STANDARD SPECIFICATIONS

SANITARY SEWER
STORM DRAINAGE
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GENERAL SPECIFICATIONS: (3/15/15)

1. Obtain a copy of the latest Town Standard Detail Sheets for sanitary sewer, storm drainage, water mains and highway.

2. The official horizontal datum for the Town of Bethlehem is NY State Plane North American Datum 1983 (NAD83) feet. The vertical datum for the Town of Bethlehem is North American Vertical Datum 88 (NAVD88) feet. All georeference files should be submitted in these horizontal and vertical datum.

3. A minimum of two benchmarks based on USGS datum must be provided. These benchmarks should be clearly labeled and located a maximum distance of 500’ apart.

4. Extreme care shall be taken in the handling of pipe and appurtenances. Under no circumstances shall such material be dropped, rolled or skidded against another pipe. All slings, hooks and pipe tongs shall be padded and used in such a manner to prevent damage to the pipe. Handling pipe from the interior pipe wall should be avoided.

5. When excavating in other than rock, heavy frost or sand, the use of a steel plate welded/bolted across the teeth of the bucket is required. "Duck bill" teeth may be substituted for the steel plate.

6. All excavators installing gravity pipe 8" in diameter, or larger, at runs over 30' must use a low intensity mobile laser for pipe alignment and grade. The laser must be set up to emit a beam of light through the pipe being installed. Using a transit to align the laser is required. Placing the laser on top of the pipe or over the structure opening is not acceptable. The use of a mechanical blower is required on all runs over 100' long. Using a level to check the elevation of the pipe at various locations is required. Structures are designed to have a minimum elevation difference of 0.10' between the incoming and outgoing pipes. Discrepancies shall be brought to the attention of the Town Engineer for approval before installation.

7. Except when installing force main/grinder pump sanitary sewer mains, structures shall not be set without the pipe being installed in the trench, or the trench for the proposed pipe being excavated. When using a laser for pipe alignment and grade, the beam of light must also be used to install the structure.

8. All of a proposed sanitary and storm sewer main must be installed from structure to structure. No partial runs are permitted.

9. Two copies of the shop drawings for each structure must be submitted to the Town Engineer for approval prior to fabrication. These drawings shall include the structure diameter, pipe sizes and locations, all elevations, locations of steps and any other pertinent information. All structures shall be precast, constructed using reinforced 4000 p.s.i. concrete, and be fitted with an eccentric 30" diameter opening. On storm structures, the 30" opening is to be located within the back 180 degrees of the structures, away from the edge of pavement. On sanitary sewer structures, the opening is to be located perpendicular to the flow. All structures shall be either:

a.) Minimum 48" in diameter when installing pipe 6" through 24" in diameter.

b.) Minimum 60" in diameter when installing pipe 30" and 36" in diameter. These structures may also be used to enclose a 42" diameter pipe with a deflection angle of 60 degrees or less. An energy dissipating structure enclosing pipes 24" or less in diameter shall have a minimum diameter of 60". A sanitary sewer manhole with an inside drop of over 2.0', shall have a minimum diameter of 60".

c.) Minimum 72" in diameter when installing 42" diameter pipe with a deflection angle of over 60 degrees. These structures may also be used to enclose a 48" and a 54" diameter pipe with a deflection angle of 60 degrees or less.

or d.) Minimum 78" in diameter when installing 48" diameter pipe with a deflection angle greater than 60 degrees. These structures may also be used to enclose a 60" pipe with a deflection angle of 60 degrees or less.

10. Steps are required to be installed in all structures over 4' deep. These steps shall be made from either aluminum or copolymer polypropylene plastic with a 1/2" grade 60 steel reinforcement. The imbedded portion of the aluminum steps is to be bituminous coated. Steps shall be installed 16" on center and be aligned with the 30" diameter opening. All steps shall have a 5" to 7" projection into the structure.

11. Except when installing an energy-dissipating structure, structures shall not be set without the pipe being installed in the trench, or the trench for the proposed pipe being excavated. When using a laser for pipe alignment and grade, the beam of light must also be used to align the structure.

12. All structures must be backfilled with R.O.B. gravel not exceeding 2" in diameter, granular pipe sand or sand.

13. Precast concrete grade extension rings are permitted and shall be constructed using reinforced 4000 p.s.i. concrete. These extension rings are permitted up to a maximum overall height of 16 inches. The outside edge of the extension ring may not extend/cantilever beyond the edge of the sewer manhole.

After Binder course installation, adjustable manhole steel riser rings are permitted up to a maximum overall height of 2 inches. Steel riser rings shall be M5257514154A, as manufactured by East Jordan Iron Works, or approved Town equal. Manhole riser rings shall be fabricated using domestic A-36 steel ¾" thick bottom (inner) ring, a 12 gauge intermediate transition ring and ½" thick (outer) ring. The manhole riser system shall be anchored to the manhole frame with three 1" cone pointed allen head set screws to prevent any movement. An optional "L" shaped angle bracket to prevent movement is to be available, if and when required. The adjusting device shall be fabricated from stainless steel and have a positive lock. The ring must be capable of adjustment +/- 3/8" from nominal. The inner ring, the transition ring and outer ring shall be securely welded to prevent any differential movement under traffic loads and shall be fabricated to +/- 1/16" concentricity. The outer riser ring shall have an inside diameter no greater than 3/16" larger than the outside diameter of the manhole lid. All materials shall be bituminous asphalt coated. Town Engineer must approve installation prior to paving.

14. All pipe bedding, haunch, initial backfill and final backfill materials shall have a moisture content suitable for proper compaction. The layer thickness used during backfilling shall not exceed the capability of the compaction equipment.

15. The proposed location of all building laterals must be reviewed with the Town Engineer before installation. In areas where there is an existing or proposed utility easement (electric, CATV, gas, phone), the building laterals must be installed beyond the utility easement during the initial phase of construction. Proposed laterals must be located a minimum of 8' horizontally from all storm structures, catch basins, gate valves and fire hydrants. The temporary end of the building lateral must be marked by a 4" x 4" wood stake. The stake must extend a minimum of 2' above finished grade, or temporary grade, whichever is higher, be painted green and indicate depth.

16. All highway borings shall have detailed plans and profiles approved by the appropriate governing agency(s). Work shall progress to completion as soon as possible after work is started.

Pavement, shoulders, curbs, sidewalks, lawns and other areas disturbed by the contractor, must be restored to original condition.

17. Appropriate traffic control devices, as shown in the most recent edition of the Manual of Uniform Traffic Devices, and personnel shall be provided in accordance with Federal, State or local regulations to regulate, warn and guide traffic through the work site.

18. All materials, design and construction methods shall comply with details and specifications set forth by the NYSDEC, New York State DOH, Albany County DOH and the Great Lakes-Upper Mississippi River Board of State Sanitary Engineers (most recent edition). In the event of a conflict, the more stringent requirement shall govern, as required by the Town Engineer.

19. Record data submissions must meet the requirements indicated in the Town of Bethlehem Final Digital Submission Standards. There is no need to create an entirely new drawing/map for these final elevations. Using the approved plan as a base, the finished elevations must be clearly identified alongside the proposed elevations. The title of the revised map must clearly indicate that it contains record data. Vertical elevations should be accurate to within 0.01'. Horizontal distances should be accurate to within 0.10'. Engineers/Surveyors must use separate plan or plan/profile sheets for each utility.

Record data consists of measured ties and final elevations of installed utilities. The project/subdivision owner shall have their Engineer or Surveyor submit:

- **a.) Final elevations of sanitary manhole rims and inverts, the locations of, and measured ties to, all sanitary sewer building laterals, gate valves, curb boxes, sanitary sewer wyes and tees, measured from the nearest downstream sanitary manhole. If applicable, use the stations of the wyes shown in the CCTV inspection, and;**
- **b.) Final elevations of storm structure rims and inverts, locations of, and measured ties to, all storm sewer building laterals, and;**
- **c.) Final elevations of newly installed hydrants (Nut at Point OF Arrow, NPOA), locations of, and measured ties to, all gate valves and curb boxes, water main tees, bends and reducers, and;**
- **d.) Critical elevations of the stormwater pond. The critical elevations include, but are not limited to spillway elevations, outlet structure elevations, top of berm elevations, bottom of pond elevation, and forebay spillway**

channel elevation. A licensed Engineer must confirm the pond was built in accordance with the approved plans.

The record data must be electronically submitted (.pfd and .dwg) to the Town within 30 days of completion of the utility work.

20. There shall be no variations from these specifications unless first approved by the Town Engineer. The Town Engineering Division may be contacted at 439-4955.

PIPE TRENCHING, BACKFILLING, AND COMPACTION: (3/15/15)

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Contractor shall provide all labor, materials, equipment, and services necessary for, and incidental to, the excavation of trenching, backfilling, compacting, dewatering, protection and disposal, as shown on the approved drawings, and as herein specified.

B. The Town Engineer will determine the suitability of materials that are to be used in the work and should any materials encountered be unsatisfactory for the purpose intended, they shall be removed from the area at the Contractor's expense.

1.2 QUALITY ASSURANCE

A. Reference Standards:

1. The standards, as referenced herein, shall be applicable.
A. "Standard Specifications, Construction and Materials, New York State Department of Transportation, Office of Engineering,"
B. "Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO)."
C. American Society for Testing and Materials (ASTM).

B. The Contractor shall comply with the requirements for soil erosion and sedimentation control and other requirements of governmental authorities having jurisdiction, including the State of New York.

C. The Contractor shall provide and pay for all costs in connection with an approved independent testing facility to determine conformance of soils and aggregate with the specifications, in accordance with Section "Quality Requirements."

1.3 SUBMITTALS

A. Samples:
1. The Contractor shall furnish representative earth materials to the testing laboratory for analysis and report, as directed by the Town Engineer, or as outlined in the specifications.

B. Test Results:

1. **The testing laboratory shall submit written reports of all tests, investigations, findings and recommendations to the Contractor and the Town Engineer.**

1.4 PROJECT REQUIREMENTS

A. Notify the Town Engineer of any unexpected subsurface condition.

B. Protect excavations by shoring, bracing, sheet piling, or by other methods, as required to ensure the stability of the excavation. Comply with OSHA requirements.

C. Underpin or otherwise support structures adjacent to the excavation, which may be damaged by the excavation. This includes service lines.

D. Protection of Existing Utilities:

1. **Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations. Comply with OSHA requirements.**
2. **Coordinate interruption and/or termination of utilities with the utility companies and the Owner.**
3. **When customers will be affected, provide a minimum of five (5) days notice to the Town before interrupting any utility.**
4. **Demolish and completely remove from the site any existing underground utilities designated to be removed.**
5. **Repair any damaged utilities as acceptable to the Town, Owner, Engineer, and utility company.**

E. Protection of Persons and Property:

1. **Barricade open excavations occurring as part of this work and post with warning lights, if required.**
2. **Operate warning lights as recommended by authorities having jurisdiction.**
3. **Protect structures, utilities, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.**
4. **Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or dryout to the greatest extent possible. Maintain moist conditions for root system and cover exposed roots with**

burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe bedding, haunch material and initial backfill (Normal Soil Conditions): Sound, durable sand, gravel, stone or blends of these materials, free from organic, frozen or other deleterious materials, conforming to the requirements of NYSDOT Section §304 and meeting the following gradation requirements (NYSDOT Subbase Type 4):

Sieve	Percent Passing
2"	100
1/4”	30-65
No. 40	5-40
No. 200	0-10

B. Pipe bedding, haunch material and initial backfill (Saturated Soil Conditions): Select mixture of graded crushed stone, free from organic, frozen, or other deleterious materials, conforming to the requirements of NYSDOT Section §703-02 and meeting the following gradation requirements (NYSDOT Size 2):

Sieve	Percent Passing
1-1/2"	100
1”	90-100
1/2”	0-15

C. Pipe bedding, haunch material and initial backfill: Sound, durable sand, gravel, stone or blends of these materials, free from organic, frozen or other deleterious materials, conforming to the requirements of NYSDOT Section §304 and meeting the following gradation requirements (NYSDOT Subbase Type 4):

Sieve	Percent Passing
2"	100
1/4"	30 - 65
No. 40	5 - 40
No. 200	0 - 10

D. Suitable Material: Sound, durable sand, gravel, stone or blends of these materials, free from organic, frozen or other deleterious materials, conforming to the requirements of NYSDOT §203-2.02C and meeting the following gradation requirements:

Sieve	Percent Passing
4"	100
No. 40	0 - 70
No. 200	0 - 15

Run-of-trench material, meeting the above criteria, shall be considered suitable material and shall be used for trench backfill only after tested in accordance with Section "Quality Requirements" and approved by the Town Engineer. The Contractor shall pay for all additional testing required to determine the conformance of run-of-trench material, if at any time during the work this material appears to be in non-conformance in the opinion of the Town Engineer.

PART 3 - EXECUTION

3.1 PRECONSTRUCTION MATERIAL QUALIFICATION TESTING

A. General:

1. Sufficient size samples shall be obtained from the potential borrow source to allow completion of tests listed in paragraph B below. Samples may be obtained from test borings, test pits, or from borrow pit faces provided that surficial dry or wet soil is removed to expose undisturbed earth. Tests listed below shall be performed on each sample obtained. A minimum of three (3) representative samples from each potential borrow source shall be furnished to the testing laboratory for prequalification testing. Test data shall be provided to the Town Engineer a minimum of 2 weeks prior to construction for approval of borrow source. Three test reports completed within three months prior to construction may be submitted for commercial earth borrow sources or suppliers of stone products (crushed stone or NYSDOT graded stone products) in lieu of prequalification tests as approved by the Town Engineer.

B. Material Tests:

1. Particle Size Analysis:
   a. Method: ASTM D422
   b. Number of Tests: One (1) per sample; three (3) per potential source.
   c. Acceptance Criteria: Gradation within specified limits.
2. Maximum Density Determination:
   a. Method: ASTM D698 - Standard Proctor

b. Number of Tests: One (1) per sample; three (3) per potential source.

3. Re-establish gradation and maximum density of fill material if source is changed during construction.

3.2 PREPARATION

A. Establish required lines, levels, contours and datum.

B. Maintain benchmarks and other elevation control points; re-establish if disturbed or destroyed, at no additional cost to the Town.

C. Establish location and extent of existing utilities prior to commencement of excavation.

3.3 EXCAVATION

A. All excavation shall be made to such depth as required and of the width shown on the approved plans to provide suitable room for building the structures and laying the pipe(s) they are to contain and for sheeting, shoring, pumping and draining as necessary, and for removing peat, silt, or any other materials which the Town Engineer may deem unsuitable.

B. Trench excavation for pipes shall be made by open cut to accommodate the pipe or structure at the depths indicated on the Contract Drawings. Excavation shall be made to such a depth and to the width indicated on the Contract Drawings so as to allow a minimum of four to six inches (4” – 6”) of bedding to be placed beneath the bottom of all structures and barrels, bells or couplings of all pipes installed unless otherwise specified on the drawings.

C. The bottom of the trench shall be accurately graded to provide a uniform layer of bedding material, as required, for each section of pipe. Trim and shape trench bottoms and leave free of irregularities, lumps, and projections.

D. Stockpile excavated subsoil for reuse where directed or approved. Remove excess or unsuitable excavated material from site.

E. Excavation Below Grade: If, in the opinion of the Town Engineer, existing material below the trench grade is unsuitable for properly placing bedding material and laying pipe, the Contractor shall excavate and remove the unsuitable material and replace the same with an approved fill material properly compacted.

F. Stability of Excavation: Slope sides of excavations shall comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavation in safe condition until completion of backfilling.

G. Removal of materials beyond the indicated subgrade elevations, without authorization by the Town Engineer, shall be classified as unauthorized excavation and shall be performed at no additional cost to the Owner.

3.4 DEWATERING

A. The Contractor shall remove all water from the excavation promptly and continuously throughout the progress of the work and shall keep the excavation dry at all times until the structures to be built therein are completed and are backfilled or have sufficient weight to resist uplift pressures. Groundwater levels shall be depressed to a minimum of 2 feet below excavation subgrade. No pipe is to be laid in water, and water shall not be allowed to rise on, or flow over any pipe or masonry until such time as approved by the Town Engineer.

B. All necessary precautions shall be taken to prevent disturbances of and to properly drain the subgrades upon which concrete is to be placed and upon which pipe is to be laid. If necessary, in the opinion of the Town Engineer, well points, deep wells, or other means shall be used to lower the groundwater level, and observation wells shall be installed to confirm that groundwater levels are lowered as specified. Well points, if used, shall be shifted frequently to avoid drainage from too long a distance. Provide a suitable point of discharge in a manner satisfactory to the Town Engineer.

C. Precautions shall be taken to protect uncompleted work from flooding during storms or from other causes. All pipe lines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected.

3.5 BEDDING AND BACKFILLING

A. All pipe trenches backfill (Pipe bedding, haunch material, initial backfill and final backfill) shall be compacted by tamping or rolling to achieve a minimum dry density of 95

percent of the standard Proctor maximum dry density of the material used (ASTM D698). Backfill in pipe trenches to be covered with pavement shall be compacted to a minimum of 95 percent of standard Proctor maximum dry density. Backfill materials shall be placed with water content within plus or minus 4 percent of optimum moisture content per the standard Proctor method (ASTM D698). Any water used for compaction shall be provided by the Contractor at his own expense. The approval of the Town Engineer of the proposed method of compaction of backfill shall in no way be construed as relieving the Contractor of responsibility of settlement of trenches, etc. and any settlement shall be repaired by him at his own expense.

B. Bedding and backfilling shall be accomplished in four stages unless otherwise specified on the Contract Drawings. The first stage shall involve placement of "pipe bedding" as a layer(s) of selected material required to support, or to stabilize unsound or unsatisfactory foundation conditions. The second stage is the placement of "pipe haunch" from the top of the pipe bedding to the springline of the pipe. The third stage shall involve placement of "initial backfill" from the pipe haunch to one (1) foot above the pipe. The fourth stage involves the placement of "final backfill" in the remainder of the trench up to the surface of the ground or the bottom of any special surface treatment subgrade elevation.

C. The bedding material shall be placed in the trench after the trench has been excavated a minimum of four to six inches (4" – 6") below the bell of the pipe to permit the placing of not less than four (4) inches of bedding material unless otherwise specified on the Contract Drawings. Where, in the opinion of the Town Engineer, more than four (4) inches of bedding material shall be required, the excavation shall be performed and bedding placed to the depth ordered by the Town Engineer.

D. The bedding material shall be placed to the full width of trench. The bedding material shall be placed in loose lifts not exceeding six (6) inches to the elevation shown on the project drawings or directed by the Town Engineer. The bedding material shall be tamped and compacted to form a firm and even bearing surface.

E. Pipe haunch and initial backfill shall be placed to the elevation shown on the Contract Drawings in loose lifts not-to-exceed six (6) inches in thickness, before compaction. The backfill shall be placed on both sides of the pipe at the

same time and to approximately the same elevation. Any pipe that is damaged or moved out of alignment, regardless of cause, shall be replaced or realigned at the Contractor's expense. Each layer shall be thoroughly compacted by hand-tamping or mechanical means being careful not to damage the pipe. When the initial backfill reaches one (1) foot over the top of the pipe, the entire surface shall be compacted by mechanical means.

F. The remainder, if any, of the trench above the initial backfill shall be backfilled in loose lifts not exceeding six (6) inches in thickness before compaction. Each layer shall be thoroughly compacted by mechanical means.

3.6 BACKFILLING AROUND STRUCTURES (buildings)

A. The Contractor shall not place backfill against any structure without obtaining the approval of the Town Engineer. No dumping shall be allowed where materials would flow against or around such structures. Backfill material shall be deposited in horizontal layers not exceeding 8 inches in loose thickness or as shown on the Contract Drawings and thoroughly compacted by hand or pneumatic tampers to the satisfaction of the Town Engineer.

3.7 SUSPENSION OF WORK

A. Whenever the work is suspended, excavations shall be protected and the roadways, if any, left unobstructed. Within or adjacent to private property, material shall be stored at such locations as will not unduly interfere with traffic of any nature and in no case shall materials be stored in locations which will cause damage to existing improvements.

3.8 DISPOSAL OF MATERIAL

A. Excess and unsuitable materials shall be landfilled by the Contractor on the site in an area approved by the Town Engineer or disposed of off- site at the Contractors expense. Any loam, material of a high clay content, or material containing a high percentage of organic material which the Town Engineer declares to be unsuitable for backfill shall be replaced at the Contractor's expense.

3.9 FIELD QUALITY CONTROL

A. Notify the Town Engineer at least one (1) working day in advance of all phases of filling and backfilling operations.

B. In-place density testing shall be performed to ascertain the compacted density of the fill and backfill materials in accordance with the following methods:

1. In-place relative density:
a. Method: AASHTO T191, Sand Cone Method
AASHTO T238, Nuclear Method

C. In-place density tests on trench backfills shall be provided for every 500 cubic yards of fill and in vertical lifts not exceeding two (2) feet, and at least once daily.

D. One particle size analysis (ASTM D422) and one standard Proctor compaction test (ASTM D698) shall be competed for every 5,000 cubic yards of material placed.

E. The Town Engineer may direct additional tests to establish gradation, maximum density, and in-place density as required by working conditions, at the Contractor's expense.

F. Acceptance Criteria: The criteria for acceptability of in-place fill shall be in-situ dry density and moisture content. If a test fails to qualify, the fill shall be further compacted and re-tested. Subsequent test failures shall be followed by removal and replacement of the material.

4.0 AREAS MARKED AS CONTROLLED FILL ON PROFILES

A. Controlled Fill - on the profiles, when sections of a proposed road have more than three (3) feet of fill (vertically), that area is to be shaded, or crosshatched. This area is to be labeled "controlled fill". All controlled fill shall be certified by a licensed engineer, that placement of the material was done in a manner suitable for the construction of the road and the installation of water main, storm sewers, and sanitary sewers. To this end, no fill shall be placed in areas identified on these plans as controlled fill areas until the certifying engineer has been consulted.

SANITARY SEWER STANDARD SPECIFICATIONS: (12/01/16)

1. Layout stakes for sanitary sewer mains are required. Typically, a location stake shall be placed to mark each structure. Two offset stakes with the cut/fill marks to the proposed rim and invert elevations are also required. Layout stakes for Town owned/maintained utilities must be placed by a licensed land surveyor or their representative.

When installing force main/grinder pump sanitary sewer mains, offset stakes shall be placed every 25' on horizontal curves and every 50' on tangent areas and be 6' to 10' from the proposed main. These offset stakes shall have cut marks to the proposed top of pipe as shown on the approved profiles. (In general, when these proposed sewer mains are to be installed in the shoulder, the shoulder is higher than the centerline of the road.)

2. Any Contractor or other party performing work in connection with the construction of a sewer, or sewer lateral connection, must have on file with the Town an Owner's and Contractor's protective liability insurance policy indemnifying the Town of Bethlehem and/or the Town of Bethlehem Sewer District. Current requirements are available at 439-4955, extension 1132.

3. The following inspection and certification requirements are required:

a.) Adequate inspection shall be provided at all times and during all phases of construction and shall be done under the direction of the Town Engineer.

b.) The inspection service may be provided either by the Town or by the Town's Designated Engineer (TDE). However, the engineer hired by the owner/developer to perform the design may not inspect his or her own work on behalf of the Town due to a conflict of interest. In either case, the cost of inspection shall be the responsibility of the developer. The costs will be based on the Town's current billing schedule in place at the time of the inspections.

c.) Written certification by a New York State licensed engineer may be required from the owner/developer certifying to the Town (and other agencies having jurisdiction) that the sanitary sewer systems were constructed in accordance with plans.

4. All gravity sanitary sewer mains shall be either:
a.) PVC sewer pipe. Pipe 4” to 12” in diameter shall be SDR 26 and comply with ASTM D-3034 and have a minimum pipe stiffness of 115 psi. All PVC sewer pipe 15” to 42” in diameter shall be SDR 35 and comply with ASTM F-679 and have a minimum pipe stiffness of 46 psi. All fittings shall be in full compliance with ASTM 3034 and other appropriate specifications. Joints in this pipe shall consist of an integral bell with a composite rubber gasket conforming to ASTM D-3212 and ASTM F-477.

or b.) SaniTite HP Sanitary pipe, 15” to 48”, as manufactured by Advanced Drainage Systems (ADS). Pipe shall conform to ASTM F2736 for diameters 15” to 24” and ASTM F2764 for diameters 30” to 48”. The pipe shall be watertight according to the requirements of ASTM D3212, and spigot shall have 2 gaskets meeting the requirements of ASTM F477. The pipe shall be manufactured in 13’ or 20’ lengths.

5. The absolute minimum design grade for an 8” gravity sanitary sewer pipe is .45%.

6. For gravity pipe, both mains and laterals, the bedding and haunch material shall be class 1A angular 1/4" to 1 1/2" graded crushed stone as specified in ASTM D-2321-89, such as a mix of NYSDOT size designation 1 and 2. The bedding under the manhole and the pipe bedding within 8' of the manhole shall be mechanically compacted. Pipe haunch material shall be manually compacted.

Initial backfill shall consist of R.O.B. gravel not exceeding 2" in diameter, graded crushed stone as described above, or granular pipe sand. Initial backfill shall be suitable for a cushion over the pipe and be mechanically compacted.

Final backfill shall consist of selected excavated material, or R.O.B. gravel, that has been approved by the Town Engineer. The Town Engineer may require compaction tests at his/her sole discretion. Final backfill in or along pavement areas shall be mechanically compacted. Keep in mind that this backfill may be the support for future pipes, roads or sidewalks.

7. All gravity residential sanitary sewer laterals shall be 6 inches in diameter within rights-of way and easements, unless otherwise noted, and shall have a minimum slope of 1.0%. No contractor shall uncover, make any connections to, use, alter or disturb any existing public sewer or appurtenances thereof, without first obtaining a written permit from the Town of

Bethlehem Sewer District. No gravity residential sewer lateral is to discharge directly into a manhole.

8. Installing a gravity sewer lateral into an existing main, where no wye exists, requires the use of a Romac Industries "CB" style sewer saddle. The saddle has one 3-1/2" wide stainless steel strap with SS bolts. Wrap saddle to prevent corrosion.

9. For low-pressure force main installations less than 4" in diameter, pipe shall be either PVC SDR 21 conforming to ASTM D-2241, or High Density Polyethylene Pipe (HDPE). HDPE shall be iron pipe (IPS) sizes, DR-11. A stiffener should be inserted when using compression type fittings on pipe 2" and less in diameter. Installing a low-pressure sewer lateral into an existing HDPE main, where no wye exists, requires the use of a Romac Industries "202N-H" style sewer saddle. The saddle has two 2" wide stainless steel straps with SS bolts. Wrap saddle to prevent corrosion.

10. For force main installations 4" or larger in diameter, pipe shall be High Density Polyethylene Pipe (HDPE). HDPE shall be ductile iron pipe (DIP) sizes, DR-17 and DR-11, joined by means of zero leak-rate heat fusion, or electro fusion, and Town approved mechanical joints proven for HDPE pipes, and meeting the specifications and requirements of Water Works Association Standard C906. When adapting the HDPE force main pipe to the SCH 80 PVC outside the FM manhole, use a Spears Manufacturing Company, or approved equal, compression fitting with a stainless steel insert in the HDPE FM pipe.

The exterior of the pipe shall be a co-extruded integral layered shell whose color is green, or green striped, for easy identification as a sewer main. All pipes shall be suitable for use as a fluid pressure conduit.

The polyethylene pipe and fittings shall be PE4710 (DR-17) high density polyethylene from virgin resins exhibiting a cell classification of PE 345444C as defined in ASTM D3350 with an established hydrostatic design basis of 1600 psi for water at 73 degrees Fahrenheit. The resin shall be listed by Plastic Pipe Institute (PPI) in its pipe-grade registry Technical Report (TR) 4, "Listing of plastic pipe compounds".

All HDPE pipe must be NSF listed by the manufacturer with the pipe bearing the "NSF" logo. All HDPE pipe must be marked as prescribed by ASTM 714, AWWA C906 and NSF. HDPE pipe markings shall include nominal size, OD base (ie: 12" ductile iron pipe sizing, DIPS), dimension ratio, pressure class, WPR, AWWA-C906, manufacturers name, manufacturers production code, including day, month, year extruded, manufactures plant and extrusion line.

#10 HDPE stainless steel tracer wire is required. (Blue for water & Green for sewer). Wire is to be installed along centerline of mainline and lateral pipe, looped to the top of each gate valve box, looped (or ended) alongside (outside) each lateral curb box to its cap, immediately under the FM manhole frame, then tied to a MH step. When required, Cott Mfg. model FinkPlate 703 pipeline markers with the COTTDome cover must be used.

11. All sewer mains and appurtenances shall be installed in a dry trench. Under no circumstances shall ground water be allowed to enter the sanitary sewer main. During construction, a watertight plug or cap is required in the outlet pipe of each manhole. If debris enters the sewer system, it must be removed prior to removing the plug or cap.

12. All sanitary sewer manholes are to have their inside and outside surfaces coated with a factory applied bitumastic sealer. If damaged, interior coating to be re-applied as required by the Town Engineer. All manholes must be fitted with an eccentric cone section with a 30" diameter opening.

13. Sanitary sewer manhole covers are to have two penetrating pickholes approximately 1 1/2" wide x 2" long. Town owned covers are to be labelled "Bethlehem Sewer District", private covers are to be labelled "Sanitary Sewer". 8" Sanitary sewer frames and covers shall be either:

a.) Neenah 1559-2000 frame with a 1556 cover, or equal.

b.) Campbell 1203Z3 frame with a 1009 cover, or equal.

or c.) East Jordan Iron Works (EJCO) 1203C cover with Epic pickbars, (4) ¾" diameter vent holes.

When a water-tight manhole is required, use a Campbell 1502 frame and cover, or equal. This has a 24" diameter opening.

When a 4" frame is necessary for repair, use a 1203Z1 frame.

14. In gravity manholes, when the difference in invert elevations exceeds 2.0', an inside drop connection is required. The connection shall be a RELINER® inside drop system manufactured by RELINER®/Duran Inc., or approved equal. See section 9b of the General Specifications for more information.

15. For force main installations less than 4", all line valves and cleanout valves shall be SCH 80 and all fittings shall be SCH 80. All line valves and cleanout valves shall be true union ball

valve type as made by Spears Manufacturing Company, or approved equal. The pipe bedding, haunching and backfill materials must provide an acceptable support and cushion for the pipe. Cleanouts or flushing stations must be incorporated into the pipe layouts. Cleanouts must be installed at the terminal ends of each main, a maximum of 400 feet along runs of pipe, and whenever two or more mains come together and feed into another pipe. Curb boxes are to be installed on the right of way line and be labeled "SEWER". Curb boxes cannot be installed within pavement areas or driveways. Detail sheets and manufacturers data for all materials to be used in this system must be submitted to the Town Engineer for approval.

16. For sanitary sewer pump stations, the Town has standardized on the use of Flygt pumps, controls and accessories.

17. Sanitary sewer main location relating to water main:

a.) Horizontal separation - whenever possible, sewers should be laid at least 10 feet horizontally (edge to edge) from any existing or proposed water main. Should local conditions prevent this lateral separation, a sewer may be laid closer if;

1. It is in a separate trench.
or 2. It is laid in the same trench as the water main and located on a bench of undisturbed earth.
In either case, the elevation of the crown of the sewer is at least 18 inches below the bottom of the water main.

b.) Vertical separation - whenever sewers must cross a water main, the sewer shall be laid at such an elevation that the outside of the sewer pipe is at least 18 inches from the outside of the water main, one full length of sewer pipe should be centered over the water main, so that both ends will be as far from the water main as possible. Special structural support for the water and sewer pipes may be required.

18. The gravity sanitary sewer mains and laterals will be air pressure tested at 4.0 p.s.i. (ASTM F-1417 or latest revision) after all storm drainage and water mains and laterals have been installed. The gauge must have a minimum of 0.5-pound increments. Allowable infiltration or exfiltration through manhole walls and pipe joints shall not exceed 100 gallons per mile of pipe per inch of diameter per 24 hours. Force main/grinder pump sanitary sewer mains shall be tested with water at 1 ½ times the maximum working

pressure for 1 hour. The gauge must have a minimum of 5-pound increments. A Town representative must witness all tests.

19. Cleaning a gravity sanitary sewer main requires the use of a high-pressure water jet and vacuum removal system. After cleaning, closed-circuit television inspection is required for all gravity sanitary sewer mains. A Town representative must witness this inspection. This inspection is to take place after the binder course of pavement has been installed. A video CD/DVD in MPEG 4 or AVI format, digital photographs in JPEG format, defect coding in the WinCan format, of the inspection must be produced and is to be kept on file with the Town.

When deemed necessary by the Town Engineer, a deflection test must be performed. This test is held a minimum of sixty (60) days after the installation of a PVC sanitary sewer. The deflection shall not exceed 7.5% as stated in the ASTM D-3034-81 or latest revision.

20. When the Town determines that extraordinary hardship would result from strict compliance with the provisions of this specification because of an unusual circumstance of topography or other physical condition in the proposed location of the infrastructure, it may modify the requirements for said infrastructure. In addition, for good cause, the Town may waive compliance with the provisions of any part of this specification in connection with the construction of the infrastructure.

STORM DRAINAGE STANDARD SPECIFICATIONS: (3/15/15)

1. Layout stakes for storm drainage are required. Typically, a location stake shall be placed to mark each structure. Typically, the location stake marks the center of the structure, not the center of the frame opening. Typically, because the structure is located off the edge of pavement, no adjustment for the frame opening is necessary. Two offset stakes with the cut/fill marks to the proposed rim and invert elevations, are also required. Layout stakes for Town owned/maintained utilities must be placed by a licensed land surveyor or their representative.

2. The following inspection and certification requirements are required:

a.) Adequate inspection shall be provided at all times and during all phases of construction and shall be done under the direction of the Town Engineer.

b.) The inspection service may be provided either by the Town or by the Town's Designated Engineer (TDE). However, the engineer hired by the owner/developer to perform the design may not inspect his or her own work on behalf of the Town due to a conflict of interest. In either case, the cost of inspection shall be the responsibility of the developer. The costs will be based on the Town's current billing schedule in place at the time of the inspections.

c.) Written certification by a New York State licensed engineer may be required from the owner/developer certifying to the Town (and other agencies having jurisdiction) that the storm drainage systems were constructed in accordance with plans.

3. A non-woven geotextile fabric is required to wrap each silt-tight coupling. The fabric shall be 2' wider than the width of the coupling and be centered on it. The fabric shall be:

a.) Amoco 4545
b.) American Engineering Fabrics 480
c.) Mirafi 140N
d.) or Town approved equal.

4. All silt-tight storm drainage pipe shall be either:

a.) High Density Polyethylene pipe, HDPE, ADS N-12 ST, Hancor HI-Q, Lane, or Town approved equal. Pipe shall have silt-tight, not watertight collars. If the pipe is equipped with a factory-installed gasket, it must be removed.

or b.) Fully bituminous coated, galvanized Corrugated Metal Pipe (CMP) with paved invert and fully bituminous coated, galvanized metal collars, shall meet the current requirements of AASHTO Specification M36.

The pipe shall be fabricated from corrugated metal sheets or coils, the base materials of which is commonly known as copper steel, and such metal sheets or coils shall be galvanized with not less than 2 oz. zinc per square foot of double exposed surface. Pipe having a diameter of ten inches (10") or less shall be fabricated with helical or spiral corrugations and a continuous longitudinal lock or welded seam. Pipe having a diameter of twelve inches (12") or more may be fabricated with circumferential (annular) corrugations and riveted or resistance spot welded, lap joint construction or with helical (spiral) corrugations and a continuous longitudinal lock or welded seam. Pipe fabricated by the latter method shall have annular or circumferential corrugations at each end of a length of pipe. The ends of corrugated pipe with diameters 12 inches or more shall be re-rolled to form a minimum of two (2) annular corrugations of no less than 2 2/3 inch pitch by a 1/2 inch depth. Pipe ends shall be designed to form a continuous line free from appreciable irregularities in the flow line.

The collars furnished with this pipe shall be fabricated from the same type of sheets or coils used to fabricate the pipe. Collars furnished for use with this pipe shall have annular or circumferential corrugations in the collar that will fit into the corrugations at the ends of each length of such pipe in a manner that will provide a snug joint. The coupling shall mesh with at least one full corrugation and shall lap equally, on each pipe end. The collar width shall be a minimum of 7 inches for pipe diameters up to and including 30 inches. The collar width shall be a minimum of 10 1/2 inches for pipe diameters greater than 30 inches. "Dimpled" collars are not acceptable. Single or one-piece collars are preferred but split collars may be used. Collars furnished with this pipe shall be of a type connected, secured or fastened with galvanized steel bolts.

The fabricated pipe and collars shall be dipped in hot bituminous material and shall be completely coated inside and outside to a minimum thickness of 0.05 inch. Following this coating, an asphalt pavement shall be added to the pipe in a manner such that the bituminous material on one-fourth of the inside circumference shall fill the valleys of the corrugations and shall present a uniform smooth interior.

The minimum thickness of this bituminous material measured over the crests of the corrugations on the inside of the pipe shall not be less than 1/8 inch. The pipe shall then be given a final hot dip coating of bituminous material to seal the pavement. Bituminous material for this purpose shall meet the latest specifications for asphalt pipe coating published by the New York State Department of Transportation. The coating shall not lose its stability when subjected to the highest summer temperature, shall be impervious to moisture and shall not crack, loosen or flake off when exposed to winter weather conditions.

5. All watertight storm drainage pipe shall be either:

a.) High Density Polyethylene pipe, HDPE, ADS N-12 WT, Hancor HI-Q, Lane, or Town approved equal. Pipe shall have watertight, not silt-tight collars.

b.) Fully bituminous coated, galvanized Corrugated Metal Pipe (CMP) with paved invert and fully bituminous coated, galvanized metal collars, as described in note 4b above. Flat gaskets or "O" rings are required under the collars.

or c.) PVC sewer pipe, meeting the requirements of note 4 of the Sanitary Sewer Standard Specifications.

6. All pipe bedding, haunch, initial backfill and final backfill materials shall have a moisture content suitable for proper compaction. The layer thickness used during backfilling shall not exceed the capability of the compaction equipment. The bedding under the structure and the pipe bedding within 8' of the structure shall be mechanically compacted. Pipe haunch material shall be manually compacted. Initial backfill shall be mechanically compacted. Final backfill in or along pavement areas shall be mechanically compacted. The Town Engineer may require compaction tests at his/her sole discretion. Keep in mind that this backfill may be the support for future pipes, roads or sidewalks.

7. Silt-tight pipe bedding, haunching, initial and final backfill materials vary depending on the pipe type and location. It may be either:

a.) When installing Corrugated Metal Pipe (CMP) and/or HDPE pipe, all pipe bedding, haunching and initial backfill shall consist of R.O.B. gravel not exceeding 2" in diameter, graded crushed stone as described in note 8b below, or granular pipe sand. Final backfill for pipe installed under the pavement shall be R.O.B. gravel, graded crushed stone, or granular

pipe sand. Final backfill in other areas may be other suitable material, which has been approved by the Town Engineer.

b.) When the storm drainage crossing is located at the low point of the street, a 6" diameter HDPE dual wall perforated rigid pipe is required to be installed parallel to the crossing pipe. The top of the 6" perforated HDPE shall not be lower than the top of the crossing pipe. Pipe bedding, haunching, initial and final backfill of the 6" diameter perforated pipe shall consist of crushed stone as described in note 8b below.

8. Water-tight joints are required on all pipes installed with a slope over 4%. Watertight joints are not to be used in other areas, unless approved by Town Engineer. Watertight pipe bedding, haunching and initial backfill materials vary depending on the pipe type and location. It may be either:

a.) When installing corrugated metal pipe (CMP) and/or HDPE pipe, all pipe bedding and haunching shall consist of R.O.B. gravel not exceeding 2" in diameter, graded crushed stone as described in note 8b below, or granular pipe sand. Initial and final backfill material shall be suitable for a cushion over the pipe and be approved by the Town Engineer.

or b.) When installing PVC pipe, all pipe bedding and haunching materials shall be Class 1A angular 1/4" to 1 1/2" graded crushed stone as specified in ASTM D-2321-89, such as a mix of NYSDOT size designation 1 and 2. Initial and final backfill material shall be suitable for a cushion over the pipe and be approved by the Town Engineer. These pipes shall be installed in accordance with the Town Sanitary Sewer Specifications.

9. Storm sewer structure frames and covers shall be either:

a.) Neenah 1559-2000 frame with 1556-5001 cover, or Campbell 1203Z3 frame and cover. Cover is to have two penetrating pickholes approximately 1 1/2" wide x 2" long,

b.) Neenah 1559-2000 frame with 2556-3005 concave grate, or Campbell 2253 frame and concave grate,

or c.) East Jordan Iron Works (EJCO) 1203C cover with Epic pickbars, (4) ¾" diameter vent holes.

When a 4" frame is necessary for repair, use a 1203Z1 frame.

Typically, inlet structure frames located along the edge of pavement are 0.30' below finished edge of pavement.

10. Cellar drain stubs shall be PVC (SDR 26 or SCH 40), A.B.S., or another Town approved material. Cellar drain pipes shall be watertight. The invert of these stubs shall be placed no lower than the top of the outlet pipe and have a maximum projection into the structure of 2".

11. Stone filling (rip rap) is required at all flared end sections. There is a minimum length of 10' at inlets, and 25' at outlets. The Town Engineer shall approve the size, gradation, final depth, length and width.

a.) Stone fill shall conform with NYSDOT Section §620-2.02, and shall meet the following gradation requirements:

1. Fine

Stone Fill	Percent Passing by Weight
<8 inches	90 - 100
>3 inches	50 - 100
<#10 sieve	0 - 10

2. Light

Stone Fill	Percent Passing by Weight
<100 lbs	90 - 100
>6 inches	50 - 100
<1/2 inches	0 - 10

3. Medium

Stone Fill	Percent Passing by Weight
<100 lbs	50 - 100
>4 inches	0 - 10

4. Heavy

Stone Fill	Percent Passing by Weight
<600 lbs	50 - 100
> 6 inches	0 - 10

b.) Bedding shall conform with NYSDOT Section §620-2.05, and shall meet the following gradation requirements:

Stone Fill	Percent Passing by Weight
4 inches	100
1 inch	15 - 60
1/4 inch	0 - 25
No. 4	0 - 10

c.) Geotextile: Amoco 4545, American Engineering Fabrics 480, Mirafi 140N, or Town approved equal.

12. At inlets and outlets, only metal flared end sections are allowed, no plastic or HDPE units are permitted.

13. The following table is a list of the absolute minimum design grades for storm pipe:

SIZE	HDPE	CMP
12″ road crossing	1.00%	1.00%
12″	.37%	.94%
15″	.28%	.69%
18″	.21%	.55%
21″	n/a	.45%
24″	.15%	.38%
30″	.11%	.28%
36″	.09%	.22%
42″	n/a	.18%
48″		.15%

14. The following table is a list of the corrugated metal pipe (CMP) gauges for standard installations. Shallow or deep installations may require heavier gauges.

SIZE	MIN. GAUGE REQUIRED	MIN. BAND WIDTH
6″	18	7″
8″	16	7″
10″	16	7″
12″	16	7″
15″	16	7″
18″	16	7″
21″	16	7″
24″	16	7″
30″	14	7″
36″	14	10.5″
42″	12	10.5″
48″	12	10.5″
54″	12	10.5″
60″	10	10.5″
72″	10	10.5″
84″	8	10.5″

15. When the Town determines that extraordinary hardship would result from strict compliance with the provisions of this specification because of an unusual circumstance of topography or other physical condition in the proposed location of the infrastructure, it may modify the requirements for said infrastructure. In addition, for good cause, the Town may waive compliance with the provisions of any part of this specification in connection with the construction of the infrastructure.

WATER MAIN STANDARD SPECIFICATIONS: (11/10/16)

1 Layout stakes for water mains are required. Typically, offset stakes shall be placed every 25' on horizontal curves and every 50' on tangent areas and be 6' to 10' from the proposed main. These offset stakes shall have cut marks to the proposed top of pipe as shown on the approved profiles. Typically, the water main has 5.0’ of cover. Offset stakes shall be placed to mark every proposed hydrant, line valve, tee and bend. In general (50’ right-of-way), when the proposed water main is to be installed in the shoulder, the shoulder (at the water main) is higher (0.11’ to 0.66’) than the centerline of the road. Layout stakes for Town owned/maintained utilities must be placed by a licensed land surveyor or their representative.

2. The following inspection and certification requirements are required:

a.) Adequate inspection shall be provided at all times and during all phases of construction and shall be done under the direction of the Town Engineer.

b.) The inspection service may be provided either by the Town or by the Town’s Designated Engineer (TDE). However, the engineer hired by the owner/developer to perform the design may not inspect his or her own work on behalf of the Town due to a conflict of interest. In either case, the cost of inspection shall be the responsibility of the developer. The costs will be based on the Town’s current billing schedule in place at the time of the inspections.

c.) Written certification by a New York State licensed engineer may be required from the owner/developer certifying to the Town (and other agencies having jurisdiction) that the water main systems were constructed in accordance with plans.

3. All water mains that are to be placed in service must be installed with a flushing point at/near the end. No water service laterals are to be installed on water mains beyond a flushing point. Hydrants are to be used as flushing points, unless an alternative is approved by the Town Engineer.

4. Water mains may be either High Density Polyethylene pipe (HDPE), or ductile iron pipe, as determined by approved plans and Town Engineer, and be either:

a.) High Density Polyethylene Pipe (HDPE) shall be ductile iron pipe sizes, DR-17 or DR-11, joined by means of zero leak-rate heat fusion, or electro fusion, and Town approved

mechanical joints proven for HDPE pipes, and meeting the specifications and requirements of American Water Works Association Standard C906.

The exterior of the pipe shall be a co-extruded integral layered shell whose color is blue, or blue striped, for easy identification as a water main. All pipes shall be suitable for use as a fluid pressure conduit.

The polyethylene pipe and fittings shall be PE4710 HDPE from virgin resins exhibiting a cell classification of PE 345464C, with an established hydrostatic design basis of 1600 psi for water at 73 degrees Fahrenheit. The resin shall be listed by Plastic Pipe Institute (PPI) in its pipe-grade registry Technical Report (TR) 4, "Listing of plastic pipe compounds".

HDPE Laying lengths are 40 or 50 feet, standard. All HDPE pipe must be NSF listed by the manufacturer with the pipe bearing the "NSF" logo. All HDPE pipe must be marked as prescribed by ASTM 714, AWWA C906 and NSF. HDPE pipe markings shall include nominal size, OD base (ie: 12" ductile iron pipe sizing, DIPS), dimension ratio, pressure class, WPR, AWWA-C906, manufacturers name, manufacturers production code, including day, month, year extruded, manufactures plant and extrusion line.

#10 HDPE High-Flex Stainless Steel Tracer Cable is required. (Blue for water & Green for sewer). Wire is to be installed along centerline of mainline and lateral pipe, looped to the top of each gate valve box, and looped (or ended) alongside (outside) each lateral curb box to its cap. When required, Cott Mfg. model FinkPlate 703 pipeline markers with the COTTDome cover must be used.

or b.) Based on standard burial depth, ductile iron water mains between 6" and 12" in diameter shall be class 52, minimum. Water mains between 16" and 24" in diameter shall be class 51, minimum. All ductile iron water mains shall be constructed in 18' or 20' lengths, and be manufactured in accordance with ANSI/AWWA C151/A21.51, and have Underwriters Laboratories, Factory Mutual and NSF 61 approvals. The ductile iron pipe joints shall use a single, elongated gasket to affect the joint seal, such as Tyton type joint, or Town approved equal. Town Engineer shall review and approve type and class of pipe for non-standard burial depth.

All ductile iron pipe and fittings shall be cement lined twice the standard thickness and paint seal coated in conformance with ANSI/AWWA C104/A21.4.

All ductile iron fittings shall be mechanical joint. All ductile iron fittings shall be cast from ductile iron class 350, have asphaltic coating, and have glands and gaskets accordance with ANSI/AWWA C153/A21.53. All fittings shall be approved by NSF 61, Factory Mutual and listed by Underwriters Laboratories, Inc. and be North American made.

T-bolts and nuts shall be Cor-Blue as manufactured by NSS Industries, or Town approved equal, in accordance with ANSI/AWWA C111/A21.1.

All tie rods shall be stainless steel (type 316).

Clow F-1217 ductile iron hydrant anchor tees must have a rotatable mechanical joint gland on the plain end branch. Ductile iron class 53 hydrant anchor pipe shall utilize a one-piece ductile iron ring continuously welded in place with a rotatable mechanical joint gland on each end.

When a 4" to 12" restraint coupling is required, use a two-bolt, wide range restraint Macro HP coupling as manufactured by Romac Industries. This coupling shall be ductile iron e-coated epoxy with stainless steel fasteners.

For repair of broken ductile iron bell and spigot joints, a Dresser bell-pack repair sleeve, style 126, is required.

For bell joint leaks, a Powerseal model 3232 bell joint repair clamp is required.

To repair circumferential breaks, longitudinal ruptures, ground movements, holes, crack and other type of damage, a Powerseal 3121 iron lug single panel repair sleeve (2" to 12"), or a Powerseal 3122 iron lug double panel repair sleeve (3" to 22") is required. Repair sleeves shall have type 304 stainless steel bolts and nuts. The nuts shall be Teflon coated.

All buried DIP, fittings and appurtances shall be wrapped with polyethylene encasement in accordance with the latest version of ANSI/AWWA C105/A21.5.

Thrust restraint is required at all tees, bends, caps and dead end hydrants. Thrust blocks and/or restrained joint pipe are acceptable alternatives. Thrust blocks shall be

3000 psi. poured-in-place concrete. Typically, precast patio, sidewalk or manhole blocks are not allowed. The fitting being restrained must be covered with polyethylene before pouring the thrust block to prevent bonding to the nuts, bolts and fitting. Size of thrust blocks, and lengths of restrained pipe, shall be based on requirements shown on the water main standard detail sheet.

When using ductile iron pipe, typically, retainer glands are required at all joints. The Town Engineer shall determine when retainer glands are not necessary. Retainer glands shall be Megalug series 1100 wedge action retainers, or Town approved equal. When using retainer glands, any joint deflection should be taken prior to tightening any bolt. Deflection at any joint shall not exceed manufacturers' recommendations. Restraining gaskets, such as U.S. Pipe Field Lok gaskets, or Town approved equal, are required at most tees, bends, plugs, caps and reducers. The Town Engineer shall determine when restraining gaskets are necessary. Deflection of the pipe should occur after the plain end has compressed the gasket, but prior to the plain end being homed into the bell. Distances to be restrained from the fitting are shown on the Towns water standard detail sheet.

5. Tapping an existing cast or ductile iron main without the interruption of water service requires the use of a tapping sleeve and valve. This process requires the use of a:

a.) Powerseal model 3490MJ sleeve and a Clow-Kennedy resilient wedge valve (section 12), or
b.) Ford stainless steel sleeve FTSS with stainless steel flange, or
c.) Smith Blair model 665 - Stainless Steel Flange Tapping Sleeve

When there is more than one water main, or when the water main is in the vicinity of a sewer force main, both mains have to be exposed before the tapping sleeve is installed.

After installation, the tapping sleeve and valve shall be tested at 150 psi for a minimum of 10 minutes before cutting the existing water main. Existing line valves on either side of the proposed tap must be located and operated before the tap is made.

6. All fire hydrants shall be manufactured within the last two years, installed using an anchor pipe, and be Clow/Eddy Medallion model F-2545, 5'-6" minimum, with a ground line break flange, dry barrel and wet-top asbestos packing. The bottom of the ground

line break flange must be installed 2-1/2" above proposed finished ground elevation. All hydrants open to the left with a 5 1/4" main valve and a 6" mechanical joint inlet. All hydrants shall have two (2) 2-1/2" hose nozzles using national standard thread (NST) pattern and one (1) 4-1/2" steamer connection using national standard thread pattern. The operating nut and caps shall be 5-sided 1-1/2" (point to flat) pentagon. All hydrants shall be painted Safety YELLOW. No hydrants shall be installed that do not meet these specifications. All hydrants shall be equipped with a REFLECTIVE hydrant flag. Unless there is an easement, all hydrants that will be maintained by the Town shall be installed within the highway right-of-way.

7. Field loc gaskets may be required at dead-ends and stubs, A.O.B.E.

8. Compression connections shall be A. Y. McDonald 74758Q, or Town approved equal. Any brass part of the fitting in contact with potable water shall be made of a "no-lead brass". Fittings shall be permanently stamped "NL".

9. Corp stops shall not be installed within pavement areas. Any brass part of the fitting in contact with potable water shall be made of a "no-lead brass". Fittings shall be permanently stamped "NL". For 3/4", 1", 1-1/2" and 2", corp stops shall be A. Y. McDonald 74701BQ, or Town approved equal.

10. Curb stops shall not be installed within pavement areas. Any brass part of the fitting in contact with potable water shall be made of a "no-lead brass". Fittings shall be permanently stamped "NL". For 3/4", 1", 1-1/2" and 2", curp stops shall be A. Y. McDonald 76100Q, or Town approved equal.

11. Curb boxes cannot be installed within pavement areas or driveways. Curb boxes shall be either:

a.) for 3/4" and 1", A.Y McDonald 5601, 5601L lid and a 5665ss stainless steel shut-off rod for use with ¾"-1" ball valve curb stop. Shut-Off rods shall be 36" x 5/8" stainless steel with a brass cotter pin.

or b.) for 1-1/2" thru 2", A.Y. McDonald 5603, 5601L lid and a 5665ss stainless steel shut-off rod for use with 1-1/2"-2" ball valve curb stop. Shut-off rods shall be 36" x 5/8" stainless steel with a brass cotter pin.

The Town of Bethlehem may require the installation of building water service laterals, especially in cul-de-sac areas, before road gravel is placed. Building water service laterals may be

ductile iron, HDPE DR 9 copper tube size (CTS) with stainless steel inserts (minimum of 1”), or type K soft copper (minimum of ¾”), as determined by approved plans or Town Engineer. A stiffener should be inserted when using compression type fittings on pipe 2” and less in diameter.

12. Water valves shall have their exterior and interior surfaces fusion epoxy coated conforming to AWWA C550-81. All shall be mechanical joint, open to the left, 2” operating nut and have stainless steel hardware. Water valves, 4” thru 12”, shall be Clow-Kennedy resilient wedge valves meeting the latest AWWA C509 revisions. 16” thru 24” valves shall Clow-Kennedy resilient wedge valves meeting the latest AWWA C515 revisions. 18” thru 24” valves shall have bevel gearing.

13. Water valve boxes shall be either:

a.) 4" thru 12" - Tyler 6855 series item 664-A, or Town approved equal, slide type.

or b.) 16" thru 24" - Tyler 6865 series item D, or Town approved equal, slide type.

14. All water mains, hydrant leads and service laterals shall have a minimum of 5' of cover.

15. Water mains location relating to sewer main;

a.) Horizontal separation - whenever possible, water mains should be laid at least 10 feet horizontally (edge to edge) from any existing or proposed sewer. Should local conditions prevent this lateral separation, a water main may be laid closer if;

1. It is in a separate trench.

or 2. It is laid in the same trench as the sewer and located on a bench of undisturbed earth.

In either case, the elevation of the crown of the sewer is at least 18 inches below the bottom of the water main.

b.) Vertical separation - whenever water mains must cross a sewer, the water main shall be laid at such an elevation that the outside of the sewer pipe is at least 18 inches from the outside of the water main. One full length of water main should be centered over the sewer so that both ends will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.

16. All water mains and appurtenances shall be installed in a dry trench. Under no circumstances shall ground water be allowed to enter the water main. When construction is not in progress, the open end(s) of the pipe will be closed by a watertight plug or cap.

17. All pipe bedding and haunch, initial backfill and final backfill shall consist of selected excavated material, R.O.B. gravel not exceeding 2" in diameter, crushed stone, sand, or other suitable material which has been approved by the Town Engineer.

18. Backfill material in or along pavement areas must be compacted. This backfill material shall have a moisture content suitable for proper compaction. The layer thickness used during backfilling shall not exceed the capability of the compaction equipment. The Town Engineers approval or rejection of the methods, materials or compaction devices shall be final. The Town Engineer may require compaction tests. Final backfill in or along pavement areas shall be mechanically compacted. The Town Engineer may require compaction tests. Keep in mind that this backfill may be the support for future pipes, roads or sidewalks.

19. Provide 24 hour advanced notice to the Town Engineer prior to using a water main. Using water mains includes, but is not limited to initial filling, initial flushing, chlorinating and final flushing.

20. All water mains and appurtenances are to be:

lst. - flushed thoroughly at line pressure.

2nd. - pressure and leakage tested at 1-1/2 times the working pressure, or 150 psi, whichever is greater. The gauge must have a minimum of 5 pound increments. This test will be held for at least two hours and the test pressure may not vary more than 5 psi. This must be witnessed by a representative of the Town of Bethlehem.

3rd. - disinfected with an initial chlorine residual of 50 P.P.M., and must have a minimum final chlorine residual of 25 P.P.M. after 24 hours. These residuals must be witnessed by a representative of the Town of Bethlehem.

4th. - flushed thoroughly at line pressure. Disposal method of heavily chlorinated water is to be approved by Town Engineer prior to discharge.

5th. - Contractor takes water samples for bacteriological test. The original copies of the bacteriological test results are to be supplied to the Town of Bethlehem.

and 6th. - the corporations used for testing shall be removed and tapered brass plugs inserted in the water main.

21. All material, construction methods, testing and disinfection shall comply with details and specifications set forth by the N.Y.S.D.E.C., New York State Department of Health and the AWWA standards.

22. When the Town determines that extraordinary hardship would result from strict compliance with the provisions of this specification because of an unusual circumstance of topography or other physical condition in the proposed location of the infrastructure, it may modify the requirements for said infrastructure. In addition, for good cause, the Town may waive compliance with the provisions of any part of this specification in connection with the construction of the infrastructure.

23. All water meters shall be manufactured by Sensus and conform to the iPERL water management system. The iPERL system is an integrated unit that incorporates an electronic 9-digit hermetically sealed electronic register with LCD display. For laterals from 1-1/2" to 10", use the Sensus Omni C meter with ECR (electronic communication register) absolute encoder (weather proof) in 100 cubic foot registration. A cut-in meter setter (new installations) shall include a factory assembled integral angle ball valve and angle dual check valve as follows:

- **a.) ¾" water meter: A.Y. McDonald model 741-3-QF**
- **b.) ¾" pack joint connection for copper: A.Y. McDonald model 7417541Q ¾"**
- **c.) 1" water meter: 741-4-QF**
- **d.) 1" pack joint connection for copper: A.Y. McDonald model 74574 1"**

A meter resetter (existing installations) shall include a factory assembled integral angle ball valve, angle dual check valve and a 125# pressure relief valve for thermal expansion as follows:

- **e.) ¾" water meter: A.Y. McDonald model 717-304DWBC**
- **f.) 1" water meter: A.Y. McDonald model 717-404DWBC**

HIGHWAY STANDARD SPECIFICATIONS: (1/28/16)

1. Layout stakes for Town owned/maintained roads must be placed by a licensed land surveyor or their representative. Existing survey markers, if disturbed, shall be reset by a licensed land surveyor at the owners' expense. Highway grade stakes shall be placed 3' from the edge of pavement and indicate edge of pavement elevation, not the centerline elevation. If a structure is at the location of a proposed grade stake, then offset the stake further away from the edge of pavement. An integral 30" wide paved apron is required around intersection corner curves, at all areas of pavement with a slope over 4% and around the inside island of cul-de-sacs. At intersections, these aprons normally extend to the P.C./ P.T. of the right-of-way, about 8'. The back edge of these aprons shall be 4" above the edge of pavement. Stakes shall be placed 4.5' from the edge of pavement where 30" aprons are required, but still must represent edge of pavement elevation. At some intersections and in some cul-de-sacs, grade stakes indicating centerline elevations may be required. All stakes should be clearly labeled with the road station, offset distance, and cut/fill marks. Stakes shall be placed every 25' on horizontal curves and every 50' on tangent areas. Stakes shall be placed at all points of curvature, points of tangency, breaks in grade, low and high points. At intersections, stakes shall be placed at the 1/4 points and at any other location as directed by the Town Engineer. All highways shall be constructed in accordance with the Standard Details as shown on sheet 4 of 4.

2. At intersections, all utilities must be installed before paving. At a minimum, the entire intersection must be paved to the P.C./ P.T. of the right-of-way of each street.

3. Conduits are required for the installation of gas mains, power lines, telephone lines and cable television within the Town of Bethlehem rights-of-way and easements. Conduits should cross under Town highways and easements at right angles whenever possible. These conduits must be a minimum of 8' from all storm manholes, catch basins, sanitary sewer manholes and fire hydrants. The proposed location of these conduits must be reviewed with the Town Engineer before installation.

4. The highway subgrade shall be compacted with an approved 8 to 12 ton tandem type static wheel roller or a vibratory type roller as specified in NYSDOT standard specification 203-3.12. The highway subgrade shall be approved by both the Town Engineer and the Town Superintendent of Highways prior to the placement of the base gravel. A ground stabilization fabric shall be placed on all clay soils and on some sandy soils, as determined by the Town Engineer or the Town Superintendent of Highways. For a typical

24' wide pavement, the gravel is 26' wide. The fabric shall be placed in one 26' wide sheet, two 14' wide sheets, or any other combination that provides a minimum of 2' overlap. Additional gravel is required around storm drainage structures, under corner curve aprons and at other locations indicated by the Town Engineer or the Town Superintendent of Highways.

a.) All trees, brush, topsoil, stumps, roots more than one-half inch in diameter shall be removed from the area of the roadway. Boulders shall be removed to a depth of two (2) feet below sub-grade elevation. Muck, spongy material or other unsuitable material shall be completely removed and the excavation filled with suitable material and properly compacted.

b.) At sub-grade elevation, a stability (proof roll) test is required utilizing a front end loader with a full bucket of soil material. Any unstable areas that have movement and/or pumping will then require undercutting. Suitable gravel sub-base material will then be placed in these areas and properly compacted.

c.) The sub-grade elevation must have a quarter (1/4) inch/foot cross-slope elevation when using Stabilization Fabric.

5. A walkthrough is required with the Town Engineer, the Superintendent of Highways and the contractor to review sub-base conditions prior to placement of stabilization fabric and/or base gravel.

6. The woven ground stabilization fabric shall be:

a.) Amoco 2002
b.) American Engineering Fabrics 200W
c.) Ling/Exxon GTF 200
d.) Synthetic Industries 200ST
e) Mirafi 500X
f) Propex 200ST
g) Geotex 200ST
h) WINfab200W
or Town approved equal.

7. When underdrains along the edge of pavement are required, they shall:

a.) be installed directly under the edge of pavement.

b.) be a 4" diameter heavy duty HDPE perforated pipe. The

invert of 4" HDPE pipe shall be 34" below the edge of pavement when the subgrade is clay, and 30" below the edge of pavement when the subgrade is sand.

c.) have the trench lined with a non-woven geotextile fabric such as:

1. Amoco 4545
2. American Engineering Fabrics 480
3. Mirafi 140N
or Town approved equal.

and d.) have all pipe bedding, haunching, initial and final backfill consist of crushed stone as described in Storm Drainage note 8b.

8. The depth of the base gravel depends on the subgrade soil conditions. Generally, when the subgrade is sand, the road gravel shall have a minimum depth of 14" (10" ROB and 4" crusher run). When the subgrade is clay, the road gravel shall be a minimum depth of 18" (14" ROB and 4" crusher run). Road gravel shall have a moisture content suitable for proper compaction and be placed in two courses. The first course, being run of bank (ROB) base gravel or NYSDOT approved Type 4 gravel, having a maximum aggregate size of 6". The second course shall be 4" of crushed limestone "crusher run", conforming to NYSDOT standard specification 304-2.02 Type 2. These depths may increase if required by the Town Engineer or the Town Superintendent of Highways. All gravel shall be placed in such a manner to minimize segregation. No gravel shall be placed under adverse weather conditions.

Base gravel depth in excess of the minimum specified may be required for special conditions, including but not limited to high traffic volume and/or poor sub-grade conditions and shall be installed at greater depths at the direction of the Highway Superintendent and/or Town Engineer.

9. All compaction requirements shall be in accordance with NYSDOT Standard Specification §402. The depth of each gravel lift shall not exceed the compactors capability. Each compactor lacking the original manufacturer identification plates, or with altered or illegible plates, will not be recognized as acceptable compaction equipment and shall be removed from the site.

10. After the road gravel has been placed and compacted in accordance with these specifications, fine grading the surface of the second course shall not vary more than 1/2" above or below true grade at any point. A walkthrough is required with the Town

Engineer, the Superintendent of Highways and the contractor to review fine grading conditions prior to placement of the binder/base course.

Once road gravel has been placed, no vehicular traffic shall be permitted until such time that the asphalt base course has been placed, unless approved by the Highway Superintendent and/or Town Engineer.

11. When the road gravel becomes mixed with the subgrade or any other material, it shall be removed and replaced with the appropriate material. The movement of any traffic over the fine graded gravel surface is not recommended. When damage or contamination occurs, it must be repaired before paving begins.

12. Compliance with these specifications during construction must be met and approved by the Town Engineer and the Town Superintendent of Highways before paving begins. Once approved, the contractor must pave as soon as possible.

13. Bituminous asphalt concrete mix shall not be placed on any wet surface or when the surface temperature is less than that stipulated in the chart below, or when weather conditions will otherwise prevent the proper handling or finishing of the bituminous mixtures as determined by the Town Engineer or the Town Superintendent Highways.

Both courses of bituminous concrete shall be applied with a bituminous paver as specified in NYSDOT Standard Specifications §402-3.02. Provide a self-powered HMA paver with an activated screed or strike-off assembly. The machine shall be capable of spreading and finishing courses of HMA plant mix material in lane widths applicable to the specified typical section and thicknesses shown on the plans. When screed extensions are necessary for placement of mainline pavement, such extensions shall be of the same design as the main screed. Auger and tunnel extensions are required to be mounted on the paver when the screed is extended more than 1 foot for fixed paving widths wider than 12 feet. Pavers used for shoulders and similar construction shall be capable of spreading and finishing courses of HMA plant material in widths shown on the plans. The paver shall have a receiving hopper with sufficient capacity for uniform spreading operation and with automatic flow controls to place the mixture uniformly in front of the screed. Heat the screed or strike-off assembly as necessary to produce a finished surface of the required smoothness and texture without tearing, shoving or gouging the mixture. When laying mixtures, the paver shall be capable of operating at forward speeds consistent with satisfactory placement of the mixtures. HMA pavers used for placing the initial paving layer,

base, binder, and surface courses shall be equipped with approved automatic transverse slope and longitudinal grade screed controls. The controls shall automatically adjust the screed and increase or decrease the mat thickness to compensate for irregularities that are in the surface being paved. The controls shall be capable of maintaining the proper transverse slope and be readily adjustable so transitions and super-elevated curves can be satisfactorily paved. The controls shall operate from suitable fixed or moving references as prescribed in §402-3.06, Spreading and Finishing. When paving width is in excess of 17 feet, a paver must have approved automatic transverse slope and longitudinal grade screed controls that operate from both sides of the paver. The transverse slope and longitudinal grade screed controls of the HMA paver may be manually adjusted according to the requirements of §402-3.06, Spreading and Finishing. The HMA pavers must be at the project site prior to the start of paving operations to allow examination and approval by the Engineer. Repair or replace immediately any paver found to be worn or defective either before or during its use.

Pavement of any street which is to be accepted as a Town highway must take place between May 1 and October 31st and must meet the following surface temperature requirements based on compacted nominal lift or course thickness.

Normal Compacted Lift Thickness - Minimum Surface Temperature:

a.) Greater than 1 1/2" (38mm), but Less than 3" (76mm) - 45°F (8°C)

b.) 3" or greater (76mm) - 40°F (5°C)

Seasonal limitations and weather conditions shall be strictly enforced unless a written waiver is received from the Town Engineer and countersigned by the Town Superintendent of Highways prior to paving stating that the above conditions shall be waived.

14. Inspection and certification requirements:

a.) Adequate inspection shall be provided at all times and during all phases of construction and shall be done under the direction of the Town Engineer.

b.) The inspection service may be provided either by the Town or by an engineer approved by the Town. However, the engineer hired by the owner/developer to perform the design may not inspect his or her own work on behalf of the Town due to a conflict of interest. In either case, the cost of inspection shall be the responsibility of the developer. If the inspection service is provided by the Town, the cost will

be based on the actual costs of payroll plus overhead incurred by the Town.

c.) Written certification by a New York State licensed engineer may be required from the owner/developer certifying to the Town that the road subgrades are correct to established line and elevation, that all storm sewer catch basin rims, sanitary sewer manhole rims, water main valve box rims and any other service access devices are at established dense binder elevation and, upon completion of the road bed prior to paving, that the established elevations of the bed are correct.

The Superintendent of Highways and/or his representative reserves the right to conduct any testing to verify that the materials and/or installation be determined not to be in accordance with Contract Plans, Specifications and Contact Documents.

The contractor shall supply a copy of their NYSDOT Plant Certification if requested by the Superintendent of Highways or his Representative.

15. The paving of the bituminous pavement will be a two-phase operation. The first phase will consist of placing a binder/base course, the second, a top course. The placement of the top course will be delayed until the building activity in the area has been essentially completed. Approval from both the Town Engineer and the Town Superintendent of Highways is required before placing the top course. The first phase consists of the placement of a binder/base course. The binder/base course shall be placed in panels of equal width for each driving lane (see sheet 4 of 4).

a.) Surrounding soil must be at a sufficient distance away to not be disturbed during the placement of binder course.

b.) For typical, low-volume residential streets, the binder course shall have a compacted thickness of 3". Expose 3” of the sanitary sewer manhole and catch basin frames.

c.) For high-volume collector streets, the binder course shall have a compacted thickness of 4". Expose 4” of the sanitary sewer manhole and catch basin frames.

d.) For commercial and industrial streets, 3 ½” of Type 1 Base along with 2” of Type 3 Dense Binder is required. Expose 5 1/2” of the sanitary sewer manhole and catch basin frames.

16. Immediately after bituminous concrete has been spread, struck off and surface irregularities adjusted, it shall be compacted with an approved 8 to 12 ton tandem type static wheel roller or a vibratory type roller as specified in NYSDOT Standard Specification 403-3.03. Acceptable compaction of the hot mixed asphalt will be determined by comparing the finished product to a laboratory compacted specimen obtained from the same asphalt mix as used on the project. Final compaction or density shall be achieved before the material cools to 185°F (85°C) or below. The target density shall be 96% of the laboratory compacted specimen with 4% air voids. Air void content of the finished product must be within a 3% to 7.5% range of the laboratory compacted sample as a condition for acceptance of new roads. The burden of proof for compliance and the associated expenses shall be the sole responsibility of the developer/owner.

17. An 18" wide paved apron is required around all inlet structures located along the edge of pavement. A 30" integrally wide paved apron is required around corner curves. This apron normally extends a minimum of 8' beyond the P.C. and P.T. of the edge of pavement corner curve. A 30" wide integrally paved apron is required along all areas of pavement with a slope over 4%. The back edge of these aprons shall be 4" above the edge of pavement. The ends of the aprons shall be square, not tapered. If necessary, the depth, width and material type of the binder course may be altered by the Town Engineer, Superintendent of Highways or their designated representative.

18. At the discretion of the Town Engineer, Superintendent of Highways or their designated representative (TDE), upon completion and compaction of the base course pavement, core samples may be taken to verify the depth, compaction and type of materials placed.

a.) Core sampling and testing shall be performed by an independent laboratory approved by the Town. All expenses associated with the taking and testing of the core samples shall be borne by the owner/developer.

b.) Core samples shall be taken along the street near the beginning and ending points and at intervals of approximately five hundred (500) feet in each pass of the paving machine. The exact location shall be determined in the field by the Town Engineer, Superintendent of Highways or their designated representative.

c.) Stamped and signed results of the core samples shall be submitted to the Town Engineer and the Superintendent of

Highways for approval before the street can be recommended for acceptance by the Town Board.

d.) The average thickness of all core samples taken on any new street shall be equal to or greater than the approved thickness for each type of material. A deficiency of more than ¼ inch in the asphalt dense binder base course thickness will be made up by increasing the top course pavement by a corresponding amount. Any deficiencies in the road gravel materials of ½ inch or more of thickness, compaction or the type of material placed shall be grounds for rejection or remedial procedures as determined by the Town Engineer or Superintendent of Highways.

19. Any damage to an existing street occurring during the course of construction and/or development shall be the responsibility of the applicant obtaining the Highway Permit for the work that was the cause of such damage and shall be repaired to the satisfaction of the Town Engineer and Superintendent of Highways or their Representative. If the repairs are not completed to the satisfaction of the Town or their Representative, the Superintendent of Highways shall have the authority to use securities posted by the applicant to complete the repairs.

20. The second phase consists of cleaning, conditioning, truing and leveling the binder course as specified in NYSDOT Standard Specification §403-3.02 and the placement of the top course. The Town may require a tack coat of bituminous material be applied to part or the entire binder course before the placement of the top course. The Town will specify the type of coating and the rate of application. The top course shall conform to the NYSDOT Standard Specification §403-2.03 Type 7 or latest revision. This course shall be placed in panels of equal width for each driving lane (see sheet 4 of 4). A minimum temperature of 50°F (50 degrees) is required for placement of the top course. If necessary, the depth, width and material type of the top course may be altered by the Town Engineer or the Superintendent of Highways:

a.) For all streets, the top course shall have a compacted thickness of 1 1/2".

b.) Unless specifically stipulated otherwise on the approved plans, the top course shall not be paved in the same calendar year as the base course.

c.) All utility access structures shall be set to within ½-inch of the base course pavement elevation. The owner/developer shall be responsible for the raising of all

iron to within ½-inch of the final finished grade prior to top course paving.

21. A walkthrough is required with the Town Engineer, the Superintendent of Highways and the contractor to review binder/base course conditions prior to placement of the top course.

22. Any adjustment to existing driveways, manhole rims and gate valve boxes required to meet the final wearing surface shall be done before the final wearing surface is placed. Any adjustment to shoulders and lawns required to meet the final wearing surface shall be done immediately after the final wearing surface is placed.

a.) Cut and remove portions of damaged driveway aprons adjoining edge of pavement.

b.) Cut and remove damaged areas of road binder course.

c.) Mill/chip around sanitary sewer frames and catch basin frames to expose 1" of frame.

d.) Edge roadway, catch basin and corner curve aprons to expose full width of binder course.

e.) Install Town standard riser-rings on all frames where needed. Typically, subdivision streets have a 4" cross-slope.

f.) Pave and compact damaged areas of binder course previously removed. Pave and compact truing and leveling course.

g.) Pave and compact top course of pavement. Typically, finished road is to have a 4" crown (12' lane width).

h.) Mill adjoining driveway aprons at a location that will provide positive drainage to the adjoining edge of pavement elevation (after top course is placed).

i.) Driveway, 30" corner curve and 18" catch basin aprons are to be installed after top course has been placed and compacted. Aprons are to be mechanically compacted.

23. Provisions for maintenance and protection of traffic are required:

a.) All Streets and traffic ways shall be kept open for the passage of traffic and pedestrians during the paving operation unless otherwise approved by the Town or their representative.

b.) The Contractor shall notify local Schools, Police, Ambulance, and Fire Departments of their tentative work plans and schedule, a minimum of forty eight (48) hours prior to the commencement of work in the area. Emergency vehicles must have 100% access all of the time during construction.

c.) The Contractor shall provide proper signage, flag persons, barricades, barriers, lights, equipment, service and personnel and all other Traffic Control Devices as required to regulate and protect all traffic, pedestrians and warn of hazards. All such material, equipment and labor shall conform to the requirements of the town and are to be in accordance with the NYSDOT Manual of Uniform Traffic Control Devices. The Contractor shall remove all temporary equipment and facilities when they are no longer required.

24. When concrete sidewalks are required, they shall meet the following specifications:

a.) Sidewalks shall be installed once forms are approved by the Town Highway Superintendent and/or Town Engineer.

b.) The subgrade shall be prepared in accordance with Section §203 of the New York State Department of Transportation Standard Specifications. The width of the subgrade shall be 1' wider than the sidewalk pavement width. The elevation of the subgrade is determined by the approved design drawings and details.

c.) Subbase:

i. The subbase shall be installed in accordance with Section §304 of the Standard Specifications. The subbase shall consist of six (6) inches of compacted gravel, Type 2, Item 304. [increase subbase depth to eight (8) inches if compacted gravel, Item §304-2.02, Type 4 is utilized] as outlined in the NYSDOT Standard Specifications. Prior to acceptance, the developer or supplier shall certify, in writing, that the materials furnished comply with the requirements of Item §304-2.02, Type 4 and/or Item §304-20.2, Type 2, respectively.

ii. The subbase shall cover the entire area of the subgrade.

iii. Subbase shall be installed in lifts not to exceed 6-inches.

d.) Concrete Top Course (Standard):

i. Concrete shall be only Portland cement concrete air-entrained of durable materials and shall have the following:

1. A low water-cement ration (maximum of 0.46);

2. A slump of 4-inches or less (a super plasticizer may be used to increase slump and workability).

3. A cement content of 606 lbs per cubic yard or more.

4. Proper finishing after bleeding water has evaporated from the surface.

5. Adequate drainage with a slope of 1/8-inch per linear foot or more.

6. A minimum of 7 days moist curing at or above 50 degrees F.

7. A minimum compressive strength of 4,000 psi at 28 days.

8. A minimum of 30 days drying period after moist curing if concrete is placed in fall and will be exposed to freeze-thaw cycles and deicers when saturated. The exact length of time for sufficient drying to take place may vary with climate and weather conditions.

9. FIBERS FOR CONCRETE REINFORCEMENT, Synthetic, fibrillated fibers, specifically engineered and manufactured for use as secondary concrete reinforcement meeting ASTM C1116 Type III.

ii. Technical specifications for concrete as herein defined shall comply with the applicable specifications of the NYSDOT standard specifications 2007 or latest addenda.

iii. Sidewalks and ramps shall conform to the Americans with Disabilities Act Accessibility Guidelines.

25. Tactile/detectable warning surfaces shall be installed at the ends of sidewalks. For the detectable warning strip, a dark gray cast-in-place panel, with truncated domes, spaced 2.35" oc., manufactured by ADA Solutions (adatile.com), part # IDPAV2, Accesstile ACC-R-2460-XX, or approved equal, shall be used. Tiles shall be manufactured using a matte finish exterior grade homogeneous glass and carbon reinforced polyester based composite material.

26. Street signs – Developers are responsible for the installation of traffic control signs. Traffic control signs shall be posted in accordance with Federal regulations and the NYS Manual Uniform Traffic Control Devises. Placement of signs varies due to underground utility locations or other engineering considerations. All proposed signs must be reviewed and approved by the Highway Department before installation. The Highway Department may be contacted at 439-4955.

a.) Street name signs, speed limits up to 35 MPH – signs shall be made of 6" x required length 0.125" aluminum blank, with a letter height of 4" (primary name) and 2" (suffix name), using B, C, D font as needed for best appearance. The background shall be of white engineering grade reflective material with a green transparent overlay.

b.) Street name signs, speed limits over 35 MPH – signs shall be made of 8" x required length 0.125" aluminum blank, with a letter height of 4" (primary and suffix name), using B, C, D font as needed for best appearance. The background shall be of white VIP diamond grade reflective material with green transparent overlay for letters.

c.) Abbreviations – Street = ST, Avenue = AVE, Road = RD, Lane = LN, Court = CT, Circle = CIR, Boulevard = BLVD, Parkway = PKWY.

d.) Post size – A white 2" (ID) x 2 3/8" (OD) galvanized steel pipe is required for all street name signs. It is to be set in concrete 4' below grade, and extend 7' above grade.

General placement of signs –

a.) Lateral – see figure §203-2 (rural) of the NYS MUTCD

b.) Height – see figure §203-2 (rural) of the NYS MUTCD.

c.) Longitudinal –

1.) Stop signs – 20’ from the nearest edge of the intersecting road.

2.) Speed limit – initial sign is within the first 60’ to 100’.

27. Length of stub streets – Stub streets over 300’ in length require the installation of a temporary turn-around.

28. When the Town determines that extraordinary hardship would result from strict compliance with the provisions of this specification because of an unusual circumstance of topography or other physical condition in the proposed location of a street, it may modify the requirements for said street. In addition, for good cause, the Town may waive compliance with the provisions of any part of this specification in connection with the construction of a proposed street.

Revisions:

04/26/02 – added notes to obtain latest Standard Detail Sheets. Added pipe gauges for corrugated metal pipe.

11/13/02 – added note for water tapping sleeve and valve near other mains.

12/07/05 – **Sanitary** – Beneficial to extend laterals beyond utilities. Mark laterals with a stake. May require compaction tests. Water-tight manhole cover specifications. Added adjustable manhole riser specifications. Test mains after all mains and laterals have been installed. Closed-circuit television specification. Record data specification.

Storm drainage – May require compaction tests. Record data specifications.

Water mains – Height of shoulder. Fire hydrant specification. Tapping sleeve specification. Corp stop and curb box specifications. Fittings to be North American made. May require compaction tests. Record data specifications.

Highway – Sidewalk specifications. Street sign specifications.

08/18/2011 – Complete update

12/12 – added 4” or less FM data, removed Performance Pipe requirement, added two-year hydrant requirement, added “how to pave” details.

7/13 – Don’t need a plate across the bucket in sand. 1203C sanitary sewer cover and storm MH cover with Epic pickbars. Cott Mfg 703 water and sewer main markers.

12/13 – Added no-lead model numbers to curb and corp stops.

1/14 – only Clow medallion hydrants

3/19/14 – added ADA warning panels. Removed WWF from sidewalks.

11/10/16 – no curb boxes in driveways.

12/1/16 – labelling of sanitary sewer covers.