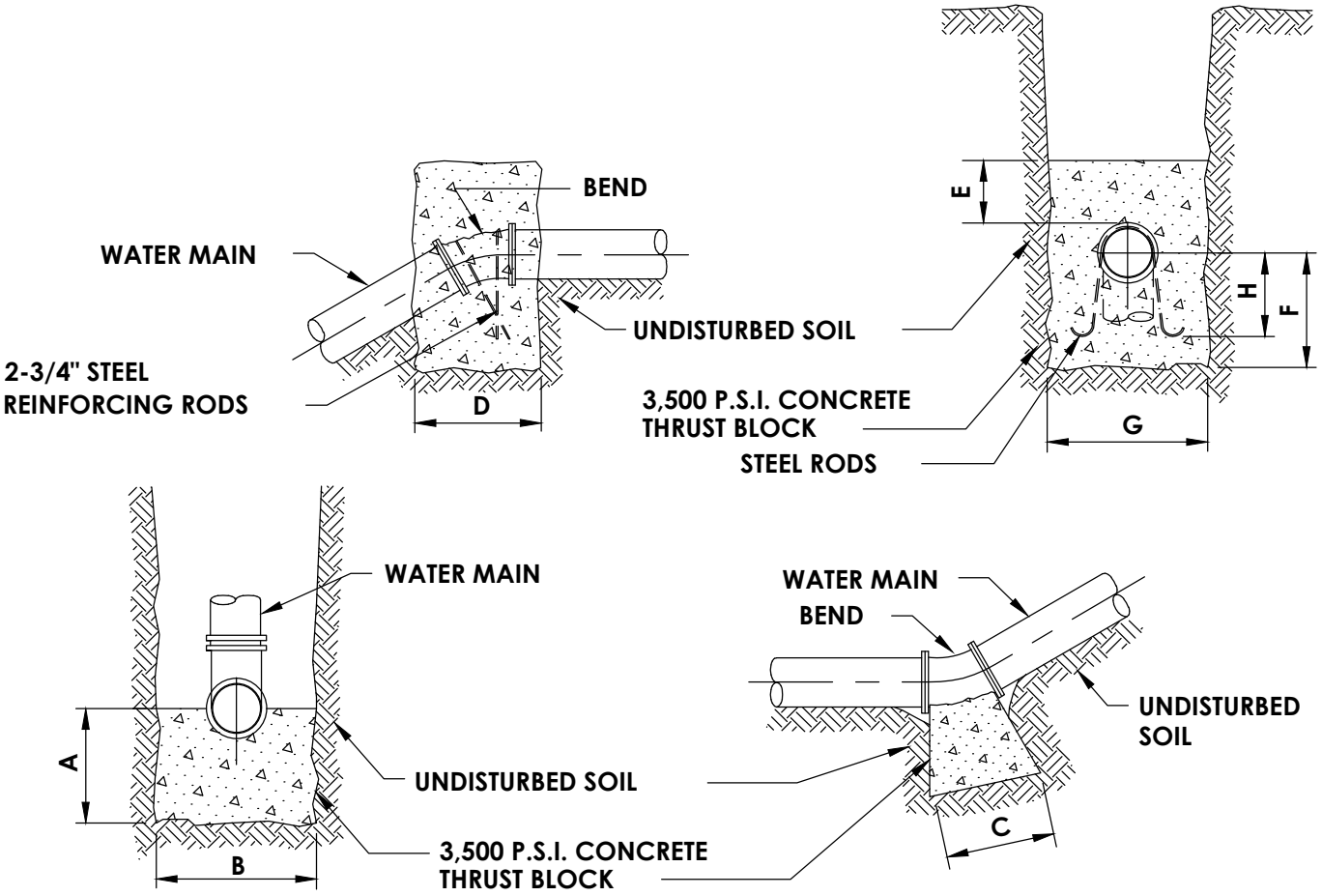
TYPICAL THRUST BLOCK DETAIL

N.T.S.

TOWN OF OAKFIELD	
WATER DETAILS	
TYPICAL THRUST BLOCK DETAIL	
APRIL 2013	DRAWING W-09

BEND	Min. Volume of Concrete For Block dimensions D,E,F,G	MINIMUM ALLOWABLE DIMENSION FOR VERTICAL THRUST BLOCKS (IN FEET)							
		A	B	C	D	E	F	G	ROD LENGTH H
6" 11 1/4°	.2 Cu. Yd.	1.0	2.5	1.0	2.0	0.5	1.0	2.0	0.5
22 1/2°	.4 Cu. Yd.	1.0	2.5	1.5	2.0	1.0	2.0	2.0	1.5
45°	.8 Cu. Yd.	1.5	2.5	1.5	2.5	1.5	2.0	2.5	1.5
90°	1.5 Cu. Yd.	1.5	2.5	2.0	4.0	1.5	2.0	3.0	1.5
8" 11 1/4°	.35 Cu. Yd.	1.0	2.5	1.5	2.0	1.0	1.5	2.0	1.0
22 1/2°	.7 Cu. Yd.	1.5	2.5	1.5	2.5	1.0	2.0	2.5	1.5
45°	1.4 Cu. Yd.	1.5	2.5	2.0	4.0	1.5	2.0	3.0	1.5
90°	2.6 Cu. Yd.	2.0	2.5	2.0	4.0	2.0	3.0	3.5	2.5
12" 11 1/4°	.8 Cu. Yd.	1.5	3.0	1.5	2.5	1.5	2.0	2.5	1.5
22 1/2°	1.6 Cu. Yd.	1.5	3.0	2.0	4.0	2.0	2.0	3.0	1.5
45°	3.2 Cu. Yd.	2.0	3.0	2.0	5.0	2.0	3.0	3.5	2.5
90°	6.0 Cu. Yd.	2.0	3.0	2.5	5.5	2.5	3.5	3.5	3.0

NOTE: THE DEVELOPER MAY ELECT TO USE REINFORCING RODS AS OPPOSED TO CONCRETE THRUST BLOCKS FOR VERTICAL BENDS. ALL THRUST RESTRAINT BY ROD SHALL BE APPROVED BY THE WATER SYSTEM OPERATOR PRIOR TO INSTALLATION.



NOTE: NO CONCRETE TO ENCOMPASS ANY BOLTS OR BELL ENDS WHERE POSSIBLE.

VERTICAL THRUST BLOCK

N.T.S.

APRIL 2013

TOWN OF OAKFIELD

WATER DETAILS

VERTICAL THRUST BLOCK

DRAWING W-10

WATER MAIN GENERAL NOTES:

1) ALL WORK IS TO BE COMPLETED IN ACCORDANCE WITH NYSDOH, GENESEE COUNTY DOH, NYSDOT, GENESEE COUNTY HIGHWAY DEPARTMENT, OSHA, AND TOWN REQUIREMENTS.

2) THE CONTRACTOR SHALL EXPOSE EXISTING UTILITIES, SERVICES, SEWERS AND LATERALS AHEAD OF PIPE LAYING OR OTHER WORK OPERATIONS SO THAT IF MINOR ADJUSTMENTS MUST BE MADE IN ELEVATION AND/OR ALIGNMENT, DUE TO INTERFERENCE, THESE CHANGES CAN BE MADE IN ADVANCE OF THE WORK.

3) MINIMUM COVER ON ALL NEW WATER MAIN SHALL BE FIVE (5) FEET MEASURED FROM FINISH GROUND SURFACE EXCEPT AS OTHERWISE NOTED.

4) WHERE THE CLEARANCE BETWEEN THE WATER MAIN AND ANY EXISTING UTILITY OR SERVICE CONNECTIONS IS LESS THAN ONE (1) FOOT, NYSDOT ITEM #203.07 SELECT GRANULAR FILL SHALL BE PROVIDED.

5) ALL FITTINGS SHALL BE BACKED UP WITH 3,500 PSI CONCRETE THRUST BLOCK.

6) HIGHWAY DRAINAGE SHALL BE MAINTAINED THROUGHOUT THE PERIOD OF CONSTRUCTION. THE ROADS SHALL BE KEPT CLEAN OF MUD AND DEBRIS AT ALL TIMES.

7) SAFE AND CONTINUOUS THROUGH TRAFFIC AND INGRESS AND EGRESS FOR ADJACENT OWNER DRIVEWAYS, SERVICE ROADS AND PUBLIC STREETS SHALL BE MAINTAINED THROUGHOUT THE PERIOD OF CONSTRUCTION.

8) THE OWNER WILL OBTAIN ALL NECESSARY EASEMENTS OR PERMITS.

9) THE CONTRACTOR SHALL LOCATE, FLAG AND PRESERVE SURVEY MONUMENTS AND PROPERTY CORNER MARKERS. THE CONTRACTOR SHALL HAVE A LICENSED SURVEYOR RE-ESTABLISH ANY PROPERTY CORNERS OR SURVEY MONUMENTS DISTURBED DURING CONSTRUCTION.

10) WHEN INSTALLING HYDRANTS OR BLOW-OFFS, SHOULD GROUND WATER BE ENCOUNTERED WITHIN 7 FEET OF THE FINISH GRADE, WEEP HOLES (DRAINS) SHALL BE PLUGGED.

11) MINIMUM VERTICAL SEPARATION BETWEEN WATER MAINS AND SEWER LINES SHALL BE 18 INCHES MEASURED FROM THE OUTSIDE OF THE PIPE AT THE POINT OF CROSSING. MINIMUM HORIZONTAL SEPARATION BETWEEN PARALLEL WATER MAINS AND SEWER PIPE (INCLUDING MANHOLES AND VAULTS) SHALL BE 10 FEET MEASURED FROM THE OUTSIDE OF THE PIPES, MANHOLES OR VAULTS. ONE FULL STANDARD LAYING LENGTH OF WATER MAIN SHALL BE CENTERED UNDER OR OVER THE SEWER SO THAT BOTH JOINTS WILL BE AS FAR FROM THE SEWER AS POSSIBLE. IN ADDITION, WHEN THE WATER MAIN PASSES UNDER THE SEWER, ADEQUATE STRUCTURAL SUPPORT (COMPACTED SELECTED FILL) SHALL BE PROVIDED FOR THE SEWER TO PREVENT EXCESSIVE DEFLECTION OF THE JOINTS AND SETTLING TO THE SEWER ON THE WATER MAIN.

12) WATER SERVICE SHALL BE MAINTAINED AT ALL TIMES.

13) ALL ASPHALT DRIVES CROSSED BY THE WATER MAIN INSTALLATION SHALL BE SAW CUT AT THE LIMIT OF THE DISTURBED AREA OR AS A MINIMUM 5 FEET BEYOND THE CENTERLINE OF THE NEW WATER MAIN LOCATION AND RESURFACED TO THE EDGE OF PAVEMENT.

14) ALL CONCRETE SIDEWALKS CROSSED BY THE WATER MAIN INSTALLATION SHALL BE SAW CUT.

15) THE CONTROL OF EROSION AND SEDIMENT ORIGINATING FROM CONSTRUCTION OPERATIONS IS CONSIDERED A CRITICAL RESPONSIBILITY OF THE CONTRACTOR. EROSION CONTROL DEVICES SHALL BE ESTABLISHED PRIOR TO COMMENCING WORK.

16) ALL EXISTING UTILITY LINES AND SERVICE LATERALS NEAR OR CROSSING THE NEW WATER MAIN SHALL BE PROTECTED PRESERVED AND SUPPORTED AS NECESSARY.

17) UTILITY POLES SHALL BE SUPPORTED, WHERE NECESSARY.

18) CONTRACTOR SHALL PRESERVE AND PROTECT FROM DAMAGE ALL TREES, FENCES AND OTHER OBSTACLES WITHIN THE ROW AND EASEMENT.

19) TO PROTECT NEW OR EXISTING WORK SHEETING OR SHORING, IF REQUIRED DURING CONSTRUCTION SHALL BE PROVIDED.

20) WHEREVER MAILBOXES, POSTS, FENCES, SHRUBBERY ETC. ARE IN CONFLICT WITH THE PROPOSED CONSTRUCTION, THEY SHALL BE REMOVED AND RESET, AS NECESSARY.

21) CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER DISPOSAL OF EXCAVATED MATERIAL FROM THE SITE.

22) THE CONTRACTOR SHALL CONFORM TO ALL CONDITIONS OF ANY APPLICABLE EASEMENTS.

23) THE CONTROL OF DUST ORIGINATING FROM THE CONSTRUCTION OPERATIONS IS CONSIDERED A CRITICAL RESPONSIBILITY OF THE CONTRACTOR. THE WATER SYSTEM OPERATOR WILL BE THE FINAL JUDGE OF THE ADEQUACY OF THE CONTRACTOR'S DUST CONTROL EFFORTS, AND WORK MAY BE SUSPENDED BY THE TOWN UNTIL ADEQUATE DUST CONTROL IS ATTAINED.

TOWN OF OAKFIELD

WATER DETAILS

WATER MAIN GENERAL NOTES

APRIL 2013

DRAWING W-11

WATER MAIN TESTING AND DISINFECTION NOTES:

1. WATER FOR TESTING AND FLUSHING SHALL BE OBTAINED FROM EXISTING WATER SYSTEM. ARRANGEMENTS SHALL BE MADE WITH THE WATER SYSTEM OPERATOR FOR PAYMENT OF WATER USED.

2. FLUSH MAINS AND SERVICES BEFORE TESTING. MINIMUM FLUSHING VELOCITY SHALL BE 2.5 FEET PER SECOND.

3. BEFORE TESTING, SECTIONS ADJACENT TO THE TEST SECTION SHALL BE FILLED WITH WATER. THE CONTRACTOR SHALL FURNISH ALL WATER, EQUIPMENT, CONNECTIONS, PIPING, METERS, MEASURING, DEVICES, PUMPS, AND TEMPORARY ENCLOSURES NECESSARY TO PERFORM THE REQUIRED TESTS. TESTING SHALL BE MADE ON SECTIONS OF WATER MAIN NOT TO EXCEED 2000 FEET IN LENGTH.

4. TESTING SHALL MEET THE MINIMUM REQUIREMENTS OF AWWA C-600 SECTION 4, EXCEPT WHERE MORE RIGID REQUIREMENTS ARE ESTABLISHED BY THESE SPECIFICATIONS. BEFORE APPLYING TEST PRESSURE, ALL AIR SHALL BE EXPELLED FROM THE PIPE. AFTER THE PIPE HAS BEEN FILLED, IT SHALL BE SUBJECTED TO HYDROSTATIC PRESSURE OF 50 PSI ABOVE NORMAL LINE PRESSURE OR A MINIMUM OF 150 PSI FOR A PERIOD OF TWO HOURS.

5. A PRELIMINARY TEST OF 50 PSI ABOVE NORMAL LINE PRESSURE OR A MINIMUM OF 150 PSI SHALL BE PERFORMED BY THE CONTRACTOR. AFTER THE PRELIMINARY TEST IS SATISFACTORY, THE WATER SYSTEM OPERATOR SHALL BE GIVEN 24 HOURS NOTICE AND A FINAL TEST PERFORMED.

6. LEAKAGE SHALL BE DETERMINED AT 30 MINUTE INTERVALS BY MEANS OF VOLUMETRIC MEASUREMENT OF THE WATER ADDED DURING THE TEST.

7. TEST PRESSURE SHALL BE BASED ON THE ELEVATION OF THE LOWEST POINT UNDER TEST. PRESSURE SHALL BE APPLIED BY A PUMP CONNECTED TO THE PIPE. THE PUMP, PIPE, CONNECTIONS, GAUGES, AND MEASURING DEVICES SHALL BE CALIBRATED TO THE SATISFACTION OF THE ENGINEER.

8. LEAKAGE SHALL BE DEFINED AS THE QUANTITY OF WATER SUPPLIED TO THE SECTION OF THE PIPE UNDER TEST NECESSARY TO MAINTAIN THE REQUIRED PRESSURE. SHOULD ANY TEST DISCLOSE LEAKAGE GREATER THAN THE ALLOWABLE, THE DEFECT SHALL BE LOCATED AND REPAIRED BY THE CONTRACTOR.

9. ALL WATER MAINS AND APPURTENANCES SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C 651 DISINFECTING WATER MAINS, ITEM 5.1 DELETED, AND THE REQUIREMENTS OF NYS DEPARTMENT OF HEALTH, USING THE CONTINUOUS FEED METHOD. THE REQUIREMENTS OF NYS DEPARTMENT OF HEALTH SHALL GOVERN WHEN THERE IS A CONFLICT. USE 50 PPM INITIAL CHLORINE DOSE. DISINFECTANT SHALL REMAIN IN THE SYSTEM FOR A PERIOD OF 24 HOURS AFTER WHICH THE RESIDUAL SHALL BE AT LEAST 25 PPM. FOLLOWING DISINFECTION, ALL TREATED WATER SHALL BE THOROUGHLY FLUSHED FROM THE MAIN.

10. WATER USED FOR DISINFECTING THE WATER MAINS, IF DISCHARGED TO THE STREAMS, MUST HAVE A CHLORINE RESIDUAL NOT EXCEEDING 0.05 mg/l AT THE POINT OF DISCHARGE, CONTRACTOR IS RESPONSIBLE TO ATTAIN THIS CHLORINE RESIDUAL LEVEL BY WHATEVER MEANS NECESSARY.

11. THE INTERIORS OF ALL APPURTENANCES AND SECTIONS OF WATER MAIN THAT CANNOT NORMALLY BE DISINFECTED SHALL BE SWABBED BY THE CONTRACTOR, TO THE SATIS- FACTION OF THE WATER SYSTEM OPERATOR, WITH A CONCENTRATED CHLORINE SOLUTION CONTAINING NO LESS THAN 200 PPM OF FREE CHLORINE. THE CONTRACTOR SHALL ALSO DISINFECT ALL EXISTING WATER LINES AND APPURTENANCES WHICH WERE BROKEN, DAMAGED, CONTAMINATED, OR SUSPECTED OF BEING CONTAMINATED AS A RESULT OF WORK DONE WITH THIS PROJECT.

12. WATER SAMPLES SHALL BE COLLECTED BY THE GENESEE COUNTY HEALTH DEPARTMENT AND ANALYZED FOR BACTERIOLOGICAL CONTENT. A MINIMUM OF ONE SAMPLE PER 1000 FEET OF NEW WATER MAIN AND ONE FOR EACH SIDE STREET SHALL BE COLLECTED AND ANALYZED. LOCATION OF SAMPLING TAP AS APPROVED BY THE WATER SYSTEM OPERATOR AND DEPARTMENT OF HEALTH. TWO (2) CONSECUTIVE SAMPLES SHALL BE TAKEN AND ANALYZED AT THE CONTRACTOR'S EXPENSE.

13. THE DEVELOPER'S DESIGN ENGINEER IS RESPONSIBLE FOR CERTIFYING TO THE WATER SYSTEM OPERATOR AND THE DEPARTMENT OF HEALTH THAT THE WATER MAIN WAS INSTALLED IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS AND THAT THE FLUSHING, TESTING AND DISINFECTION WAS PERFORMED IN ACCORDANCE WITH THESE REQUIREMENTS. THE DESIGN ENGINEER SHALL SUBMIT THIS CERTIFICATION ALONG WITH THE PRESSURE TEST AND BACTERIOLOGICAL TESTING RESULTS TO THE WATER SYSTEM OPERATOR AND THE DEPARTMENT OF HEALTH. THE WATER MAIN CANNOT BE PLACED IN SERVICE UNTIL AN APPROVAL OF COMPLETED WORKS IS RECEIVED FROM THE DEPARTMENT OF HEALTH.

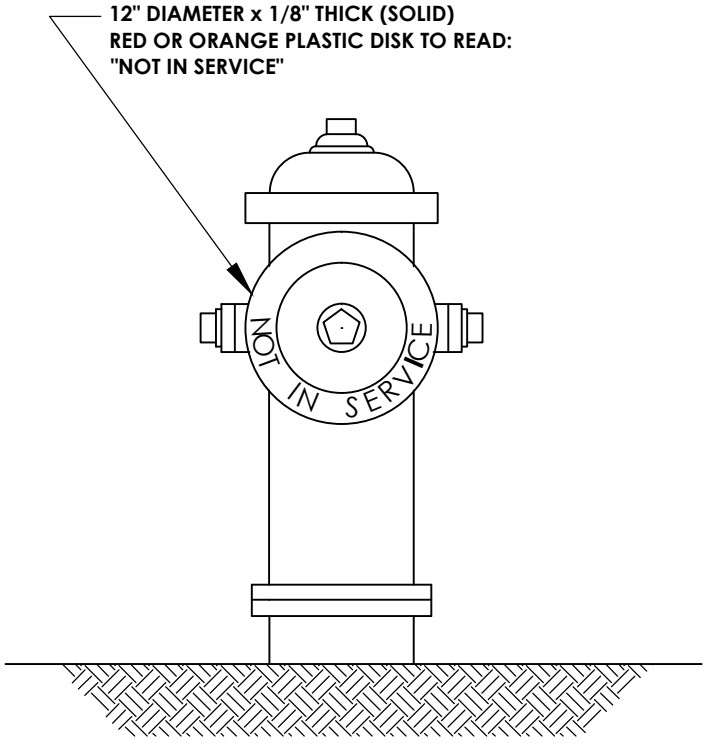
TOWN OF OAKFIELD

WATER DETAILS

WATER MAIN TESTING AND DISINFECTION NOTES

APRIL 2013

DRAWING W-12



NOTES:

1. ALL LETTERING SHALL BE 2" MINIMUM AND PAINTED BLACK BY THE USE OF A STENCIL.
2. HYDRANT MARKER TO BE INSTALLED AND MAINTAINED ON STEAMER NOZZLE OF EACH HYDRANT UNTIL HYDRANT IS PLACED IN SERVICE BY WATER SYSTEM OPERATOR RECEIVING A COMPLETED WORKS CERTIFICATE FROM DOH.

HYDRANT SERVICE MARKER

N.T.S.

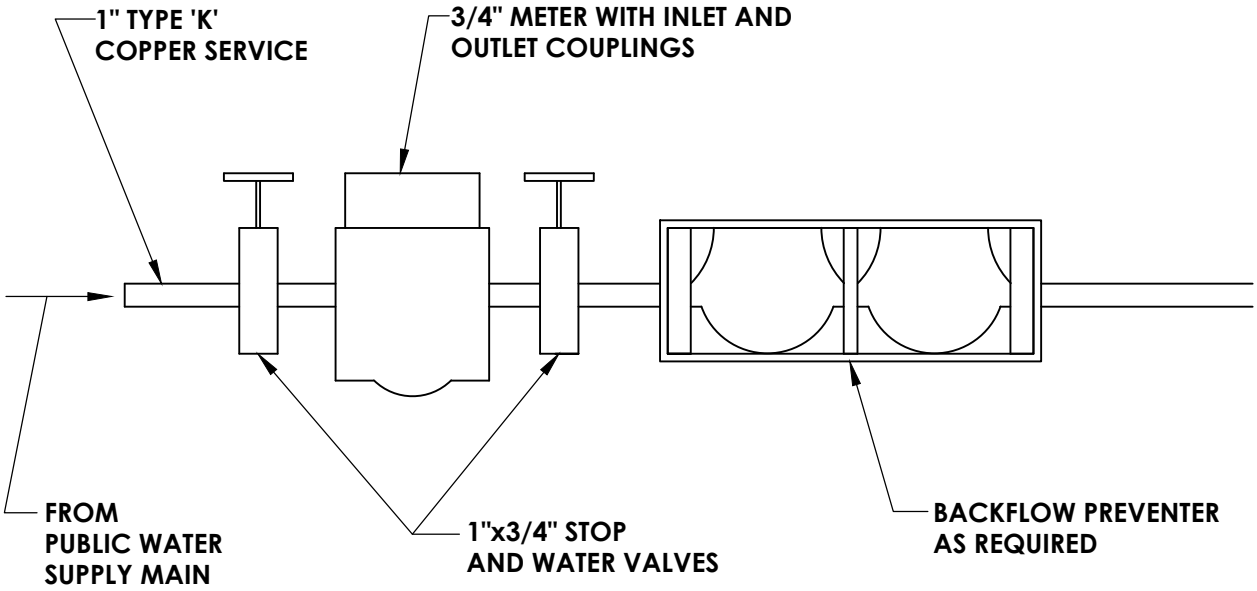
TOWN OF OAKFIELD

WATER DETAILS

HYDRANT SERVICE MARKER

APRIL 2013

DRAWING W-13



NOTES:

1. **WATER METERS ARE NOT TO BE INSTALLED ON INCORRECT PLUMBING PROVISIONS OR WITHIN CRAWL SPACE LOCATIONS.**
2. **STOP AND WASTE VALVE TO BE INSTALLED BEFORE AND AFTER WATER METER.**
3. **IF A BACKFLOW PREVENTER IS REQUIRED, IT SHALL IMMEDIATELY FOLLOW THE WATER METER BEFORE ANY SIDE CONNECTION.**

TYPICAL RESIDENTIAL INSIDE METER INSTALLATION DETAIL

N.T.S.

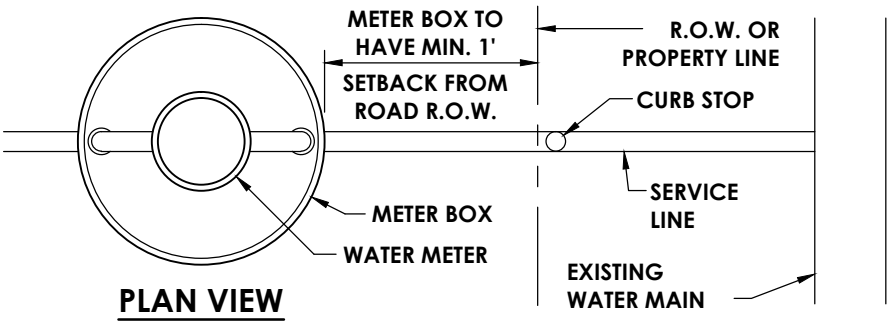
TOWN OF OAKFIELD

WATER DETAILS

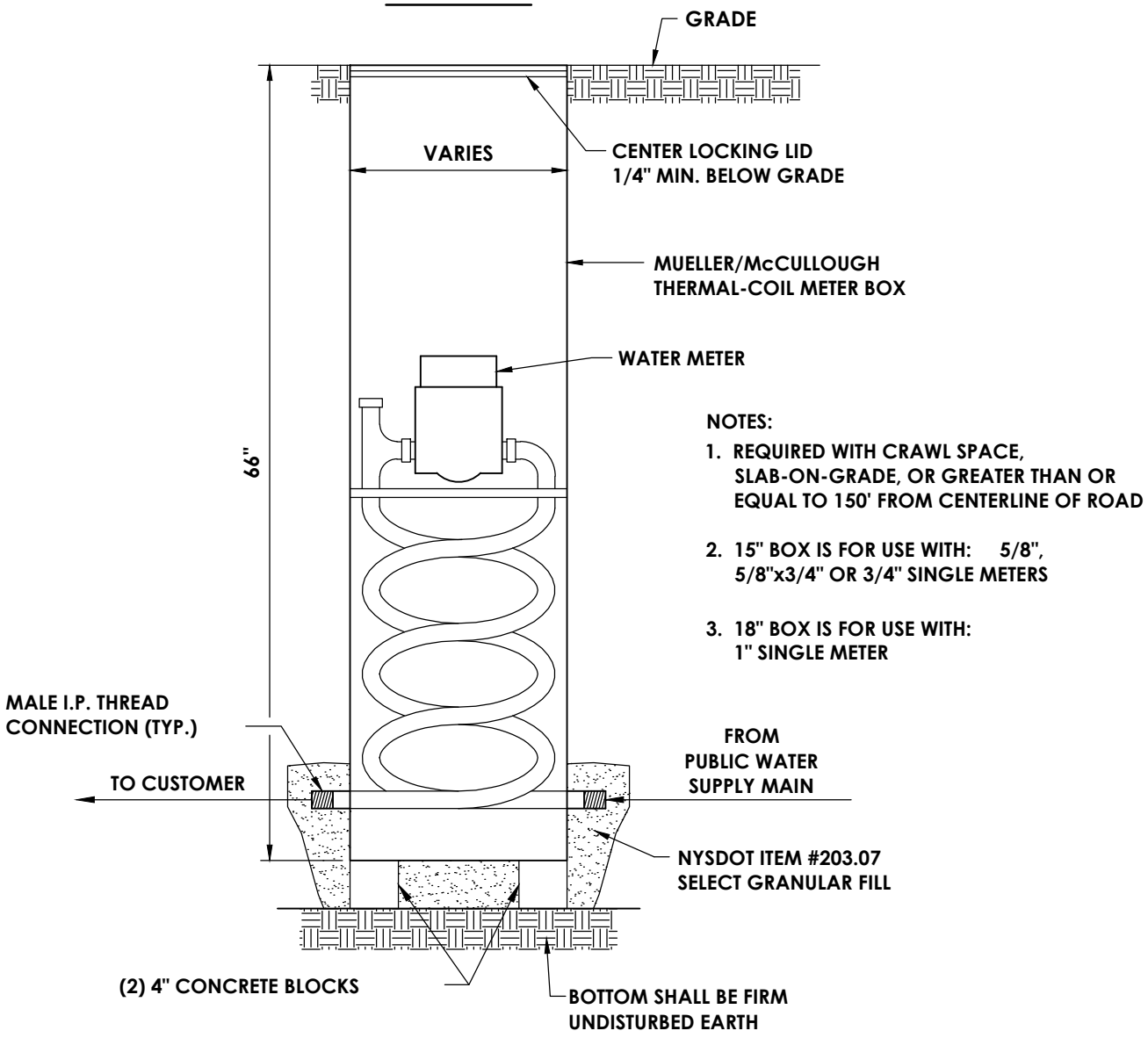
TYPICAL RESIDENTIAL INSIDE METER INSTALLATION DETAIL

APRIL 2013

DRAWING W-14



PLAN VIEW



NOTES:

1. **REQUIRED WITH CRAWL SPACE, SLAB-ON-GRADE, OR GREATER THAN OR EQUAL TO 150' FROM CENTERLINE OF ROAD**
2. **15" BOX IS FOR USE WITH: 5/8", 5/8"x3/4" OR 3/4" SINGLE METERS**
3. **18" BOX IS FOR USE WITH: 1" SINGLE METER**

CROSS SECTION VIEW

TYPICAL PIT FOR 3/4" AND 1" WATER METER INSTALLATIONS

N.T.S.

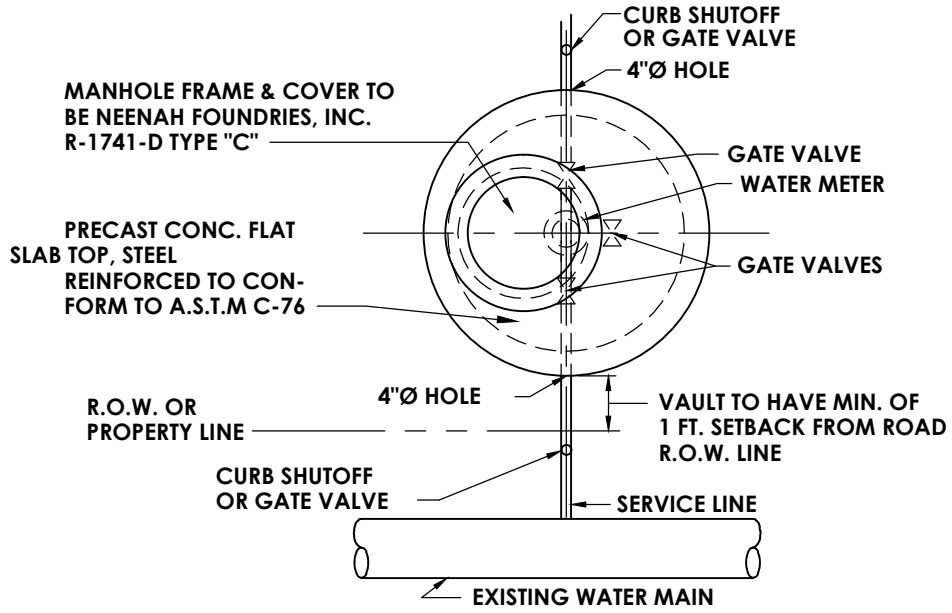
TOWN OF OAKFIELD

WATER DETAILS

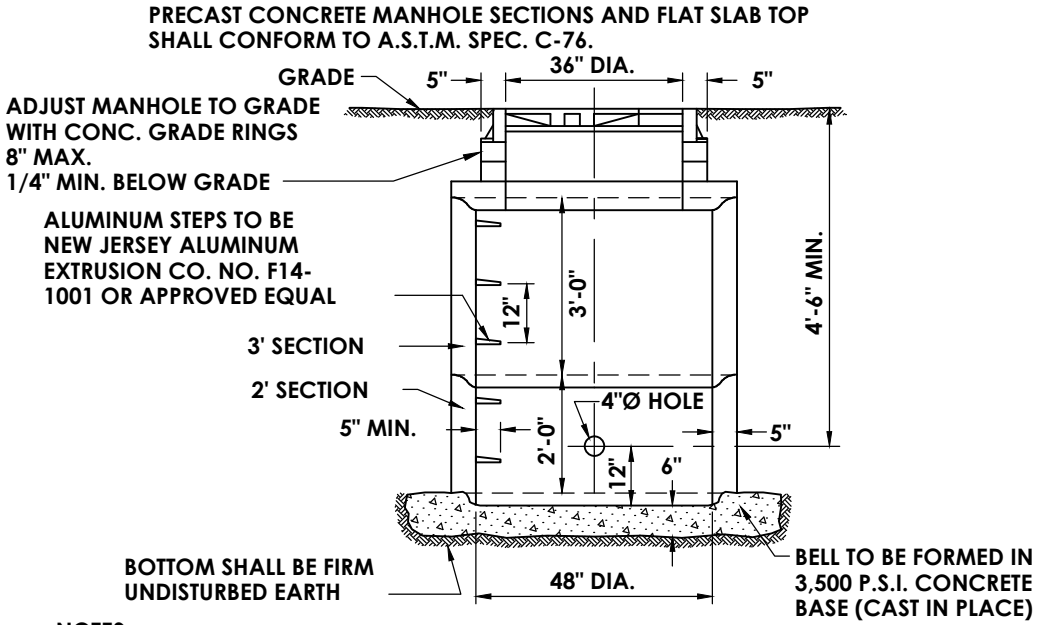
TYPICAL PIT FOR 3/4" AND 1" WATER METER INSTALLATIONS

APRIL 2013

DRAWING W-15



PLAN VIEW



NOTES:

1. MORTAR TO BE PLACED BETWEEN SERVICE LINE AND WALL OF MANHOLE AFTER INSTALLATION OF SERVICE LINE AND WATER METER.
2. MANHOLE SECTIONS SHALL BE SET IN A FULL BED OF APPROVED MORTAR.
3. CONCRETE SUPPORT SHALL BE PLACED UNDER WATER METER AFTER INSTALLATION.

CROSS SECTION VIEW

TYPICAL VAULT FOR 2" AND GREATER WATER METER INSTALLATIONS

N.T.S.

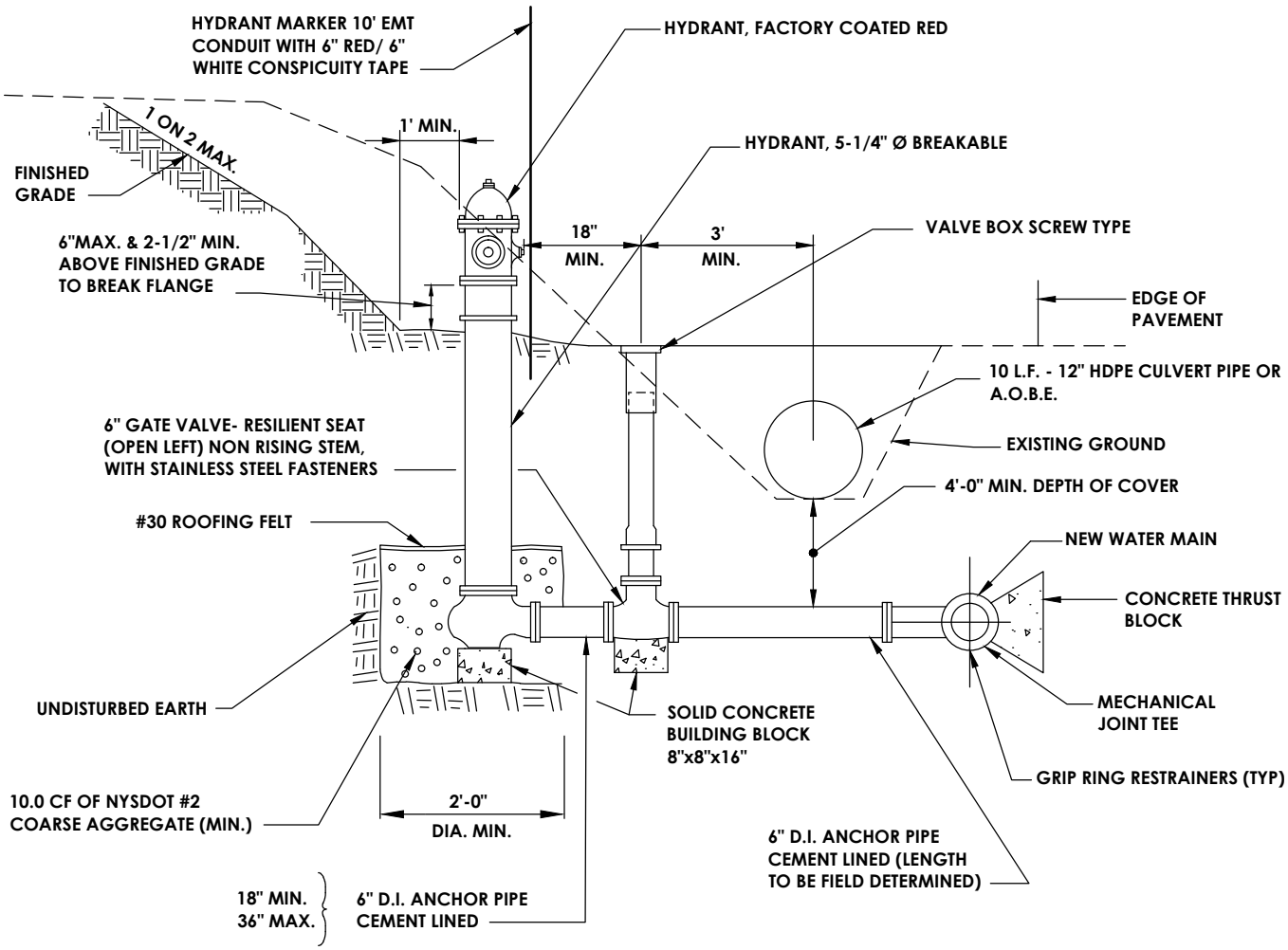
TOWN OF OAKFIELD

WATER DETAILS

TYPICAL VAULT FOR 2" AND GREATER WATER METER INSTALLATIONS

APRIL 2013

DRAWING W-16



NOTES:

1. HYDRANT WEEP HOLES SHALL NOT BE PLUGGED UNLESS GROUNDWATER IS ENCOUNTERED WITHIN 7 FEET OF FINISHED GRADE. IF HYDRANT WEEP HOLES ARE PLUGGED, PAINT PUMPER CONNECTION BLUE.
2. ALL FLANGES ON FIRE HYDRANT LEG SHALL BE MECHANICAL JOINT RESTRAINING TYPE OF FLANGES.
3. BARREL SHALL BE SINGLE PIECE PROVIDED TO MEET FIELD CONDITIONS AND THE MINIMUM AND MAXIMUM DIMENSIONS AS SHOWN ON THIS DETAIL.
4. HYDRANTS DESIGNATED AS BLOW OFF HYDRANTS SHALL HAVE THE TEE ROTATED 45 DEGREES DOWN FROM THE HORIZONTAL AXIS WITH APPROPRIATE FITTINGS AND APPURTENANCES PROVIDED.
5. ORIENTATION AND EXACT LOCATION TO BE DETERMINED BY ENGINEER.
6. EXISTING GRADE AT HYDRANT LOCATION SHALL BE MODIFIED AS NECESSARY TO MAINTAIN A MINIMUM ELEVATION DIFFERENCE FROM BREAKAWAY FLANGE TO EDGE OF PAVEMENT ELEVATION OF ±2 FEET. THIS INCLUDES CUTTING OR FILLING AS NECESSARY.
7. DIP FITTINGS AND VALVES SHALL BE WRAPPED WITH 2 MIL. THICK POLYETHYLENE, 2 FEET BEYOND END OF FITTING ON PVC PIPE, TO INCLUDE HYDRANT BURY.
8. ALL BOLTS AND NUTS SHALL BE FLUOROCARBON COATED.

FIRE HYDRANT ASSEMBLY WITH DITCH CROSSING

N.T.S.

TOWN OF OAKFIELD

WATER DETAILS

FIRE HYDRANT ASSEMBLY WITH DITCH CROSSING

APRIL 2013

DRAWING W-17