



**DESIGN AND CONSTRUCTION STANDARDS  
FOR LAND DEVELOPMENT**

DRAFT



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TOWN OF TYRE, SENECA COUNTY, NEW YORK  
DESIGN AND CONSTRUCTION STANDARDS FOR LAND DEVELOPMENT

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## INTRODUCTION

These Standards have been prepared to provide guidelines for, and control over, the development of land within the Town of Tyre, Seneca County, New York.

The intent is to assure proper design and construction of facilities which will be dedicated to the Town, and to assure that development is compatible with the long range development plans of the Town.

It is the intent of these Standards to conform with the Code of the Town of Tyre or general control of development by the Town Board and Planning Board, and it is intended to supplement such policies by providing the technical details necessary to carry out general policy.

These Standards do not include control over building design or construction. These matters are covered elsewhere by Tyre Town Code.

These Standards are divided into THREE Sections as follows:

Section 1 is entitled Design Standards and provides a guide for Developers' Engineers in the preparation of plans and other information for the development of land.

Section 2 is entitled Construction Standards and provides the construction specifications. Developers and their Engineers are responsible that their Contractors follow these Specifications in constructing dedicated facilities.

Section 3 is entitled Standard Details and provides detail drawings that supplement the Construction Standards.

## **SECTION 1.0 DESIGN STANDARDS**

## **SECTION 1.0 DESIGN REQUIREMENTS**

### **1.1 GENERAL**

The development of land shall conform with zoning regulations established by the Town. It shall also conform with all appropriate laws, rules, and regulations established by all governing bodies having or claiming jurisdiction over various phases of the development.

Where these Standards impose greater restrictions than are imposed by the provision of any law, ordinance, regulation or private agreement, these Standards shall control. Where greater restrictions are imposed by any law, ordinance, regulation, or private agreement than are imposed by these Standards, such greater restrictions shall apply.

### **1.2 REFERENCES TO OTHER SPECIFICATIONS**

References to other standards and specifications shall mean that the applicable portions thereof shall be followed as if the specifications were actually incorporated in these Standards. It shall be understood that such references shall be to the latest edition or revision thereof, including all addenda.

### **1.3 RESPONSIBILITY FOR DESIGN**

Developers are responsible for providing sound engineering design of all facilities, subject to review by the Town. The design shall be prepared by a New York State licensed professional engineer and/or land surveyor experienced in the design of such facilities. Design information, engineering reports, plans and specifications shall provide the information required by these Standards and additional information that may be required by the Planning Board.

Boundary surveys shall be performed and certified by a licensed land surveyor.

All revisions to the originally submitted Plans and Reports shall be noted and dated by the Developer's Engineer on the revised Plans and Reports before they are resubmitted for further review.

### **1.4 TOWN ROAD CROSSINGS**

Open cutting of Town roads for installation of underground utilities is not allowed unless an exception is granted by the Town Highway Superintendent.

### **1.5 WATER DISTRIBUTION SYSTEM**

#### **1.5.1 GENERAL**

Public water supply shall be provided wherever existing water mains are reasonably accessible in the opinion of the Planning Board.

Only those developments that cannot be served by extension of public water systems may be designed with individual wells. The Developer is responsible for obtaining approval for individual wells from the NYS Department of Health.

#### **1.5.2 PUBLIC WATER SYSTEMS**

Design shall conform to the following standards supplemented and superseded by additional requirements as listed.

1. Recommended Standards for Water Works - Policies for the Review and Approval of Plans and Specifications for Public Water Supplies (Ten-State Standards).

### **1.5.3 INDIVIDUAL WELLS**

Design shall conform to the following standards supplemented and superseded by additional requirements as listed.

1. Rural Water Supply, by NYS Department of Health.
2. Where wells are proposed on lots with individual subsurface sewage disposal systems, soils data for the full depth of proposed wells and detailed plans shall be submitted to indicate how pollution of the wells will be prevented.
3. A well for a residential lot shall be developed from a water-bearing formation at a depth greater than 20 feet below the ground surface, have sustained yield of not less than 5 gallons per minute, and provide a pressure of at least 20 psi at ground level at the entry point into the house.
4. A note shall be included on the plans requiring that the well driller's report, in the form required by the Town, be submitted to the Town before a building permit is issued.
5. A note shall be included on the plans requiring that wells be sampled for adequate quantity and required quality of potable water and that a laboratory report be submitted to the Town before a building permit is issued.
6. Sampling and analytical methods to determine compliance with Drinking Water Standards shall be in accordance with NYS Department of Health requirements.

## **1.6 SANITARY SEWER SYSTEMS**

### **1.6.1 GENERAL**

Public sanitary sewers shall be provided wherever existing sanitary sewers are reasonably accessible in the opinion of the Planning Board.

Only those developments that cannot be served by extension of public sanitary sewers may be designed with individual sewage disposal systems. The Developer is responsible for obtaining approval for such systems from regulatory agencies.

### **1.6.2 PUBLIC SANITARY SEWER SYSTEMS**

Design shall conform to the following standards supplemented and superseded by additional requirements as listed:

1. Recommended Standards for Sewage Works, by Great Lakes-Upper Mississippi River Board of State Sanitary Engineers. (Ten-State Standards).
2. Materials shall be in accordance with Section 2. Construction Standards and construction shall conform to Section 3. Standard Details.
3. Manholes shall be spaced at intervals not greater than 300 feet.



4. Depths of sewers shall be sufficient to serve basements of all houses in the development.
5. The minimum inside diameter of manholes shall be 48-inches for 8" through 12" sewers and 60-inches for sewers larger than 12 inches.
6. A drop of 0.1 foot shall be provided through each manhole for all changes in horizontal alignment.
7. Building sewers shall be 4 inch diameter minimum, at a minimum slope of 1/4-inch per foot.
8. Cleanouts shall be provided for building sewers at the right-of-way or back of any public easement line, at all horizontal bends and at a maximum separation distance of 100 feet.
9. A vertical separation of two (2) feet shall be provided between parallel sanitary sewers and storm sewers to provide clearance for crossing of building sewers and drains.
10. Pumping stations and force mains shall be designed to conform to Ten-State Standards, and to NYSDEC and Town of Tyre requirements.
11. Pump station wet wells shall be minimum 5-foot diameter.

### **1.6.3 INDIVIDUAL DISPOSAL SYSTEMS**

Design shall conform to the following standards supplemented and superseded by additional requirements as listed.

1. Standards for Waste Treatment Works Institutional and Commercial Sewage Facilities, by NYS Department of Environmental Conservation.
2. Appendix 75-A, Wastewater Treatment Standards – Residential Onsite Systems (10NYCRR 75-A).
3. Individual sewage disposal systems shall not be used in any development with more than 49 lots.
4. The Planning Board may require design and installation of house plumbing for future public sanitary sewer connection.
5. Two (2) percolation tests and a deep hole shall be provided within each proposed absorption field area.
6. Soils which have any percolation test results faster than 5 minutes per inch for any lots shall not be used for absorption fields and seepage pits, unless the results are evaluated and approved by the Planning Board.
7. Minimum distance between the bottom of the absorption system or seepage pit and seasonal high groundwater level, bedrock or impervious layer shall be not less than 4.0 feet.

8. Seepage pits shall not be used if soil and site conditions are adequate for absorption trenches.
9. An additional 50% of the required absorption field area shall be available for future expansion and replacement. Such area shall be shown on the drawings.
10. Minimum total length of absorption trench shall be 200 feet.
11. Where percolation rates exceed 60 minutes per inch, subsurface disposal systems shall not be allowed. In extreme cases for a single lot development, where the lot size exceeds 5.0 acres and the lot dimensions allow all parts of the sewage disposal system to be located 100 feet or more from any lot line, the Developer may apply to the NYS Department of Health for approval to use an alternative system of special design.
12. Ground Water Protection Program Requirements.
  - 12.1. Results from percolation and deep hole tests shall be shown on the drawings and one such percolation test and deep hole test shall be performed within a 200 foot radius of each on-site sewage disposal system proposed.
  - 12.2. Depth to seasonal high groundwater shall be determined at the location of each deep hole test from direct measurement, from US Soil Conservation Service data, or from other published data. The source of the data must be cited in the Engineer's Report.
  - 12.3. The Engineer's Report shall contain an estimate of the average gradient (in percent) of the groundwater table towards (+) or away from (-) the nearest point of water use or the nearest surface water body such as a stream, pond, lake, or wetland in the vicinity of each deep test pit location. An estimate shall also be made of the distance from the deep test pit location to the nearest point of water use or nearest surface water body.
  - 12.4. The Engineer's Report shall address the potential for groundwater quality degradation due to subsurface sewage disposal in the vicinity of the test pit locations. This shall be done using procedures for the Soil-Site-Waste Interaction Matrix, the Surface Impoundment Assessment, and the DRASTIC empirical assessment methodologies in Appendix "B" of the Groundwater Protection Program.

In the case where this preliminary analysis indicates that subsurface sewage disposal at the site has a moderate to high potential to cause groundwater quality degradation, the Town Engineer will likely require additional data in order to determine if the site is suitable for subsurface sewage disposal.

- 12.5. As a minimum, the additional data, if required, shall consist of test borings, with detailed boring logs, sufficient in number and location, as approved by the Town Engineer, to determine the gradient, thickness, and hydraulic conductivity of the shallowest saturated zone (aquifer) underlying the site.

Based on the above information, the Developer's Engineer shall submit dilution calculations of expected nitrate pollution at the property boundary.

- 12.6. On the basis of this additional data, the Town Engineer may determine that the site is suitable, is suitable with specific conditions, or that the site does not appear to be suitable for subsurface sewage disposal. In the later case, additional detailed modeling of groundwater flows and pollutant dispersion may be submitted by the applicant in order to demonstrate that the site is appropriate for subsurface sewage disposal and that such an activity will not cause an unacceptable degradation in groundwater quality.

## **1.7 STORM DRAINAGE SYSTEMS**

### **1.7.1 GENERAL**

Storm drainage systems shall be provided to convey stormwater runoff from within the development and from the upland watershed area along natural direction of drainage.

Drainage facilities shall include the green infrastructure practices, street drainage system, a system of back-lot-line drainage swales, main drainage channels through the development, and stormwater detention facilities.

Generally, preservation and improvement of natural streams, channels and swales within the development is preferable to the construction of new drainage channels, and whenever practicable, such watercourses shall be preserved.

The preservation and improvement of streams and channels downstream of the proposed development shall be required whenever such watercourses are subject to potential overflow, erosion or siltation as a result of runoff from the development.

### **1.7.2 DESIGN STANDARDS**

Design of drainage facilities shall conform to the following standards supplemented and superseded by additional requirements as listed:

1. Urban Hydrology for Small Watersheds, Technical Release No. 55 by Soil Conservation Service, U.S. Department of Agriculture.
2. New York State Standards for Erosion and Sediment Control by New York State Department of Environmental Conservation New York.
3. State Stormwater Management Design Manual by NYSDEC.
4. Materials shall be in accordance with Section 2. Construction Standards.
5. Manholes shall be spaced at intervals not greater than 300 feet.
6. Minimum size of storm sewers shall be 12-inch diameter pipe, except as otherwise permitted by these Standards.
7. Minimum velocity in storm sewers shall be 3 feet per second when flowing full.

8. Storm sewers shall be designed with uniform grade and straight alignment between manholes, outlets, and drop inlets.
9. Drop inlets shall be located at intervals not greater than 300 feet, at low points, and at street intersections.
10. Drop inlet connections between drop inlets shall be a minimum of 12" inch diameter pipe, and shall be connected from the drop inlet to the manhole with a minimum of 12" inch diameter pipe.
11. Building drains shall be 4-inch diameter minimum, at a minimum slope of 1/4-inch per foot.
12. Minimum inside diameter of manholes shall be 48-inches for 12" through 18" pipe, 60-inches for 21" through 30" pipe, and 72-inches for 33" through 42" pipe.
13. All three-way manholes shall be 60-inch inside diameter or greater depending on size of storm sewers.
14. Swales and turf-lined channels shall be designed with slopes of not less than 1.0%.
15. Site grading should be no steeper than 1 vertical to 3 horizontal.

### 1.7.3 HYDROLOGIC DESIGN

Storm sewers and other drainage facilities for drainage areas up to 1,000 acres shall be based on a design flow with a minimum return interval of 10 years.

The design of drainage facilities for larger drainage areas and for natural watercourse channels shall be based on the drainage area according to the following:

<u>Drainage Area</u>	<u>Return Interval</u>
1000 acres to 4 sq miles	25 years
4 sq miles to 20 sq. miles	50 years
20 sq miles and above	100 years

### 1.7.4 GREEN INFRASTRUCTURE

The following green infrastructure practices shall be considered for use on a case-by-case basis to avoid, reduce and manage the impacts that occur during development, in an effort to meet the runoff reduction requirements noted in the New York State Stormwater Management Design Manual (NYSSMDM). All proposed green infrastructure designs must conform to the requirements listed in the current version of the NYSSMDM.

- Preservation of Undisturbed Areas
- Preservation of Buffers
- Reduction of Clearing and Grading
- Locating Development in Less Sensitive Areas

Open Space Design  
Soil Restoration  
Driveway Reduction  
Cul-de-sac Reduction  
Building Footprint Reduction  
Parking Reduction  
Sheet flow to riparian buffers or filter strips  
Vegetated open swale  
Tree Planting / Tree Box  
Disconnection of rooftop runoff  
Stream daylighting for redevelopment projects  
Rain Garden  
Green Roof  
Stormwater Planter  
Rain Tank / Cistern  
Porous Pavement

#### **1.7.5 STORM SEWERS AND CHANNELS**

Storm sewers and channels shall be designed to convey the anticipated runoff from within the development as well as all future development from the upstream or upland watershed area.

For drainage areas of 100 acres or less, runoff within the development shall be computed by the Rational Method, using the 10-year storm. Time of concentration to first inlet shall be taken as not more than 15 minutes.

For drainage areas larger than 100 acres and for major channels or piping systems conveying stormwater through the development, the design shall be based on the Soil Conservation Service Method using the appropriate storm return interval.

#### **1.7.6 OPEN CHANNELS**

Only natural drainage channels may be continued as open channels. Street drainage systems for major subdivisions shall be designed with storm sewers.

#### **1.7.7 DETAILS OF HYDRAULIC STRUCTURES**

Complete and sufficient details of hydraulic structures shall be submitted as part of the plans. This includes, but is not limited to, cross-sections of drainage channels, erosion control facilities, special manholes, and all such other items as may be necessary to establish fully the methods and materials to be followed in construction.

#### **1.7.8 SURCHARGING OF DRAINAGE FACILITIES**

Storm drainage systems shall be designed so that surcharging will not cause backup or flooding of basements. The effect of a 25-year storm shall be studied by calculating the

high water elevation, and evaluating the operation of the storm drainage and detention facilities under such flows.

## **1.7.9 BUILDING AND LOT STORM DRAINAGE**

### **1.7.9.1 Finished Grade Adjacent to Buildings**

Finished grade adjacent to building walls shall be a minimum one (1) foot higher than the edge of pavement for standard subdivision development. In minor developments where front setbacks exceed 150 feet and/or where natural drainage characteristics would be better utilized by draining away from the street, this requirement may be waived. In any case, provisions shall be made for positive drainage of each lot by designing a minimum grade of 2.0% away from the building to side-lot and back-lot swales, natural drainage channels, or drains.

### **1.7.9.2 Roof and Basement Drainage**

Provisions shall be made for disposing of roof and basement drainage into the storm sewer system. Basement floors shall be at an elevation higher than the pavement to permit the street drainage system to be fully surcharged without causing backup or flooding of basements. In lieu of this, the Developer may provide that basements shall be drained with sump pumps and appropriate check valves.

In special conditions, where storm sewers are not available and topography permits, basement drainage may be conveyed to drainage swales if abutting or downstream properties will not be adversely affected. In such instances the basement floor shall be designed above the project design flood elevation to prevent backup or flooding of the basement.

### **1.7.9.3 Dry Wells**

Dry wells shall be used for disposing roof drainage where storm sewers are not available and soil conditions are suitable.

1. Determine if soil conditions are suitable for dry well discharge. According to the New York State Stormwater Management Design Manual (NYSSMDM), dry wells shall not be accepted in soils with a tested infiltration rate of less than 0.5 inches per hour. Soils shall also have a clay content of less than 20% and a silt/clay content of less than 40%.
2. Determine distance to seasonal high groundwater level. According to the NYSSMDM, there shall be no less than 3 feet between the bottom of the dry well and seasonal high groundwater levels.
3. Determine roof area. Calculate run-off, using Rational Method, from roof area based on minimum 10-year storm.
4. Size drywell based on run-off and soil infiltration rates, considering a complete discharge of run-off volume within a 72 hour period.
5. Dry wells shall be separated a minimum of 10 feet from structures.

### **1.7.9.4 Restrictions**

Laundry, sanitary, or kitchen wastes shall not be discharged to storm drainage systems. Drain connections from garages shall not be discharged to drainage swales.

#### **1.7.9.5 Grading**

Lots shall be graded to provide positive drainage. Runoff from uphill lots shall be conducted around and across downhill lots alongside-lot and back-lot swales.

Grading shall be designed to prevent runoff from adjacent lots draining against buildings and flowing across individual sewage disposal systems.

#### **1.7.10 STORM WATER MANAGEMENT**

Detention or retention ponds, sedimentation basins and related control measures shall be provided where in the judgment of the Town such facilities may be required for proper drainage control. The Town reserves the right to establish specific requirements for a proposed development; however, in general, runoff is limited from any development to an amount no more than the runoff from the natural, undeveloped condition, regardless of the disturbed area size.

Stormwater management facilities shall be designed to control the runoff from the developed project site to a rate not to exceed the runoff from the natural, undeveloped site for a 2- year, 10-year, and 100-year 24 hour storm considered individually. Stormwater management practices shall be designed in accordance with the current version of the New York State Stormwater Management Design Manual. The Stormwater Management Officer will review water quality volume requirements for sites with less than one acre of disturbed area.

The Town reserves the right to establish more restrictive requirements if the proposed development site caused downstream flooding even in its natural, undeveloped condition. The Town may require an impoundment area, and storm sewers and culverts of sufficient size and type to correct the existing downstream flooding conditions.

#### **1.7.11 DETENTION AND RETENTION POND REQUIREMENTS**

1. Ponds shall be designed to provide water quantity and quality control in accordance with the New York State Stormwater Design Manual.
2. Minimum freeboard above design high water level to the top of embankment shall be 1”.
3. Controlled overflow structures shall be provided for flows in excess of the maximum design flow.
4. Temporary settling basins or sediment sinks shall be provided as specified under sediment control in these Standards.
5. The outlet structure shall be designed to discharge flow as a continuous function of head at a rate not to exceed runoff from the natural, undeveloped site for all flow conditions with maximum allowable flow occurring at maximum pond depth.
6. Trickle tube outlets shall include anti-vortex devices and trash racks.

7. Controlled overflows using emergency spillways shall be designed with spillway crest not less than 2 feet below the top of the pond embankment and 1 foot above design high water level.
8. Pond embankments shall be designed with minimum side slopes of 1 vertical to 3 horizontal. Seepage control collars shall be provided on piping passing through embankments.
9. Bottom of ponds shall be designed with a minimum longitudinal slope of 0.5%.

#### **1.7.12 STORMWATER GROUND RECHARGE**

In areas where positive surface stormwater disposal is not feasible, the Town may allow stormwater ground recharge.

The Developer shall retain a geotechnical engineer to provide a detailed report and plan documenting the ability of the aquifer to receive ground recharge. The report shall include soil permeability data, geologic features, and soil sampling and exploration data. Test pits and test borings shall be provided to define the limits of the aquifer where recharge is proposed.

The ground recharge facility shall include a detention facility to provide for settling of sediment and for storage. Discharge to the recharge area shall use a trickle tube or other discharge control. Additional information including details of infiltration piping and other facilities, useful life of system, and operation and maintenance costs shall be provided by the Developer.

### **1.8 EROSION AND SEDIMENT CONTROL**

#### **1.8.1 GENERAL**

To control siltation and erosion resulting from land development, the Developer shall implement erosion and sediment control measures as required by the Town.

It is the Developer's responsibility to certify that the design and construction specifications for the erosion control measures are adequate and meet all requirements.

#### **1.8.2 EROSION CONTROL PLAN.**

The Developer shall submit an erosion control plan as part of the review process. The erosion control plan shall consist of maps and other information showing the existing features, the existing and proposed contours, and applicable erosion control methods including the following:

1. Fitting the development plan to the topography and type of soils to minimize the erosion potential.
2. Exposing the smallest practical area of land at any one time during development.
3. Providing for temporary vegetation, mulching or other soil stabilization to protect critical areas during construction.
4. Returning and protecting natural vegetation wherever possible.
5. Installing permanent final vegetation and structures as soon as practicable.



6. Providing protective measures for slopes in excess of 10% and minimizing such steep grading. Terracing of steep slopes should be considered to minimize erosion potential.
7. Providing rip-rap and stone fill at points of discharge of storm sewers into open channels, ponds and swales.
8. Completing phases of construction as quickly as possible and stabilizing disturbed areas.
9. Providing a landscaping plan and planting schedule. Ground cover shall be selected to minimize future maintenance and provide plant hardiness.

### **1.8.3 SEDIMENT CONTROL**

All siltation and sedimentation caused by erosion due to clearing, grading and removal of vegetation or other ground cover shall be retained on-site. Use interceptor swales at the base of disturbed areas, draining to temporary settling basins with sediment sinks. The storm sewer systems shall also temporarily drain to settling basins until sufficient turf has been established on graded areas to prevent erosion.

The following guidelines shall apply in the design of settling basins and sediment sinks.

1. The design of the settling basin shall prevent short circuiting. Generally, the length of the pond shall be at least twice the width, with the inlet and the outlet at opposite ends. Entrance swales and pipes shall be designed to discharge at the bottom of the pond to prevent erosion at the entrance point.

### **1.8.4 STEEP SLOPES**

Development in steep slope areas is subject to the guidelines as follows.

#### **1.8.4.1 Required Information**

Development proposals shall be of sufficient detail to show site grading, building site locations, drainage facilities, erosion and sedimentation control measures, stream channel improvements and location of roads.

#### **1.8.4.2 Grading of Building Sites**

Padding to provide level building sites may be designed only when sufficient information is developed to clearly demonstrate that the overall design of the site will not have an adverse environmental effect or negative appearance.

#### **1.8.4.3 Design Principles**

Design in steep slope areas shall include, but not be limited to the following principles:

1. Landscaping of areas around structures to make them compatible with the natural terrain.
2. Shaping, grouping and placement of structures to complement the natural landscape.

3. Shaping of essential grading to complement existing land forms,
4. Retaining outstanding natural features such as the highest crest of the hill, natural rock outcroppings, particularly desirable trees and vegetation, and other unique features.
5. Land within the hill area in excess of 30% slope should not be developed as individual residential lots.

### **1.8.5 FLOOD HAZARD CONTROL**

Inundation and excessive ground water seepage shall be controlled by site grading and by the establishment of adequate elevations of buildings, building openings and roadways above the project design high water levels.

Particular care shall be used in the design of developments in the vicinity of designated flood plain areas as defined by the National Flood Insurance Program or known high groundwater problem areas. The effect of such development on upstream and downstream areas and adjacent properties shall be considered, and adequate protective measures shall be included in the design.

Proposed developments within the special Flood Hazard Area as defined by the National Flood Insurance Program shall comply with the regulations required by the Flood Insurance Program.

Development within or adjacent to flood plains shall also comply with current Town requirements and NYS Department of Environmental Conservation regulations.

## **1.9 ROADS AND STREETS**

### **1.9.1 GENERAL**

Roads and streets shall be provided for convenient traffic flow and circulation, and for fire safety, emergency and maintenance access. Roads, streets and driveways shall comply with the following designations:

#### **1.9.1.1 Primary Road**

Dedicated major road used to carry greater than 3,000 Average Daily Traffic (ADT) from developed neighborhoods and municipal boundaries, and all streets serving commercial and industrial developments.

#### **1.9.1.2 Collector Road**

Dedicated main road or street used to carry up to 3,000 ADT from local streets to primary or major thoroughfares, including the principal entrance streets of major developments.

#### **1.9.1.3 Local Street**

Dedicated local street used to carry up to 1,000 ADT which connects to a Primary Road or Collector Road and which provides access to abutting properties and protection from through traffic.

#### **1.9.1.4 Dead End Street**

Dedicated local street with only one means of access, used to carry up to 250 ADT.

#### **1.9.1.5 Driveway**

A driveway, as defined as both an undedicated common and an individual access point used as ingress and egress for not more than three properties which are not fronting on a dedicated road or street; the creation of a common driveway requires reciprocal easements and a common maintenance agreement.

Four (4) or more lots must be served by a drive, road or street, consistent with these Design and Construction Standards for dedicated roads and streets.

### **1.9.2 DESIGN STANDARDS**

Major subdivisions and commercial and industrial developments require a Traffic Impact Analysis. Scope of the analysis will be determined by the Planning Board.

Design of roads, streets and driveways shall conform to the following standards supplemented and superseded by additional requirements listed in these Town Standards.

1. A Policy of Geometric Design of Highways and Streets, by American Association of State Highway and Transportation Officials (AASHTO).
2. Geometric Design Guide for Local Roads and Streets, by American Association of State Highway and Transportation Officials (AASHTO).
3. Revised Draft Guidelines for Accessible Public Rights-of-Way, by the United States Access Board.
4. Materials shall be in accordance with Section 3. Construction Standards.
5. Minimum right-of-way widths, pavement widths, road sections, and other details shall conform to Section 3. Standard Details.

### **1.9.3 HORIZONTAL DESIGN REQUIREMENTS**

Roads and streets shall be designed to conform to the following horizontal alignment requirements:

1. Minimum radius along the centerline of horizontal curves:

Primary Roads	500 feet
Collector Roads or Streets	300 feet
Local Streets	150 feet

2. Minimum tangent along the centerline of road between horizontal curves shall be not less than 100 feet.

3. Stopping sight distance for each type of road shall be not less than:

Primary Roads	450 feet
Collector Roads or Streets	225 feet
Local Streets	150 feet

4. Dead end streets in developments with public water supply shall provide access to not more than 25 single family homes, and shall have a turnaround at the terminal end in accordance with Section 3. Standard Details.

Length of dead end streets in subdivisions without public water supply shall be limited to 900 feet due to restrictions for fire protection.

Exceptions to the length of dead end streets may be granted at the discretion of the Planning Board in consultation with the Town Highway Superintendent, Town Engineer and the Fire Chief. Any exceptions shall be mitigated including the following:

- Provision along the dead end street for ease of access by emergency vehicles.
  - Greater front setback for properties near the dead end access.
  - Buffering along the roadway for properties near the dead end access.
  - Traffic calming design to control speeds along the dead end street, such as islands and curvilinear alignment.
5. Layout of street systems in the development shall provide for access of adjacent future developments.
6. Temporary dead-end streets shall be provided with paved turnarounds conforming to the dimensions in Section 3. Standard Details.

#### 1.9.4 VERTICAL DESIGN REQUIREMENTS

Roads and streets shall be designed to conform to the following vertical alignment requirements:

1. Minimum grade 0.50%.
2. Maximum grade for:

Primary Road	6.0%
Collector Road or Street	6.0%
Local Street	8.0%
Driveway	8.0%

3. Vertical curves shall be provided for all changes in grade exceeding 1.0%.
4. Minimum length of vertical curves shall be determined based on the sight distance required for each type of road.

### **1.9.5 INTERSECTION DESIGN REQUIREMENTS**

Intersections shall be designed to conform to the following requirements:

1. Within 50 feet of intersections, streets shall be approximately at right angles and in no case shall the intersecting centerlines have an angle less than 75°.
2. Minimum pavement radius at intersections shall be not less than 30 feet.
3. Intersections of Primary Roads shall be spaced not less than 1,000 feet between centerlines.
4. Intersections of Collector Streets by other streets shall be spaced not less than 800 feet between centerlines.
5. Minimum distance between centerlines of offset streets shall be not less than 200 feet.
6. Acceleration and deceleration lanes may be required by the Town along Primary Roads at principal entrance streets of developments.
7. Leveling areas shall be provided on all sides of intersections for a minimum distance of 100 feet where the grade shall not exceed 4.0%.
8. Maximum pavement grade within intersections shall not exceed 1.0% in any direction.
9. Visibility for traffic safety shall be provided within triangular areas formed by the intersecting right-of-way lines and a sight line between points 75 feet from their intersection. There shall be no plantings or structures in these triangular areas.
10. Provide intersection lighting as required by the Planning Board.

### **1.9.6 GRADING AND ROADSIDE SWALES**

11. Areas within road and street rights-of-way shall be graded to slopes not steeper than 1 vertical to 3 horizontal, except in residential subdivisions, where roadside swales/ditches shall not be allowed. Roadside swales steeper than 6.0%, or where soil conditions require, shall incorporate special design to control erosion.

### **1.9.7 ISLANDS**

Islands shall not be situated in local road medians or cul-de-sacs.

### **1.9.8 SIDEWALKS**

Sidewalks shall be provided where required by the Town for safety or convenience. Generally, sidewalks will be required along Primary Roads and along other streets near schools, or where pedestrian traffic is anticipated. The minimum width of sidewalks shall be five (5) feet.

Sidewalks shall be constructed in accordance with FHWA guidelines (Designing Sidewalks and Trails for Access), ADA Accessibility Guidelines, and NYSDOT Standard Sheet 608-01, SIDEWALK CURB RAMP DETAILS and DETECTABLE DETAILS.

#### **1.9.9 TREES WITHIN THE RIGHT-OF-WAY**

Generally, the right-of-way shall be cleared of trees and brush. Only occasional existing desirable trees should be preserved within the right-of-way if approved by the Town.

#### **1.9.10 STREET NAMES**

All streets shall be named, and the names shall be subject to the approval of the Town. Names shall be sufficiently different in sound and spelling from other street names in the Town and municipalities contiguous to the Town so as not to cause 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.

#### **1.9.11 MONUMENTS**

Permanent monuments shall be provided for major subdivisions at the following locations and shall be shown on the final subdivision plat:

1. All boundary corners and angle points along street rights-of-way of the parcel being subdivided.
2. In street right-of-way boundaries at all street intersections.
3. In street right-of-way boundaries at PC and PT of horizontal curves.

Monuments are required on one side of the street only, and at only one corner of intersecting streets. Adjacent monuments shall be intervisible.

Monuments shall be tied into the NYS Coordinate System where practical in the opinion of the Town Highway Superintendent or Engineer for the Town.

#### **1.9.12 PROPERTY CORNER MARKERS**

Permanent markers shall be provided for all property corners of each lot of major and minor subdivisions, and shall be in place upon completion of final grading of the lot.

#### **1.9.13 CONSERVATION EASEMENT MARKERS AND BOUNDARY PINS**

Markers and boundary pins shall be provided for all conservation easements at the following locations and shall be shown on the final subdivision plat:

**1.9.13.1** At all intersections of property lines with the conservation easement boundary.

**1.9.13.2** At all angle points in the conservation easement boundary.

**1.9.13.3** Along the conservation easement boundary not more than 200 feet apart.

## **1.9.14 ROAD DEDICATION REQUIREMENTS**

### **1.9.14.1 Policy**

All primary roads, collector roads and local streets serving a development shall be built to the appropriate Town design standards and dedicated to the Town. Common driveways serving not more than three (3) properties shall be privately owned and maintained. All driveways must be built to the appropriate design standards of the Town.

### **1.9.14.2 Dedication Requirements**

All roads offered for dedication must set through one winter season and be monumented before dedication will be considered. Prior to any road being accepted for dedication, it must be completed in accordance with the approved plans to the satisfaction of the Engineer for the Town.

### **1.9.14.3 Common Driveways**

This section pertains to any commonly owned means of access to not more than three (3) properties. All proposals for common driveways must be approved by the Highway Superintendent and the Planning Board and be made part of the subdivision review record. Private ownership must be clearly identified on the final subdivision map. Prior to final approval of subdivision plans, an application for a home owners association and a draft offering plan for the New York State Attorney General's Office must be filed with the Planning Board. An "exempt status" letter from the NYS Attorney General's Office may be filed in lieu of the application and offering plan. Should the commonly owned access not require a home owners association, then reciprocal easement and a maintenance agreement must be approved by the Attorney for the Town and placed in the deeds of the affected lots. A copy of the filed deed must be presented to the Building Department prior to a building permit being issued for an affected lot.

### **1.9.14.4 Surety**

Appropriate surety shall be required for all dedicated roads and common driveways. The dedication of roads is subject to requirements in the Town Subdivision Regulations.

## **1.9.15 DEDICATION OF EXISTING PRIVATE ROADS**

**1.9.15.1** Matter is considered a re-subdivision and must undergo Town Planning Board review.

**1.9.15.2** Matter will normally be considered a minor subdivision unless complexities require otherwise in which case, process for major subdivision applies.

**1.9.15.3** All responsible officials will review the proposal and their respective approvals are required before the Planning Board will consider the final plat.

**1.9.15.4** As with all other Planning Board matters, project sponsors will pay all costs (legal and engineering) associated with review of the project before dedication is accepted. If the effort is unsuccessful, then the sponsors will still be responsible for municipal review costs.

**1.9.15.5** After appropriate approvals are granted, a letter of approval and any and all conditions will be forwarded to the Town Board for action. A resolution accepting dedication must be approved by the Town Board.

#### **1.9.16 DRIVEWAY DESIGN REQUIREMENTS**

Design and location of driveways shall be in accordance with applicable Town Standards and requirements of NYSDOT Policy and Standards for Entrances to State Highways. These standards shall apply also to driveways entering on County and Town roads and streets.

##### **1.9.16.1 Vertical Alignment**

Maximum grade shall not exceed 10%.

Driveways shall slope away from the edge of road pavement at the same slope as the road shoulder, and the slope shall extend at least the full width of the shoulder so as not to create a bump or depression in the shoulder area.

##### **1.9.16.2 Horizontal Alignment**

Minimum radius along the centerline of driveways shall be 50 feet.

Minimum radius along the inside edge of driveway shall be 35 feet unless shown otherwise in Section 3. Standard Details.

Driveways shall conform to the horizontal alignment requirements of Driveway Details in Section 3. Standard Details. Driveway pavement shall extend at least 10 feet back from the edge of the travel lane.

##### **1.9.16.3 Application Requirements**

Written application including a plan and a profile of the driveway may be required by the Highway Superintendent for approval.

##### **1.9.16.4 Fire Department Requirements**

All common driveways regardless of length and individual driveways which are longer than 200 feet shall be constructed to support HS-25 loading and to provide access for emergency and fire-fighting equipment. There shall be 10 feet clearance from the edge of the driveway to any obstruction. Plans and details of such driveways shall be submitted to the Fire Department for review.

Residential driveways for one and two family dwellings that extend beyond 250' must be designed to support HS-25 loading, require a 30' x 10' pull over lane every 250', and a turn-around point near the house.



## **1.9.17 STREET AND TRAFFIC SIGNS**

### **1.9.17.1 Street Signs**

Street signs shall be provided at all street intersections, shall be of the type approved by the Town Highway Superintendent, and shall conform to the requirements of National Manual of Uniform Traffic Control Devices with NYS Supplement. All street signs, including their size, MUTCD designation, and sign face shall be shown in their proposed location on the preliminary and final plans.

### **1.9.17.2 Traffic Signs**

Traffic signs shall be provided at intersections designated by the Town Highway Superintendent and shall conform to the requirements of National Manual of Uniform Traffic Control Devices with NYS Supplement. All traffic signs, including their size, MUTCD designation, and sign face shall be shown in their proposed location on the preliminary and final plans.

## **1.9.18 STREET LIGHTING**

All major commercial and industrial subdivisions with dedicated roads shall create a lighting district. However, in major residential subdivisions, individual homeowner lamp posts shall be installed in lieu of a New York State Electric & Gas lighting district. Lamp posts will be required prior to issuance of a Certificate of Occupancy. The lamps shall have photo electric devices and be maintained by the property owner. Lamp posts shall have uniform location of 20 feet from right-of-way and use uniform light fixtures.

Provide intersection lighting as required by the Planning Board.

A street lighting plan showing the location of street lighting fixtures shall be submitted as part of all Final Subdivision Plans.

## **1.10 FIRE SERVICE PROVISIONS**

### **2.10.1 Key Boxes**

Fire Department Access Key boxes shall be required for all new commercial or tenant spaces. Where appropriate, a single key box may be shared by several tenants within a single structure. Key boxes shall be located above the FDC or next to the front tenant door.

### **2.10.2 Sprinkler Systems**

Fire suppression sprinkler systems protecting more than one commercial tenant space shall be electronically monitored by an agent of the building's owner.

### **2.10.3 Vehicle Access Points**

Vehicle access points must have minimum clearances of 13'-6" height, 20' width and a turning radius of 50'. Turning radii must be separated by at least 30', measured from the beginning of the point of curvature to the next point of curvature.

#### **2.10.4 Hydrants and Fire Department Connections**

Hydrants located on cul-de-sacs or dead-end roads will have hydrants situated at the end of the cul-de-sac/ road.

Hydrants serving fire department connections (FDC) must be situated within 100 feet of the FDC but outside the collapse zone(s) of the building (distance equal to 1.5 times the measure of the peak of the structure to final grade).

Additional hydrants are to be provided when the distance of apparatus path of travel exceeds 500' from nearest street hydrant and/or additional apparatus, including pumpers and aerial devices, would be blocked from accessing building by supply hose of first arriving apparatus.

Private fire hydrants shall have independent supply lines, not shared with sprinkler supply lines.

## **SECTION 2.0 CONSTRUCTION STANDARDS**

## **SECTION 2.0 CONSTRUCTION STANDARDS**

### **2.1 GENERAL**

#### **2.1.1 PRELIMINARY MATTERS**

Site preparation, grading and construction of facilities shall not be started until the Final Subdivision Plan has been approved by the Planning Board and all necessary signatures have been affixed on the drawings, and until the Letter of Credit has been received by the Town. Items to be completed prior to construction commencing are listed on the Checklist Prior to Construction Commencing for Land Development Projects included in Section 2.1.12 on page 3-4.

#### **2.1.2 PRE-CONSTRUCTION MEETING**

A pre-construction meeting shall be held prior to the start of construction to review Town requirements and to establish the project schedule. The Developer, his Engineer and Contractor along with permitting agency personnel shall attend this meeting to discuss the project with Town representatives.

#### **2.1.3 INSPECTION**

All construction shall be subject to inspection by representatives of the Town. The Developer and his Contractor shall give not less than 24 hours' notice for inspection and shall provide adequate access for such inspection at all stages of the work. This shall include erosion and sediment control inspections.

All costs related to engineering and inspection by representatives of the Town shall be paid by the Developer. An amount estimated by the Town for engineering and inspection shall be included in the Letter of Credit.

#### **2.1.4 RESPONSIBILITY FOR CONSTRUCTION**

The Developer is solely responsible for construction of all dedicated facilities in accordance with the approved plans, and all applicable regulations and Town standards.

Inspection during construction shall not imply acceptance of the work by the Town. If subsequent inspections, operation or occurrences reveal defects in the work, such defects shall be corrected by the Developer to the satisfaction of the Town.

The development shall not be accepted for dedication until all construction of dedicated facilities is fully completed by the Developer and found to be satisfactory by the Town.

#### **2.1.5 PROTECTION OF EXISTING UTILITIES AND STRUCTURES**

It is the Developer's and his Contractor's responsibility to locate and protect all existing utilities and structures before, during, and after excavation. Protect all utilities, services, and systems, including public and private poles, conduits, wells, water piping, storm drainage piping and culverts, existing sewage disposal systems, and farm tiles, including related structures, in a manner acceptable to the representative of the Town and the owner of each utility, service or system.

Any damage done to any utility, service or system shall be repaired at the Contractor's expense in a manner acceptable to the representative of the Town and the owner of the system. Where construction is near or underneath any pole, conduit, pipe or similar structure, provides any necessary support.

Notify all utilities and the Underground Facilities Protective Organization, Inc. (Telephone 1-800-962-7962) 48 hours prior to any excavation.

Where excavations are within existing pavement and sidewalk areas, pavements and sidewalks shall be sawed or cut uniformly along the limits of excavation. All disturbed pavements, sidewalks, curbs and gutters shall be replaced by the Contractor to match the existing or remaining surfaces.

#### **2.1.6 PERMITS AND TRAFFIC CONTROL**

The Developer and his Contractor shall obtain and comply with all necessary permits from the authority having jurisdiction for construction within and adjacent to public roads.

Provide flagmen, signs, barricades, lights, and flashing signals for traffic control, safety and protection of the public as required by the authority having jurisdiction.

#### **2.1.7 SHOP DRAWINGS AND MANUFACTURER'S INFORMATION**

The Contractor shall submit shop drawings for all materials to be incorporated in the dedicated facilities to the Developer's Engineer for review. Upon confirming that the shop drawings conform to the approved plans, specifications and Town standards, the Developer's Engineer shall forward four (4) signed copies of such shop drawings to the Engineer for the Town for review. The Town Engineer will return two (2) reviewed copies to the Developer's Engineer for forwarding to the Contractor. A digital-based or equivalent alternative process may be proposed to the Town Engineer.

#### **2.1.8 NOISE CONTROL**

Construction equipment and vehicles shall be maintained by the Contractor in good working condition to control noise and exhaust emissions.

Construction activity shall be restricted to Monday through Friday from 7:00 a.m. to 7:00 p.m. and Saturdays from 7:00 a.m. to 6:00 p.m. No construction activity is allowed on Sundays and holidays. Special permission shall be obtained from the Town for activities that require continuous operation beyond the restricted hours. This restriction applies also to starting up and moving of construction equipment.

#### **2.1.9 WEATHER CONDITIONS**

Work shall be suspended during unsuitable weather conditions. The Contractor shall take necessary precautions to protect all Work, materials and equipment from damage or deterioration due to floods, rain, wind, and snow storms.

The mixing and placing of concrete, construction of pavements, gutters and sidewalks, laying of masonry and installation of sewers shall be stopped during rain storms or other unsuitable weather. Newly placed concrete and masonry shall be protected by suitable covering.

#### **2.1.10 CONNECTION TO, AND OPERATION OF, EXISTING FACILITIES**

Connection to and operation of existing Town facilities is not permitted for any purpose, unless specifically authorized by a designated representative of the Town. It is strictly prohibited to operate existing hydrants, valves or other controls. Discharging sewage, groundwater or surface drainage to existing sanitary or storm sewer systems is also prohibited. Any person violating this restriction will be prosecuted to the full extent of the law.

Generally, connection to existing systems will not be permitted until all work on the new facility to be dedicated is completed, tested and found to be acceptable by the Town.

#### **2.1.11 RECORD DRAWINGS**

Record drawings shall be prepared by the Developer's Engineer for all dedicated facilities and public & private underground utilities. Record drawings submitted for review shall be submitted in electronic format. Review set shall include one (1) set of electronic files and one (1) set of paper prints. If the Town Engineer recommends revisions to the submitted plan, the Developer's Engineer shall revise the record mapping and resubmit one (1) set of electronic files and one (1) set of paper prints for further review. Continue the re-submittal process until record mapping approval is obtained from the Town Engineer.

Following approval by the Town Engineer, record drawings for minor subdivisions shall include one (1) set of electronic files and four (4) paper prints and shall be submitted as final to the Town. Record drawings for major subdivisions and commercial development projects shall include two (2) sets of electronic files and four (4) paper prints and shall be submitted as final to the Town.

**2.1.12 CHECKLIST PRIOR TO CONSTRUCTION COMMENCING FOR LAND DEVELOPMENT PROJECTS**

DATE

1. Planning Board Approval of Final Plans \_\_\_\_\_
2. Drawings signed by Planning Board Chairman & Town Engineer \_\_\_\_\_
3. Stormwater Pollution Prevention Plan signed by Developer & Contractor \_\_\_\_\_
4. NYS Department of Health Water System Plan Approval \_\_\_\_\_
5. NYS Department of Health Realty Subdivision Approval \_\_\_\_\_
6. NYS Department of Environmental Conservation  
Sanitary Sewer Plan Approval \_\_\_\_\_
7. NYS Department of Environmental Conservation  
Notice of Intent for SPDES General Permit for Stormwater Discharges from  
Construction Activity \_\_\_\_\_
8. NYS Department of Environmental Conservation  
Freshwater Wetlands Permit \_\_\_\_\_
9. NYS Department of Environmental Conservation  
Water Supply Permit Application Approval \_\_\_\_\_
10. NYS Department of Transportation Highway Work Permit \_\_\_\_\_
11. Seneca County Highway Work Permit \_\_\_\_\_
12. Water Benefitted Area or District Application \_\_\_\_\_
13. Sewer District Formation or Extension Application \_\_\_\_\_
14. Stormwater Control Facility Maintenance Agreement \_\_\_\_\_
15. Utility Easement Drawing and Description \_\_\_\_\_
16. Right-of-way Description and Drawing \_\_\_\_\_
17. Surety Posted with Town and Accepted by Town Board \_\_\_\_\_
18. Amount of Letter of Credit \_\_\_\_\_
19. Pre-Construction Meeting Held \_\_\_\_\_
20. All Legal and Engineering Review Fees Paid \_\_\_\_\_

## **2.2 SITE PREPARATION**

### **2.2.1 GENERAL**

Site preparation consists of clearing and grubbing, topsoil removal and stockpiling, protection of existing facilities, providing temporary access, erosion and siltation control, and related work.

### **2.2.2 CLEARING AND GRUBBING**

Clear and grub all areas of excavations, trenches, embankments, and areas to be graded by removing all trees, stumps, roots, brush and debris within the limits indicated on the drawings. All trees, shrubs and vegetation that are not to be removed shall be protected and preserved.

Arrange for disposal of clearing and grubbing materials satisfactory to the New York State Department of Environmental Conservation and the Town. Burning of debris in the work areas is not permitted.

### **2.2.3 LAYOUT OF WORK**

The Developer is responsible for layout of all work on the project. All work shall be staked-out by experienced surveying personnel in accordance with the approved plans. Stake-out shall be in sufficient detail to provide correct horizontal locations and elevations of structures, pipes, roads and grading.

Stake-out shall be performed as the work progresses. Any stake-out that is disturbed shall be re-staked before continuing with the work.

### **2.2.4 TOPSOIL REMOVAL AND STOCKPILING**

Remove and stockpile topsoil from areas to be excavated and graded. Topsoil shall not be removed from the project site, but shall be retained until it is used in landscaping of project sites. Erosion control shall be provided and maintained for all topsoil stockpiles.

### **2.2.5 EROSION AND SILTATION CONTROL**

Construction of erosion and siltation control for projects disturbing more than one (1) acre shall be in accordance with the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity.

Construct temporary erosion and siltation control facilities before starting excavation and grading. Before starting construction of these facilities, submit to Engineer for the Town for review written description and details of the proposed erosion and siltation control facilities.

Prevent direct discharge from dewatering pumps and surface runoff from the construction sites to storm sewers, culverts, streams or ditches. Intercept and conduct surface runoff and discharge from dewatering pumps to siltation ponds before discharging to natural drainage channels.

Maintain temporary erosion and siltation control facilities during the construction period until final grading, landscaping and permanent erosion control are completed. At that time, remove the temporary facilities, after obtaining authorization from the Engineer for the Town, and complete the site work as specified.



## 2.2.6 TEMPORARY ACCESS

Provide and maintain temporary parking areas and access roads to project sites for use by all Contractors on this project, and for delivery of materials.

Maintain the temporary roads and parking areas in serviceable condition until the permanent roads are completed.

## 2.3 GRADING, EXCAVATION AND RELATED WORK

### 2.3.1 GRADING

Site grading shall be completed to within one (1) foot of finished grades and contours shown on the grading plan before starting any trench excavation, and shall include grading of lots, drainage channels, detention ponds, temporary siltation ponds, and roadways.

Graded areas shall be relatively smooth and free of ruts, depressions or mounds, and shall be graded for proper drainage.

### 2.3.2 TRENCH EXCAVATION

Excavation shall include the removal of all materials encountered, including rock, necessary for the installation of piping, appurtenances and structures. Excavation shall also include separation and disposal of material that is not suitable for backfill and storing material that is suitable for backfill.

Trenches shall be excavated only so far in advance of pipe laying as necessary for installation of pipe and to comply with access requirements.

If encountered, rock may be loosened by blasting or other methods after review by the Engineer. The Contractor must take proper precautions to protect persons and property. Blasting operations shall be carried out only by experienced personnel. The Contractor shall obtain any permits and insurance necessary for blasting operations. Any damages resulting from rock excavation shall be the responsibility of the Contractor.

Rock, boulders and large stones shall be removed to provide a minimum clearance of 6 inches below and on each side of all pipes and a minimum clearance of 1 1/2 feet around manhole risers.

### 2.3.3 TRENCH WIDTH LIMITS

The following trench width limits must be maintained at all times until backfill is complete even if it may be necessary to leave sheeting and bracing in place:

	<u>MAXIMUM TRENCH WIDTH</u>	
	<u>At Top of Pipe</u>	<u>At Ground Surface</u>
Building Sewers	2'-6"	5'-0"
Sanitary Sewers	3'-0"	7'-0"
Storm Sewers	3'-0"	7'-0"

See special requirements for excavation limits at manholes.

#### **2.3.4 SEPARATION OF BACKFILL MATERIAL**

Excavated material which is suitable for backfill shall be separated from earth excavation which is unsuitable for backfill and rock, boulders, frozen earth, paving materials, concrete, and stones larger than 8 inches in their greatest dimension. These materials which are not to be used for backfill shall be hauled away and disposed of at a site to be arranged for by the Contractor and subject to the approval of the New York State Department of Environmental Conservation.

#### **2.3.5 DEWATERING**

Trenches shall be dewatered so that pipe is not installed in water. The Contractor shall provide pumping equipment and other methods for dewatering trenches. The discharge from dewatering equipment shall be conducted to sedimentation basins and silt traps before discharging to natural drainage channels, gutters, drains, or storm sewers. Surface water shall be diverted or otherwise prevented from entering excavations and to prevent damage to adjacent property.

Water shall not be allowed to soften the bottom of the trench. If the trench bottom becomes soft due to failure to keep the excavation dry, the softened material shall be removed and replaced with crushed stone.

#### **2.3.6 MAINTENANCE OF BANKS**

Provide sheeting, bracing, and shoring of trenches as necessary to protect adjacent structures including poles, trees, pavements, pipelines, and to provide safe working conditions.

The use of a trench shield will be permitted if adequate provisions are made for preventing movement of the pipe and caving of the banks while the shield is being moved. The use of a bar by a workman is not considered adequate.

The methods to maintain the stability of banks must be in accordance with applicable laws, rules and regulations, and are the sole responsibility of the Contractor.

#### **2.3.7 PIPE BEDDING**

When crushed stone cradle pipe bedding for storm sewer pipe is not required, the bottom of the pipe trench shall be formed in solid, undisturbed earth except as otherwise specified. Water shall not be allowed to soften the bottom of the trench. The pipe bed shall be prepared accurately with hand tools so that the full length of the pipe is supported by the pipe bed. The bottom of the trench shall be checked before the pipe is lowered into the trench to make certain that the pipe to be laid will not exceed the allowable deflection. Recesses shall be excavated for pipe bells, so that the pipe does not rest on the bells. If the trench is excavated below the required depth, the excess depth shall be filled with crushed stone cradle.

Trenches shall be excavated to a level 6 inches below the bottom of the pipe in rock areas or where the trench bottom contains stones larger than 2" in diameter. The foundation for the pipe in such areas shall be provided by the use of crushed stone cradle.

Trenches for sanitary sewers and buildings sewers shall be excavated to a level 6 inches below the bottom of the pipe. The foundation for the pipe shall be provided by the use of crushed stone cradle. The crushed stone cradle shall be spread and shaped by

hand to provide uniform support for the pipe for at least 3/4 of the pipe diameter and shall extend for the full width of the trench.

Where the 6 inch depth of crushed stone cradle is not adequate to provide a proper foundation for the pipe in the opinion of the Engineer, additional depth of crushed stone cradle shall be used.

If any trench is excavated below the required depth or depth as authorized by the Engineer, the excess depth shall be filled with crushed stone cradle.

Coupling or bell holes shall be prepared so that the pipe does not rest on the outer portion of the coupling or bell. Holes shall be of adequate size but must not be excessively large.

### **2.3.8 CRADLE MATERIALS**

Cradle materials for pipes, manholes and building sewers shall be as follows:

#### **2.3.8.1 Crushed Stone Cradle**

NYSDOT 703-02, Size No. 2, mixed with sufficient smaller sized stone and screenings to provide a dense material that gives the maximum support to the pipe. Use only enough smaller stones and screenings to fill the voids in the No. 2 stone. Crusher run material that meets this specification is acceptable.

#### **2.3.8.2 Concrete Cradle**

NYSDOT Section 501, Portland Cement Concrete, Class B with 1-1/2 inch maximum slump. When approved by the Engineer, water may be omitted from the mix.

### **2.3.9 SPECIAL REQUIREMENTS AT STRUCTURES**

Excavation around manholes and other structures shall provide a clearance of 1% feet. The excavation in the areas where pipes enter the structure shall be kept to a minimum.

Where any pipe passes through a structure excavation, crushed stone cradle shall be provided under the pipe for support. The crushed stone cradle with 2:1 side slopes shall extend from the pipe to the bottom of the excavation and shall support the pipe for a width equal to at least 3/4 of the pipe diameter.

Provide uniform support with crushed stone cradle under manhole bases as detailed.

Special attention shall be given to keeping the excavation opened and dewatered so that work around the outside of structures can be completed properly.

### **2.3.10 SPECIAL REQUIREMENTS FOR BUILDING SEWERS**

Where building sewers pass through main sewer trench excavations, the foundation for the pipe and tee shall be provided by the use of crushed stone cradle. The crushed stone cradle shall extend the full width of the trench. The crushed stone cradle shall be shaped by hand to provide uniform support for the pipe and tee for a width equal to at least 3/4 of the pipe diameter.

### **2.3.11 STABILIZATION OF STEEP SLOPES**

Stabilization of grades 1 vertical to 3 horizontal (or steeper) shall include additional measures beyond seeding. Practice to consider include biological rolled erosion control blankets (or mats), which may use jute, excelsior, straw, wood fibers, coconut fibers, or a combination of these items, or others to the satisfaction of the Town Engineer (if new products become available). Non-biodegradable options may be acceptable as well, including plastic netting or mesh, synthetic fibers with netting, or bonded synthetic fibers, or a combination of biodegradable and non-biodegradable products or others to the satisfaction of the Town Engineer. Area to be properly prepared and seeded prior to blanket installation. Blanket to be anchored in accordance with manufacturer's recommendations. Contractor to be responsible for maintenance of slope stabilization until vegetation is established.

## **2.4 BACKFILL AND EMBANKMENTS**

### **2.4.1 GENERAL**

Backfill and embankments consist of placing and compacting backfill material in trenches and around structures, and construction of embankments and fills, including maintenance of backfilled surfaces, disposal of excess excavated material, and related work, and shall generally conform to applicable requirements of NYS DOT 203.

Embankments and fills shall be completed before installation of piping and appurtenances are started.

### **2.4.2 MATERIALS**

In general, construct fills and backfill trenches with excavated material provided that the excavated material is suitable in the opinion of the Engineer. Where there is a deficiency of excavated material due to the rejection of a part thereof, use excess excavated material from other portions of the project.

Granular fill shall be used for backfill, where directed by the Engineer or where there is a deficiency of suitable or select excavated material on the project.

#### **2.4.2.1 Suitable Excavated Material**

Dry excavated material from which all frozen material, pavement materials, cinders, ashes, refuse, sod, roots, organic material, rock or stones larger than 8 inches in the greatest dimension have been removed.

#### **2.4.2.2 Select Excavated Material**

Select, dry excavated material from which all pavement materials, concrete, cinders, ashes, refuse, organic material, topsoil, sod, roots, frozen material, boulders, rock, or stones larger than 2 inches in the greatest dimension, or other material, which in the opinion of the Engineer is not suitable, have been removed.

### **2.4.2.3 Granular Fill**

NYSDOT 203-2.02C, Select Granular Fill except that all particles shall pass a 2-inch square sieve.

### **2.4.2.4 Controlled Density Fill**

K-Krete Controlled Density Fill (CDF) Mix consisting of Portland Cement and salvaged materials as developed by K-Krete Inc.

## **2.4.3 EMBANKMENTS AND FILLS**

Construct fills and embankments using select excavated material within 2 feet of finished grade, and suitable excavated material below depths of 2 feet within finished grade. Place and compact fill material in layers not to exceed 12 inches or as specified under compaction requirements.

Rework embankment and fill that does not conform to these specifications to meet the requirements, or remove and replace the material with acceptable fill. Compact all fill material placed before the end of each work day. Grade the final layer placed each day for proper drainage to prevent ponding of surface run-off on the fill.

## **2.4.4 TRENCH BACKFILL**

### **2.4.4.1 General**

Trenches shall be backfilled immediately after installing the pipe and completion of work within the excavation. Backfill around each pipe shall be placed before installing the next length of pipe. Trenches shall be relatively dry during backfilling.

### **2.4.4.2 Pipe Sidefill and Safety Cover**

From the top of the pipe bed or cradle to a level one foot over the top of the pipe, backfill shall be select excavated material deposited by hand in 6 inch layers and compacted by tamping. Backfill shall be deposited in the trench for its full width on each side of the pipe simultaneously so as not to disturb the pipe.

### **2.4.4.3 Backfill around Structures and Appurtenances**

Backfill around manholes, inlets, valve boxes and hydrants shall be select excavated material deposited in accordance with the requirements for backfill around pipe to a level one foot over the top of the entering pipes. Above this level, backfill shall be deposited uniformly around the structure or appurtenance in 12-inch layers and thoroughly compacted.

### **2.4.4.4 Backfill above Safety Cover**

Above the levels specified for pipe sidefill and safety cover, the trench shall be backfilled and compacted by mechanical methods. For each section of trench, the Engineer shall review the method of backfill and compaction considering the type of backfill material and the finished ground surface above the pipe.

#### 2.4.4.5 Backfill under Pavement Areas

Backfill under roadways and surfaces normally subject to vehicular traffic, including pavements and gutters, shall be granular fill uniformly placed, leveled, and compacted in 12 inch layers using mechanical compactors. Select excavated material may be used only if it meets the specifications for granular fill.

#### 2.4.4.6 Detectable Warning Tape

Acid & alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility in bold readable lettering, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried less than 30-inches deep from finished grade.

### 2.4.5 COMPACTION

Compaction methods employed shall produce the specified compaction, prevent subsequent settlement, and provide the required support for proposed construction on the compacted subgrade. Proposed compaction methods shall avoid damage to existing facilities and to completed construction.

Prior to starting placement and compaction of backfill and embankment, submit in writing to the Engineer for the Town a description of the methods and equipment proposed for compaction. The Engineer will review this information considering the type of backfill material and the finished ground surface. If the proposed method does not provide the compaction required, alternate methods shall be adopted until the required compaction is achieved.

Minimum compaction requirements for backfill and embankment shall generally conform to the following, unless otherwise specified:

#### 2.4.5.1 Embankments

	<u>Maximum Layer Before Compaction</u>	<u>Minimum Compaction</u>
Under roadways, shoulders, gutters and sidewalks	12 inches	95%
All other areas	24 inches	85%

#### 2.4.5.2 Trench Backfill

Under pipe and pipe cradle	6 inches	95%
Pipe sidefill and safety cover to 1 foot over top of pipe	8 inches	93%
Under roadways, shoulders, sidewalks, parking areas, and gutters	12 inches	95%
All other areas	24 inches	85%

### **2.4.5.3 Structure Backfill**

Around all structures and appurtenances including manholes, inlets, hydrants and valve boxes	12 inches	95%
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### **2.4.6 SITE MAINTENANCE AND CLEANUP**

The Developer shall maintain the site in a neat and safe condition. Surplus materials, debris, rock and unsuitable excavated material shall be removed and disposed of as the work progresses.

Dust shall be controlled so as not to affect adjacent developed areas, roads and streets.

Gravel run-off areas shall be provided for construction traffic leaving the site to control tracking and deposits of dirt from the site on adjacent roads and streets. The Developer and his Contractor are responsible for removing tracked or dropped material as often as required to keep roads and paved areas clean.

## **2.5 WATER DISTRIBUTION SYSTEM**

All water main and water service materials, installation, testing, and disinfection shall be in accordance with the Recommended Standards for Water Works – Policies for the Review and Approval of Plans and Specifications for Public Water Supplies (Ten State Standards).

All new hydrants shall include a reflective hydrant marker. The marker shall be 3/8"-diameter fiberglass rod, with red and white reflective banding, a heavy-duty stainless steel spring, and be top-mounted. Markers shall be in place prior to the final surety release.

## **2.6 SANITARY SEWER SYSTEM**

### **2.6.1 MATERIALS**

#### **2.6.1.1 Polyvinyl Chloride (PVC) Main Sewer**

ASTM D3034 SDR 35, PVC Plastic Gravity Sewer Pipe with elastomeric gasket joints. Provide 4 inch diameter branch fittings. Use SDR-21 PVC pipe for sewers deeper than 16 feet.

#### **2.6.1.2 Polyvinyl Chloride (PVC) Building Sewer**

ASTM D3034-SDR-21, PVC Plastic Gravity Sewer Pipe and fittings with elastomeric gasket joints. Glued joints will not be allowed.

#### **2.6.1.3 Ductile Iron Pipe (DIP) Force Main**

AWWA C151/ANSI A21.51, thickness Class 50 with ANSI A21.4 cement mortar lining and seal coating inside, bituminous coating outside, ANSI 21.1 1 push-on joints.

#### **2.6.1.4 Polyvinyl Chloride (PVC) Force Main**

ASTM D2241 SDR 21, PVC Pressure Rated Pipe and fittings, 200 psi pressure rating, with elastomeric gasket joints, adapters, and 3" wide detectable underground tape. Detectable tape shall be green and read, "CAUTION - BURIED SEWER LINES BELOW".

#### **2.6.1.5 Force Main Fitting**

AWWA C110/ANSI A21.10 ductile iron fittings or AWWA C153/ANSI A21.53 ductile iron compact fittings with ANSI A21.4 cement mortar lining and seal coating inside, bituminous coating outside.

#### **2.6.1.6 Crushed Stone Cradle**

NYSDOT 703-02, Size No. 2, mixed with sufficient smaller size stone and screenings to provide a dense material that gives maximum support to the pipe. Crusher run material meeting these specifications will be acceptable.

#### **2.6.1.7 Concrete**

Concrete for backing, bracing, encasement and cradle shall be NYSDOT Section 501, Portland Cement Concrete, Class B, 2-inch maximum slump. Water may be omitted from the mix for cradle and encasement when approved by the Engineer.

#### **2.6.1.8 Cleanouts**

Fabricated from ASTM D3034 SDR 35, PVC Plastic Gravity Sewer Pipe and fittings, and brass screw plugs as shown in the Standard Details. Glued joints will not be allowed.

#### **2.6.1.9 Manholes**

##### **a. Bases, Risers, and Cone Tops**

Precast reinforced concrete manhole units conforming to NYSDOT 706-04 requirements for circular manhole units and ASTM C-478 and designed to sustain AASHTO H20-44 wheel loading. Refer to Standard Details for dimensions, minimum base slab reinforcing steel and other features.

##### **b. Cover Slabs**

Precast reinforced concrete cover slabs. NYSDOT 555-2, Structural Concrete, Class A conforming to NYSDOT 501-1, 501-2, and 501-3 and ASTM A-615, grade 60 deformed reinforcing steel, and other features.

##### **c. Base, Riser, and Cover Slab Joints**

Tongue and groove with continuous solid rubber ring gasket joints conforming to ASTM C-443.



d. Pipe to Manhole Connections

Flexible rubber boot gasket, power sleeve, and a stainless steel take-up clamp, PSX Positive Seal as manufactured by Press Seal Gasket Corporation, or equal.

All flexible manhole seals shall be sized for inlet and outlet pipes to provide a watertight seal and shall be installed in preformed manhole openings by the manhole supplier.

e. Manhole Steps

Aluminum Alloy 6005-T5 forged from a solid extruded section Part No. 20100 conforming to ASTM B221, as manufactured by Aluminum Company of America or Relgrit Part No. LR-800 as manufactured by Reliance Steel Products Company, or equal.

The portion of the step embedded in concrete shall be coated with a six mil coat of Bitumastic No. 505 as manufactured by Koppers Company or a 15 mil coat of DeGraco Moisture/Gard 9330 thick black as manufactured by the Detroit Graphite Company, or equal. The first step should be no more than 30 inches below the rim.

f. Manhole Frames and Covers

Cast iron frames and covers, uniform quality, free from blow holes, porosity, hard spots, shrinkage defects, cracks, fins, burrs, sand and slag. Cleaned by sand blasting. Asphalt coated. Materials shall conform to ASTM A-48, Class 30. Bearing surfaces shall be ground or machined. Designed to carry a wheel load of 16,000 pounds plus impact. Total weight of frame and cover shall be not less than 300 pounds. Covers shall be cast with the words "SANITARY SEWER" as part of the design.

Standard frames and covers with indented top design as manufactured by Neenah Foundry Co., Catalog No. R-1726, Type B; Syracuse Castings Sales Corp., Catalog No. 1032; or equal.

g. Concrete for Benches

NYSDOT 555-2, Structural Concrete, Class A conforming to NYSDOT 501-1 and 501-3.

h. Dampproofing

Two 3.6 wet mil coats of bitumastic black coal tar sealer / damp-proofing applied by the manufacturer on interior and exterior surfaces, except the base slab. RC-30 as manufactured by Midland Asphalt, Hydrocide 700B as manufactured by BASF or equal.

i. Non-Shrink Grout

Fast setting, non-shrink, non-metallic, high strength, water resistant, premixed grout. Octocrete as manufactured by Penncrete Products Company, or equal.

j. Grade Rings

ASTM C-478 precast reinforced concrete rings, 3 inches thick, 8 inches wide and 24 inches inside diameter.

k. Brick

ASTM C-32 sewer and manhole clay or shale brick.

l. Mortar

ASTM C-270, Type M. Mix design by volume shall be one part Portland Cement, one part masonry cement, and five parts mortar sand. Lime shall not be used.

m. Concrete Curing Compound.

ASTM C-309 Liquid membrane-forming compound for curing concrete.

n. Drop Pipe and Fittings.

ASTM D3034 SDR 35 PVC Plastic Gravity Sewer pipe and fittings with elastomeric gasket joints.

o. Manhole Cover Inserts.

High density polyethylene bowl, ASTM D1248, Class A, Category 5, minimum thickness 1/16 inch. Black, closed cell neoprene gasket, ASTM-D-1056-73T, cemented to the underside of the insert bowl rim by the manufacturer.

One gas pressure relief and one vacuum relief valve installed in the insert bowl. Valve bodies manufactured of high density polyethylene with neoprene valve plugs confined with stainless steel springs. The pressure and vacuum relief valves shall release at a differential pressure of 1 psi.

Sewer Guard as manufactured by Preco Industries, Ltd., or equal.

p. Pipes for Inverts

ASTM D3034 SDR 35 PVC.

### **2.6.1.10 Pumping Stations**

Pumping stations shall include above ground fiberglass reinforced enclosures housing self-priming, horizontal, centrifugal, v-belt motor driven sewage pumps, valves, internal piping, emergency by-pass piping connections, motor and level controls, internal wiring, emergency power, and remote monitoring.

The pumping station equipment and accessories shall be provided as a complete system package, factory assembled and tested by the pump manufacturer. Self-priming Super T or Ultra V Series pumping station for automatic operation, as manufactured by Gorman Rupp Company or equal.

Pumps 15HP and greater shall be provided with soft starts. Where required by the Engineer or the Town, variable frequency drives shall be provided.

Emergency power generation shall consist of a Gorman Rupp Company "Auto Start" pump or equal.

Remote monitoring shall consist of FSI Systems, Inc. Phoenix Sentry Internet Enabled Monitoring System, with battery back-up and padlock adapter or equal.

Provide two (2) sets of Operation and Maintenance Instructions with submittal of shop drawings.

## **2.6.2 INSTALLATION OF MAIN SEWERS, BUILDING SEWERS AND FORCE MAINS**

### **2.6.2.1 Handling Materials**

The Contractor shall inspect pipe for damage before unloading. The pipe shall be unloaded in accordance with the manufacturer's instructions and with care to avoid damage. Pipe shall not be dropped or bumped against pipe already on the ground or any other object on the ground. Prevent damage to the pipe ends. Keep interior and ends of pipe free from dirt.

The pipe shall be lowered into the trench to prevent impact and damage. As the pipe is lowered, the ends and interior of the pipe shall be inspected for cleanliness and shall be cleaned, if necessary. Do not allow the pipe to be dragged along the ground or trench bottom.

### **2.6.2.2 Making Joints**

Joints shall be made in accordance with the manufacturer's instructions and direction of the Engineer. Glued joints will not be allowed.<sup>1</sup> The interior of the pipe and coupling already in place shall be cleaned, the gasket inserted in the groove, lubricant applied, and the length of pipe to be installed pushed home. A gauge shall then be used to verify that the rubber ring is located in the groove all the way around.

The pipe joint shall not be made under water.

### **2.6.2.3 Other Installation Requirements**

Pipe installation shall commence at the lowest elevation and shall terminate only at manholes. Pipe bells or couplings shall be laid on the upstream end.

Each section of pipe shall rest on the prepared pipe bed or cradle for the full length of the barrel. The pipe shall be laid true to established line and grade to

within 1/4 inch. Any pipe that is disturbed after laying shall be taken up and relaid.

If a trench shield is used, the pipe joint shall not be covered until after the shield has been advanced in the trench and the joint has been inspected for movement.

The upstream end of the pipe shall be plugged at all times when pipe laying is not in progress. Water and dirt shall be prevented from entering the pipe.

#### **2.6.2.4 Special Requirements for Main Sewers**

Tee branches for building sewers shall be installed at the locations shown on the drawings or as directed by the Engineer. The tee branches shall be installed with the main sewer pipe.

#### **2.6.2.5 Special Requirements for Building Sewers**

Building sewers shall be a minimum 4 inch diameter unless otherwise shown and shall be laid at a grade of 1/4 inch per foot. A riser shall be installed if necessary, so that the building sewer can be laid at a grade of 1/4 inch per foot to meet the required end elevation.

Concrete cradle, bend, end cap, and marker shall be installed for each building sewer before backfilling the main sewer pipe. If risers are to be used, they shall also be installed with these fittings.

Building sewer extensions to the street right-of-way shall be made as required after the main sewer has been completed or may be installed immediately after installation of the main sewer.

Whenever the end of a building sewer is to be backfilled, whether temporarily or permanently, a removable plug or end cap shall be installed. The plug or end cap shall be braced with removable blocking to prevent movement during testing. A hardwood or pressure treated 2" x 4" marker extending three feet above finished grade shall be placed at the end of all laterals.

#### **2.6.2.6 Special Requirements for Force Mains**

Force main installation shall commence at the pumping station with pipe bells or couplings laid on the upstream end. The force main shall slope up from the pumping station to the discharge manhole without sags, dips or air pockets.

Force main fittings shall be provided with concrete backing against undisturbed earth to prevent movement during testing and operation. Soft, unstable soil may require the use of tie rods and clamps.

Provide a minimum area of 2.0 square feet of blocking against undisturbed earth for each force main fitting.

### **2.6.2.7 Repairs**

If it is necessary to repair or relay a section of pipe due to broken pipe, faulty line or grade, or any other reason, repair clamps shall not be used, but the pipe to be repaired shall be removed and replaced with new pipe.

## **2.6.3 INSTALLATION OF MANHOLES AND PUMPING STATIONS**

### **2.6.3.1 Handling and Setting Manholes**

Precast manhole sections shall not be shipped or handled until concrete is completely cured. Any damage that occurs during shipping or handling shall be cause for rejection. Precast sections shall be inspected before unloading and any sections that have been damaged or do not meet the specifications shall not be unloaded.

Set the manholes on concrete cradle as detailed. All pipe openings shall be performed as detailed.

### **2.6.3.2 Openings and Joints**

Openings around pipes and lift holes shall be completely filled with nonshrink grout and after initial set waterproofed on the outside with two coats of dampproofing. Riser, top, and grade ring joints shall be made using nonshrink grout in a sufficient quantity to cover the joint approximately 1/4 inch thick for a strip 4 inches wide all around the outside of the manhole and waterproofed by covering with two coats of dampproofing. All joints and openings shall be closed upon setting the manhole.

### **2.6.3.3 Benches and Inverts**

Benches shall be constructed of NYSDOT class A concrete and sloped to drain. Change in size and grade shall be made gradually and evenly. Changes in direction of the sewer and entering branches shall have a radius 1/2 the inside diameter of the manhole. Apply 2 coats of SIKAGARD 62 epoxy resin coating to bench walls. Sprinkle silica sand on top of freshly coated bench walls. In highly corrosive conditions/areas, Town Engineer may require epoxy coatings to be applied to manhole walls and top slab.

Inverts shall be formed of half pipe PVC or VTP. For PVC pipe, anchor in place with 1/2 inch diameter x 2.5 inch long stainless steel carriage bolts. Locate the round head of the bolt on the inside of the pipe with a SS washer and nut, snugged tight on the outside. Bolt hole should be at least two inches below the top of the pipe. Anchors should be installed 12 inches on-center each side of the invert pipe. Brick formed inverts may be used when approved by the Town Engineer. Refer to the Precast Concrete Sanitary Manhole detail; brick shall be installed above the half pipe section to set the elevation of the manhole bench wall to the top of the pipe elevation across the manhole.

#### **2.6.3.4 Grade Rings and Covers.**

Grade rings shall be used to bring the manhole cover and frame to an elevation 1/4 inch below finished grade in paved areas and to meet finished grade in other areas. Total height of grade rings shall not exceed 8 inches.

#### **2.6.3.5 Manhole Cover Inserts**

Furnish and install watertight manhole cover inserts where shown on the drawings or designated by the Engineer.

After completion of all other work on the manhole, clean manhole frame bearing surface of all dirt and debris. Place insert with the rim gasket in full contact on the frame bearing surface. Replace the manhole cover being careful to prevent damage to the pressure and vacuum relief valves.

Test the seal with water after installation of the manhole cover insert. If infiltration is more than 1 gallon per 24 hours, remove the manhole cover, reseal the insert rim gasket, and retest the seal.

#### **2.6.3.6 Installation of Pumping Stations**

Install pumping station structure, enclosure, and mechanical and electrical equipment as shown on the drawings. Installation of pumps, level control system, electrical equipment, and related components shall be in accordance with the manufacturer's instructions.

The electric service for the pumping station shall be as shown on the drawings. Arrangements for the final connection shall be made by the Contractor.

Remote monitoring systems shall be as shown on the plans. Arrangements for activation shall be made by the Contractor.

Install an underground electric service at a minimum depth of 24 inches, from the connection on the power company power pole to the meter box. Use galvanized heavy wall rigid conduit from the conduit on the electrical control panel to the power pole.

All electrical work shall conform to National Electrical Code and shall meet all requirements of the New York Board of Fire Underwriters. Upon completion of the work, the Contractor shall furnish a certificate of inspection and approval by the New York Board of Fire Underwriters. Inspections and final approval of the work shall be obtained and paid for by the Contractor.

Provide lightning arresters on the electric service located adjacent to the meter in accordance with National Electrical Code requirements.

Provide the proper electrical equipment including any transformers necessary for the electric service provided, to operate pumps, controls and accessories at their respective voltage and ampere ratings.

All metal conduits, cabinets and other enclosures and neutral conductor of systems shall be permanently grounded to grounding rods or underground piping. Make all ground connections as required by the National Electrical Code. All circuits and feeders shall be tested and proven free of improper grounds.

## **2.6.4 PREPARATION OF SEWER SYSTEM FOR USE**

### **2.6.4.1 General**

Provide all labor and equipment for cleaning and testing including hoses, pumps, plugs, temporary connections, gauges, meters and measuring devices to perform the specified tests. Testing shall be done under observation of the Engineer for the Town.

### **2.6.4.2 Water Supply for Testing and Flushing**

The Contractor shall make arrangements for furnishing and disposing of water for testing.

### **2.6.4.3 Cleaning and Flushing**

Each section of sanitary sewer and all wet wells shall be flushed to remove all silt, sand, gravel, and other debris prior to testing. Hydraulic propelled devices, rodding equipment or machines for direct removal shall be used if any sections of pipe cannot be flushed clean.

Flushing shall be started at the highest end and proceed to the lowest end of the system. All debris shall be removed at each consecutive manhole and shall not be flushed into downstream sections.

### **2.6.4.4 Testing Requirements**

All sewers, manholes, and wet wells shall be tested for exfiltration and infiltration. Exfiltration testing of sewers shall be done by the use of compressed air. Manholes and wet wells shall be tested for exfiltration by water testing or by vacuum testing.

Force mains shall be tested by hydrostatic pressure test.

Any section of sewer and force main, and any manhole that does not meet the specified test results must be repaired and retested until a satisfactory test is completed.

Tracer wire or detectable metal tape shall be tested for continuity.

#### **2.6.4.5 Air Testing Main Sewers and Building Sewers**

Building sewers shall be tested with the main sewer and the following procedure shall be used:

- (a) The test shall be conducted between two (2) consecutive manholes.
- (b) The test section of the sewer line shall be plugged at each end. One of the plugs used at the manhole must be tapped and equipped with air inlet connection for filling the line from the air compressor.
- (c) Ends of building sewers, cleanouts, stubs and fittings into the sewer test section shall be properly capped or plugged, and carefully braced against the internal pressure to prevent air leakage.
- (d) An air hose shall be connected to tapped plug from the portable air control equipment which shall include valves and pressure gauges to control the air entry rate, and to monitor the air pressure in the pipeline.
- (e) A second air hose shall be connected between the air compressor and the air control equipment.
- (f) Supply air to the test section slowly, filling the pipeline until a constant pressure of 3.5 psig is maintained. The air pressure shall be regulated to prevent the pressure inside the pipe from exceeding 5.0 psig.
- (g) When constant pressure of 3.5 psig is reached, throttle the air supply to maintain the internal pressure above 3.0 psig for at least five minutes. This time permits the temperature of the entering air to equalize with the temperature of the pipe wall.
- (h) After the stabilization period, the air pressure shall be adjusted to 3.5 psig and the air supply disconnected. Observe the gauge until the air pressure reaches 3.0 psig. At 3.0 psig, commence timing with a stop watch which is allowed to run until the line pressure drops to 2.5 psig, at which time the stop watch shall be stopped. The time required, as shown on the stop watch, for a pressure loss of 0.5 psig shall be used to compute the air loss.
- (i) An air pressure correction shall be required when the prevailing groundwater is above the sewer line being tested. Under this condition, the air test pressure shall be increased to 0.433 psig for each foot the groundwater level is above the invert of the pipe.
- (j) When building sewers are tested with the main sewers, the time requirement shall be determined by averaging the time for each diameter in proportion to the length of each size of pipe tested.



- (k) If the length of the sewer being tested is less than 200 feet, an adjustment shall be made for the length and diameter of pipe in determining the allowable length of time for the loss of air at the average rate of 0.0011 cubic feet per minute per square foot of internal pipe surface under test from 3.0 psig to 2.5 psig.

Any time in paragraph (h) which is less than 5 minutes, 6 seconds shall be cause for rejection.

#### **2.6.4.6 Water Testing Manholes and Wet Wells**

Exfiltration tests shall be conducted on all manholes and wet wells by filling the manhole or wet well with water to the top of the cast iron frame and allowing to stand for at least two hours. More than one inch drop in water level shall be cause for rejection.

#### **2.6.4.7 Infiltration Testing**

A satisfactory infiltration test will be required for all sections of sanitary sewers before final acceptance of the system. The infiltration test shall include main sewers, building sewers and manholes, and the following procedure shall be used.

- (a) The test shall be conducted in the downstream manhole.
- (b) Any leaks into manholes shall be repaired prior to conducting the test.
- (c) Place a V-notch weir into the upstream pipe in the manhole. The weir shall be installed so as to maintain a watertight seal between the weir and the interior surface of the pipe to prevent water by-passing the V-notch weir.

V-notch weirs shall be commercially manufactured specifically for infiltration testing of sewers. All weirs used for testing shall be approved by the Engineer.

- (d) After the V-notch weir has been installed, allow 24 hours for the infiltrating water to build-up and level off behind the weir, and thus permit a steady, uniform flow to pass over the V-notch weir.
- (e) Measurements shall be taken after steady flow occurs over the V-notch weir. Leakage is determined from the readings, either directly or by converting the readings of the flow into terms of gallons per inch of pipe diameter per mile per day.

Infiltration rates exceeding 100 gallons per day per inch of sewer diameter per mile shall be cause for rejection.

#### **2.6.4.8 Deflection Testing**

Deflection tests shall be performed on all flexible pipe main sewers. 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 test is to use a rigid 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.

#### **2.6.4.9 Vacuum Testing of Manholes**

Each manhole shall be tested immediately after assembly and prior to backfilling. All lift holes shall be plugged with an approved non-shrink grout. All pipes entering the manhole shall be plugged, taking care to securely brace the plug from being drawn into the manhole.

The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturers' recommendations.

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 if the time is greater than 60 seconds for 48" diameter, 75 seconds for 60", and 90 seconds for 72" diameter manholes.

If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained.

#### **2.6.4.10 Testing Force Mains**

Pressure test force mains by filling with water, expelling air, applying hydrostatic pressure of 50 psi above normal operating pressure at lower end of force main for a 2 hour period. After 2 hours, if the pressure has fallen below 50 psi, measure the volume of water necessary to bring pressure up to 50 psi.

Leakage shall not exceed 0.17 gallons per inch of pipe diameter per 1,000 feet per 2 hours. Leakage shall be located and repaired until this limitation is met.

#### **2.6.4.11 Inspection after Testing**

After testing, the Engineer will make a complete visual inspection of the system. The Contractor shall remove and replace manhole covers and furnish lights to assist the Engineer in making this inspection. All defects shall be promptly repaired by the Contractor.

#### **2.6.4.12 Testing Pumping Stations**

The pumping station piping, equipment and control systems shall be tested for proper operation under normal operating conditions for all anticipated conditions, including emergency power. Testing shall include the station's remote monitoring system. In the presence of the Engineer for the Town, and Superintendent of the Farmington Water and Sewer District, the manufacturer's representative shall inspect the installation and operation of the equipment and controls, and make adjustments as necessary for proper operation of all equipment and systems.

Upon completion of testing, provide manufacturer's certification that the equipment has been installed and operates in accordance with the manufacturer's specifications.

### **2.7 STORM DRAINAGE SYSTEM**

#### **2.7.1 MATERIALS FOR STORM DRAINAGE SYSTEM**

##### **2.7.1.1 Storm Sewers and Culverts (RCP)**

NYSDOT 706-02 Reinforced Concrete Pipe (RCP), Class IV, Wall B minimum, bell and spigot type elastomeric gasketed joints, with fully bituminous coated CMP or SDR 35 PVC laterals and couplings. Provide for culverts NYSDOT 706-07 Reinforced Concrete Pipe End Sections.

##### **2.7.1.2 Storm Sewers and Culverts (CMP)**

NYSDOT 707-02, Corrugated Steel Pipe (CMP), helically corrugated, 14 gauge minimum thickness, galvanized, fully bituminous coated, including bituminous coated corrugated steel connecting bands, branch tees and laterals. Provide for culverts NYSDOT 707-10 Galvanized Steel End Sections.

##### **2.7.1.3 Storm Sewers and Culverts (CPEP)**

NYSDOT 706-14, Corrugated Polyethylene Storm Drain Pipe, smooth interior, conforming to AASHTO M-252 and M-294, including split couplings corrugated to engage a minimum of four pipe corrugations and neoprene gaskets, branch tees and laterals. Provide for culverts NYSDOT 707-10 Galvanized Steel End Sections.

##### **2.7.1.4 Polyvinyl Chloride (PVC) Building Sewer**

ASTM D3034-SDR 35, PVC Plastic Gravity Sewer Pipe and fittings with elastomeric gasket joints. Glued joints will not be allowed

##### **2.7.1.5 Perforated Piping Between Catch Basins, Underneath Town Road.**

12-inch diameter and larger, NYSDOT 706-12 Smooth Interior Corrugated Polyethylene Pipe

#### **2.7.1.6 Concrete**

NYSDOT Section 501, Portland Cement Concrete, Class A.

#### **2.7.1.7 Reinforcing Steel**

ASTM A-6 15, Grade 60 deformed reinforcing steel.

#### **2.7.1.8 Nonshrink Grout**

ASTM Nonshrink, high strength, non-metallic, water resistant, pre-mixed grout. Octocrete as manufactured by Penncrete Products Company, or equal.

#### **2.7.1.9 Concrete Curing Compound**

ASTM C-309 liquid membrane-forming compound for curing concrete.

#### **2.7.1.10 Concrete Cradle**

NYSDOT Section 501, Portland Cement Concrete, Class B, 2-inch maximum slump.

#### **2.7.1.11 Manholes**

##### **a. Bases, Risers, and Cone Tops**

Precast reinforced concrete manhole units conforming to NYSDOT 706-04 requirements for circular manhole units and ASTM C-478. Refer to Standard Details for dimensions, minimum base slab reinforcing steel and other features.

##### **b. Cover Slabs**

Precast reinforced concrete cover slabs. NYSDOT 555-2, Structural Concrete, Class A conforming to NYSDOT 501-1, 501-2 and 501-3, and ASTM A-615, Grade 60 deformed reinforcing steel. Refer to Standard Details for cover slab dimensions, reinforcing steel and other features.

##### **c. Base, Riser, and Cover Slab Joints**

Tongue and groove joints set in fast setting, nonshrink, high strength, water resistant, nonmetallic, premixed grout.

Continuous solid rubber ring gasketed joints conforming with ASTM C-443 will be considered by the Engineer in lieu of the nonshrink grout joints.

##### **d. Manhole Steps**

Aluminum Alloy 606 1 -T6, forged from a solid extruded section Part No. 12653A as manufactured by Aluminum Company of America or Relgrit Part No. LR-800 as manufactured by Reliance Steel Products Company, or equal.

The portion of the step embedded in concrete shall be painted with a six mil coat of Bitumastic No. 505 as manufactured by Koppers Company or a 15 mil coat of DeGraco Moisture/Gard 9330 thick black as manufactured by the Detroit Graphite Company, or equal.

e. Dampproofing

Two 3.6 wet mil coats of bitumastic black coal tar sealer / damp-proofing applied by the manufacturer on interior and exterior surfaces, except the base slab. RC-30 as manufactured by Midland Asphalt, Hydrocide 700B as manufactured by BASF or equal.

f. Manhole Frames and Covers.

Castings shall be uniform quality and shall be free from blow holes, porosity, hard spots, shrinkage defects, cracks, fins, burrs, sand and slag. Castings shall be cleaned by sand blasting and shall be asphalt coated by the manufacturer. Materials shall conform to ASTM A-48, Class 30.

Castings shall be true to pattern with satisfactory fit of component parts. Bearing surfaces shall be ground or machined. Castings shall be designed to carry a wheel load of 16,000 pounds plus impact.

Total weight of frame and cover shall be not less than 300 pounds.

Standard manhole frame and cover, Catalog No. R-1726, Type B, indented top design as manufactured by Neenah Foundry Company, or Catalog No. 1042 indented top design as manufactured by Syracuse Castings Sales Corporation, or equal.

g. Grade Rings

ASTM C-478 precast reinforced concrete rings, 2 inches thick, 8 inches wide, and 24 inches I.D.

h. Brick

ASTM C-32 sewer and manhole clay or shale brick.

**2.7.1.12 Inlets**

a. Concrete Catch Basins

Precast, reinforced concrete catch basins conforming to NYSDOT 706-04, designed for AASHTO HS-20 loading. Refer to Standard Details for dimensions and other requirements.

b. Concrete Brick and Block

ASTM C-139 solid load bearing units.

c. Mortar

ASTM C-270, Type M. Mix design by volume shall be one part Portland Cement, one part masonry cement, and five parts mortar sand. Lime shall not be used.

d. Inlet Frame and Grate

NYSDOT 655-2.02, Frames and Grates. Rectangular steel welded grates and frames, galvanized, supplied with locking devices

e. Damp-proofing

Two 3.6 wet mil coats of bitumastic black coal tar sealer / damp-proofing applied by the manufacturer on interior and exterior surfaces, except the base slab. RC-30 as manufactured by Midland Asphalt, Hydrocide 700B as manufactured by BASF or equal.

### **2.7.1.13 Dry Wells**

1. According to the NYSSMDM, dry wells may be constructed by lining an excavation with filter fabric and filling with bank run gravel.
2. As an alternative, precast products are recommended, for ease of maintenance and for larger capacity (with the same volume of space), such as Kistner Concrete Products, Inc. or Lakelands Concrete Products, Inc. "Leaching Chamber" or similar.
3. Where practical, use roof gutter guards and/or sumps or traps (with clean-outs) in the conduit(s), to minimize the potential pollution entering the dry well.

## **2.7.2 INSTALLATION OF STORM SEWERS**

### **2.7.2.1 Alignment and Grade**

Pipe installation shall commence at the lowest point with pipe bells laid on the upstream end. Pipe shall be installed at the elevation and grades shown on the drawings and with straight alignment between manholes and inlets.

### **2.7.2.2 Preparation of Pipe Bed**

When crushed stone cradle pipe bedding for pipe is not required, the<sup>2</sup> pipe bed shall be prepared using hand tools to shape the bottom of the trench to match the barrel of the pipe with recesses for the joints. The pipe bed shall provide as nearly as possible a uniform and continuous bearing for the full length of the pipe between joints. Tolerances up to ¼ inch ± variance in the pipe bed will be permitted.

Except where excavation for rock or unsuitable foundation material is required, care shall be taken not to excavate below the depth necessary to lay the pipe. If excavation does exceed the necessary depth, the trench shall be backfilled under the pipe with crushed stone, thoroughly tamped.

Where rock is encountered, it shall be removed to a depth six inches below the bottom of the pipe. Support the pipe on crushed stone cradle.

Where wet or unsuitable foundation material is encountered, it shall be removed. Support the pipe on crushed stone cradle.

### **2.7.2.3 Handling Pipe**

The Contractor shall inspect pipe for damages before unloading. The pipe shall be unloaded with care to avoid damage. Pipe shall not be dropped or bumped against pipe already on the ground or any other object. Keep the pipe ends and interior clean.

### **2.7.2.4 Making Joints**

Joints shall be made in accordance with the manufacturer's instructions and as directed by the Engineer. Joints shall not be made under water.

### **2.7.2.5 Installation of Pipe**

Each length of pipe shall rest on the prepared pipe bed or cradle for the full length of the barrel. The pipe shall be laid true to established line and grade to within ¼ inch. Any pipe that is disturbed after laying shall be taken up and re-laid.

If a trench shield is used, the pipe joint shall not be covered until after the shield has been advanced in the trench and the joint has been inspected for movement.

### **2.7.2.6 Repairs**

If it is necessary to repair or relay a section of pipe due to broken pipe, faulty line or grade, or any other reason, repair clamps shall not be used, but the pipe to be repaired shall be removed and replaced with new pipe.

## **2.7.3 INSTALLATION OF MANHOLES**

### **2.7.3.1 Handling and Setting Manholes**

Precast manhole sections shall not be shipped or handled until concrete is completely cured. Any damage that occurs during shipping or handling shall be cause for rejection. Precast sections shall be inspected before unloading and any sections that have been damaged or do not meet the specifications shall not be unloaded.

Set the manholes on crushed stone cradle as detailed. All pipe openings shall be performed as detailed.

### **2.7.3.2 Openings and Joints**

Openings around pipes and lift holes shall be completely filled with nonshrink grout and after initial set waterproofed on the outside with two coats of dampproofing. Riser, top, and grade ring joints shall be made using nonshrink grout in a sufficient quantity to fill the joint completely and to cover the joint approximately ¼ inch thick for a strip 4 inches wide all around the outside of the

manhole and waterproofed by covering with two coats of dampproofing. All joints and openings shall be closed immediately upon setting the manhole.

### **2.7.3.3 Benches and Inverts**

Benches and inverts shall be formed of concrete and accurately shaped to a semicircular section conforming to the inside of the adjacent sewer pipe. Change in size and grade shall be made gradually and evenly. Changes in direction of the sewer and entering branches shall have a radius  $\frac{1}{2}$  the inside diameter of the manhole.

### **2.7.3.4 Grade Rings and Covers**

Grade rings shall be used to bring the manhole cover and frame to an elevation  $\frac{1}{4}$  inch below finished grade in paved areas and to meet finished grade in other areas. Total height of grade rings shall not exceed 8 inches.

## **2.7.4 INSTALLATION OF INLETS**

Set precast inlets on concrete cradle as detailed. Construct inlets in accordance with NYSDOT 604-3, and as shown in the Standard Details.

Openings around pipes shall be completely filled with non-shrink grout. Inverts and benches shall be formed of concrete and shaped to drain.

Frames and grates shall be set in full mortar beds.

## **2.7.5 INSTALLATION OF DRY WELLS**

1. Protect infiltration area from compaction prior to installation.
2. Excavate dry well area and line with non-woven filter fabric (such as Mirafi 180-N or Carthage FX-80S). A sand layer may be used at on the bottom of the dry well in lieu of filter fabric. Sand shall be washed and meet AASHTO Std. M-43, Size No. 9 or No. 10.
3. Place washed bank run gravel (meeting size requirements for AASHTO Std. M-43; Size No. 2 or No. 3) in the lined area, to within 12" of the ground surface. See NYSSMDM C.2, "Construction Specifications for Infiltration Practices" for additional material and installation requirements. ALTERNATIVELY, excavate for precast structure. Install stone bedding layer at bottom of excavation, and place precast structure. Fill sides with additional stone envelope (12" width from dry well perimeter, for full depth of dry well). In both instances, top the dry well excavation with topsoil.
4. If possible, install dry well(s) during later phases of site construction to prevent sedimentation and/or damage from construction activity.



## 2.7.6 PREPARATION FOR USE

### 2.7.6.1 Cleaning

All pipes and appurtenances shall be cleaned by flushing or mechanical methods to remove all foreign material. Water shall be furnished and disposed of by the Contractor.

### 2.7.6.2 Inspection

After cleaning, the Engineer will make a complete visual inspection of the system. The Contractor shall remove and replace manhole covers and furnish lights to assist the Engineer in making this inspection.

## 2.8 ROADWAYS AND STREETS

### 2.8.1 MATERIALS

#### 2.8.1.1 Granular Fills

NYSDOT 203-2.02C, Select Granular Fill except that the material shall have the following gradation:

<u>U.S. Standard Sieve</u>	<u>Percent Passing By Weight</u>
2"	100
No. 40	0 – 70
No. 200	0 – 15

#### 2.8.1.2 Foundation Course

NYSDOT 304-2, Subbase Course, Type 4, gravel or crushed stone, with the following gradation limits:

<u>U.S. Standard Sieve</u>	<u>Percent Passing By Weight</u>
2"	100
1"	75 – 100
1/4"	30 – 65
No. 40	5 – 40
No. 200	0 – 10

#### 2.8.1.3 Crushed Stone for Underdrain

NYSDOT 703-0201, Crushed Stone, consisting of equal parts of Size 1 and 2 washed crushed stone.

**2.8.1.4 Filter Fabric for Underdrain and Perforated Pipe**

High porosity nonwoven geotextile fabric composed of polypropylene filaments, Mirafi 140N as manufactured by Mirafi, Inc.

**2.8.1.5 Underdrain Pipe**

NYSDOT 706-13, Corrugated Polyethylene Storm Drain pipe (CPEP), perforated, conforming to AASHTO M252, including corrugated split couplings. Provide minimum one foot cover, as measured from the bottom of the subbase, over underdrain pipe.

**2.8.1.6 Geotextile Fabric**

Nonwoven or woven geotextile fabric for stabilization of soft subgrade, conforming to AASHTO/AGC Task Force 25 Specifications and the following minimum requirements:

<u>Fabric Property</u>	<u>ASTM</u>	<u>Property Value</u>
Tensile Strength	D-4632	180 lbs
Puncture	D-4833	75 lbs
Trapezoidal Tear	D-4533	75 lbs
UV Resistance	D-4355	70 %

**2.8.1.7 Crushed Stone**

NYSDOT 703-0201, Crushed Stone, Size 1A for surface treatment, or size selected by Engineer.

**2.8.1.8 Bituminous Material**

NYSDOT 702-3 101, Asphalt Emulsion, Grade RS-2, or grade and type of material selected by Engineer and Contractor.

**2.8.1.9 Asphalt Concrete**

NYSDOT 400, Bituminous Plant Mix, Type 3 (19.0 mm) Binder Course and Type 6F (12.5 mm) Top Course.

**2.8.1.10 Concrete**

NYSDOT Section 501, Portland Cement Concrete. Class and compressive strength as specified.

#### **2.8.1.11 Sidewalks**

NYSDOT 608-2, Conventionally Formed Concrete Sidewalks, Class A, except that wire fabric reinforcing shall be omitted. with the exception of driveway crossings, refer to Concrete Sidewalk detail. Machine formed concrete sidewalks shall use Class J concrete.

#### **2.8.1.12 Concrete Gutters**

NYSDOT 624-2.02, Conventionally Formed Concrete Gutters, Class A concrete. NYSDOT 624-2.05, Machine Formed Concrete Gutters, Class J concrete).

#### **2.8.1.13 Joint Fillers**

NYSDOT 705-07, Premoulded Bituminous Joint Filler  
NYSDOT 705-02, Asphalt Filler.

#### **2.8.1.14 Curing Compound**

NYSDOT 711-05 white pigmented membrane curing compound

### **2.8.2 CONCRETE TESTING**

**2.8.2.1** The Contractor shall be responsible to complete concrete compressive strength testing by an independent testing agency approved by the Town to ensure minimum strength requirements are achieved. The approved independent testing agency shall cast the concrete test cylinders during concrete placement.

**2.8.2.2 At a minimum, the following testing frequency shall be followed:**

a. Compression Test Specimen: ASTM C 31; One composite sample (minimum of 4 cylinders) for each day's pour of each concrete mix exceeding 5 cu. yd, but less than 25 cu. yd., plus one set of four standard cylinders for each additional 50 cu. yd. or fraction thereof. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required. One additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.

b. Compressive Strength Tests: ASTM C 39; one set for each 25 cu. yds. or fraction thereof, of each concrete class placed in any one day; one specimen tested at seven days, two specimens tested at 28 days, and one specimen held for testing at 56 days if needed.

c. When frequency of testing will provide less than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

d. When strength of field-cure cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

e. Strength level of concrete will be considered satisfactory if averages of sets of two consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive by more than 500 psi.

**2.8.2.3** The approved testing agency shall also conduct slump and air entrainment testing, as well as monitor surface and ambient air temperatures during concrete placement. Any batch of concrete that does not fall within the specified ranges shall be rejected and removed from the site of work. Concrete placed from the rejected batch shall be removed and reconstructed. As a minimum, testing frequency shall be as follows:

- a. Slump: ASTM C 143; one test for each concrete load at point of discharge; and one test for each set of compressive strength test specimens.
- b. Air Content: ASTM C 231 pressure for normal weight concrete; one for each set of compressive strength test specimens.
- c. Concrete Temperature: Test hourly when air temperature is 40° F (4° C) and below, and when 80° F (27° C) and above; and each time a set of compression test specimens are made.
- d. Batching: All concrete shall be batched from a NYSDOT accepted automated plant. Batch plant deliveries shall be accompanied with a ticket showing weights of ingredients in loads. Provide the Town Representative or Town Engineer a copy of the ticket at time of delivery.

### **2.8.3 PREPARATION OF SUBGRADE**

Preparation of subgrade shall not be started until all underground utilities are installed, tested, and found acceptable by the Town.

After completion of all underground construction, grade the subgrade surface to the required cross-section and grade, and compact it to form a smooth surface free of ruts, depressions and mounds in accordance with the requirements of Section 3.4.5. Compaction. The final subgrade surface shall not deviate more than 1 inch from the required grade and cross-section.

The Contractor shall notify the Town Highway Superintendent, the Developer's Engineer, and the Engineer for the Town when the subgrade is completed. The completed subgrade shall be proof-rolled with a roller of not less than 10 tons operating weight. The subgrade shall not roll, deflect, displace or show cracking when proof-rolled.

Remove any soft or saturated subgrade material, replace it with granular fill and compact in accordance with requirements for Backfill and Embankments.

Geotextile fabric may be used only after obtaining written approval and where appropriate in the opinion of the Highway Superintendent and the Engineer for the Town. Subgrade shall be undercut to provide minimum thickness of foundation course based on fabric manufacturer's design curves for H25 loading and shear strength of subgrade soil. Soil support value shall be determined in the field by a soils engineer in accordance with AASHTO methods. Design information shall be submitted to the Engineer for the Town for review.

#### **2.8.4 FOUNDATION COURSE**

Do not start placing foundation course material until the subgrade is proof-rolled and inspected and approved by the Town Highway Superintendent.

Place, grade and compact the foundation course on completed subgrade surface to the alignment, grade and cross-section shown on the drawings. The subgrade surface shall be free of standing water, snow, ice and frozen material prior to placing the foundation course.

Construct the foundation course in accordance with NYSDOT 304-3. Compaction shall be in accordance with applicable requirements of NYSDOT 203-3.12, and shall provide not less than 95% of the maximum dry weight density of the material as determined by ASTM D698.

Construct the foundation course for roads and streets in two equal lifts to a minimum total compacted thickness of 12 inches. Construct the foundation course for sidewalks and gutters in a single lift to a minimum compacted thickness of 6 inches.

Adjust all manhole and drop inlet frames and covers, valve boxes, and other appurtenances to conform to finished grades.

#### **2.8.5 UNDERDRAIN CONSTRUCTION**

The Developer shall install perforated underdrain and crushed stone weeps to drain the subgrade. Construction of underdrain shall not be started until preparation of subgrade is completed.

Excavate the underdrain trench to conform to the detail on the Drawings. Place filter fabric carefully in the trench. Provide sufficient width to allow wrapping of the fabric over the top of the underdrain trench with a minimum of one (1) foot overlap. Transverse splices shall be in accordance with manufacturer's instructions.

Place the underdrain pipe in the trench with perforations in the down position and cap the high end of the pipe.

Stone shall then be carefully placed on the fabric and around the pipe, brought to normal subgrade elevation, and compacted prior to placement of the road base. After the stone has been placed, the filter fabric shall be wrapped over the top of the weep and fastened. Connect underdrain pipe to drop inlets and storm manholes.

#### **2.8.6 PAVEMENT CONSTRUCTION**

##### **2.8.6.1 General**

After completion of the foundation course and only after inspection and approval by the Town Highway Superintendent, construct pavements to the alignment, grade and cross-section shown on the drawings. The foundation course shall be free of standing water, snow, ice and frozen material prior to and during pavement construction.

The finished pavement surface shall be dense, smooth, free of ruts, ridges, roller marks, cracks, depressions or other irregularities. Any defective pavement that cannot be corrected by additional rolling shall be removed and replaced with new pavement.

The type of pavement shall be as shown on the drawings and on typical sections.

### **2.8.6.2 Asphalt Concrete Binder**

Binder shall be constructed to a minimum compacted thickness of three (3 ) inches, or greater thickness as shown on the drawings, in accordance with applicable requirements of NYSDOT 402-3 and 403-3.<sup>3</sup> The material shall be placed with a self-propelled bituminous paver conforming to NYSDOT 402-3.02, and compacted with vibrator type or static steel wheel type roller conforming to NYSDOT 402-3.04 Contractor to place all essential safety markings on binder course.

### **2.8.6.3 Asphalt Concrete Top**

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. Tack coat shall be applied 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 applying the tack coat and placing the top course.

Top course shall be constructed to a minimum compacted thickness of one and a half (1 1/2) inch, or greater thickness as shown on the drawings, in accordance with applicable requirements of NYSDOT 402-3 and 403-3.

Placing and compaction shall be as specified for the binder course.

### **2.8.6.4 Bituminous Surface Treatment**

Bituminous surface treatment shall be constructed on completed foundation course in accordance with NYSDOT 410-3.01 - Bituminous Surface Treatment - Pavement, by applying a first course of 0.25 - 0.50 gallons per square yard of bituminous material and 20 - 30 pounds per square yard of crushed stone, followed by a second course of 0.25 - 0.40 gallons per square yard of bituminous material and 15 - 25 pounds per square yard of crushed stone.

Stabilized shoulders shall be constructed on completed foundation course in accordance with NYSDOT 410-3.02 - Bituminous Surface Treatment – Shoulders, by applying 0.4 gallons per square yard of bituminous material followed by 20 - 30 pounds per square yard of crushed stone.

## **2.8.7 CONCRETE GUTTERS**

### **2.8.7.1 General**

NYSDOT 703-0201 washed stone weeps shall be provided under all concrete gutters.

Concrete gutters shall be constructed using conventional steel forms or machine forming.

Before setting forms, the foundation course shall be inspected by the Town Highway Superintendent. Any ruts, depressions and soft areas shall be corrected and the surface regraded and thoroughly compacted. The foundation course shall be thoroughly wetted before placing concrete.

Construct concrete gutters where indicated on the drawings in accordance with the Standard Details and NYSDOT 624-3.02.

#### **2.8.7.2 Casting Segments**

Conventionally formed gutters shall be cast in 8-foot segments. A 1/8-inch thick separator plate cut to fit the section shall be used in each joint and removed as the concrete hardens, or the gutter may be constructed in alternate sections, 24 hours to elapse before construction of adjacent sections. Construction joints shall be poured full with Asphalt Filler.

#### **2.8.7.3 Conventional Forms**

Forms shall be steel, straight, free from warp, and constructed not to interfere with inspection for grade or alignment. All forms shall extend for the full gutter depth and shall be braced and secured to prevent displacement from alignment during placing of concrete.

#### **2.8.7.4 Concrete Placing and Finishing**

Concrete shall be placed in conventional forms in accordance with the applicable requirements of NYSDOT 555-3.04. Excess concrete shall be screeded off perpendicular to the flow line of the gutter. Forms shall be left in place for 24 hours or until the concrete has sufficiently hardened, as determined by the Engineer, so that they can be removed without damage to the gutter.

The gutters shall be finished to produce a smooth surface and then lightly broomed to a uniform texture.

#### **2.8.7.5 Machine Forming**

Gutter shall be machine formed to the proper line and grade. The Engineer may require the Contractor to demonstrate that the specific equipment he proposes to use is capable of satisfactorily placing the concrete mix.

Any gutter placed outside of tolerance of 1/2 inch of the established line or 1/4 inch of the established grade shall be removed and replaced at the Contractor's expense.

Maximum placement slump shall be 2 1/2". Air content shall be within +1% of design.

#### **2.8.7.6 Contraction Joints**

Contraction joints for machine formed gutter shall be spaced every 10 feet and formed or sawcut 1/8" wide and 3/4" deep. The sawcut or formed joints shall be left unfilled.

### **2.8.7.7 Expansion Joints**

Expansion joints for conventionally formed and machine formed gutter shall be 1/2-inches wide and shall be formed with Joint Filler, placed at intervals not to exceed 50 feet. The filler material shall be cut to conform to the cross-section of the gutter and shall extend the full width and depth of the gutter.

### **2.8.7.8 Concrete Curing**

Curing shall comply with the requirements of NYSDOT 502-3.11, Curing. NYSDOT 711-05 white pigmented membrane curing compound shall be applied by spraying in accordance with manufacturer's instructions upon initial setting of the concrete.

### **2.8.7.9 Protection**

The Contractor shall keep the gutter clean, aligned, and protected from damage until final acceptance of the work. Any gutter damaged prior to the final acceptance of the work shall be repaired or replaced at the Contractor's expense.

## **2.8.8 CONCRETE SIDEWALKS**

### **2.8.8.1 General**

Before setting forms, the foundation course shall be inspected by the Town Highway Superintendent. Any depressions, ruts and soft areas shall be corrected and the surface regraded and thoroughly compacted. The foundation course shall be thoroughly wetted before placing of concrete.

Construct concrete sidewalks where shown on the drawings in accordance with the Standards Details and NYSDOT 608-3.01.

### **2.8.8.2 Forms**

Forms shall be steel, straight, free from warp and constructed not to interfere with screeding of concrete. Wood forms may be used only for curved sections. All forms shall extend the full 5-inch depth of the sidewalk and shall be braced and secured to prevent displacement of alignment during placing of concrete.

### **2.8.8.3 Concrete Placing and Finishing**

Concrete shall be placed to the full depth as shown on the drawings and in the Standard Details.

Transverse construction joints shall extend to the full depth of the slab and shall be spaced 20 to 25 feet apart. The edges of joints shall be finished with an edging tool having a 1/4-inch radius.

A premolded bituminous joint filler 1/2-inch thick shall be installed at all construction joints and joints between sidewalk and curb, pavement and buildings.



The concrete surface shall be scored at intervals of three to five feet so that the finished walk will be marked in squares. The concrete shall be finished to produce a smooth surface and then lightly broomed to a uniform texture.

#### **2.8.8.4 Curing**

Curing shall comply with the requirements of NYSDOT 502-3.11, Curing. NYSDOT 711-05 white pigmented membrane curing compound shall be applied by spraying in accordance with manufacturer's instructions upon initial setting of the concrete.

#### **2.8.8.5 Protection**

The Contractor shall keep the sidewalk clean and protected from damage until final acceptance of the work. Any sidewalk damaged prior to the final acceptance of the work shall be repaired or replaced at the Contractor's expense.

#### **2.8.8.6 Detectable Warnings**

Install dark gray precast polymer panel, or cast iron, detectable warnings during construction of sidewalk curb ramps.

### **2.8.9 STREET AND TRAFFIC SIGNS**

#### **2.8.9.1 Street Signs**

Temporary signs shall be installed at each street intersection when construction of new roadways allow passage by vehicles. Street signs shall be provided at all street intersections, shall be of the type approved by the Town Highway Superintendent, and shall conform to the requirements of NYS Manual of Uniform Traffic Control Devices.

#### **2.8.9.2 Traffic Signs**

Traffic signs shall be provided at intersections designated by the Town Highway Superintendent and shall conform to the requirements of NYS Manual of Uniform Traffic Control Devices.

### **2.8.10 MONUMENTS**

Monuments shall be 4-inch diameter or square precast concrete 36 inches long, with a 1/2-inch steel reinforcing rod embedded in the center. The top of the rod shall serve as the point of reference.

Monuments shall be installed plumb, with the top set 1/4-inch lower than adjacent finished grade, at the locations shown on the approved final plans and staked out by a Licensed Surveyor. Fill the space around the monument with thoroughly compacted dry concrete.

### **2.8.11 PROPERTY CORNER MARKERS**

During construction lots may be staked with wood hubs. After construction and final grading is completed, permanent corner markers consisting of 3/4-inch diameter solid steel rod 24-inches long shall be set by a Licensed Surveyor at all corners of each lot.

The top of the rod shall be set 1/4-inch lower than adjacent finished grade.

At the option of the property owner, monuments conforming to Section 3.8.10 may be used in lieu of steel rods.

### **2.8.12 CONSERVATION EASEMENT MARKERS AND BOUNDARY PINS**

Boundary pins consisting of 3/4-inch diameter solid steel rod 24-inches long with the top set 1/4-inch lower than adjacent finished grade shall be set by a Licensed Surveyor.

Conservation easement markers shall be one of the following:

**2.8.12.1** Pressure treated 4" x 4" wood posts, six (6) feet long, installed plumb, with the top set three (3) feet above adjacent finished grade, located within 12 inches of the conservation easement boundary pins.

**2.8.12.2** Brown fiberglass posts, five (5) feet long, with pull out anchors, Glas-Flex (GFX) as supplied by Rockart, Inc., or equal as approved by the Town, set plumb, with the top set three (3) feet above adjacent finished grade, located within 12 inches of the conservation easement boundary pins.

**2.8.12.3** In lawn areas, alternate durable, visible natural markers may be used in lieu of 3.8.12.1 and 3.8.12.2 above, and shall be located within 10 feet of the conservation easement boundary pins. Such alternate markers shall be submitted in advance for approval by the Town.

A sign, as approved by the Town, shall be attached to all markers, and shall include the following information: "Town Conservation Easement".

### **2.8.13 TOWN ROAD CROSSINGS**

Town road crossings shall be made by boring unless specific approval is granted by the Town Highway Superintendent for open cut. If crossing by open cut is approved, the road shall be repaired in accordance with the Standard Detail of Typical Town Road Crossing Repair. All crossings shall require casing in accordance with NYSDOT Specification Section 650 – Trenchless Installation of Casing.

## **SECTION 3.0 STANDARD DETAILS**