

**TOWN OF GEORGETOWN
DESIGN AND CONSTRUCTION STANDARDS
FOR
WATER, SEWER, AND STREETS**

Prepared for:

Mayor & Council
Town of Georgetown
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Georgetown, Delaware

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GENERAL CONDITIONS

1. PURPOSE OF STANDARD SPECIFICATIONS

The following specifications and accompanying details are made available to private contractors and developers, and also for projects conducted by the State of Delaware and Sussex County within the town limits of Georgetown, for use on every utility or street project within the incorporated area of the Town of Georgetown and those areas outside the town limits but within the project authority of the Town of Georgetown. They are binding and shall be closely observed; any exceptions or alterations shall be obtained in writing from the Town at least four (4) weeks prior to commencement of the project.

2. DEFINITIONS OF TERMS

- A. Whenever in these specifications, bond and other contract documents, the following terms or pronouns are used, the intent and meaning shall be interpreted as follows:

“Town of Georgetown” or “Town”

Town of Georgetown, Sussex County, Georgetown, Delaware, acting through the Town Council or its authorized representative.

“Contractor”

Party responsible for the construction of a utility or the construction of a sidewalk, curb, gutter or driveway or the construction or restoration of any street or road surface, acting directly or through his or her agents or employees.

“Subcontractor”

Any individual, firm or corporation who contracts with a contractor to perform part or all of the latter's contract.

“Shop Drawings”

Drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor or any subcontractor, manufacturer, supplier or distributor, and which illustrate some portion of the work.

"Drawings"

All drawings or reproductions of drawings, pertaining to the work under the contract, which are furnished or approved by the Town.

“Specifications”

The definitions, descriptions, directions, provisions and requirements contained herein, and all written supplements thereto, made or to be made, pertaining to the contract, and the materials, equipment and workmanship to be furnished under the contract.

"Contract" or "Contract Documents"

All things contained in the specifications, drawings, proposals, agreement and bond, and therein referred to, are to be considered as one instrument forming the contract, including any and all supplementary agreements which could reasonably be required to complete the construction contemplated.

"Approved", "As Required", and similar expressions

Meaning shall be construed as "as approved by the Town" and "as required by the Town".

"Provide"

A direction to the Contractor to furnish all materials, equipment and labor and make payment for all of these necessary to complete the contract.

"Work"

Any and all things agreed to be furnished or done by, or on the part of, the Contractor, and which are required in the construction and completion of the project herein contemplated. Includes also labor, material and equipment.

"Material" or "Materials"

Unless the context otherwise requires, these words or either of them, shall include equipment.

"Furnish"

A direction to the Contractor to supply and make payment for materials and equipment but not necessarily to install or pay workmen to install, or both, these items.

"General Conditions"

Provisions that establish and pertain to the legal responsibilities between the parties involved in the work, namely the Town and Contractor.

- B. Whenever in the specifications and upon the drawings, the words DIRECTED, REQUIRED, PERMITTED, ORDERED, DESIGNATED, PRESCRIBED, and words of like import are used, it shall be understood that the directions, requirements, permission, order, designation, or prescription of the Town is intended. In the case of shop drawings and similar submissions by a contractor or subcontractor, the words APPROVED, ACCEPTABLE, SATISFACTORY, and words of like import shall mean the submission by the contractor or subcontractor is approved by, or acceptable or satisfactory to the Town unless otherwise expressly stated. Town approval shall not negate reliance on the contractor's selection of materials or methods to achieve a performance objective specified by the Town.
- C. All references herein to the singular shall include the plural, to the plural, shall include the singular, and to any gender shall include all genders.

3. GENERAL CONDITIONS

INTENT OF THE GENERAL CONDITIONS

It is not the intention of the general conditions and/or any other part of these specifications to contradict or supersede any ordinance or legislative enactment of the Town of Georgetown but to act only as a supplement thereof.

PERMITS, FEES, AND NOTICES

- A. The Contractor shall pay taxes, royalties, and fees, and secure licenses and permits that are required, during the time of the contract, by local, county, state and federal laws, ordinances, rules, codes and regulations for the legal performance of the contract.
- B. The Contractor shall perform the work in accordance with notices issued by public authorities having jurisdiction over the work including but not limited to Delaware Department of Transportation (DelDOT), Delaware Department of Health and Social Services, and the USDA Soil Conservation Service.
- C. If the Contractor performs work, knowingly or ignorantly, contrary to requirements of local, county, state and federal laws, ordinances, rules, codes and regulations, he or she shall assume full responsibility therefore and shall bear all costs of suits, actions and damages resulting from his or her illegal work performance.

PERFORMANCE (GUARANTEE) BOND

- A. The Developers of major subdivisions and any other project deemed appropriate by the Town, shall submit a Performance Bond in the amount of 150% of all improvements to be eventually taken over by the Town. These improvements may include, but are not limited to, the costs of installing streets, curb, and sidewalks; water and sewer utilities and appurtenances; storm sewer pipes and catch basins; street lighting; and any other improvements that the Town deems necessary for bonding.
- B. The Performance Bond shall be in a form acceptable to the Town and it shall include an agreement which defines the terms of the bond. The Bond and agreement shall be submitted to the Town for review and approval.
- C. The Performance Bond shall not be surrendered by the Town until the Mayor and Town Council have formally acknowledged Final Acceptance of the improvements; and not until a two (2) year Maintenance Bond has been submitted to and approved by the Town.

MAINTENANCE BOND

- A. Following acknowledgement of Final Acceptance of a major subdivision or other project for which a Performance Bond has been required by the Town, the owner shall submit a Maintenance Bond to the Town for review and approval. The Bond shall be in an amount equal to 10% of the Performance Bond; or in an amount equal to the portion of the Performance Bond which the Town will release. The term of the Maintenance Bond shall be a period of two (2) years, unless otherwise specified for the project, which shall begin on the date of the Town's acknowledgement of Final Acceptance.
- B. The Maintenance Bond shall be in a form acceptable to the Town and it shall include an agreement which defines the term of the Bond.

INDEMNIFICATION

- A. The Contractor shall indemnify and hold harmless the Town, and all who represent them, from" and against claims, damages, losses and expenses arising out of the Contractor's performance of the work, provided such claim, damage, loss and expense" are related to:
 - 1. Bodily injury, sickness, disease or death, or to injury to tangible property, including the loss of use resulting there from, and
 - 2. Negligence, recklessness and/or malfeasance of the Contractor or his or her subcontractors and others, directly related to the project, or both.

COOPERATION OF CONTRACTOR AND REPRESENTATIVE

The Contractor shall give the work his or her constant attention to facilitate the progress thereof and shall cooperate with the Town. The Contractor shall have at all times a competent and reliable English-speaking representative on the work, authorized to receive orders and act for him or her.

COOPERATION WITH OTHER CONTRACTORS

- A. The Contractor shall cooperate with and so conduct his or her operations as not to interfere with or injure the work of other contractors or workmen employed by the Town. He or she shall promptly make good, at his or her own expense, any injury or damage which may be done by him or her or his or her employees or agents on the work.
- B. The Contractor shall suspend such part of the work herein specified, or shall carry on the same in such manner, as may be ordered by the Town.

DEFECTIVE MATERIALS AND WORK

The materials and work as described and outlined in these specifications are for the sole purpose of maintaining quality, conformity and safety in all project construction (and materials used) performed within the town limits and authority of the Town of Georgetown. All materials not conforming to the requirements of these specifications shall be considered as defective, and all such materials whether in place or not, shall be rejected and shall be removed immediately from the work unless otherwise permitted. No material which has been rejected, the defects of which have been corrected or removed, shall be used until approval has been given. All work which has been rejected or condemned shall be remedied, or if necessary, removed and replaced in an acceptable manner by the Contractor at his/her own expense.

FAILURE TO REMOVE AND RENEW DEFECTIVE MATERIALS AND WORK

Should the Contractor fail or refuse to remove and renew defective materials used or work performed previously or to make any necessary repairs: in an acceptable manner, and in accordance with the requirements of these specifications, within the time indicated in writing, the Town shall have the authority to cause the unacceptable or defective materials or work to be removed and renewed or such repairs to be made at the Contractor's expense.

LAWS TO BE OBSERVED

The Contractor shall observe and comply with federal, state, county, and local laws, ordinances, rules, regulations, decrees and orders that are in effect and applicable to the work during the time of construction; and he or she shall see that his or her subcontractors likewise meet this requirement. He shall indemnify, and hold harmless, the Town and its representatives against claims and liability arising from Contractor's and/or subcontractor's violations of such laws, ordinances, rules, regulations, decrees, and orders, whether such violations be by the Contractor or any Subcontractor, or any of their agents and/or employees.

LINES, GRADES AND ELEVATIONS

- A. The Contractor shall be responsible for layout of the lines, grades, and elevations of the work and shall conform his or her work thereto.
- B. The Contractor shall furnish the Town, at least five days prior to the start of construction, two record copies of line and grade stakeout data as well as cut sheets for approval. The furnishing of such record data shall in no way release the Contractor from his or her responsibility for the completeness and accuracy of stakeout work necessary for construction.
- C. All survey and stakeout work shall be done by qualified personnel subject to the approval of the Town.
- D. All proposed manholes, catch basins, etc., shall be field located by the Contractor prior to the start of construction. Notice shall be given to the Town to observe the

location and make any adjustments deemed necessary.

SANITARY PROVISIONS

The Contractor shall provide and maintain in a neat and sanitary condition such sanitary conveniences and accommodations for the use of his or her employees as may be necessary to comply with the requirements and regulations of the Department of Health or of other bodies or tribunals having jurisdiction thereof. He shall commit no public nuisance.

PUBLIC CONVENIENCE AND SAFETY

- A. The Contractor shall conduct the work in a manner that will minimize obstruction to traffic in the area. The safety and convenience of the general public and of the residents and occupants of property along and adjacent to the work shall be provided in an adequate and satisfactory manner. Footways and portions of highways and streams adjoining the work shall not be obstructed more than absolutely necessary. In no case shall any traveled thoroughfare be closed without permission of the Town.
- B. Fire hydrants on or adjacent to the work shall be kept accessible to fire apparatus at all times, and no obstructions shall be placed within 15 feet of a hydrant.
- C. Gutters and storm drain inlets shall be kept unobstructed at all times, except as temporarily required to prevent entrance of construction related debris.
- D. In order to protect the lives and health of his or her employees, the Contractor shall comply with all pertinent provisions of the Contract Work Hours and Safety Standards Act, as amended, commonly known as the Construction Safety Act as pertains to health and safety standards; and shall maintain an accurate record of all cases of death, occupational disease, and injury requiring medical attention or causing loss of time from work, arising out of and in the course of employment on work under contract.

ACCESS BY RESIDENTS AND BUSINESSES

- A. The Contractor shall schedule his work so as to minimize the time during which vehicular access to each dwelling along the work route is prevented. The Contractor shall provide, at all times, safe pedestrian access to all dwellings.
- B. Vehicular access on side streets, in the proximity of the route of the work, shall not be encumbered by the Contractor.
- C. Public access to businesses shall be provided during all periods of construction.

DETOURS

- A. Detours may be requested by the Contractor. Traffic may be detoured over

approved routes along existing roads with written approval of the Town and/or DelDOT (if applicable). The Cost of all work associated with any detour, including revisions to the M.O.T. plans and erection and maintenance of the detour signs, etc., is to be borne by the Contractor.

- B. The Contractor shall notify the Town and/or DelDOT (if applicable), local fire companies, post office and the school district of all proposed detours seven (7) days prior to implementation of any detour.

BARRICADES, DANGER, WARNING, AND DETOUR SIGNS

The maintenance of traffic shall be in accordance with a Town and/or DelDOT approved Maintenance of Traffic (MOT) Plan. The Contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient lights, danger signals and signs, provide a sufficient number of watchmen and take all necessary precautions for the protection of the work and safety of the public. Highways closed to traffic shall be protected by effective barricades, on which shall be placed acceptable warning signs. All signage materials and placement; and all flagging, staging, and personnel shall be in accordance with current DelDOT requirements. The Contractor shall detour traffic and shall furnish and maintain all detour signs required to direct traffic over the entire route of the detour. Costs for maintaining traffic shall be the responsibility of the Contractor.

WORK WITHIN STATE RIGHT-OF-WAY

- A. All materials and construction methods for work affecting DelDOT jurisdiction shall be done in complete accordance with permit and/or franchise stipulations or directives issued by same. All costs for such work shall be the responsibility of the Contractor.
- B. Maintenance of traffic shall be accomplished in full accordance with current DelDOT requirements. Work in DelDOT right-of-way shall not commence without an approved signing plan.

PRESERVATION AND RESTORATION OF PROPERTY

- A. Easements for proposed work on private property shall be submitted to the Town for review and approval during the plan review process. The Contractor shall not enter private property without an easement approved by the Town, or in the case of “minor” and unanticipated necessary encroachment, permission from the property owner that is first verified by the R.P.R. or Town inspector.
- B. The Contractor shall take necessary measures to preserve public and private property, including paving and lawns outside the required excavation lines, adjacent to the property. He shall not permit monuments to be moved until an authorized agent has referenced their locations, and until directed to move them. The Contractor shall pay all expenses for replacing property markers disturbed. Replacement shall be by a surveyor licensed in the state of Delaware.

- C. The Contractor shall be responsible for damages to public and private property whether caused by himself, his or her subcontractors, or as a result of negligent construction methods. Contractor shall provide restoration of damaged property to its original condition, or better, at no additional cost to the Town. If contractor fails to restore such property, the Town may, upon 48-hours notice, have property restored at the Contractor's expense.

EROSION AND SEDIMENT CONTROL

The Contractor shall provide for safe disposal of run-off from construction areas in accordance with DNREC erosion and sediment control requirements. Such requirements may be defined in the approved construction drawings, or ordered during construction by the controlling agency, the Town, or the Engineer. The cost of erosion and sediment control shall be the responsibility of the Contractor.

CONTRACTOR'S RESPONSIBILITY FOR WORK

- A. Until final acceptance of all the work has been indicated in writing by the Town, the work shall be under the charge of and care of the Contractor. He shall take every precaution against destruction of, injury, or damage to the work or to any part thereof from any other cause whatsoever. The Contractor shall rebuild, repair, restore, and make good, at his or her own expense, any destruction to, injury of, or damage made to the work before its final completion. Acceptance of any restored, rebuilt or repaired work shall be indicated in writing by the Town.
- B. Contractor shall furnish, and maintain in safe working condition, equipment necessary to properly perform the work in the scheduled time.

SUBCONTRACTORS

- A. The Contractor shall give his personal attention to the faithful performance of the work, shall keep the same under his own control, and shall not assign the contract by power of attorney or otherwise. No sub-contractor shall be engaged upon any branch of the work, who is not thoroughly practical and reasonable and at the time of making this contract conducting business in the particular branch of trade for which he is employed.
- B. If the Town or Engineer objects to any proposed sub-contractor, materials or equipment supplier, the Contractor shall furnish such data as may be required to secure the Town's and Engineer's approval. If such approval is not then forthcoming, the Town and the Contractor will negotiate the matter to a mutually acceptable conclusion.
- C. The Contractor shall not be released from any of his liabilities or obligations should any sub-contractor or sub-contractors fail to perform in a satisfactory manner the work undertaken by him or them.

- D. The Contractor agrees that he is as fully responsible to the Town for the acts and omissions of his sub-contractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.
- E. Nothing contained in any document shall create any contractual relation between any subcontractor and the Town.

CONTRACTOR'S EMPLOYEES

- A. Employees of the Contractor or persons connected with the Contractor shall be discharged upon request of the Town for any or all of the following reasons:
 - 1. Directing profanity or abusive language, or both, at the Resident Project Representative and/or other Town representatives;
 - 2. Interfering with Resident Project Representative and/or other Town representatives in performance of their work;
 - 3. Disobeying or evading, or both, instructions of the Resident Project Representative and/or other Town representatives;
 - 4. Carelessness or incompetence, or both;
 - 5. Discharged employees shall not be rehired without consent of the Town.

TEST OF SAMPLES OF MATERIALS

Tests of materials shall be made at the Contractor's expense, by a certified testing laboratory, in accordance with the officially approved methods as described or designated. The Town reserves the right to conduct verification testing at its own expense.

STORAGE OF MATERIALS

Materials shall be stored so as to insure the preservation of their quality and fitness for the work. When considered necessary, they shall be placed on wooden platforms or other hard clean surfaces, and not on the ground, and shall be placed under cover when directed. Stored materials shall be located so as to facilitate prompt inspection. Lawns, grass plots, or other private property shall not be used for storage purposes without written permission of the owner or lessee.

QUALITY OF MATERIALS AND WORKMANSHIP

- A. Materials and workmanship shall be of best possible quality and feasibility for the intended purpose, whether or not a brand name *is* specified. Materials shall be new and unused and they shall be in accordance with approved shop drawings

where such drawings submissions are required.

- B. Representative preliminary samples of materials may be requested by the Town for examination or testing, or both. Materials, for which samples are submitted to the Town, shall not be ordered by Contractor until the Town furnishes written approval of said samples. Materials may be further inspected by the Town during preparation and construction of the work; materials found to be substandard will be rejected.

CLEAN UP

- A. The Contractor shall, at his or her own expense, keep the sites of his or her operations clean during construction and remove all rubbish as it accumulates.
- B. Upon failure of the Contractor to keep the sites of his or her operations clean to the satisfaction of the Town, the Town may, upon 24 hours notice to the Contractor, remove rubbish, as *is* deemed necessary, and charge the cost thereof to the Contractor.
- C. On or before the completion of the work, the Contractor shall, without charge therefore, tear down and remove all his or her buildings and temporary structures built by him or her, shall remove all rubbish of all kinds from any grounds which he or she has occupied, and shall leave the site of the work in a clean and neat condition.

TEMPORARY SUSPENSION OF WORK

The Town shall have the authority to suspend the work, wholly or in part, for such period or periods as he or she may deem necessary, due to unsuitable weather, or such other conditions as are considered unfavorable for the suitable execution of the work, or for such time as is necessarily due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract. If it should become necessary to stop work for an indefinite period, the Contractor shall store all materials in such manner that they will not obstruct or impede the traveling public unnecessarily nor become damaged in any way, and he or she shall take every precaution to prevent destruction, damage or deterioration of the work performed, provide suitable drainage by opening ditches, shoulder drains, etc., and erect temporary structures where necessary. The Contractor shall not suspend the work without authorization. Neither the failure of the Town to notify the Contractor to suspend the work on account of bad weather or other unfavorable conditions nor permission by the Town to continue work during bad weather or other unfavorable conditions, shall be a cause for the acceptance of any work which does not comply in every respect with the contract and specifications.

CONDITONAL ACCEPTANCE

Whenever, in the opinion of the Town, the Contractor shall have the work in an acceptable manner in accordance with the terms of the contract, the Contractor shall

arrange for start-up of each facility and an inspection of the entire work by the Town and upon completion of all repairs or renewals which may appear at the time to be necessary, the Town will conditionally accept the work.

MAINTENANCE, REPAIRS, ETC., AFTER COMPLETION

The Contractor, at his or her entire cost and expense, shall maintain all portions of the work to meet the requirements of these specifications for and during the period of one (1) month from and after the date of the conditional acceptance of the entire work by the Town, and, in addition, shall at his or her entire cost and expense, make all repairs and replacements of the work and appurtenances which may become necessary, in the judgment of the Town at any time or times, during the following one (1) month period, on account of any failures or defects in said work and appurtenances due to improper work done or materials furnished by the Contractor.

FINAL ACCEPTANCE

A. For projects where the Contractor is under Contract directly with the Town:

1. One (1) month after the date of conditional acceptance of the work, the Town shall make a final inspection of the entire work, witness and approve the satisfactory operation of all facilities and complete restoration, and upon completion of all repairs or renewals which may appear at that time to be necessary in the judgment of the Town, shall certify in writing as to the final acceptance of the entire project.

B. For projects where the Contractor is under Contract with an owner other than the Town, such as a major subdivision or other project involving infrastructure which will be taken over by the Town, the Town shall not grant Final Acceptance until the following have been satisfied:

1. All monumentation must be complete.
2. All improvements to be taken over by the Town must be completed to the satisfaction of the Town, except, in the case of a major subdivision, the top coat of asphalt.
3. In the case of a major subdivision, the ownership of no lots or parcels shall be transferred until the Town has granted Final Acceptance of the project or the current phase.
4. A Maintenance Bond in the amount of 10% of the amount of any Performance Bond must be submitted to the Town for review, and be approved. Final Acceptance will not be granted until the Maintenance Bond has been approved. The term of the Maintenance Bond shall be two (2) years, unless otherwise specified. When Final Acceptance has been granted, the Performance Bond will be released, except that the cost of any

remaining top coat of asphalt which has not yet been installed shall remain bonded in an amount of 150% of the value until it has been installed.

5. All rights-of-way to be taken over by the Town must be formally deeded to the Town, at expense of the Grantor.
6. A Bill of Sale for all items which will be taken over by the Town must be submitted, reviewed, and approved.
7. Unconditional Releases of Liens from the General Contractor, all sub-contractors, and all major material suppliers must be submitted and approved by the Town.
8. The record ("as-built") drawing submission must be reviewed, and approved by the Town.

TERMINATION OF MAINTENANCE PERIOD(S)

- A. It shall be the Contractor's responsibility to notify the Town prior to the termination of any two (2) year maintenance period.
- B. Upon being notified that any maintenance period is near the termination point, the Town shall perform an inspection of the items for which the bond applies. The Town shall, if necessary, generate a punch list and provide a copy to the Contractor. When all items are acceptable to the Town, the Maintenance Bond, or its unused portion, shall be released by the Town.

UNLIMITED LIABILITY OF CONTRACTOR

It is understood and agreed that any and all of the duties, liabilities and/or obligations imposed upon or assumed by the Contractor by or under these specifications, shall be taken and construed to be cumulative, and that the mention of any specific duty, liability or obligation imposed upon or assumed by the Contractor under these specifications shall not be taken or construed as a limitation or restriction upon any or all of the other duties, liabilities and/or obligations imposed upon or assumed by the Contractor.

WORK HOURS

No work-between the hours of 6:00 PM and 7:00 AM shall be permitted without first obtaining written permission of the Town.

LEGAL HOLIDAYS

- A. The Contractor will not be permitted to work on Sundays or days which are legal holidays in the State of Delaware, except in cases of emergency, and only with the written permission of the Town.

- B. If the Contractor desires to work upon any such legal holidays, he or she shall notify the Town in writing at least two (2) days in advance of such holiday stating that he or she desires to work and the location of the proposed work. The Town reserves the right to deny or approve the Contractor's request.

GUARANTEE

The Contractor shall guarantee all of the work for a period of two (2) years after the date of completion and final acceptance thereof by the Town as follows:

- A. Against all faulty materials and against all imperfect, careless, and unskilled workmanship.
- B. That the entire equipment and each and every part thereof shall operate (with proper care and attention) in a satisfactory and efficient manner, and in accordance with the requirements of these specifications.
- C. That all structures shall be watertight and leakproof at every point, and in every particular.
- D. The Contractor agrees to replace, with proper workmanship and materials, and to reconstruct, correct, or repair, without cost to the Town, work which is improper, imperfect, does not operate in a satisfactory manner, fails to perform as specified, or all of these.
- E. The guarantee obligations assumed by the Contractor under the contract documents shall not be held or taken to be in any way impaired because of the specifications errors, indication of approval by or on behalf of the Town of articles, materials, means, combinations or things used in the construction, performance and completion of the work or any part thereof, or all of these.
- F. No use acceptance by the Town of the work or any part thereof, nor any failure to use the same, nor any repairs, adjustments, replacements or corrections made by the Town due to the Contractor's failure to comply with his or her obligations under the contract documents, shall impair in any way the guarantee obligations assumed by the Contractor under the contract documents.

SHOP DRAWINGS

- A. The Contractor shall furnish shop drawings for any fabricated construction materials required for the work, unless otherwise directed by the Town. The Contractor shall furnish PDF files of shop drawings via e-mail unless this method is not possible, in which case the Contractor shall submit six (6) paper copies of each shop drawing for the Engineer's approval. The Contractor shall not order any item or material for which a shop drawing submission is required until the respective shop drawing has been approved by the Engineer.

- B. Regardless of corrections made in or approval given to shop drawings by the Town, the Contractor will nevertheless be responsible for the accuracy of such drawings and for their conformity to the plans, performance objectives and specifications, unless he or she notifies the Town in writing of any deviation at the time he or she furnishes such drawings. Only drawings bearing the approval stamp of the Town shall be used for ordering materials or for construction.

SCHEDULE OF CONSTRUCTION

The Contractor shall complete the utility or street construction contract according to a schedule of construction as submitted by the Contractor and approved by the Town. Submit three copies for approval.

LOCATION OF EXISTING UTILITIES

- A. The Contractor shall contact "Miss Utility", or other such appropriate telephone number, at (800) 282-8555 at least 48 hours prior to digging in the vicinity of existing underground utilities to have them located and marked. It shall then be the Contractor's responsibility to verify these utilities, by test pits, a minimum of fifteen (15) days in advance of actual construction operations in the vicinity of the utilities.
- B. The failure to show on the contract documents any existing utilities shall not relieve the Contractor of his or her responsibilities of determining the location of these utilities, and any damage to the utilities or interruption of service shall be repaired by the Contractor according to the Town or utility company specifications. The Town shall be notified of any damage to any utilities.

EXISTING WATER AND SEWERAGE SYSTEMS

- A. It is essential that the existing water and sewerage systems remain in operation throughout the construction period. Connections to existing pipes and structures shall be scheduled and coordinated with the Town. Although some interruptions in service may be impossible to avoid, the Contractor shall make every effort to keep these interruptions to a minimum.
- B. Certain connections to existing systems might have to be made during weekends or nighttime hours. This determination shall be made by the Town.

WATER SUPPLY

The Contractor shall at his or her own cost provide such quantities of clean water as may be required for any and all purposes under the contract. He shall supply sufficient drinking water to all his or her employees.

RIGHT-OF-WAY AND LOT LINE MONUMENTATION REQUIRED

- A. Monuments must be set at all points of deflection of newly formed or existing (if not found) right-of-way and lot lines and curves. In the case of major subdivisions, monumentation must be complete and included in the record (as-built) submission prior to Final Acceptance; and in the case of minor subdivisions, the monumentation must be complete prior to the issuance of a Certificate of Occupancy.

RECORD ("AS-BUILT") DRAWINGS

- A. Upon completion and prior to the release of the Performance Bond, the Developer/Contractor shall submit to the Town a draft copy of the record drawings for review and comment. Record drawing information shall include surveyed as-built elevations of the following:
1. All property monuments or markers, found and set;
 2. Sewer manhole rims, pipe sizes, and pipe inverts;
 3. Sewer cleanout covers and inverts;
 4. Pump station wet well rim and bottom, pipe sizes, and pipe inverts;
 5. Pump station valve vault rims, pipe sizes, and inverts;
 6. Forcemain inverts every 50 feet;
 7. Air release valve rims, pipe sizes, and inverts;
 8. Grease trap rims, pipe sizes, and inverts;
 9. All water valves, hydrants, vaults, meter pits, and curb stops (where required);
 10. All storm sewer catch basin grates and manhole rims, all pipe sizes, and inverts;
 11. All other items deemed necessary by the Town.
- B. When the record drawings have been approved, the Developer/Contractor shall submit to the Town four (4) signed and sealed paper copies of the approved record drawings, a CD of the signed and sealed record drawings in PDF format; and a CD with the record information in digital AutoCAD (2010 or newer) format. The digital AutoCAD information shall be on Delaware State Plane horizontal control and NAVD 88 vertical control.

END OF SECTION

DIVISION 1
DESIGN PARAMETERS

SECTION 1A - DESIGN PARAMETERS FOR WATER DISTRIBUTION SYSTEMS

1.01 GENERAL

Where water mains are to be installed for residential or commercial development, the Developer is responsible for all costs associated with the design, Town review, and installation of the improvements. Developer shall hire a Contractor approved by the Town of Georgetown to install the improvements. The improvements shall include the installation of all water services, including curb stops and meter pit assemblies. All water services must be installed before any paving will be permitted to take place.

1.02 DESIGN CAPACITY

A. Water Mains

In determining the required size and capacity of the water main, the following factors should be considered.

1. Estimated average and maximum water demand for the design period.
2. Topography of area.
3. Depth of excavation.
4. Fire fighting requirements.
5. Number of proposed services.
6. The calculations for design of the water mains shall accompany the Project drawings, when submitted to the Town Engineer for review when requested.
7. Hydrant tests.

B. Water Service Lines

Individual water services shall be installed to each lot of a subdivision. Each unit of a townhouse and condominium shall have a separate meter. Sub-metering shall be the responsibility of the Developer. Service lines sizes shall be designed by the developer for the use intended. Minimum standards shall include the following:

| | <u>Min. Service Size</u> | <u>Min. Meter Size (Each Unit)</u> |
|--------------------------------------------------------------|------------------------------|----------------------------------------|
| Single family residence | 2" | 5/8" x 3/4" |
| Each duplex residence | 2" | 5/8" x 3/4" |
| 4 unit apartment, condominium or townhouse (gang service) | 2" | 5/8" x 3/4" |
| 8 unit apartment, condominium or apartment (gang service) | 2" | 5/8" x 3/4" |

1.03 DESIGN SIZE

A. Pressure

All water mains shall be sized after a hydraulic analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 21 psi at ground level at all points in the distribution system under all conditions of flow. Design of new pipe shall use an aging c-factor of 100 for ductile iron pipe and 120 for plastic. Design engineer shall provide certification of design and fire flow conditions. Water system shall meet Delaware State Fire Marshal requirements. The static pressure in the distribution system should be designed for 52 psi wherever new pressure sources are provided.

B. Diameter

The minimum size of water main for providing fire protection shall be 6-inch diameter. Larger mains will be required, if necessary, to allow the withdrawal of the required fire flow while maintaining the minimum residual pressure.

C. Small Mains

Any departure from minimum requirements shall be justified by hydraulic analysis and future water use and can be considered only in special circumstances.

1.04 DEPTH OF WATER MAIN

Minimum depth of cover over water mains shall be 42 inches as measured from the top of the pipe to finished grade.

1.05 VALVES

Sufficient valves shall be provided on the water mains for isolation during repairs. Valve spacing shall be in accordance with the Delaware State Fire Marshal's Office and the State Office of Drinking Water. Valves shall also be placed at all main branch connections.

1.06 HYDRANTS

Location and Spacing: Hydrants should generally be provided at each street intersection and at intermediate points between intersections as required or requested by the Town. Hydrant location and spacing shall be in accordance with the Delaware State Fire Marshal's Office.

1.07 SERVICE METERS

Each service connection, except fire service, shall be individually metered. Fire services shall be installed with a detector check meter system.

1.08 DEAD ENDS

Dead ends shall be minimized by looping of all water mains whenever practical. Hydrants shall be placed at the end of all dead end lines. Blow-offs shall not be substituted for hydrants.

1.09(A) DESIGN FLOW

The water system shall be designed on the basis of an average daily demand of 275 gallons per day per equivalent dwelling unit, or typical 2 to 3 bedroom home. Additional allowance may be required for irrigation demands.

1.09(B) WATER IMPACT STUDY

- A. Study required for 11 or more EDUs.
- B. Developer's engineer is responsible for determining whether adequate flows and pressures are available to meet project needs and for sizing and designing onsite improvements; for sizing and locating any offsite water main extensions or loops needed to meet those needs based upon existing (or proposed, if available) system pressures and flows. The study shall indicate any needs for upgrading existing portions of the system if applicable.
- C. In cases where there is an impact on the existing system requiring improvements, the Town may require additional information or conduct an impact study of its own with information provided by the developer's engineer. The cost of this study shall be reimbursed to the Town by the developer.
- D. Indicate any high rise projects, isolated areas, commercial and institutional projects needing flows in excess of capacity of existing system, for the project will install private booster pumping and/or tankage to meet site demands.
- E. Obtain hydrant test data from Department of Public Works, run additional tests as needed, and provide a water main layout and with sizes needed to meet project demands for fire, domestic, and process.
- F. Provide a schematic of proposed improvements drawn to scale.
- G. Upon request from the Town, provide the proposed water main layout in a scaled drawing or electronic format on Delaware State Plane Coordinates. The Town may elect to enter this into a master water model for plan review purposes.
- H. Checklist:
 - 1. Name and contact information of developer and engineer
 - 2. Proposed water demands (fire, domestic, other). EDU calculation.
 - 3. Demand phasing schedule for build outs in excess of 5 years

4. Copies of hydrant test results, source and date
 5. Written summary and pertinent backup information to indicate that design parameters will be met when connecting to the existing system, or proposed improvements to meet project needs.
 6. If applicable, show scope of proposed offsite water extensions with schematic.
 7. If applicable, show proposed offsite easements or use of public rights of way.
 8. If applicable, indicate water quality needs if they are different from normal domestic potable water.
 9. Estimated itemized construction cost for offsite improvements and extensions.
- I. Developments greater than 50,000 gallons per day require a scoping meeting and the Town may elect to have source and treatment components added to the impact study.

END OF SECTION

SECTION 1B - DESIGN PARAMETERS FOR SANITARY SEWERS

1.10 GENERAL

- A. Where sewer mains are to be installed for a residential or commercial development, the developer is responsible for all improvements. Developers shall hire a contractor approved by the Town of Georgetown and pay all costs associated with the work. The Developer shall install sewer laterals with cleanouts in the pipe laying process. Connections to the main shall be made with wye fittings.
- B. Laterals shall be constructed of the same material as the sewer main. Maintain a minimum of 36-inch cover. Lateral extensions from the cleanout to the house shall conform with State Plumbing Regulations.

1.11 DESIGN CAPACITY

In determining the required size and capacity of the sanitary sewer, the following factors should be considered:

- A. Average and peak hourly domestic sewage flow.
- B. Topography of area.
- C. Depth of excavation.
- D. Pumping requirements if necessary.

The calculations for design of the sanitary sewers shall accompany the Project's Drawings, when submitted for review.

1.12 DESIGN FLOW

- A. Average Flow

The sanitary sewer system shall be designed on the basis of an average daily flow of sewer of 225 gallons per day equivalent dwelling unit. Additional allowance may be required for high water use appliances and fixtures.

- B. Peak Design Flow

Sanitary sewers shall be designed on a peak flow basis using the 3.5 ratio of peak to average daily flow unless approved otherwise.

1.13 MINIMUM SIZE

- A. Sanitary Sewer Main

The required size of sanitary sewer mains will vary with the character and size of the Development. The minimum size for sanitary sewer main is eight (8") inches.

B. Lateral Connections

Lateral cleanouts are required for use with all laterals unless a written waiver is received from the Town Engineer.

Each individual dwelling unit and multi-family units, with the exception of structures where each unit may not extend to the ground floor, shall have an individual lateral installed. The minimum diameter of laterals extending from the Town maintained cleanouts shall be six (6") inches. Cleanouts shall be placed at the property line. Additional cleanouts shall be per the State or County Plumbing Code in effect.

1.14 DEPTH OF SEWER MAIN

Minimum depth of cover over sewer mains shall be three (3') feet as measured from the top of the pipe to finished grade. Any piping not meeting the required minimum depth shall be concrete encased.

1.15 SLOPES

All sewers shall be designed and constructed to give mean velocities, when flowing full, of not less than 2.0 feet per second, based on Manning's formula. If possible, pipe slopes should be increased above minimum slope in locations where pipes will carry functional flow.

Using an "n" value of 0.010 for P.V.C., the following are the minimum slopes which are allowed:

| <u>Sewer Size</u> | <u>Minimum Slope in Feet Per 100 Feet</u> |
|-------------------|-----------------------------------------------|
| 8 inch | 0.28 |
| 10 inch | 0.22 |
| 12 inch | 0.17 |
| 15 inch | 0.12 |
| 18 inch | 0.10 |
| 21 inch | 0.08 |

Using an "n" value of 0.013 for Ductile Iron Pipe, the following are the minimum slopes which are allowed:

| <u>Sewer Size</u> | <u>Minimum Slope in Feet Per 100 Feet</u> |
|-------------------|-----------------------------------------------|
| 8 inch | 0.40 |
| 10 inch | 0.28 |
| 12 inch | 0.22 |
| 14 inch | 0.17 |
| 16 inch | 0.14 |
| 18 inch | 0.12 |

The minimum slope for 6-inch sewer laterals shall be one (1) foot per 100 feet, or 1.00%; unless approved otherwise by the Town.

1.16(A) MANHOLES

A. Location and Spacing

Manholes shall be installed at the end of each line; at all changes in grade, size or alignment; at all intersections, and at distances not greater than 400 feet.

B. Cleanouts

Terminal cleanouts shall not be substituted for manholes. However, terminal cleanouts may be approved under Special Conditions by the Town Engineer on a case by case basis. Under no conditions shall terminal cleanouts be installed at the end of a main line sewer greater than 150 feet from the last manhole.

C. Drops

A drop pipe should be provided for a sewer entering a manhole at an elevation of 21 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 21 inches, the flow channel should be filleted to prevent solids deposition.

D. Minimum Diameter

The minimum diameter of manholes shall be 48 inches. Larger diameters are required for drop connections in new construction. A minimum access diameter of 24 inches shall be provided.

E. Flow Channels

The flow pipe channel through manholes shall be brick and mortar unless otherwise approved and conform in shape and slope to that of the sewers. The top of the brick channel shall be at the same elevation as the crown of the main sewer

line in the manhole. Channel shall drop a minimum of 0.10 foot from influent pipe unless otherwise approved.

- F. Use coring machine for connection to an existing manhole and provide flow channel reconstruction to suit. Grouting in of new pipe shall be via Link Seal or Town approved sand collar. Connection shall be watertight.

1.16(B) SEWER IMPACT STUDY

- A. Study required for 11 or more EDUs.
- B. Developer is responsible for conducting the study and submitting it to the Town for review, or, by decision of the Town, the Town may conduct the study and be reimbursed by the Developer.
- C. The study will include existing collection system capability and may include treatment and disposal capability upon review by the Town. All projects over 50,000 gpd and projects needing treatment and disposal capacities may require a scoping meeting.
- D. EDU determination component (non-residential uses)
- E. Checklist:
 - 1. Contact information for developer and engineer doing study
 - 2. Proposed sewer flows and EDU calculation
 - 3. Flow phasing schedule for build outs in excess of 5 years
 - 4. Written summary and pertinent backup information to indicate that design parameters will be met when connecting to the existing system, or proposed improvements to meet project needs.
 - 5. If applicable, show scope of proposed offsite sewer extensions with schematic.
 - 6. If applicable, show proposed offsite easements or use of public rights of way.
 - 7. Estimated itemized construction cost for offsite improvements and extensions
 - 8. Indicate sewage quality if different from normal domestic.

END OF SECTION

SECTION 1C - DESIGN PARAMETERS FOR SEWAGE PUMPING STATIONS AND FORCE MAINS

1.17 DESIGN CAPACITY

In determining the required size and capacity of the pumping station and force mains, the following factors should be considered:

- A. Maximum hourly domestic sewage flow.
- B. Topography of area.
- C. At no place on the pump curve should the horsepower rating of the pump motor be exceeded.
- D. The volume of the wet well between the start elevation and the stop elevation of a single pump.
- E. The calculations for design of the pump station shall accompany the Project's Drawings, when submitted to the Town Engineer for review.

1.18 PUMP STATIONS

- A. General
 - 1. Flooding - Sewage pump station structures and electrical and mechanical equipment shall be protected from the one hundred (100) year flood.
 - 2. Accessibility - The pump station shall be readily accessible by maintenance vehicles during all weather conditions. The facility should be located off the traffic way of streets and alleys.
 - 3. Station Type - Station type shall be coordinated with the public works director or Town Engineer based on flow, location and standardization desired.
- B. Pumps and Hardware
 - 1. Multiple Units - Two (2) pumps at a minimum shall be provided. Approved submersible pumps include Flygt and Myers.
 - 2. Hardware shall be Type-316 stainless steel and shall include guide rails, brackets, chains, cables, etc.
 - 3. Each pump shall have the same capacity and individually shall be capable of handling flows in excess of the expected maximum flow.
- C. Valves
 - 1. Discharge Line - Suitable shutoff and check valves shall be placed on the discharge line of each pump. The check valve shall be located between

the shutoff valve and the pump. Valves shall be capable of withstanding normal pressure and water hammer. Gate valves shall have rising stems and be of the resilient seat type.

2. Unless approved otherwise, discharge and check valves shall be installed in a concrete valve vault.
3. Install an isolation valve and quick connect in an adjacent bypass handhole for emergency pump connection to the force main per Town Standards.

D. Wet Well

1. Size - The wet well size and control setting shall be appropriate to avoid heat buildup in the pump motor due to frequent starting and to avoid septic conditions due to excessive detention time.
2. Floor Slope - The wet well floor shall have a minimum slope of one to one to form the hopper bottom. The horizontal area of the hopper bottom shall not be greater than necessary for proper installation and function of the pump inlet.
3. Material - Wet well shall be reinforced concrete, unless approved otherwise by the Town.
4. Pumping volume shall be 7 times average daily flow divided by 4 (between lead pump on and off).
5. A manhole shall be installed just upstream of the wet well. The invert out of this manhole shall be plugged when bypass pumping is required and the manhole shall serve as a standby wet well for the suction line during bypass pumping.

E. Electrical

1. Electrical plans are required with detailed specifications for control. Controls shall include a flow meter and a pressure sensing device located in the valve vault. The output signal from these two devices shall be routed to digital readout components located in the control panel. The pumps shall operate automatically in a lead/lag fashion and each pump shall be equipped with elapsed time meters. Controls shall also include run lights, alarms, and telemetry as required.
2. Unless approved otherwise, stations shall be provided with an emergency generator with automatic transfer switch in a weatherproof housing on a concrete pad. Small stations may, on a case-by-case basis, be allowed to substitute portable power generation or portable pumping equipment.
3. Electrical equipment and cabinets shall meet standards set by the National Electric Code and Town of Georgetown.
4. Contractor shall hire and pay for an independent licensed inspection agency who shall certify that the installation of the electrical components meet all applicable electrical codes.

1.19 GREASE TRAPS

- A. Grease traps are required for all commercial operations, restaurants, convenience stores, etc. which have cooking operations. Traps shall be designed to prevent accumulation of grease in sanitary sewers. Maintenance of grease traps shall be at a minimum of 1 time per month or as needed. Maintenance is the responsibility of the property Owner. The property Owner shall submit to the Town a maintenance contract with a local hauler defining these responsibilities for inspection and pump out as required. Maintenance records shall be made available to the Town upon request.
- B. Capacity of grease traps shall be determined based on the specific application.*

One of the following formulas shall apply:

1. Number of Seats Method for Restaurants:

$$(D) \times (GL) \times (ST) \times HR/2 \times (LF) = \text{Size of Grease Interceptor, gallons}$$

where:

| | | |
|----|---|------------------------------------------------|
| D | = | Number of seats in dining area |
| GL | = | Gallons of wastewater per meal, normally 5 gal |
| ST | = | Storage capacity factor -- minimum of 1.2 |
| HR | = | Number of hours open |
| LF | = | Loading factor -- |
| | | 1.0 major highway |
| | | 1.0 recreational areas |
| | | 0.8 main highways |
| | | 0.5 Town center |

2. Nursing Homes, Other Type Commercial Kitchens :

$$(M) \times (GL) \times (ST) \times (2.5) \times (LF) = \text{Size of Grease Interceptor, gallons*}$$

where:

| | | |
|----|---|-----------------------------------------------|
| M | = | Meals per day |
| GL | = | Gallons of wastewater per meal, normally 2.0 |
| ST | = | Storage capacity factor -- minimum of 1.7 |
| LF | = | Loading factor -- |
| | | 1.25 garbage disposal & dishwashing |
| | | 1.00 without garbage disposal |
| | | 0.75 without dishwashing |
| | | 0.50 without dishwashing and garbage disposal |

Thus, for a restaurant with a 75-seat dining area, an 8 hour per day operation, a typical discharge of 5 gal. per meal, a storage capacity factor of 1.7 and a loading factor of 0.8, the size of the grease interceptor is calculated as follows:

$$(75) \times (5) \times (1.2) \times 8/2 \times (0.8) = 1,440 \text{ gal.}$$

3. Fixture method.

| | |
|-----------------------------|---------|
| Per restaurant kitchen sink | 100 gal |
| Per single compartment sink | 100 gal |
| Per double compartment sink | 75 |
| Per triple compartment sink | 100 |
| Per dishwasher | 100 |

*Minimum size grease interceptor should be 1000 gal.

- C. Other design considerations include: facilities for insuring that both the inlet and outlet are properly baffled; easy manhole access for cleaning; and inaccessibility of the trap to insects and vermin.

1.20 FORCE MAINS

- A. Force mains shall be sized for a flow velocity of 2.0 feet per second minimum and 6.0 maximum.
- B. Designer shall use Hazen & Williams equation and shall plot system curves for new pipe (C = 140 for PE or PVC or C = 130 for DIP) and minimum static head condition, and secondly for old pipe (C = 120 for PE or PVC or C = 100 for DIP) and minimum static head condition.
- C. Materials must be approved by the Town.
- D. Design and construct force main in profile with grades controlled to plus or minus one half inch to prevent unnecessary high points. Install an air release valve at each high point and at intervals as needed along flat or nearly flat force main grades. Air valves shall be cast iron combination sewage type with stainless steel internals, stainless steel isolation ball valve with street ell attached to top of outlet to prevent contamination from debris, and provided with flushing connections. The minimum depth of cover over forcemains shall be three (3) feet. The depth of cover over force main at high points at air release valves shall be sufficient to accommodate equipment with top of manhole flush with grade in pavements, shoulders, or traffic ways. There shall be a minimum of 6 inches of clearance provided between the top of the air release valve and the underside of the manhole cover.

END OF SECTION

SECTION 1D - DESIGN PARAMETERS FOR STREETS

1.21 GENERAL

- A. Where a Developer proposes to construct public streets in the Town of Georgetown, such streets shall be designed in accordance with the Standards defined herein.
- B. Sussex County Conservation District, where applicable, shall administer the issuance of permits required for erosion & sediment control and stormwater management. Their requirements are in addition to those defined herein.

1.22 LAYOUT, RIGHT-OF-WAY AND STREET DESIGN

- A. The arrangements of streets shall be such as to provide for the appropriate extension of existing streets.
- B. Minor streets shall be so designed as to discourage through traffic.
- C. Subdivisions abutting arterial streets may be required to provide a marginal service road, or reserve frontage with a buffer strip for planting, or some other means of separation of through and local traffic as the Town may determine appropriate.
- D. The minimum right-of-way width shall be measured from lot line to lot line and shall be in accordance with the following schedule:
 - 1. Arterial Streets - 80'-120'
 - 2. Collector Streets - 60' (50-300 homes potential) (35 mph max)
 - 3. Minor Streets -50' (Less than 50 homes potential) (25 mph max)
 - 4. Arterial streets, internal roads, alleys, driveways, and aisles in parking areas shall be designed and built to satisfy the requirements of the Town of Georgetown.
- E. Grades of arterial and collector streets shall not exceed four (4%) percent. Grades on other streets shall not exceed ten (10%) percent. No street shall have a minimum grade of less than 0.3%. Where possible, minimum grade shall be 0.5%.
- F. Street intersections shall be as nearly at right angles as is possible and in no case shall be less than sixty (60) degrees. The corners at the intersections of the right-of-way lines shall be rounded with a curve having a radius of not less than twenty five (25') feet. The radii of the curb and paving shall be concentric offsets from the right-of-way radii. Larger radii may be required depending upon usage.
- G. Street jogs with center line offsets of less than one hundred twenty-five (125') feet shall be prohibited.

- H. A tangent, at least one hundred (100') feet along, shall be introduced between reverse curves on arterial and collector streets.
- I. When connecting street centerlines deflect from each other at any point by more than ten (10) degrees they shall be connected by a curve with a radius of not less than one hundred (150') feet for Minor Streets and three hundred (300') feet for Arterial and Collector Streets.
- J. All changes in grade greater than 1% shall be connected by vertical curves of sufficient radius to provide a smooth transition and proper sight distance.
- K. Dead-end streets of a permanent nature, if approved, shall not be longer than four hundred (400') feet and shall provide a circular cul-de-sac turn around at the end with a minimum radius along the edge of paving of thirty-eight (38') feet. The radius of the right-of-way of the cul-de-sac shall be 52 feet..
- L. If a dead-end street is of a temporary nature, a similar turn around shall be provided and provisions made for future extension of the street and reversion of the excess right-of-way, to the adjoining properties.
- M. No street shall have a name which will duplicate or so nearly duplicate as to be confused with the names of existing streets. The continuation of an existing street shall have the same name. Street names are subject to Sussex County 911 Addressing and Town approval.
- N. Concrete monuments shall be set at each point of deflection along the approved rights-of-way.

1.23 TRAFFIC IMPACT STUDY

- A. Threshold (per project or group of projects):
 - 215 single family
 - 402 townhomes/condos
 - 324 apartments
 - or, upon request for problem areas
- B. TIS Procedure for impact of development on existing streets:
 - 1. Conducted by applicant's engineer, or Town at developer's cost
 - 2. Scoping subject to Town approval
 - 3. Methodology per DelDOT Rules and Regulations for Subdivision Streets
 - 4. DelDOT review
 - 5. DelDOT recommendations for Town streets subject to Town approval
 - 6. Capacity Analysis for internal intersections would be required in lieu of meeting DelDOT Entrance Manual Requirements for left and right turn lanes. Requires design report by developer's engineer

7. Analysis to be conducted by developer's engineer subject to Town approval.
8. Roundabout designs to be accompanied by Engineer's report and subject to Town approval.

1.24 SIGNAGE AND PAVEMENT MARKINGS

- A. All streets shall be designed with traffic control signage and pavement markings in accordance with the Manual of Uniform Traffic Control Devices standards. Pavement markings shall use Thermostripe materials.
- B. Street parking and travel lanes shall be delineated by striping when directed.

END OF SECTION

SECTION 1E - SOILS INVESTIGATION AND PAVEMENT DESIGN

1.25 SOILS INVESTIGATION

- A. The Town may require the Owner or Developer to employ the services of a Geotechnical Engineering firm to perform a subsurface investigation for the purpose of obtaining information needed to design the proper pavement section.
- B. If required, the Geotechnical Engineering firm used must have on staff, an engineer registered in the State of Delaware who is qualified and experienced in the field of Geotechnical Engineering and who is actually engaged in the practice of soils mechanics and foundation engineering.
- C. Borings shall be made for all proposed streets within the project area. The following guidelines and methods will be followed when performing the field work:
 - 1. Borings shall be accomplished by using hollow stem augers and/or other equipment necessary to obtain soil samples of each stratum encountered.
 - 2. Boring locations shall be placed along the centerline of the street no more than 300 feet apart, with a minimum of two (2) borings per street. Boring shall be located such that all questionable areas are investigated.
 - 3. Borings shall be performed to a depth of 6 feet below the subgrade of the proposed pavement system.
 - 4. Soil shall be sampled by stratum and at least every one foot depth of boring. At each soil composition change, a sample, sufficient in size to perform the required laboratory testing, shall be obtained.
 - 5. When water is encountered, borings should be left open until water level stabilizes and then depth to water should be recorded.
 - 6. A log of each boring should be performed by the Geotechnical field personnel. The following information should be recorded on the boring log.
 - a. Name of street.
 - b. Location of boring -- station and offset.
 - c. Surface elevation.
 - d. Date boring was performed.
 - e. Depth, vertical arrangement and thickness of each stratum.
 - f. Sample number.
 - g. Visual soil classification of each stratum.
 - h. Depth to water (if encountered).
- D. The following laboratory tests shall be performed on the material sampled from each stratum encountered in the individual borings:
 - 1. Practice for dry preparation of soil samples for particle-size analysis and determination of soil constants (ASTM Designation D-421).

2. Method of particle-size analysis of soils (ASTM Designation D-422).
 3. Amount of material in soils finer than the number 200 sieve (ASTM Designation D-1140).
 4. Method of laboratory determination of water content of soils (ASTM Designation D-2216).
 5. Classification of soils for engineering purposes (ASTM Designation D-2487).
 6. Test method for liquid limit, plastic limit and plasticity index of soils (ASTM Designation D-4318) when required.
- E. Methods which deviate from any of the above procedures must be submitted to the Town of Georgetown for approval.
- F. Results of the soil investigation submitted to the Town of Georgetown shall contain the following information:
1. A plan view of the proposed streets showing boring locations.
 2. Logs containing the required data for all borings made.
 3. Tests results of all laboratory tests performed.
 4. A profile view of each boring plotted to scale showing the ASTM classification of soils encountered.
 5. Pavement design report by geotechnical engineer.
- G. The Town of Georgetown reserves the right to check soil survey borings and to inspect testing laboratories as part of their review of the investigative work.

1.26 SUBDIVISION PAVEMENT DESIGN

- A. Subdivision entrances and internal streets shall be designed in accordance with the DelDOT *Development Coordination Manual*, latest edition, with the following exceptions.
1. The minimum paving section for a street which will be taken over by the Town shall include 1 ½ inches of Type C asphalt, over 3 ½ inches of Type B asphalt, over 6 inches of GABC (crusher run).
 2. The final wearing course (top coat) of asphalt shall not be installed, in the case of a subdivision, until 75% of the homes have been constructed; or, when directed to do so by the Town.
 3. The minimum required paving section prior to 75% build-out shall equal the full approved depth of stone sub-base (GABC) and the full approved depth of Type B asphalt base course.
 4. The number of proposed residential units is to be converted to Average Daily Trips (ADT) by using the appropriate equation(s) as given in the Institute of Transportation Engineer's *Trip Generation Manual*, latest

edition. Weekday ADT equations with no specific time shall be used for all residential uses. Weekday and Saturday ADT equations shall be considered for non-residential uses. Copies of the manual pages used shall be submitted to the Town for review.

- B. The applicable details show typical sections for residential streets, based on the following definitions:
1. Minor Street - A street which will serve no more than 50 dwelling units.
 2. Collector Streets - A street serving between 50 and 300 dwelling units.
- C. Prior to placing the pavement and graded aggregate section, the subgrade shall be prepared and proof rolled in the presence of the Town Public Works or Engineer. If the proof rolling shows the subgrade to be unstable, the Contractor shall scarify, disc, aerate or add moisture and re-compact the subgrade to the extent that when retested it will be stable. If, in the opinion of the Town Public Works or Engineer, there are areas to be removed or undercut, they may be ordered to excavate and replace with approved material. Equipment for proof roll shall be a fully loaded standard 10 wheel tandem dump truck or as otherwise approved by the Town. The Town may, at its discretion, request that samples be taken to generate one or more modified proctor curves followed by testing of the subgrade to verify that the soil is at least 98% of ASTM D1557, based on the proctor curve(s) generated.
- D. The pavement section of streets built to serve an adjoining future area of development shall be increased in strength to serve both the present and future traffic loads. If such a street must also serve construction traffic of the future development, the pavement section shall again be increased in strength as follows:

| <u>No. of Units Proposed for Future Development Area</u> | <u>Increase in Structural Number</u> |
|--------------------------------------------------------------|------------------------------------------|
| 1 – 100 | 0.48 |
| 101 – 300 | 0.80 |

- E. Streets under construction shall be maintained free of standing water, and any damaged or soft pavement and subgrade shall be removed and replaced prior to installation of the final bituminous surface course. Catch basins on streets under construction shall be modified as necessary to capture and drain runoff with only the base course of asphalt in place. This is especially critical in low point areas. Details concerning the modifications shall be included on the construction drawings.

END OF SECTION

SECTION 1F - STORM DRAIN SYSTEMS

1.27(A) STORM DRAIN SYSTEMS

- A. Design of storm drain systems shall be in accordance with drainage criteria included in the *DelDOT Development Coordination Manual*, latest edition.
- B. Double inlets may be required by the Town at low points.
- C. Design engineer shall certify the design and submit storm drainage report and calculations.

1.27(B) STORM DRAIN IMPACT STUDY

- A. Threshold: All site plans and subdivisions requiring Planning and Zoning Commission approval which propose to discharge to a Town storm drain system and propose a storm water management waiver from NRCS, or propose to increase runoff to the Town's storm drain system to an existing problem area (including Savannah Ditch).
- B. Developer's engineer shall provide field survey and calculations to characterize and evaluate the capacities of the impacted system and submit it for Town review. Report shall indicate adequate capacity is available, or indicate offsite improvements needed along with a cost estimate of these improvements.
- C. Checklist:
 - 1. Contact information for developer and engineer.
 - 2. Existing and proposed stormwater runoff locations and intent to discharge to Town storm drain system.
 - 3. Evidence of known or suspected storm drain problems downstream of development. Scoping meeting may be needed.
 - 4. Predevelopment and post-development calculations and storm drain system evaluation to show suitability or upgrades of infrastructure such that the resulting storm drain system design satisfies all the criteria included in the *DelDOT Development Coordination Manual*, latest edition. Provide construction cost estimate for offsite improvements. DE PE seal required.
 - 5. If applicable, proposed offsite easements or use of public rights of way.

END OF SECTION

SECTION 1G – PROJECT DRAWINGS

1.28 FINAL SITE AND SUBDIVISION CONSTRUCTION IMPROVEMENT PLANS

The Developer and his Engineer are responsible for preparation of detailed drawings. Sheet numbers shall be placed in a prominent location in the lower right corner of each sheet and shall use the following order and sheet number conventions. The numbers below will be used as prefixes for sheet numbering. For example, for a project with three utility plan sheets, they will be numbered 6.1, 6.2, and 6.3. The sheets may also contain the engineer's in-house or other agency sheet numbers provided they do not cause confusion with the Town of Georgetown sheet numbers.

A. Order of Sheets and Sheet Prefix Numbers:

1. Title Sheet containing (The title sheet need not contain a sheet number)
2. Record Plat(s) for subdivision projects. (First sheet in this series will be a key sheet if record plat takes up more than one sheet).
3. General Sheet (General Notes, Site Data Notes, etc.)
4. Construction Key Plan (For large projects)
5. Site and Grading Plans Horizontal
6. Utility Plans Horizontal (For scale of 1"=20' utilities may be shown on site and grading plans. For scale of 1" = 30' or 1" = 40', and where necessary for clarity, provide utility drawings separate from grading drawings).
7. Sediment and Stormwater Plans and Details (Per NRCS Requirements)
8. Street and Stormdrain Profiles
9. Site Details Using Georgetown Standards where applicable and available
10. Utility Profiles (Sewer, and force main)
11. Pump Station if applicable (Site Plan at 1" = 10', Section and Details)
12. Sewer, and Water Details Using Georgetown Standards were available
13. Traffic Signs and Striping Plan for dedicated streets (may be included on Site and Grading Plans for small projects).
14. Landscape and Lighting Plan
15. Architectural where applicable
16. Electrical/Mechanical where applicable

B. Revision Blocks

Provide a revision block on each sheet to accurately disclose and identify all drawing revisions made after the first submittal for preliminary plan review. Provide a Revision Summary Table on the title sheet with sheet number and date of revision.

C. Title Sheet and G-1 General Sheet

1. Title of Project and Address.
2. Phase of Project if applicable
3. Developers' Name, address, phone, and fax number.

4. Design Engineers' Name, address, phone and fax number.
5. Drawing Index
6. Certification Blocks
7. Location Map showing location of Project within the Town and related to area streets. Scale shall be no smaller than one inch equals 1000 feet.
8. Phasing Map if drawings are for one phase of the development.
9. Design Engineer's Seal and Signature.
10. General Legend
11. General Notes:

D. The following minimum general notes shall appear on construction improvement plans:

1. The boundary information shown on these drawings is based on a survey performed by _____, on _____. (if the boundary is based on a previous survey, provide the following) and recorded in the Sussex County recorder of deeds office, plat book _____, page _____.
2. A topographic survey was performed by _____ of _____, Delaware on _____. Elevations are based on control monument _____, with an elevation of _____ NAVD88.
3. Horizontal datum is based on Delaware State Grid, NAD83/91, control monuments _____.
4. Existing utilities are shown in accordance with the best available information. Completeness or correctness thereof is not guaranteed. It shall be the Contractor's responsibility to contact the utility companies involved in order to secure the most accurate information available as to utility location and elevation. No construction around or adjacent to utilities shall begin without notifying their owners at least 48 hours in advance. The Contractor shall take the necessary precautions to protect the existing utilities and maintain uninterrupted service and any damage done to them due to his/her negligence shall be immediately and completely repaired at the Contractor's expense. To locate existing utilities in the field prior to construction, the Contractor shall contact Miss Utility Delmarva (see note 24).
5. All materials shall be installed in accordance with the manufacturer's recommendations. Materials and workmanship shall meet the requirements of the Town of Georgetown design and construction standards for water, sewer, and streets, and all applicable agencies having jurisdiction over the proposed improvements.
6. Use only suitable and approved granular material for back filling trenches.

7. The Contractor shall determine the location of all right-of-way lines and property lines to his own satisfaction. Any disturbed areas beyond the right-of-way or easement lines shall be restored immediately to their original condition.
8. All valve closures and cut-ins shall be coordinated with the Town. Town officials will carry out all necessary valve closures. Contractor shall coordinate isolation of existing water mains with the town and notify affected residents at least 48 hours prior to cut-in.
9. Pipeline detection tape shall be color coded, appropriately labeled, and installed 18 inches below the ground surface and directly above all proposed water main, sewer main, sewer laterals, and water services.
10. Conductive tracer wire shall be installed with all non-metallic water pipe and services; and along all sewer laterals and forcemain. Wire shall be secured to the pipe and shall be securely bonded together at all wire joints with approved watertight connectors. Tracer wire shall be accessible at all valve boxes, meter pits, cleanouts, and air release valves.
11. Prior to isolation and cut-in procedures, Contractor shall excavate, locate, and observe function of all existing valves to assist in the system isolation.
12. Shop drawings for any item(s) which will eventually be taken over by the Town shall be submitted to the town for review and approval prior to the installation of the item(s).
13. All sanitary sewer mains and forcemains shall have a minimum cover of 36 inches and all water mains shall have a minimum cover of 42 inches as measured from the top of pipe to proposed grade. Sewer laterals shall have a minimum diameter of six (6) inches and have a minimum cover of 36 inches.
14. There shall be a minimum horizontal separation between water mains and sanitary sewer mains and forcemains of 10 feet, as measured from edge of pipe to edge of pipe. There shall be a minimum vertical separation of 18 inches between water mains and sanitary sewer mains or forcemains at crossings. One full length of water pipe shall be located so that both joints will be as far from the sewer as possible at crossings.
15. There shall be a minimum vertical separation of 12 inches between any storm drain pipe and any water main or sewer main. If 12 inches cannot be maintained, a minimum of six (6) inches is required and provisions shall be made acceptable to the Town of Georgetown for properly encasing the pipe in concrete.

16. Insert a note which gives the FEMA firm panel number and floodplain classification for this site.
17. All roadways are to be swept free of sediment on a daily basis.
18. The Contractor shall remove and immediately replace, relocate, reset or reconstruct all obstructions in the work area, including, but not limited to, mailboxes, signs, landscaping, lighting, planters, culverts, driveways, parking areas, curbs, gutters, fences, or other natural or man-made obstructions. traffic control regulatory, warning and informational signs shall remain functional and visible to the appropriate lanes of traffic at all times, with their relocation kept to a minimum distance. The cost shall be included in the cost of items bid.
19. It is the Contractor's responsibility to insure that paving is installed to the elevations shown and that no ponding of water will occur after paving is complete.
20. The storm drainage system has been designed using the criteria of the state of DelDOT Standards and Regulations for Subdivision Streets and State Highway Access, latest edition.
21. All fire lanes, fire hydrants, exits, and standpipes will be marked in accordance with State Fire Prevention Regulations.
22. Delaware regulations prohibit the burial of construction demolition debris, including trees and stumps on construction sites. Any solid waste found during the excavation for structures and utility lines on and off site must be removed and properly discarded. Any remedial action required is the responsibility of the owner.
23. Drawings do not include necessary components for construction safety. All construction must be done in compliance with the Occupational Safety and Health Act of 1970, as amended and all rules and regulations thereto appurtenant.
24. Contractor shall grade, topsoil, seed and mulch all disturbed areas of construction, including pipe installation or ditch construction. Erosion control matting shall be provided on all slopes greater than 3:1.
25. A professional surveyor licensed in the State of Delaware shall be responsible for permanently re-establishing any property markers or monuments disturbed during construction. A survey and metes and bounds that includes the re-established marker(s) or monument(s) shall be presented to the property owner for comparison with the original plat, for verification.

26. Miss Utility shall be notified three (3) consecutive working days prior to excavation, at 1-800-282-8555.
27. Insert a note declaring who will be responsible for the short term (during construction) maintenance of the stormwater management and storm sewer systems.
28. Insert a note declaring who will be responsible for the long term (after final acceptance by the Town) maintenance of the stormwater management and storm sewer systems.
29. The Town of Georgetown will assume ownership and maintenance responsibility of water, sewer, and storm sewer pipes and appurtenances installed within town right-of-way, and easements dedicated to the Town, after all items have passed town inspection; after the Town has received and approved digital and hard copies of the record drawings; after the rights-of-way have been deeded to the town; and after all the water, sewer, and storm sewer items have been transferred to the Town by bill of sale.
30. Sewer and water capacity are not guaranteed until building permits are issued, all fees are paid, and suitable utilities are in place for proper conveyance, treatment, and disposal.
31. For preliminary subdivision and site plans, Town approval shall expire within five (5) years of the preliminary plan approval unless the required building permit has been issued. A one (1) year extension may be requested where allowed by code.
32. The applicant is responsible to ensure that all Town and/or agency construction permit applications have been completed, submitted, and all applicable fees have been paid prior to commencing construction. The Town shall not be held responsible for an anticipated construction start date that is not met due to the applicant or his/her Contractor not having met the construction permitting requirements.
33. As a condition of the approval of the construction drawings, and prior to the start of construction, the applicant is required to enter into a formal Public Works Agreement with the Town and to post a completion guaranty for any improvements which will eventually be taken over by the Town. The guaranty shall be in an amount equal to 150% of the cost of the improvements as estimated or approved by the Town engineer. The guaranty shall be in the form of a bond or funds deposited in an escrow account. The Public Works Agreement and the guaranty shall be reviewed and approved by the Town solicitor. The completion guarantee shall not be released until a maintenance bond in the amount of 10% of the improvements has been submitted.

34. A maintenance bond in the amount of 10% of the amount of the completion guaranty shall be submitted to the Town by the owner prior to final acceptance of the improvements and release of the completion guaranty. The maintenance period shall be a minimum of two years. An agreement reviewed and approved by the Town solicitor shall accompany the bond and shall describe the terms of the bond.
35. Upon completion and prior to the release of the developer's completion guarantee, the developer shall provide the Town engineer a draft paper set of detailed record plans (plan view and profile sheets).. Record plan information shall include surveyed as-built elevations and horizontal locations of all property monuments/markers; sewer manhole rims, pipes sizes & inverts' pump stations' force mains (inverts every 50 feet), cleanouts, air release valves, and grease traps; all water valves, hydrants, vaults, meter pits, and curb stops; all storm sewer catch basins, manhole rims, pipe sizes & inverts, and any other item which will be taken over by the Town. Record information shall be placed on the appropriate approved drawings. Original design elevation and/or distance information shall be struck through with a fine line and the record information shall be inserted next to it. When the draft set of drawings has been approved by the Town, three (3) final paper copies shall be submitted, signed and sealed by the owner's engineer. A CD shall also be provided with digital record information in AutoCAD format (version 2010 or later). The digital information shall be on Delaware State Plane, NAD83 horizontal control and NAVD88 vertical control.
36. The Contractor shall notify the Town a minimum of two weeks prior to the start of construction and schedule a pre-construction meeting. The site Contractor and the owner, or his/her representative shall be in attendance.

Town of Georgetown - (302) 856-7391

E. SITE AND GRADING PLANS

1. The scale shall be 1 inch equals 20 feet for small projects up to a maximum of 1 inch equals 40 feet for large projects.
2. North Arrow.
3. The existing and proposed legend if different from main legend
4. Special drawing notes
5. Location, elevation and description of all the Project Bench Marks
6. Property lines, lot lines, lot numbers, and rights-of-ways and easements with bearings and distances, and location of all monuments and references.
7. Location of all existing and proposed structures and buildings with unit numbers.
8. Beginning and end of proposed construction, including phase limits and offsite improvements where applicable.
9. Existing and proposed street names.

10. Stormwater management, drainage pipe, culverts, slopes, and spot elevation and pipe material.
11. Location of all other drainage facilities and public utilities.
12. Existing and proposed contours (minimum of 1 foot vertical intervals) with major vegetation noted. Provide this information within a minimum of 50 feet beyond the property line or proposed improvements.
13. Ownership of abutting properties.
14. Width of pave, curb lines and sidewalks.
15. Outfall ditches shall be shown for a minimum of 1000' from the property line. Elevation shall be taken at a minimum of 50' intervals.
16. Recreation, open space, common use areas, and parking.
17. Radii at intersections.
18. Stationing of roads with curve data, points of tangent and curve.
19. Curbing locations with type denoted plus top and bottom elevations, at all changes in elevations, and minimum 100 foot intervals.
20. Centerline street data with bearings, distances, and curve data and stations corresponding to the profile.
21. Traffic signage & striping plans.

F. UTILITY (Water and Sewer) PLANS

1. Same as 1-12 for Site and Grading Plans
2. Location of all existing water mains, valves, hydrants, services, meters, etc.
3. Location and sizes of all proposed water lines with stationing.
4. Locations of proposed valves, fittings, meters, services and fire hydrants.
5. Property lines with details of existing and proposed easements where required.
6. Location of existing and proposed structures and buildings.
7. Beginning and end of proposed construction, and connections to existing and future utilities.
8. Locations of proposed service lines.
9. Location of all other drainage facilities and public utilities.
10. Provide profiles at all utility crossings.
11. All existing sanitary sewer facilities (i.e. manholes and pipelines) and labeled for inverts and size.
12. Location, sizes, type and slope of all proposed sanitary sewer lines with stations corresponding to the profiles.
13. Location of all manholes with grades and invert elevations.
14. Location of proposed laterals, wyes, cleanouts, etc.
15. Proposed manhole numbers

G. PUMPING STATIONS AND FORCE MAINS (IN ADDITION TO REQUIREMENTS 1 THROUGH 9 FOR UTILITY PLANS)

1. Metes and bounds for property lines to be deeded to the Town with details of any easements where required.

2. Electrical service with transformers, equipment cabinet, generator, etc.
3. Related landscaping
4. Pump and system curves showing the system's flow and total dynamic head for both proposed and future demands and conditions
5. Design calculations for average daily flow, peak factor, and volume of wet well calculations.
6. Force main and stationing

H. PROFILES (Streets)

1. Scale to match plan horizontally. Vertical scale shall be 1/10 of the horizontal scale.
2. Existing and proposed grades with elevations noted at 25' intervals for vertical curves.
3. Drainage pipes and outfalls.
4. Street Name.
5. Stationing, high points, low points, vertical curves, longitudinal slopes along the center line, the left flow line, and the right flow line.

I. PROFILES (Sanitary Sewers and Force Mains)

1. The horizontal scale shall be identical to the horizontal plan. Vertical scales shall be 1/10 of the horizontal scale.
2. Profiles of existing and proposed ground surface over the pipe with elevations at the top of manholes and air release vaults and at the inverts line.
3. Pipe size, material, slope, manholes, air release vaults, manhole and air release valve numbers, bends and any necessary concrete encasements.
4. Location of all utility and storm drain crossings.
5. Cross section or profile of each location where a proposed water main crosses a sewer, storm drain or other significant utility.

J. DETAILS

1. Provide copies of applicable utility, street and storm drain details per Standard Construction Details as provided by the Town of Georgetown for all facilities proposed to be dedicated to the Town.
2. Dimension all air release valve vault or manhole details for each location installed.
3. Street cross section
4. Curbing type(s), and sidewalks.
5. Entrances
6. Other as required

K. CERTIFICATIONS AND SIGNATURE BLOCKS FOR FINAL IMPROVEMENT PLANS (This information is to be located on the Title Sheet).

1. ENGINEER (SURVEYOR, ARCHITECT) STATEMENT (as applicable):
(Note to applicant: Site plans which also contain public street, public utilities, or stormwater management shall be sealed by an Engineer or a Surveyor.)

I hereby certify that I am a registered engineer (licensed surveyor, registered architect) in the State of Delaware, that the information shown hereon has been prepared under my supervision and to my best knowledge and belief represents good engineering practices as required by the applicable laws of the State of Delaware. (Print Name, Address and Phone Number)

Signature: _____ Date: _____
(Printed Name)

2. OWNER'S, DEVELOPER'S, or OWNER/DEVELOPER CERTIFICATION*

I hereby certified that I am the (owner, developer, or owner/developer) of the property described and shown on this plan. The plan was made at my direction, that I acknowledge the same to be my act. It is my desire to have the plan developed as shown and in accordance with all applicable laws and regulations.

Signature: _____ Date: _____
(Print Name, Address and Phone Number)

*If owner and developer are separate entities, certification statements are to be provided for each.

3. TOWN ENGINEER

Construction improvements plans have been reviewed and are found to be in general conformance with the Town of Georgetown Construction Standards and Specifications for Water, Sewer and Streets. The owner and his engineer and/or surveyor assume all responsibility for design and accuracy of information shown hereon.

Signature: _____ Date: _____
(Printed Name)

4. TOWN OF GEORGETOWN APPROVED BY:

Town Manager: _____ Date: _____
(Printed Name)

1.29 RECORD DRAWINGS

- A. No later than 90 days after completion of construction, submit three (3) copies of record drawings with as-built information including surveyed as-built elevations of all manholes, pump stations, and force mains at air release valves. Also submit one copy of record drawings on AutoCAD or other digital disk format approved by the Town. Digital drawings shall be on Delaware State Plane NAD83 Horizontal control and NAVD88 Vertical control.

END OF SECTION

DIVISION 2
CONSTRUCTION SPECIFICATIONS

DIVISION 2 – SECTION 1

EXCAVATION AND BACKFILL FOR PIPELINES AND STRUCTURES

1.01 GENERAL

- A. The Contractor shall perform all excavation, backfilling, grubbing and grading required for construction and installation of pipelines, structures and appurtenances. Excavation shall include removal of pavement, concrete, rock, earth and debris, regardless of character. Trenches and excavations shall be sheeted, shored and braced by the Contractor, as necessary to allow construction and provide safe working conditions. Additionally, the Contractor shall be responsible for maintaining a dry excavation by dewatering. He shall also support and protect existing utilities and structures encountered in the work, provide traffic control, dispose of surplus and unsuitable excavated materials and restore backfilled areas to original condition or as required by the respective contract drawings and specifications.
- B. The Contractor is responsible for direct or indirect damage to existing structures, pipelines, conduits, poles, wires of every description in the vicinity of his or her work whether above or below ground, or that may be encountered in trench or structure excavation. This responsibility shall include the cost of protection by sheeting, bracing, hand excavation, when warranted, and the expense to repair or replace any existing facility damaged directly or indirectly by construction activities, whether such facility is or is not shown on the drawings.
- C. The Contractor shall verify the location and inverts of all existing utilities at the various points of connection and/or crossings prior to starting any work. Any discrepancies in locations or inverts shall be brought to the attention of the Town in order that the designs may be adjusted accordingly. Damages suffered or additional costs incurred by the Contractor as a result of his or her failure to conform to the requirements of this paragraph shall be the sole responsibility of the Contractor. Connections to existing utilities shall be made by the Contractor at such a time and in such a manner as the Town may direct.
- D. Excavation and backfill, within an area where a State agency has jurisdiction, shall be done in accordance with requirements and provisions of the permits issued by the agencies for the construction within their respective rights-of-way. Such requirements and provisions, where applicable, shall take precedence and supersede the provisions of these specifications.
- E. Prior to excavation, soil explorations in the area of the proposed project will be carried out by a qualified geotechnical engineer to determine subsurface conditions.

1.02 PIPELINE TRENCH EXCAVATION

- A. The Contractor shall excavate, maintain and backfill all excavation necessary for completing the work under the contract. Unless otherwise specified or approved, excavation shall be open cut.
- B. Trenches shall be excavated to the necessary width and depth, as shown on the drawings and as required for the safe installation of the utility, etc.
- C. The sides of the trenches shall be practically plumb and shall not be sloped unless approved in writing by the Town. Trench sides shall be supported or sheeted as required to protect pavement surfaces, curbing, utilities, etc., and as required for safety. Safety regulations shall be as required by State safety codes and OSHA.
- D. In paved areas, the Contractor shall remove the paving only as necessary for the excavation of the trench or as detailed. Pavement edges at the trench shall be saw cut neat and straight prior to the start of any excavation. Should pavement damage result from cave-ins, settlement, etc., he or she shall replace such paving at his or her own expense.
- E. The excavation of all trenches shall be fully completed at least twenty (20) feet in advance of pipe laying, unless otherwise authorized or directed. The Town may require the backfilling of open trench, over completed pipelines, or ahead of the pipe laying operation, if in his or her judgment such action is necessary.
- F. Should work be stopped for any reason and any excavation is left open for an unreasonable length of time, the Contractor shall refill the excavation at his or her own expense if so directed, and shall not reopen the excavation until he or she is ready to complete the facility. Should the Contractor refuse or fail to refill any excavation completely within eight (8) hours after a proper notice, the Town shall be authorized to do the work and expenses resulting shall be paid by the Contractor.
- G. The Contractor shall complete excavation as nearly as practicable to the lines of the utility to be installed as detailed. All cavities in the bottom of the trench shall be filled to the required level with compacted crushed stone or gravel.
- H. Excavated materials shall be graded, hauled, stored and protected as such material found suitable will be required for backfilling, repaving or other purposes. Material classified as unsuitable shall be disposed of by the Contractor.
- I. Excavated materials shall not be placed on private property, unless written permission is obtained from the property owner.
- J. The Contractor shall be responsible for any damage to curb, gutter, sidewalk, traffic control devices, and pavement material. Any damage resulting directly or indirectly shall be replaced in kind by the Contractor. The reuse of disturbed curb, gutter or sidewalk is prohibited. New sections shall be installed to the nearest undisturbed control joint.

1.03 PIPELINE TRENCH BACKFILL

- A. Materials excavated from the trench shall be used for trench backfill, provided that, in the opinion of the Town, the excavated material is suitable for this purpose. Backfill material shall be free from large lumps and stones having any dimension greater than two (2) inches.
- B. Suitable material, as approved by the Town, shall be carefully deposited in the trench by methods which will not damage or disturb the pipeline or structure, and shall be solidly tamped around the pipe or structure. Backfill material shall be placed in 8-inch layers. Care shall be taken in the use of mechanical tampers not to injure or move the pipe or to cause the pipe to be supported unevenly.
- C. All backfill material shall be compacted to 95 % of maximum density at ± 2 % of optimum moisture content as determined by the Modified Proctor Test, ASTM D 1557 Method C. Materials containing an excess of moisture shall be permitted to dry until the moisture content is within the specified range. Materials too dry shall be wetted uniformly until the moisture content is in the specified range.
- D. No compacting shall be done when the material is too wet to be compacted properly. At such times the work shall be suspended until the backfill materials have dried out sufficiently to permit proper compaction or such other precautions shall be taken as may be necessary to obtain proper compaction. The Contractor is responsible for hauling, storing and drying of excavated material to be used in backfill operations.
- E. The Town may request compaction tests of the backfilled trenches at any time during construction or upon completion of the backfill operations. Such testing shall be arranged by the Contractor and performed by an independent testing agency approved by the Town. The Contractor shall pay the testing laboratory for all tests performed inclusive of sample collection, preparation and transportation. If the results of any tests show that backfills do not meet the specified compaction, the Contractor shall, at his or her own expense, correct the condition as directed by the Town.
- F. The Contractor shall, at his or her own expense, maintain all refilled excavations in proper condition. Trench surfaces shall be reshaped when necessary. If the Contractor fails to make repairs within forty eight (48) hours after receipt of written notice from the Owner, the Town may refill said depression wherever necessary and the cost of so doing will be paid by the Contractor. The Contractor shall be responsible for any injury or damage that may result from lack of maintenance of any refilled excavation at any time prior to final acceptance.
- G. All unauthorized excavations made by the Contractor shall be immediately backfilled in accordance with the requirements of the specifications for trench backfill at the Contractor's expense.

- H. After completion of backfilling, all material not used shall be disposed of and all places on the line of the work shall be left clean and in good condition. This cleaning up shall be done by the Contractor. If he or she fails to do this work within a reasonable time after receipt of notice, it will be performed by the Town, and the cost will be assessed to the Contractor.
- I. No backfill shall be placed against new concrete or masonry structures until the concrete or mortar is properly cured.
- J. The Contractor shall exercise caution in backfill and compaction to prevent damage to structures.

1.04 EXCAVATION BELOW SUBGRADE AND GRAVEL REFILL

Materials below the excavation limit for pipelines and structures (below subgrade), which in the judgment of the Town should be removed, shall be removed as directed. All spaces created by the removal of unsuitable material below subgrade shall be refilled and compacted with crushed stone or gravel.

1.05 DEWATERING

- A. All excavations must be kept free of water below the subgrade of the work while work is in progress. This may be accomplished by ordinary pumping methods or by well points, whichever will produce the required results. Upon removal of dewatering equipment, the Contractor shall backfill all holes and restore disturbed areas to their original condition.
- B. Dewatering for the structures and pipelines shall commence when groundwater is first encountered and shall be continued until such time as backfill has been completed. No concrete footings shall be laid in water nor shall water be allowed to rise over them until the concrete or mortar has set at least eight (8) hours. Groundwater shall not be allowed to rise around the pipe until the trench is backfilled.
- C. The Contractor shall dispose of the water from the work in a suitable manner without damage to adjacent property. No water shall be drained into work built or under construction without prior consent of the Town. Water shall be disposed of in such a manner as not to be a menace to public health.
- D. The Contractor shall remove any siltation deposits in storm sewer systems, resulting from his or her dewatering or construction operations. He shall also be responsible for conveyance of dewatering flows and for erosion and sediment control.

1.06 SHEETING, SHORING AND BRACING

- A. The Contractor shall furnish and install all sheeting, shoring and bracing necessary to insure safe working conditions and to prevent damage to public and private property and structures. If, in the opinion of the Town, the sheeting, shoring, or bracing is not of proper quality or is not properly placed to insure safe working conditions and to prevent property damage, the Contractor shall remedy such inadequacy at his or her own expense as may be directed by the Town. Sheeting, shoring, and bracing shall be removed as backfilling progresses, except at such locations as the Town may direct or approve it to be left in place.
- B. The Contractor shall cut off any sheeting left in place, at least eighteen (18) inches below finished grade, and shall remove the material cut off without compensation.
- C. Where necessary for the protection of any structure or property, sheeting shall be driven to such depth below the bottom of the trench as may be required to protect all existing and/or proposed work.
- D. A trench box is an acceptable alternative to sheeting, shoring or bracing providing such boxes conform to safety codes in effect for the project.

1.07 SELECT BACKFILL

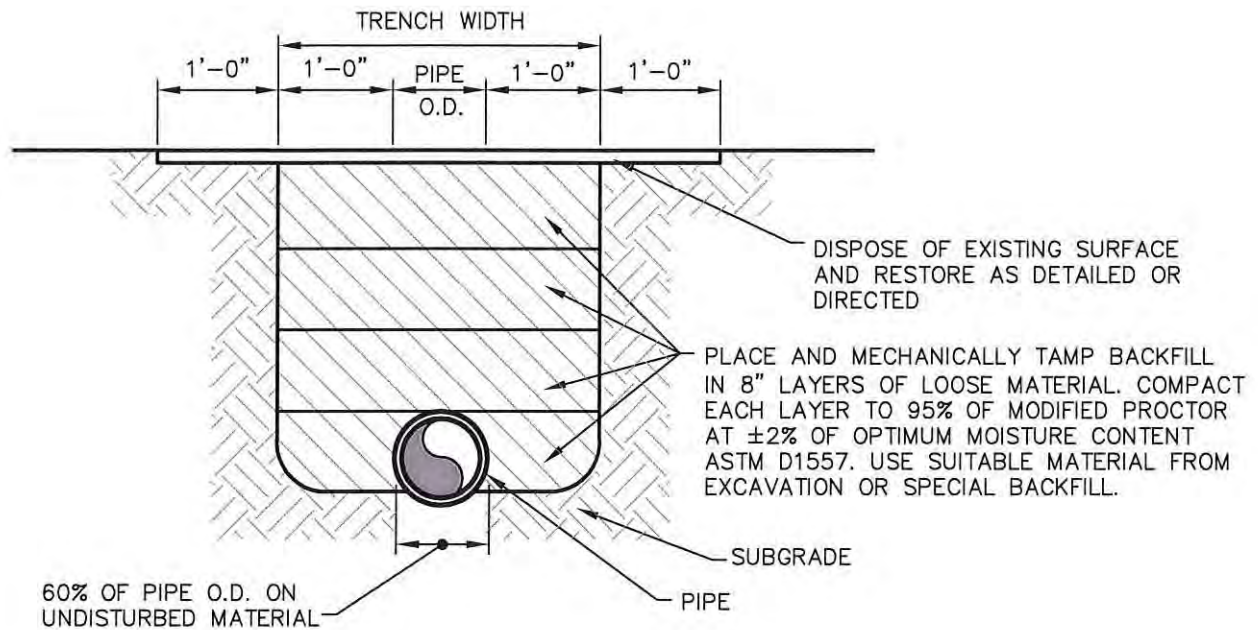
- A. Should the Contractor encounter material during excavation deemed by the Town to be unsuitable for backfill, he or she shall remove and dispose of such material.
- B. Should sufficient suitable material from excavations on the project not be available for backfill, the Contractor shall furnish and install select backfill upon approval of the Town. Special backfill shall conform to DelDOT Type "B" borrow.
- C. The Contractor shall furnish certification that his or her borrow is from a DelDOT approved source.

1.08 TEMPORARY REPAVING

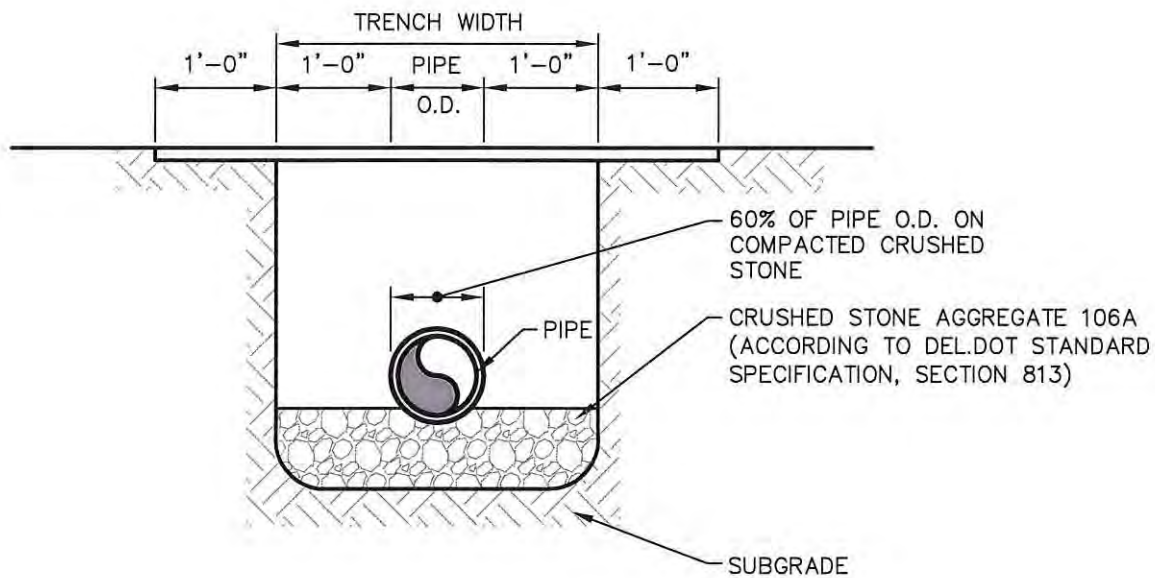
- A. The Contractor shall furnish and place 1 ½ inches (compacted depth) of cold patch as temporary pavement surface over all backfill areas created for pipeline and structure installation located in roadways or driveways. This surface shall be maintained by the Contractor until permanent surface restoration has been performed.
- B. Should the Contractor remove existing pavement beyond the width specified or detailed on the plans, or should pavement be disturbed from settlement, slides or other construction activities, he or she shall saw cut back the pavement and provide temporary paving in these areas.
- C. On State highways and all other areas over which the DelDOT exercises jurisdiction, all pavement restoration shall be done in accordance with the permit

requirements of the Division of Highways.

END OF SECTION



TRENCH BACKFILL



CRUSHED STONE BEDDING

DATE: FEBRUARY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

TRENCH BACKFILL & PIPE BEDDING DETAIL

NO SCALE

SECTION - 1

DRAWING: D1-1

DIVISION 2 – SECTION 2

WATER MAINS AND APPURTENANCES

2.01 GENERAL

The Contractor shall furnish and install all water mains, valves, hydrants, fittings, meters, corporation stops, housing service piping and appurtenances as specified herein and as defined on the drawings or as directed by the Town. Provide all necessary adaptors for connection to existing mains. PVC pipe shall not be permitted for hydrant leads or inside railroad steel crossing sleeves.

2.02 DUCTILE IRON PIPE AND FITTINGS

- A. Ductile iron pipe shall be manufactured in accordance with ANSI/AWWA C151/A21.51, latest edition, and shall be thickness Class 50 in streets and inside highway sleeves and Class 56 under railroads unless otherwise required. The Contractor shall have the option of furnishing mechanical or push-on joints conforming to latest edition of ANSI/ A WW A C 111/ A21.11.
- B. Pipe and fittings shall have an external standard asphaltic coating approximately 1 mil thick.
- C. Pipe and fittings shall have an internal cement lining in accordance with latest revisions of ANSI/AWWA C104/A21.4. No bituminous coating shall be used on the inside of pipe and fittings.
- D. All fittings and specials shall be cast-iron with mechanical joints having a 250 psi pressure rating. They shall be marked and manufactured in conformance with ANSI/AWWA C110/A21.10, latest edition. Ductile iron fittings will be an acceptable alternative. They shall be mechanical joint with a 350 psi pressure rating conforming to ANSI/AWWA C 153/A21.53 and C111/A21.11.

2.03 POLYVINYL CHLORIDE (PVC) PLASTIC PIPE AND FITTINGS

- A. Polyvinyl chloride pipe shall meet the requirements of AWWA C-900. It shall be manufactured in standard length not exceeding 20 feet and have an outside diameter equal to ductile cast iron pipe. PVC pipe shall have a dimension ratio (DR) of 18.0 or less. The pipe shall be rated for a working pressure of at least 150 psi.
- B. Polyvinyl chloride (PVC) pipe shall be manufactured with an elastomeric-gasket joint conforming to ASTM D 3139. Pipe ends shall be beveled.
- C. Fittings for PVC water main shall be cast iron or ductile iron as specified in 2.02.
- D. The Contractor shall provide all necessary adapters for connecting PVC pipe to cast iron fittings and valves or other pipelines. Adapters shall be as recommended

by the pipe manufacturer.

- E. Polyvinyl chloride pipe shall be delivered and stockpiled in unit pallets. Store pipe on flat surface. No stacking of pallets of random lengths above 5 feet in height will be allowed. If pipe is stockpiled for more than 30 days prior to installation in the trench, it must be suitably covered with reflective materials to protect the pipe from ultra-violet rays emanating from sunlight. Do not use plastic sheets. Allow for air circulation under covering.
- F. Bowed sections of pipe will not be acceptable and will not be allowed to be installed.

2.04 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS (FOR DIRECTIONAL BORES)

- A. HDPE pipe shall be SDR11 plain end for fusion welding conforming to ASTM F 714 and ASTM D 3035. Minimum pressure rating shall be 160 psi.
 - B. Molded fittings will conform to ASTM F 714. Terminal ends of HDPE piping in directional bore shall have an AWWA C-207 Class D flanged end, butt, fusion welded to HDPE main. Flange shall be drilled to standard 125 pound template.
 - C. Terminal end of HDPE pipe shall be connected to continuing ductile iron or PVC pipe with a flanged expansion joint. The flanged expansion joint shall be a "FlexTend" flexible expansion joint as manufactured by EBAA, or approved equal.
- #### 2.05 BORING AND JACKING OF WATER MAINS

- A. Where possible, an approach trench shall be excavated far enough to provide a jacking face of at least three (3) feet from a pavement surface. This open face shall be shored securely to prevent slipping or raveling of the face.
- B. Boring pits shall be large enough to contain all-necessary equipment and tools. Adequate provision shall be made for the removal of excavated material.
- C. A substantial backstop of heavy timber or steel beams shall be provided to take the thrust of the jack or boring equipment.
- D. As material is excavated or bored ahead of the pipe, the pipe shall be jacked in to follow this excavation. The distance dug ahead of the pipe shall not exceed six (6) inches.
- E. The installation of casing pipe and the boring or excavation shall be done simultaneously.
- F. Voids between the sleeve and excavation shall be filled by pressure grouting.
- G. Cement grout shall be used to seal the pipe ends between the carrier pipe and

sleeve.

- H. A one (1) inch PVC pipe shall be installed in the downgrade seal to permit drainage.
- I. Steel sleeve shall be furnished in random lengths of the diameter shown on the plans and shall conform to the requirements of AWWA C-200 and ASTM A-53; ASTM A-53; ASTM 53 Grade B pipe shall be used. The pipe, including field connections, shall be coated with bitumastic compound, inside and outside. Wall thickness for 18-inch diameter sleeves shall be a minimum of 0.313 inches. Wall thickness for 12-inch diameter sleeves shall be a minimum of 0.250 inches. All sleeve sections shall be joined to one another by continuous weld around the full circumference of the pipe in accordance with AWWA C-206. At railroad crossings, sleeves shall be extra heavy duty or meet railroad specifications.
- J. Carrier pipe shall be DR 18, C-900 PVC at each location as requested by the plans except at railroad crossings, where the carrier pipe shall be Class 56 ductile iron.
- K. Casing spacers shall be Model SI, as manufactured by Advanced Products & Systems, Inc. and they shall be installed at intervals along the carrier pipe in accordance with the manufacturer's recommendations.

2.05 DIRECTIONAL BORE

- A. The system must be remotely steerable and permit electronic monitoring of tunnel depth and location. The system must be able to control the depth and direction of the pipe and must be accurate to a window of +/- 2 inches.
- B. The system must be capable of turning 90 degrees in a 35 foot radius.
- C. The system shall be a fluid-cutting process which utilizes a liquid clay such as bentonite. This clay must be totally inert and contain no risk to the environment.
- D. Liquid clay shall remain in the tunnel to increase stability of the tunnel and provide a lubricant to reduce frictional drag when the pipe is installed.
- E. Spoils shall be recovered through the use of a vacuum system mounted on a vehicle for removal of spoils to an approved spoils site. Spoils shall not be discharged into sewer or storm drain system.
- F. The equipment must be capable of completing the boring in a single bore.
- G. Equipment must be fitted with a permanent alarm system capable of detecting an electrical current. The system will have an audible alarm to warn the operator when the drill head nears electrified cables.

2.06 GATE VALVES AND BOXES

- A. Gate valves shall be resilient type, in accordance with AWWA C509. Valve bodies and bonnets shall be cast iron epoxy coated on the inside per AWWA C550.
- B. Stem and wedge nuts shall be bronze. Stems shall be sealed by at least two O-rings. Seals shall be replaceable with the valve fully open and while subject to the rated pressure.
- C. Wedge shall be constructed of ductile iron fully encapsulated in synthetic rubber except for guide and wedge nut areas or it shall have a replaceable, internally reinforced, contoured molded rubber disc seat ring attached to the face of the wedge with self-locking stainless steel screws. Wedge rubber shall seat against accurately formed seating surfaces in the valve body.
- D. Waterway shall be smooth and shall have no depressions or cavities in seat area where foreign material can lodge and prevent closure or seating.
- E. Valves shall bear firmly on 4" x 8" x 16" solid concrete block set on undisturbed soil or sufficiently compacted fill.
- F. Gate valves shall be manufactured by Kennedy.
- G. The appropriate size and model Valve Box Adapter II adapters, as manufactured by Adapter, Inc. shall be installed on the bonnet of all valves.
- H. Provide each gate valve with a 5 1/4 inch diameter Buffalo screw type, heavy duty cast iron valve box with "WATER" cast in the lids. All valve boxes shall be Tyler Union 6850 series, two-piece valve boxes with standard base. If valve boxes placed on valves installed on existing or approved new water mains cannot be adjusted to reach the finished surface, cast iron adjustable valve box extensions, as manufactured by Tyler Union, shall be installed. Valves with operating nuts greater than 3'-0" below the finished surface shall be equipped with operating nut extensions, as distributed by Pollard Water or approved equal. Extensions shall be equipped with a plate that will keep the top nut centered in the valve box. If operating nut extensions are used, the top of the extended operating nut shall be between 1'-0" and 2'-6" from the finished surface. Lids shall be extra deep and have two holes for removal of lid. All valve boxes, valve box extensions, bases, and lids shall be as manufactured by Tyler Union or approved equal.
- I. Provide socket valve operating wrenches if requested by the Town.

2.07 TAPPING SLEEVE AND VALVE

- A. Tapping sleeves shall be of all stainless steel construction including sleeve, bolts and nuts. Sleeves shall wrap 360° around the pipe with gridded full circumference

gasket. Units shall be FAST Model by Ford Meter Box Co., or approved equal. Tapping sleeves shall be hydrostatically tested to a pressure of 100 psi. The 100 psi test pressure must be maintained for a period of one (1) hour for successful completion of the test. The tap may not be executed if the sleeve does not pass the test.

- B. Tapping valves shall be cast iron as manufactured by Kennedy.
- C. Install tapping sleeve and valve per manufacturer's recommendations.

2.08 FIRE HYDRANTS

- A. Hydrants shall be compression type with a 5 ¼ inch main valve opening, two 2 ½ inch hose nozzles, one 4 ½ inch pumper nozzle, and a 6 inch mechanical joint hub base. Hydrant seats shall be provided with bronze to bronze threaded connections.
- B. All nozzle and steamer threads shall conform to National Standard. Hydrants shall be of proper length for a 4-foot trench depth or as required by field conditions and be the Guardian model manufactured by Kennedy Model K-81. They shall meet the requirements of AWWA C-502.
- C. A sworn certificate of inspection and testing shall be furnished by the manufacturer. Install hydrants with restraint system as detailed on the drawings.
- D. All hydrants to be furnished with non-kinking chains on the 2 ½ inch nozzles.
- E. Hydrants shall open by turning the operating nut counterclockwise.
- F. Fire hydrants to receive 1 coat of primer and 2 coats of red paint in accordance with Federal Standard 595A. The final coat shall be field applied after the hydrant has been installed.
- G. Ductile iron pipe with cast iron or ductile iron fittings shall be used exclusively throughout the hydrant assembly. The use of polyvinyl chloride pipe will not be permitted in construction of any portion of the hydrant leads.
- H. Provide hydrant operating wrenches and repairs kits. Deliver a minimum of one wrench and repair kit per project, and a minimum of one per five hydrants installed.
- I. Base of hydrants shall bear firmly on 4-inch x 8-inch x 16-inch solid concrete block set on undisturbed soil or sufficiently compacted fill.

2.09 LAYING WATER MAINS, FITTINGS AND APPURTENANCES

- A. Water main pipe, fittings, and valves shall be installed per manufacturer's printed

instructions. Care shall be taken to insure that no joints are made with unevenness or rough edges. Pipeline deflection must be kept below the manufacturer's limitations.

- B. All pipes shall be bedded on a solid foundation prior to backfilling. Defects due to settlement shall be corrected by the Contractor at his or her own expense. Bell holes shall be dug sufficiently large to receive same.
- C. Pipe fittings shall be kept clean until final acceptance of the work. All open pipe ends shall be provided with plugs to keep dirt, water and other materials from entering. This plug shall be kept in place when actual pipe laying is not in progress.
- D. Excavation and backfill for water mains and appurtenances shall be per Section 1 of these specifications.
- E. PVC pipe shall be beveled before making pipe joint.
- F. Install no pipe on frozen or frost penetrated subgrade. When directed, the Contractor shall install pipe on artificial foundations. Such foundation may consist of gravel or concrete and shall be to the dimensions and in the manner directed by the Town.
- G. Pipeline detectable tape shall be installed continuously along all PVC water mains. The tape shall be installed directly above the water main and 18 inches below the ground surface. The tape shall be Lineguard Type III Detectable Tape as manufactured by Lineguard, Inc. of Wheaton, Illinois, or equal. The tape shall be a minimum of two inches wide, blue in color, imprinted with the words, "CAUTION - WATER LINE BELOW", and capable of being detected with inductive methods.
- H. Pipeline tracer wire shall be installed along all proposed water main and water services.
 - 1. For direct burial of proposed gasketed-joint water main, wire shall be fastened directly to the top of the pipe, at each end and in the center. For direct burial of HDPE water services, tracer wire shall be attached to the top of the pipe. The distance between attachment points shall be no greater than 10 feet. Tracer wire shall be a #12 AWG high strength, copper-clad steel (HS-CCS) conductor, insulated with a 30 mil, high-density, high molecular-weight polyethylene (HDPE) insulation, and rated for direct burial use at 30 volts. Insulation color shall meet the APWA color code standard for identification of buried utilities. Tracer wire shall be Copperhead HS-CCS HDPE 30 mil insulation as manufactured by Copperhead Industries, LLC of Monticello, MN.

2. For directional drilling/boring of water main, or moling of water services, tracer wire shall be a #12 AWG extra high strength, copper-clad steel (EHS-CCS) conductor, insulated with a 45 mil, high-density, high molecular-weight polyethylene (HDPE) insulation, and rated for direct burial use at 30 volts. Insulation color shall meet the APWA color code standard for identification of buried utilities. Tracer wire shall be Copperhead SoloShot Extra High Strength, EHS-CCS HDPE 45 mil insulation as manufactured by Copperhead Industries, LLC of Monticello, MN.
 3. Splicing of tracer wire shall not be permitted. Long runs of tracer wire may not be greater than 400 feet (+/-). At these intervals, or at dead ends, tracer wires shall be extended from the main to grassed area behind the curb or sidewalk. Magnetized tracer boxes, as manufactured by Copperhead Industries, LLC shall be installed in the grassed area and the tracer wires shall be installed up into the boxes and connected to lugs in the boxes. All boxes shall have a color coded cover to match the APWA color code standard for identification of buried utilities. Tracer wire shall not be run up and inside of valve boxes. Tracer on water services shall be connected to the tracer wire on the main using connectors manufactured by Copperhead Industries, LLC. Water service tracer wire shall be attached to, and extended along the service pipe to the inside of the meter pit, where it shall be fixed and made accessible to the locator.
 4. All dead ends of tracer wire not made accessible at the ground surface, either in a tracer wire box or a water meter pit shall be grounded by attaching the end to a magnesium anode as manufactured by Copperhead Industries, LLC.
- I. All concrete required to construct buttresses behind plugs, tees, bends and other fittings, and anchorages beneath vertical bends, shall be placed as directed and/or as shown on the details.
 - J. Water mains shall be laid 10 feet horizontally from any existing or proposed sewer. The distance should be measured edge to edge. All water mains and services shall have a minimum depth of cover of 42 inches. Water mains crossing sewers shall be laid to provide a minimum vertical distance of eighteen (18) inches between the outside of the water main and the outside of the sewer, and the water main shall be above the sewer wherever possible. At crossings, one full length of water pipe should be elevated so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required. If this minimum vertical separation cannot be provided, either the water line or the sewer line shall be encased for a distance of ten (10) feet on either side of the crossing. Water mains crossing storm drain shall meet requirements of 6.05 (J).

2.10 INSTALLING FITTINGS, HYDRANTS, GATE VALVES, AND VALVE BOXES

- A. Fittings, hydrants, gate valves and valve boxes shall be placed along the water mains at the locations indicated on the drawings or where otherwise designated by the Town. The base of hydrants and gate valves shall bear firmly on 4-inch x 8-inch x 16-inch solid concrete blocks set on undisturbed soil or sufficiently compacted fill.
- B. Valve box adapters (see 2.05, G. above) shall be installed over valve bonnets and a valve box shall be carefully placed over the adapters on each gate valve with the top at the finished surface of the street, sidewalk or at such other elevation as the Town shall direct. The valve box shall be set exactly plumb. In tamping the backfill around the box special care shall be taken to keep the box plumb. Any box which is found out of plumb, or which is not firmly supported, shall be excavated and reset in a satisfactory manner, at the Contractor's expense.

2.11 INSTALLATION OF FIRE SUPPRESSION BACKFLOW PREVENTORS

- A. Any buildings requiring fire suppression shall have a dedicated fire flow water main connected directly to a Town maintained water main. A valve must be installed on the fire main at the tapping or standard tee connection to the Town's main, or at the property line, as directed by the Town.
- B. The fire flow backflow preventer shall be a detector check assembly. The detector check shall be located between valves to facilitate removal for maintenance if necessary. The detector check shall be standard pressure operation and shall be located inside the building in an equipment room; or, if permitted by the Town, it may be located outside the building in a vault. See detail D5-1.
- C. The detector check shall be Mueller Model EDC-IV.
- D. The potable water service for a facility with a dedicated fire flow water main shall not be permitted to be tapped on the fire flow main. The service must have an independent tap on the Town maintained water main and the service shall be installed in accordance with Section 5.

2.12 DISINFECTION OF WATER MAINS

- A. Upon completion of water main construction, disinfect main and appurtenances. Disinfection shall be done in accordance with ANSV AWWA C-60 1, latest addition. Contractor shall submit a plan of disinfection for approval by the Town.
- B. The Contractor shall place in each length of pipe, hydrants, hydrant branches and other appurtenances, a sufficient amount of HTH Tablets to insure adequate disinfection treatment of the main after its completion. Tablets shall be fastened to the inside top of every length of pipe as laid, using gasket cement known as

"Permatex No.2".

- C. Water for filling the mains shall be introduced at a velocity of less than 1 foot per second in order to permit the HTH or Perchloron to completely dissolve and have a reasonable uniform distribution throughout the mains. It is the intent of this Specification to require a sufficient amount of chemical to be equivalent to a dosage of 50 p.p.m. of chlorine.
- D. The Contractor will be held entirely responsible for securing a minimum residual chlorine content of 5 p.p.m. at the extremities of the mains after twenty-four (24) hours or more contact with the full water pressure on the main.
- E. After the chlorine has been in contact with the mains or storage units for twenty-four (24) hours or longer, samples collected for the extremities of the mains shall indicate a residual chlorine content of 5 p.p.m. or more.
- F. If less than 5 p.p.m. residual chlorine is indicated, the system shall be drained and the disinfection treatment repeated.
- G. After the applicable retention period, the heavily chlorinated water shall be flushed from the main. This water shall be discharged to the sanitary sewer system. Only after water leaving the main is no higher in chlorine concentration than normal drinking water will a discharge to storm drains be allowed. Convey flushed water to discharge point in a closed system.
- H. Affidavits of compliance certifying the water sampled from the water mains to be free of coliform bacteria shall be submitted to the Town. The contractor is responsible for requesting tests from the Delaware Department of Public Health. He shall provide written documentation when a section of mains can be placed in service.
- I. If samples collected at the extremities indicate residual chlorine of 5 p.p.m. or more, the system shall be flushed until there is only normal chlorine residual (1.0 p.p.m. or less) present, as determined by the DPD Method Test. Samples of water shall be collected from various points along the lines, by the Delaware Division of Public Health for bacteriological analysis. If satisfactory bacteriological results are obtained, the lines may then be allowed to be placed in service. A copy of all test results shall be submitted to the Town.

2.13 WATER MAIN TESTING

- A. The Contractor shall furnish all equipment, labor and materials, including water, pumps, compressors, stopwatch, gauges, and meters as approved by the Town for testing. The Town shall determine the amount of main to be tested at any one time and reserves the right to separate the installation into several test sections. All tests must be witnessed by the Town.

B. Pressure Test

After the pipe has been laid, all newly laid pipe or any valved section thereof, shall be subjected to a hydrostatic pressure of 150 psi.

1. Test Pressure shall:
 - a. Be of at least two hour duration.
 - b. Not vary by more than five psi.
2. Pressurization. Each valved section of pipe shall be filled with water slowly and the specified test pressure, based on the elevation of the lowest point of the line or section under the test and corrected to the elevation of the test gage, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Town.
3. Air Removal. Before applying the specified test pressure, air shall be expelled completely from the pie, valves and hydrants. If permanent air vents are not located at all high point, the Contractor shall install corporation cocks at such points, so that the air can be expelled as the line is filled with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test all corporation cocks shall be removed and plugged, or left in place at the discretion of the Town.
4. Examination. All exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with same material and the test shall be repeated until it is satisfactory to the Town.

C. Leakage Test

A leakage test shall be conducted concurrently with the pressure test.

1. Leakage Defined. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or at any valved section thereof, to maintain pressure within five psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.
2. Allowable Leakage. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = (ND)(\text{SQRT of } P)/7400$$

in which the allowable leakage, in gallons per hour; N is the number of

joints in the length of pipeline tested; D is the nominal diameter of the pipe in inches; and P is the average test pressure during the leakage test in pounds per square inch gage.

3. When hydrants are in the test section, the test shall be made with hydrant valves open and hydrant nozzles closed.

- D. Should the tests show the main to be defective, the Contractor shall remedy such defects and retest the main as specified above. This procedure shall be repeated until the test requirements are met. Segments of main which do not meet minimum requirements will not be accepted.

TABLE I Allowable Leakage per 1000 feet of Pipeline*
- gph Nominal Pipe Diameter - inch

| Ave. Test Pressure psi | 2 | 3 | 4 | 6 | 8 | 10 |
|---------------------------|------|------|------|------|------|------|
| 150 | 0.18 | 0.28 | 0.37 | 0.55 | 0.74 | 0.92 |
| 125 | 0.17 | 0.25 | 0.34 | 0.50 | 0.67 | 0.84 |
| 100 | 0.15 | 0.23 | 0.30 | 0.45 | 0.60 | 0.75 |

| Ave. Test Pressure psi | 12 | 14 | 16 | 18 | 20 | 24 |
|---------------------------|------|------|------|------|------|------|
| 150 | 1.10 | 1.29 | 1.47 | 1.66 | 1.84 | 2.21 |
| 125 | 1.01 | 1.18 | 1.34 | 1.51 | 1.68 | 2.01 |
| 100 | 0.90 | 1.05 | 1.20 | 1.35 | 1.50 | 1.80 |

$$\text{Formula } L = (ND)(\text{SQRT of } P) / 7,400$$

L = Allowable leakage (gph per 1,000 feet of pipeline)

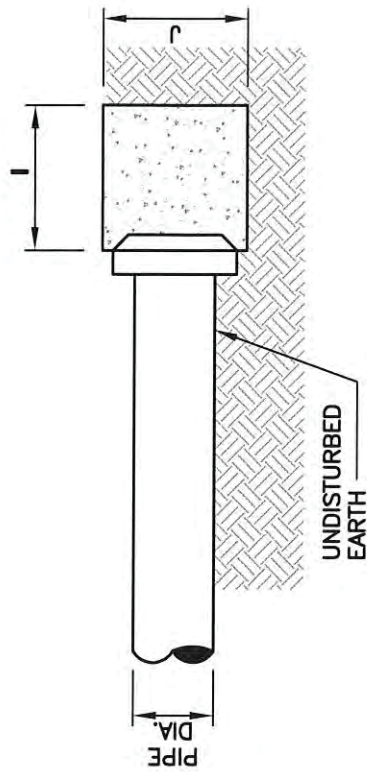
N = Number of joints in length of pipeline tested

D = Nominal diameter of pipe in inches

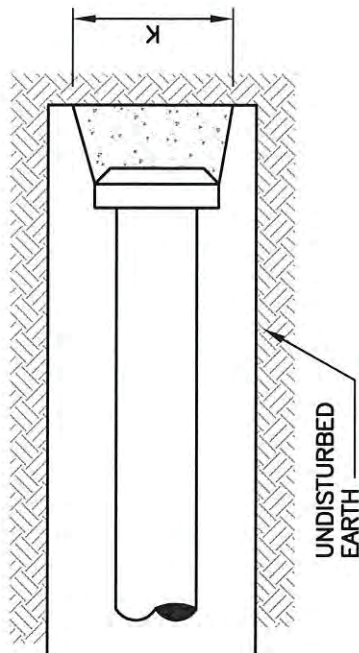
P = Average test pressure during leakage test in psi

*For pipe with 18-ft nominal lengths. To obtain the recommended allowable leakage for pipe with 20-ft nominal lengths, multiply the leakage calculated from the table by 0.9. If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

END OF SECTION



PROFILE



PLAN

| DIMENSION SCHEDULE | | | | | | | | | | |
|--------------------|-------|-------|--------|-------|--------|-------|-------|-------|-------|--|
| PIPE DIA. | 4" | 6" | 8" | 10" | 12" | 16" | 18" | 20" | 24" | |
| I | 6" | 6" | 8" | 8" | 10" | 1'-0" | 1'-4" | 1'-6" | 1'-8" | |
| J | 1'-0" | 1'-0" | 1'-4" | 1'-8" | 2'-0" | 2'-8" | 4'-0" | 4'-6" | 5'-0" | |
| K | 1'-5" | 1'-5" | 1'-11" | 2'-5" | 2'-10" | 3'-9" | 4'-0" | 4'-6" | 5'-0" | |

* USE OF BAGGED CONCRETE PROHIBITED.

DATE: FEBRUARY 2015

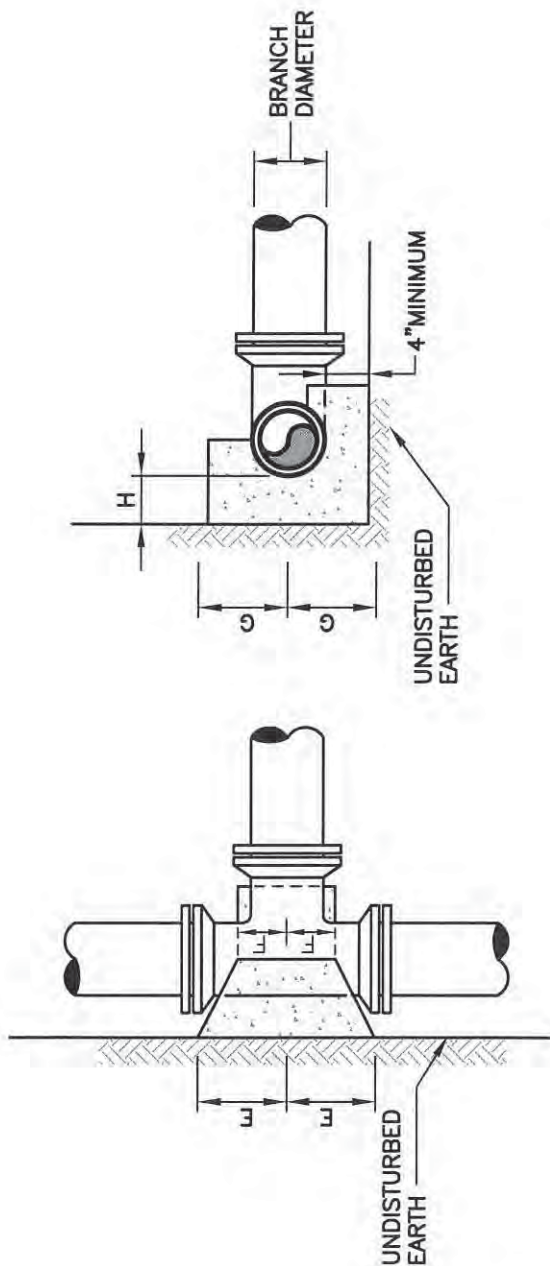
PLUG THRUST BLOCK DETAIL

NO SCALE

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

SECTION - 2

DRAWING D2-1



| DIMENSION SCHEDULE | | | | | | | | | | |
|--------------------|----|----|-----|-------|-------|-------|-------|-------|-------|--|
| BRANCH DIA. | 4" | 6" | 8" | 10" | 12" | 16" | 18" | 20" | 24" | |
| E | 8" | 8" | 10" | 1'-0" | 1'-3" | 1'-8" | 2'-0" | 2'-6" | 2'-9" | |
| F | 6" | 6" | 8" | 8" | 8" | 10" | 1'-0" | 1'-0" | 1'-2" | |
| G | 7" | 7" | 9" | 1'-0" | 1'-2" | 1'-6" | 2'-0" | 2'-6" | 2'-9" | |
| H | 8" | 8" | 9" | 10" | 1'-0" | 1'-2" | 1'-4" | 1'-5" | 1'-6" | |

* USE OF BAGGED CONCRETE PROHIBITED.

DATE: FEBRUARY 2015

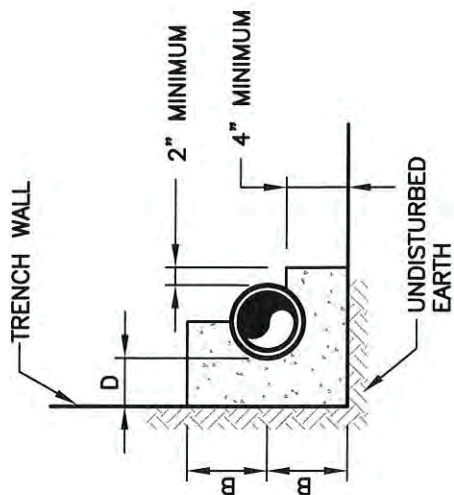
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

TEE THRUST BLOCK DETAIL

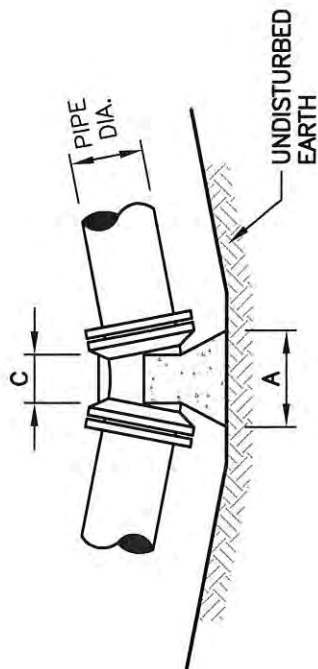
NO SCALE

SECTION - 2

DRAWING D2-2



PROFILE



PLAN

| DIMENSION SCHEDULE | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------|--|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|-------|-------|--|--|--|--|--|
| BEND | | 11½' | | | | | | | | | | | 22½' | | | | | | | | | | |
| | | 4" | 6" | 8" | 10" | 12" | 16" | 18" | 20" | 4" | 6" | 8" | 10" | 12" | 16" | 18" | 20" | 24" | | | | | |
| PIPE DIA. | | A | 6" | 6" | 6" | 10" | 1'-0" | 1'-4" | 2'-0" | 2'-2" | 9" | 9" | 1'-0" | 1'-6" | 2'-3" | 2'-3" | 2'-8" | 3'-0" | | | | | |
| | | B | 7" | 7" | 8" | 9" | 10" | 1'-0" | 1'-6" | 1'-6" | 7" | 8" | 9" | 1'-0" | 1'-0" | 1'-6" | 1'-6" | 1'-6" | | | | | |
| | | C | 4" | 4" | 6" | 6" | 10" | 1'-0" | 1'-6" | 1'-6" | 4" | 6" | 8" | 10" | 1'-0" | 1'-0" | 1'-2" | 1'-6" | | | | | |
| | | D | 7" | 7" | 7" | 8" | 8" | 9" | 1'-0" | 1'-2" | 8" | 9" | 10" | 11" | 1'-2" | 1'-2" | 1'-4" | 1'-8" | | | | | |
| BEND | | 45° | | | | | | | | | | | 90° | | | | | | | | | | |
| | | 4" | 6" | 8" | 10" | 12" | 16" | 18" | 20" | 4" | 6" | 8" | 10" | 12" | 16" | 18" | 20" | 24" | | | | | |
| PIPE DIA. | | A | 1'-3" | 1'-3" | 1'-8" | 2'-1" | 2'-6" | 3'-4" | 4'-0" | 4'-0" | 2'-0" | 2'-6" | 3'-0" | 3'-6" | 5'-0" | 5'-0" | 6'-0" | 5'-6" | | | | | |
| | | B | 7" | 7" | 8" | 9" | 1'-1" | 1'-3" | 2'-0" | 2'-6" | 6" | 9" | 1'-0" | 1'-3" | 1'-6" | 1'-6" | 3'-0" | 2'-0" | | | | | |
| | | C | 4" | 4" | 6" | 8" | 10" | 1'-0" | 1'-6" | 1'-6" | 4" | 6" | 8" | 10" | 1'-0" | 1'-0" | 1'-6" | 1'-6" | | | | | |
| | | D | 8" | 8" | 9" | 10" | 11" | 1'-2" | 1'-4" | 1'-6" | 1'-5" | 1'-7" | 1'-8" | 1'-9" | 1'-10" | 1'-10" | 2'-0" | 2'-4" | | | | | |

* USE OF BAGGED CONCRETE PROHIBITED.

DATE: FEBRUARY 2015

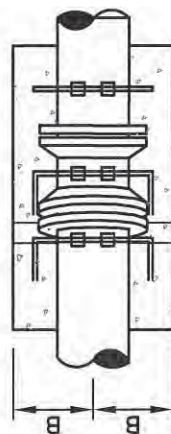
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

HORIZONTAL BEND THRUST BLOCK DETAIL

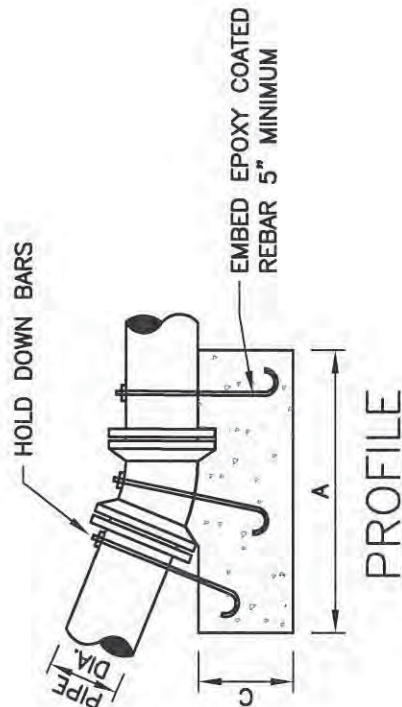
NO SCALE

SECTION - 2

DRAWING D2-3



PLAN



PROFILE

| DIMENSION SCHEDULE | | | | | | | | | | |
|--------------------|---------------|-------|-------|-------|-------|-------|-------|--|--|--|
| BEND | PIPE DIAMETER | | | | | | | | | |
| | 4" | 6" | 8" | 10" | 12" | 16" | 24" | | | |
| 11 1/4° | A | 6" | 8" | 10" | 1'-0" | 1'-4" | 2'-6" | | | |
| | B | 7" | 8" | 9" | 10" | 1'-0" | 1'-6" | | | |
| | C | 7" | 7" | 8" | 8" | 9" | 1'-4" | | | |
| 22 1/2° | A | 9" | 9" | 1'-0" | 1'-6" | 2'-3" | 3'-0" | | | |
| | B | 7" | 7" | 8" | 10" | 1'-0" | 1'-6" | | | |
| | C | 7" | 7" | 8" | 8" | 9" | 1'-4" | | | |
| 45° | A | 1'-3" | 1'-3" | 1'-8" | 2'-1" | 3'-4" | 4'-2" | | | |
| | B | 7" | 7" | 8" | 11" | 1'-3" | 2'-0" | | | |
| | C | 7" | 7" | 8" | 10" | 1'-3" | 2'-0" | | | |

* USE OF BAGGED CONCRETE PROHIBITED.

| BAR SCHEDULE | | | | |
|--------------|------------------|---------|------|------|
| SIZE | REINFORCING BARS | | | |
| | 11 1/4° | 22 1/2° | 45° | |
| 4 & 6" | 3 #4 | 3 #4 | 3 #4 | 3 #4 |
| 8" | 3 #4 | 3 #4 | 3 #4 | 3 #4 |
| 10" | 3 #5 | 3 #5 | 3 #5 | 3 #5 |
| 12" | 3 #5 | 3 #5 | 3 #5 | 3 #5 |
| 16" | 3 #5 | 3 #5 | 3 #5 | 3 #5 |
| 18" | 3 #6 | 3 #6 | 3 #6 | 3 #6 |
| 20" | 3 #6 | 3 #6 | 3 #6 | 3 #6 |
| 24" | 3 #6 | 3 #6 | 3 #6 | 3 #6 |

DATE: DECEMBER 2014

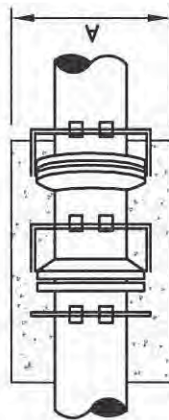
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

VERTICAL UPWARD BEND
THRUST BLOCK DETAIL
NO SCALE

SECTION - 2

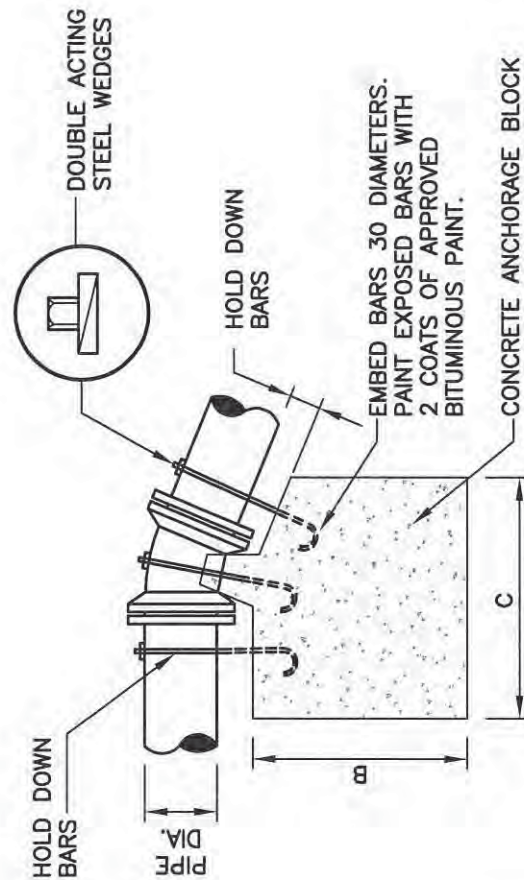
DRAWING D2-4

| DIMENSION SCHEDULE | | | | | | | | | | | | |
|--------------------|---------------|-------|-------|--------|-------|-------|-------|-------|-------|--|--|--|
| BEND | PIPE DIAMETER | | | | | | | | | | | |
| | 4" | 6" | 8" | 10" | 12" | 16" | 18" | 20" | 24" | | | |
| 1 1/4" | A 1'-6" | 1'-6" | 1'-6" | 2'-5" | 3'-0" | 3'-4" | 3'-6" | 3'-9" | 4'-0" | | | |
| | B 1'-3" | 1'-3" | 1'-9" | 1'-9" | 2'-0" | 2'-4" | 2'-6" | 2'-9" | 3'-0" | | | |
| | C 2'-0" | 2'-0" | 2'-6" | 2'-9" | 3'-0" | 3'-4" | 3'-6" | 3'-9" | 4'-0" | | | |
| 2 1/2" | A 2'-0" | 2'-0" | 3'-4" | 3'-8" | 4'-0" | 4'-4" | 4'-6" | 4'-9" | 5'-0" | | | |
| | B 1'-9" | 1'-9" | 2'-3" | 2'-6" | 2'-6" | 3'-0" | 3'-2" | 3'-4" | 3'-6" | | | |
| | C 2'-6" | 2'-6" | 2'-8" | 3'-10" | 4'-0" | 5'-4" | 5'-6" | 5'-9" | 6'-0" | | | |
| 45° | A 2'-6" | 2'-6" | 3'-0" | 4'-0" | 4'-6" | 5'-0" | 5'-3" | 5'-6" | 5'-8" | | | |
| | B 2'-6" | 2'-6" | 2'-9" | 3'-0" | 3'-6" | 4'-4" | 4'-6" | 4'-9" | 5'-0" | | | |
| | C 3'-0" | 3'-0" | 4'-0" | 4'-6" | 4'-9" | 5'-0" | 5'-3" | 5'-6" | 5'-8" | | | |



PLAN

* USE OF BAGGED CONCRETE PROHIBITED.



PROFILE

| BAR SCHEDULE | | | |
|--------------|------------------|--------|------|
| SIZE | REINFORCING BARS | | |
| | 1 1/4" | 2 1/2" | 45° |
| 4 & 6" | 3 #6 | 3 #6 | 3 #6 |
| 8" | 3 #6 | 3 #6 | 3 #6 |
| 10" | 3 #6 | 3 #6 | 3 #6 |
| 12" | 3 #6 | 3 #6 | 3 #6 |
| 16" | 3 #6 | 3 #6 | 3 #6 |
| 18" | 3 #8 | 3 #8 | 3 #8 |
| 20" | 3 #8 | 3 #8 | 3 #8 |
| 24" | 3 #8 | 3 #8 | 3 #8 |

DATE: FEBRUARY 2015

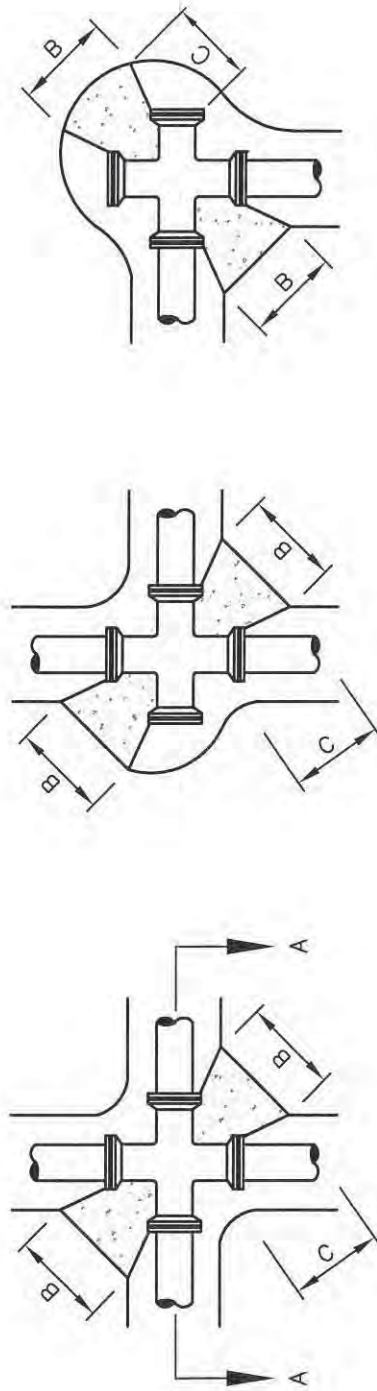
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

VERTICAL DOWNWARD BEND
THRUST BLOCK DETAIL

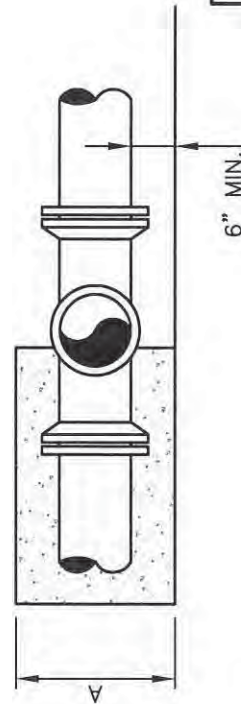
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SECTION - 2

DRAWING D2-5



PLAN VIEW



SECTION A

| DIMENSION SCHEDULE | | | | | | | |
|------------------------|-------------------------------------------|-------|-------|-------|-------|-------|-------|
| LARGEST BRANCH DIA. | 4" | 6" | 8" | 10" | 12" | 16" | 24" |
| A | 1'-9" | 1'-9" | 2'-6" | 3'-0" | 3'-3" | 3'-9" | 4'-6" |
| B | 1'-2" | 1'-2" | 1'-4" | 2'-0" | 2'-2" | 2'-6" | 3'-6" |
| C | MIN. TO UNDISTURBED SOIL 2' - 6" | | | | | | |

* USE OF BAGGED CONCRETE IS PROHIBITED.

DATE: FEBRUARY 2015

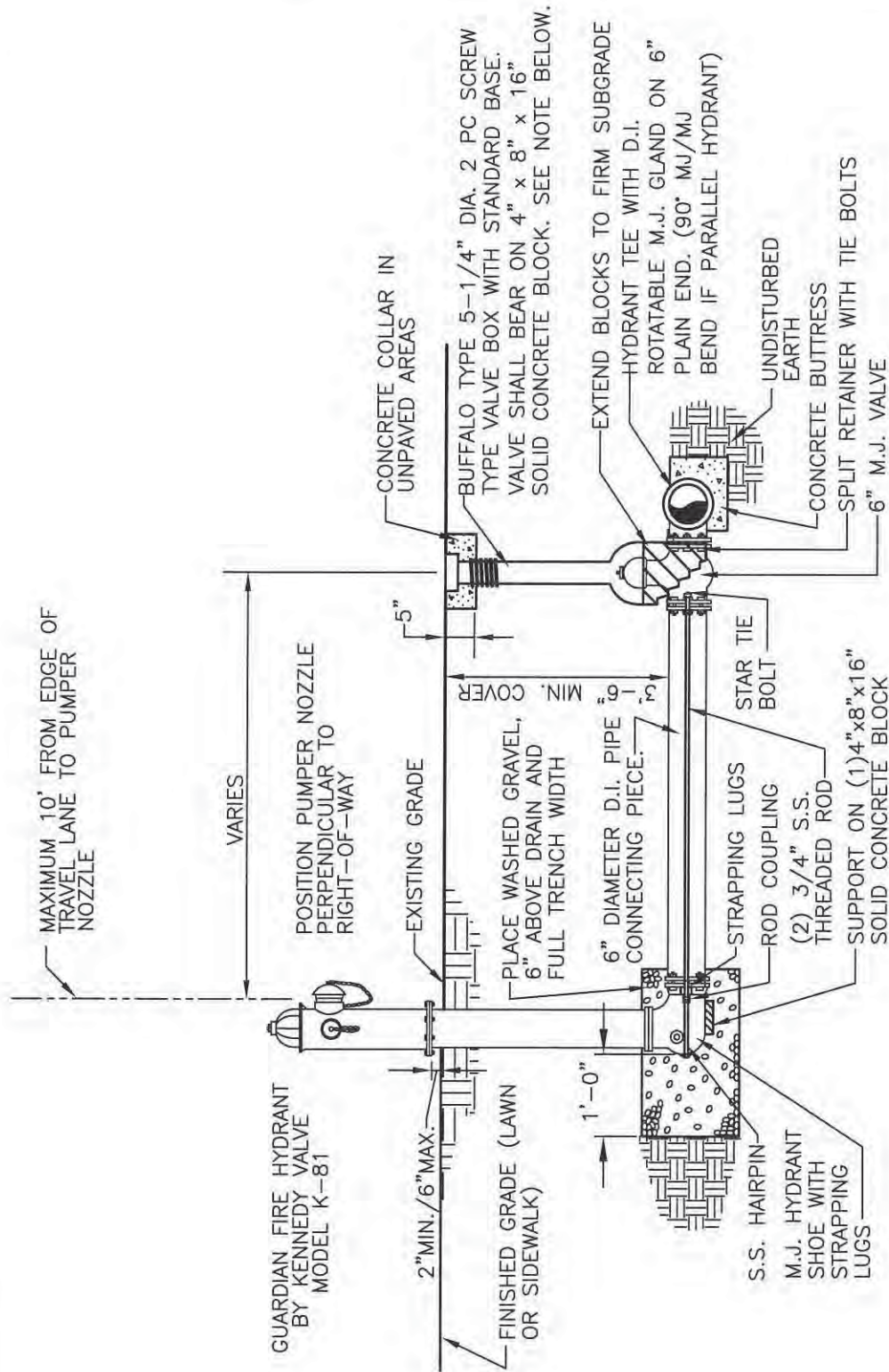
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

CROSS THRUST BLOCK DETAIL

NO SCALE

SECTION - 2

DRAWING D2-6



- NOTE:
1. VALVE BOX BASE SHALL FIT AROUND VALVE BOX ADAPTER II, MANUFACTURED BY ADAPTER, INC. PLACED ON BONNET OF VALVE.
 2. TRACER WIRE NOT SHOWN BUT REQUIRED.

DATE: FEBRUARY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

FIRE HYDRANT DETAIL

NO SCALE

SECTION - 2

DRAWING D2-7

DIVISION 2 – SECTION 3

SANITARY SEWER, FORCE MAINS, AND APPURTENANCES

3.01 GENERAL

- A. The Contractor shall furnish all material and shall construct the pipe lines and all required appurtenances at the locations and to the lines, slopes, and elevations shown on the drawings or designated by the Town.
- B. The Contractor shall submit certifications to the Town that all pipe, fittings, and joints are as specified herein.

3.02 POLYVINYL CHLORIDE PIPE AND FITTINGS

A. GENERAL

- 1. Polyvinyl Chloride (PVC) pipe shall be manufactured with integral wall bell and spigot joints which shall utilize an elastomeric O-ring gasketed joint conforming to ASTM D-1860. Pipe ends shall be beveled to accept gasketed fittings.
- 2. Pipe shall be manufactured in lengths not to exceed 20 feet. Laterals shall have a minimum diameter of 6 inches. Lateral shall not cross sewer main it connects into.
- 3. Polyvinyl Chloride Pipe shall be delivered and stockpiled in unit pallets. Stacking of pallets above 5 feet in height will not be allowed. If pipe is stockpiled for more than 30 days prior to installation in the trench, it must be suitably covered with reflective material to protect the pipe from ultra-violet rays emanating from sunlight. Do not use plastic sheets. All for air circulation under covering.
- 4. Bowed sections of pipe will be unacceptable and installation of pipe which has bowed, whether or not the bow has been corrected, will not be allowed.

B. POLYVINYL CHLORIDE SEWER PIPE AND FITTINGS

- 1. Polyvinyl Chloride (PVC) pipe, used for gravity sewer construction, shall equal or exceed the requirements of ASTM D 3034 and shall have a maximum standard dimension ratio (SDR) of 26 and the minimum pipe stiffness, as tested in accordance with ASTM D 2412, shall be 45 when measured under 5 percent deflection at 73 degrees Fahrenheit.

2. Polyvinyl Chloride wye branches, pipe stoppers, and other fittings shall be SDR 26 and shall be manufactured in accordance with the same specifications and shall have the same thickness, depth of socket, and annular space as the pipe. Tee fittings will not be permitted for use. Wye branches shall be complete pipe sections. Saddles will not be permitted for use.

C. POLYVINYL CHLORIDE FORCE MAIN PIPE AND FITTINGS

1. Polyvinyl Chloride (PVC) force main pipe shall be manufactured to meet or exceed the requirements of AWWA C-900, latest revision. It shall have outside diameters equal to cast iron pipe with a dimension ratio (DR) of 18 or less. The pipe shall be rated for a working pressure of at least 150 psi plus a surge allowance of at least 35 psi and shall have a minimum hydrostatic strength of 600 psi.
2. All fittings for PVC force main shall be made of cast iron in accordance with ANSI Standard A21.20. Fittings shall be class 250 and provided with mechanical joint ends furnished in accordance with ANSI Specifications A21.11 except where noted on the plans or delineated in these specifications. Inside of fittings shall be double cement lined with a bituminous seal coat in accordance with ANSI 21.40.
3. Pour concrete thrust blocks according to details D4-2 through D4-7 of these specifications on all horizontal or vertical pipe bends.

3.03 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS (FOR DIRECTIONAL BORING OF FORCEMAIN)

- A. HDPE pipe shall be SDR11 plain end for fusion welding conforming to ASTM F 714 and ASTM D 3035. Minimum pressure rating shall be 160 psi.
- B. Molded fittings will conform to ASTM F 714. Terminal ends of HDPE piping in directional bore shall have an AWWA C-207 Class D flanged end, butt, fusion welded to HDPE main. Flange shall be drilled to standard 125 pound template.
- D. Terminal end of HDPE pipe shall be connected to continuing ductile iron or PVC pipe with a flanged expansion joint. The flanged expansion joint shall be a "FlexTend" flexible expansion joint as manufactured by EBAA, or approved equal.

3.04 DUCTILE IRON PIPE AND FITTINGS

- A. Ductile iron pipe for gravity sewer construction shall be Tyton Joint, Class 52 ductile iron pipe as manufactured by U.S. Pipe. All fittings shall be 250 psi cast iron per ANSI requirements.

- B. Pipe and fittings shall have a standard internal and external asphaltic coating approximately 1 mil thick.
- C. Laterals along the ductile iron main shall be installed using a ductile iron tee fitting. The lateral branch of the tee shall be 6". Extend the 6" ductile iron lateral pipe vertical to a ductile iron 45 degree bend. Connect another length of 6" ductile iron to the bend and then transition to 6" PVC using a Fernco coupling with stainless steel sheer ring and clamps. Lateral shall have a minimum diameter of 6". Lateral shall not cross sewer main it connects into.

3.05 BORING AND JACKING OF GRAVITY SEWER MAINS

- A. Where possible, an approach trench shall be excavated far enough to provide a jacking face of at least three (3) feet from a pavement surface. This open face shall be shored securely to prevent slipping or raveling of the face.
- B. Boring pits shall be large enough to contain all-necessary equipment and tools. Adequate provision shall be made for the removal of excavated material.
- C. A substantial backstop of heavy timber or steel beams shall be provided to take the thrust of the jack or boring equipment.
- D. As material is excavated or bored ahead of the pipe, the pipe shall be jacked in to follow this excavation. The distance dug ahead of the pipe shall not exceed six (6) inches.
- E. The installation of casing pipe and the boring or excavation shall be done simultaneously.
- F. Voids between the sleeve and excavation shall be filled by pressure grouting.
- G. Cement grout shall be used to seal the pipe ends between the carrier pipe and sleeve.
- H. A one (1) inch PVC pipe shall be installed in the downgrade seal to permit drainage.
- I. Steel sleeve shall be furnished in random lengths of the diameter shown on the plans and shall conform to the requirements of AWWA C-200 and ASTM A-53; ASTM A-53; ASTM 53 Grade B pipe shall be used. The pipe, including field connections, shall be coated with bitumastic compound, inside and outside. Wall thickness for 18-inch diameter sleeves shall be a minimum of 0.313 inches. Wall thickness for 12-inch diameter sleeves shall be a minimum of 0.250 inches. All sleeve sections shall be joined to one another by continuous weld around the full circumference of the pipe in accordance with AWWA C-206. At railroad crossings, sleeves shall be extra heavy duty or meet railroad specifications.

- J. Carrier pipe shall be SDR 26 PVC at each location as requested by the plans except at railroad crossings, where the carrier pipe shall be Class 56 ductile iron.
- K. Casing spacers shall be Model SI, as manufactured by Advanced Products & Systems, Inc. and they shall be installed at intervals along the carrier pipe in accordance with the manufacturer's recommendations.

3.06 DIRECTIONAL BORE (FORCEMAIN)

- A. The system must be remotely steerable and permit electronic monitoring of tunnel depth and location. The system must be able to control the depth and direction of the pipe and must be accurate to a window of +/- 2 inches.
- B. The system must be capable of turning 90 degrees in a 35 foot radius.
- C. The system shall be a fluid-cutting process which utilizes a liquid clay such as bentonite. This clay must be totally inert and contain no risk to the environment.
- D. Liquid clay shall remain in the tunnel to increase stability of the tunnel and provide a lubricant to reduce frictional drag when the pipe is installed.
- E. Spoils shall be recovered through the use of a vacuum system mounted on a vehicle for removal of spoils to an approved spoils site. Spoils shall not be discharged into sewer or storm drain system.
- F. The equipment must be capable of completing the boring in a single bore.
- G. Equipment must be fitted with a permanent alarm system capable of detecting an electrical current. The system will have an audible alarm to warn the operator when the drill head nears electrified cables.

3.07 PIPE INSTALLATION

- A. Pipe and fittings shall be carefully handled and lowered into the trench. Special care shall be taken to insure that each length shall abut against the next in such a manner that there shall be no shoulder or unevenness of any kind along the inside of the pipe.
- B. Before pipe is placed, the bottom of the trench shall be carefully shaped to fit the lower part of the pipe exterior with reasonable closeness for circumference of at least 60% of the pipe diameter. Bell holes shall be dug sufficiently large to insure the making of proper joints and so that after placement, only the barrel of the pipe receives bearing pressure from the trench bottom. No pipe shall be brought into position until the preceding length has been thoroughly bedded and secured in place. Any defects due to settlement shall be made good by the Contractor.

- C. Sewer laterals and wyes connecting to sewer mains with greater than 8 feet of cover shall be connected using the deep sewer lateral connection method. See detail D2-2.
- D. Proper and suitable tools and appliances for the safe and convenient handling and laying of pipe shall be used.
- E. Whenever a pipe requires cutting to fit into the line or to bring it to the required location, the work shall be done in a satisfactory manner so as to leave a smooth end.
- F. The pipes shall be thoroughly cleaned before they are laid and shall be kept clean until the acceptance of the completed work. The open ends of all pipe lines shall be provided with a stopper carefully fitted so as to keep dirt and other substances from entering. This stopper shall be kept in the end of the pipe line at all times when laying is not in actual progress.
- G. All concrete required to support and reinforce wye branches, bends and other fittings shall be placed as directed.
- H. Backfill materials shall be hand placed and mechanically tamped in six inch layers, placed uniformly on both sides of the pipe, to a point at least one foot above the pipe crown. Each layer shall be thoroughly compacted for the full trench width and under, around and over the pipe.
- I. Pipeline detectable tape shall be installed continuously along all sewer and force mains. The tape shall be installed directly above the pipe and 18 inches from the ground surface. The tape shall be Lineguard Type III detectable tape as manufactured by Lineguard, Inc. of Wheaton, Illinois, or equal. The tape shall be a minimum of two inches wide, imprinted with the words "CAUTION – SEWER LINE BELOW and capable of being detected with inductive methods.
- J. Pipeline tracer wire shall be installed along all gravity sewer, sewer forcemain, and sewer laterals.
 - 1. For direct burial of gasketed-joint gravity sewer, sewer forcemain, and sewer laterals, tracer wire shall be fastened directly to the top of the pipe, at each end and in the center. For direct burial of HDPE forcemain, tracer wire shall be attached to the top of the pipe. The distance between attachment points shall be no greater than 10 feet. The distance between attachment points shall be no greater than 10 feet. Tracer wire shall be a #12 AWG high strength, copper-clad steel (HS-CCS) conductor, insulated with a 30 mil, high-density, high molecular-weight polyethylene (HDPE) insulation, and rated for direct burial use at 30 volts. Insulation color shall meet the APWA color code standard for identification of buried utilities. Tracer wire shall be Copperhead HS-CCS HDPE 30 mil insulation as manufactured by Copperhead Industries, LLC of Monticello, MN.

2. For directional drilling/boring of forcemain, tracer wire shall be a #12 AWG extra high strength, copper-clad steel (EHS-CCS) conductor, insulated with a 45 mil, high-density, high molecular-weight polyethylene (HDPE) insulation, and rated for direct burial use at 30 volts. Insulation color shall meet the APWA color code standard for identification of buried utilities. Tracer wire shall be Copperhead SoloShot Extra High Strength, EHS-CCS HDPE 45 mil insulation as manufactured by Copperhead Industries, LLC of Monticello, MN.
 3. Splicing of tracer wire shall not be permitted. Long runs of tracer wire may not be greater than 400 feet (+/-). At these intervals, tracer wires shall be extended from the forcemain to grassed area behind the curb or sidewalk. Magnetized tracer boxes, as manufactured by Copperhead Industries, LLC shall be installed in the grassed area and the tracer wires shall be installed up into the boxes and connected to lugs in the boxes. All boxes shall have a color coded cover to match the APWA color code standard for identification of buried utilities. Tracer on sewer laterals shall be connected to magnesium anode at the sewer main. Anode shall be as manufactured by Copperhead Industries, LLC. The upstream end of the tracer wire shall be run up into the cleanout frame and cover where it shall be fixed and made accessible to the locator.
 4. All dead ends of tracer wire not made accessible at the ground surface, either in a tracer wire box or a sewer cleanout frame and cover shall be grounded by attaching the end to a magnesium anode as manufactured by Copperhead Industries, LLC.
- K. For refill of the remaining trench depth, refer to “Excavation and Backfill” Section 1 of these specifications.

3.08 LAYING PIPE IN FREEZING WEATHER

No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when the Town shall deem that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation unless all required precautions as to the minimum length of open trench and promptness of backfilling are observed.

3.09 ARTIFICIAL FOUNDATION

Whenever directed, the Contractor shall lay pipe upon an artificial foundation which he or she shall construct. Such foundation may consist of gravel or of concrete and shall be to the dimensions and placed in a manner required by the Town.

3.10 TESTING

A. GENERAL

1. Contractor shall furnish all labor, tools, materials, and equipment, including water, pumps, compressors, stopwatch, gauges, flashlights or other artificial lighting, mirrors and meters, subject to the approval of the Town, for testing in accordance with these specifications.
2. The Town shall be notified in advance of all tests, and all tests shall be conducted to the entire satisfaction of the Town.
3. Sewer mains must pass all test requirements listed hereafter prior to acceptance by the Town with no exceptions.

C. All gravity sanitary sewer pipes shall be mandrel tested as follows. Excepted from this requirement is yard piping used for temporary by-passing.

1. MANDREL TESTING OF SANITARY SEWERS

- a. Sanitary sewer pipe shall be deflection tested not less than 30 days after the trench backfill and compaction has been completed. The test shall be conducted by pulling an approved solid pointed mandrel through the completed pipeline. The diameter of the mandrel shall be 95 percent of the inside diameter of the pipe. The mandrel shall be a rigid, non-adjustable mandrel having an effective length of not less than its normal diameter.
- b. Testing shall be conducted on a manhole to manhole basis and shall be done after the line had been completely cleaned and flushed. Any portion of the sewer which fails to pass the test shall be excavated, repaired, or realigned and retested with both air and deflection tests.

2. LEAK TESTING USING AIR:

- a Sewers shall be tested in sections not exceeding 400 feet in length unless otherwise approved by the Town. Each section shall be tested immediately upon completion thereof. Each section shall meet the air pressure drop limitation specified herein.
- b All material and labor required for leakage tests shall be furnished by the Contractor.
- c Sewers shall be tested using the low-pressure air method in accordance with the requirements of ASTM C-828 and the Uni-Bell Plastic Pipe Association recommendations, based upon the Ramseier

test time criteria. Procedural and equipment details shall be submitted to the Town prior to acceptance of its use for testing.

- d If the test time for the designated size and length, elapses before the test pressure drops 0.5 psig, the section undergoing the test shall have passed.
- e If the pressure drops 0.5 psig before the appropriate test time has elapsed, the air loss rate shall be considered excessive and the section of pipe has failed the test. Contractor shall determine at his or her own expense the source or sources of leakage and he or she shall repair or replace all defective materials and/or workmanship to the satisfaction of the Town. The completed pipe installation shall then be retested and required to meet the requirements of this test.

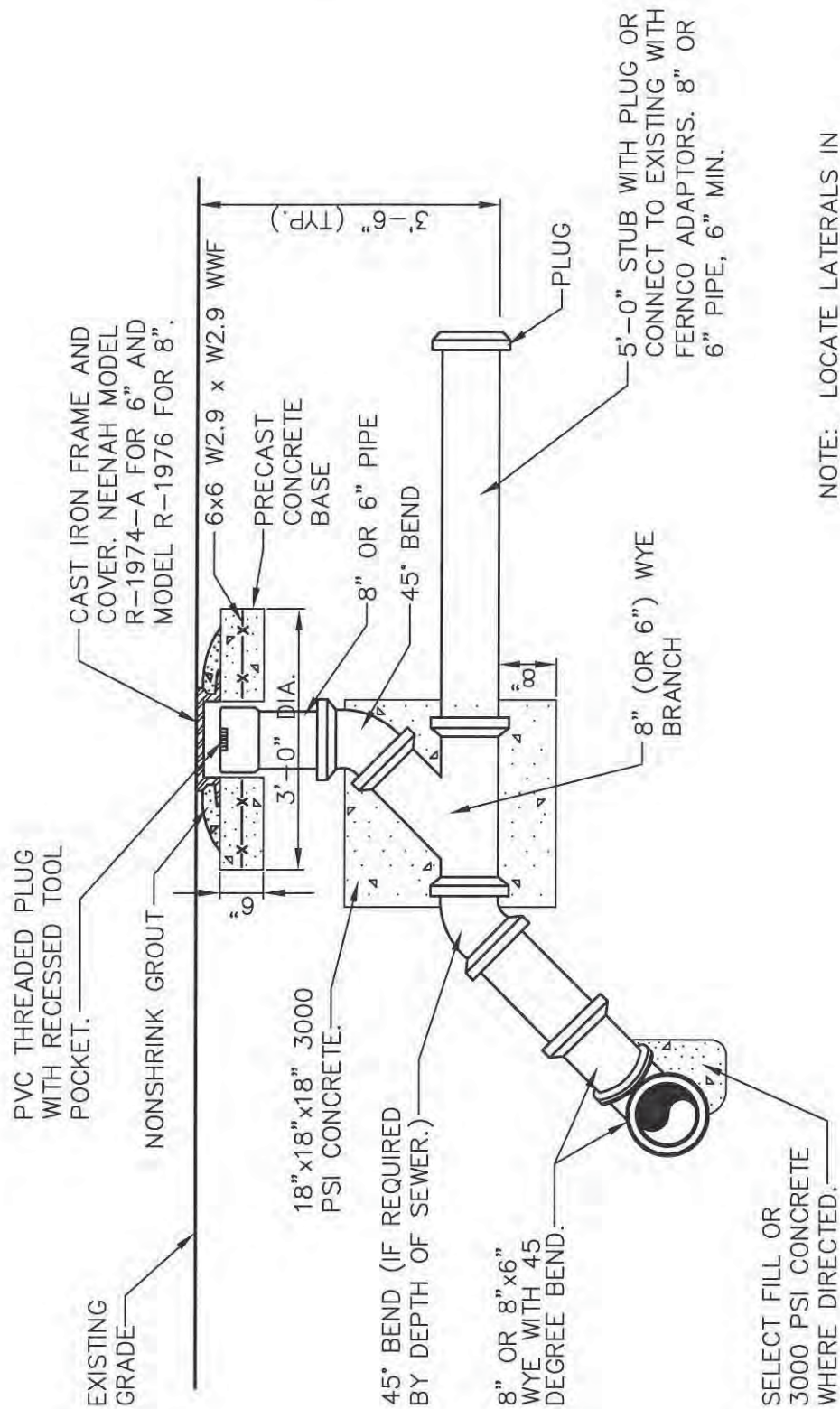
C. Force main is to be tested in accordance with the following:

- 1. The force mains shall be filled with water, supplied by the Contractor, as directed by the Town, and the pressure raised to obtain a minimum test pressure measured at the highest point of the section of pipeline under test. Particular care shall be taken to eliminate all air from pipeline. The force mains shall be subject to pressure and leakage tests as specified in Section 2 for water mains at the specified test pressure, measured at the highest point of the section of pipeline under test. This test shall be a minimum of four (4) hours duration. All visible leaks shall be repaired by the Contractor at no expense to the Town. The Contractor shall make any and all repairs at his or her expense that may be necessary until the leakage test requirements have been met.

3.11 OIL/WATER SEPARATOR

All new and/or upgraded car washes and vehicle maintenance garages shall install (Model HT) Highland oil/water separators of adequate size for proper operation.

END OF SECTION



DATE: FEBRUARY 2015

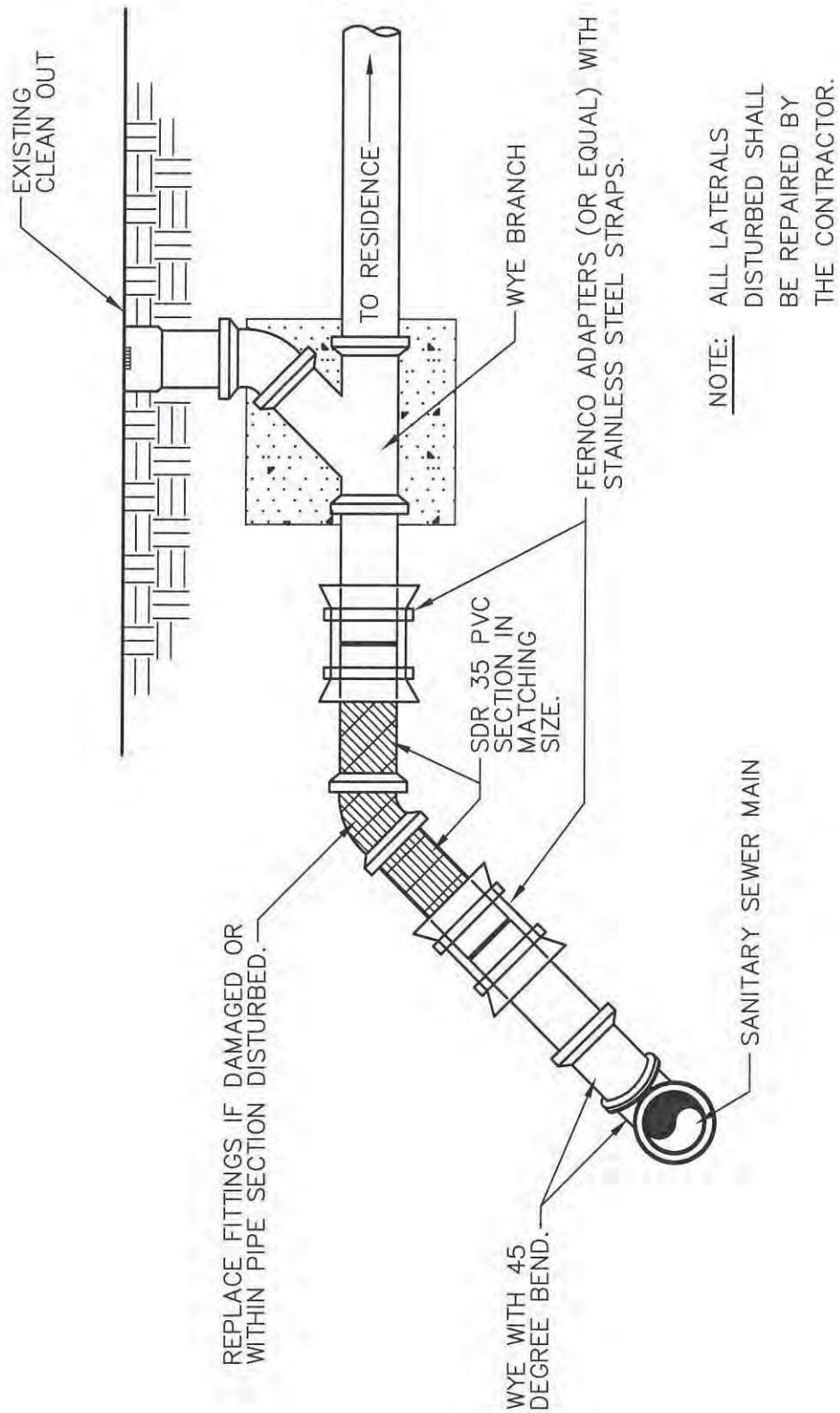
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

BUILDING LATERAL CLEANOUT DETAIL

NO SCALE

SECTION - 3

DRAWING D3-1



NOTE: ALL LATERALS
DISTURBED SHALL
BE REPAIRED BY
THE CONTRACTOR.

DATE: FEBRUARY 2015

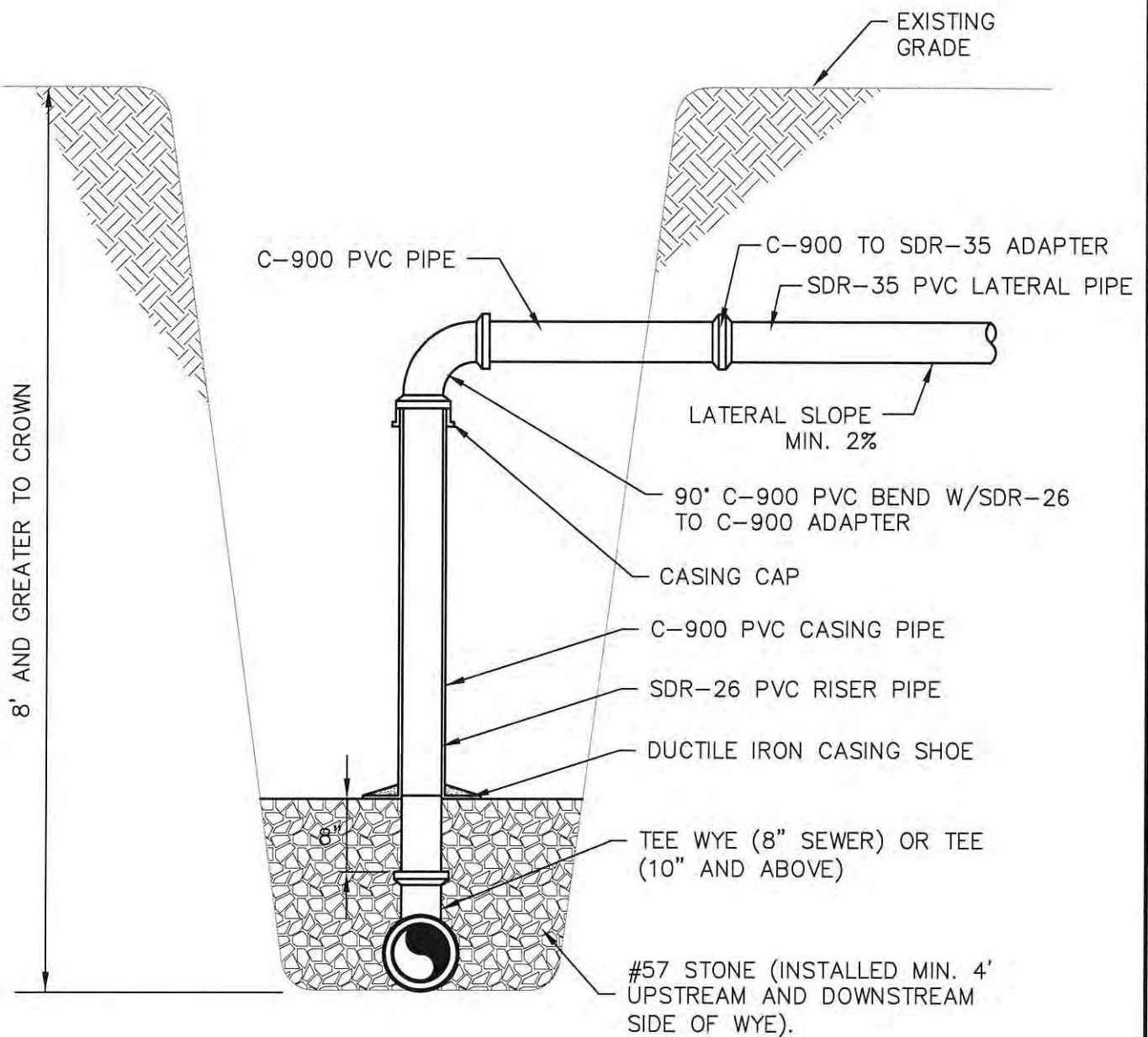
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

SEWER LATERAL RESTORATION DETAIL

NO SCALE

SECTION - 3

DRAWING D3-2



DATE: FEBRUARY 2015

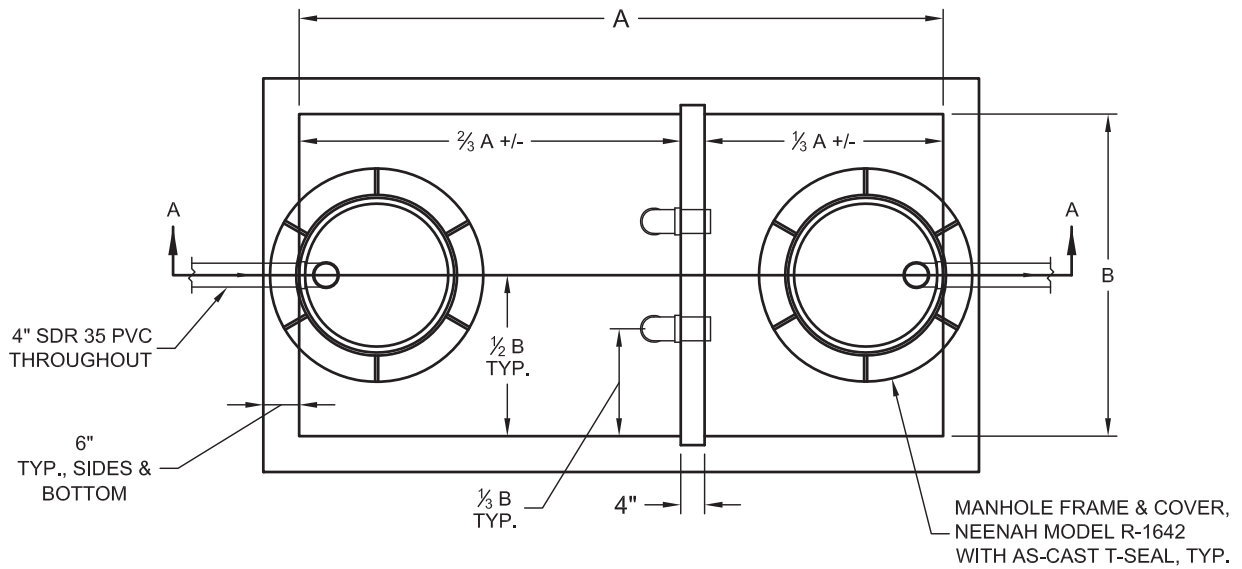
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

DEEP SEWER LATERAL CONNECTION DETAIL

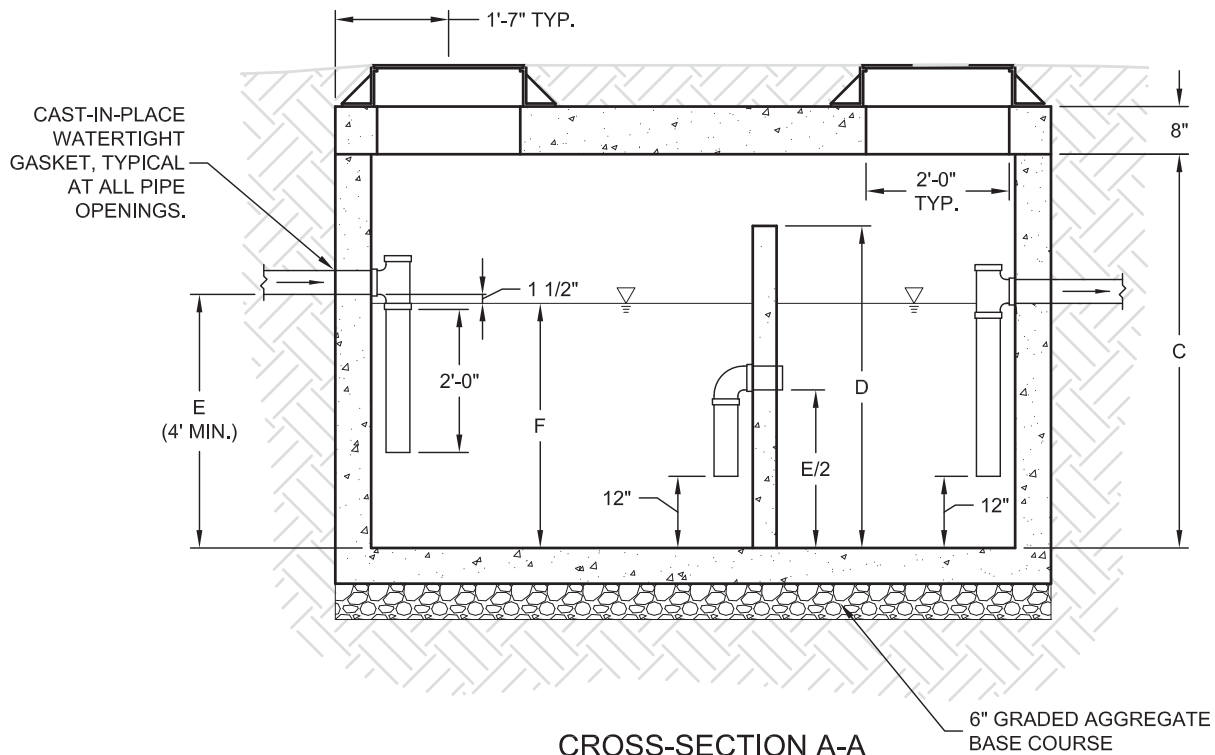
NO SCALE

SECTION - 3

DRAWING D3-3



PLAN VIEW



CROSS-SECTION A-A

NOTES:

1. DESIGN ENGINEER SHALL SPECIFY REQUIRED GREASE TRAP VOLUME AND DIMENSIONS A THROUGH E.
2. GASKETS FOR PIPE PENETRATIONS SHALL BE A-LOK OR APPROVED EQUAL, CAST-IN-PLACE.
3. REINFORCEMENT FOR TOP SHALL BE SUITABLE FOR H-20 LOADING IF VAULT IS IN TRAFFIC AREA.
4. REINFORCEMENT OF BOTTOM, SIDES AND TOP SHALL BE INDICATED ON SHOP DRAWING SUBMISSION. ALL REINFORCEMENT SHALL MEET DELDOT REQUIREMENTS.
5. FLOATATION CALCULATIONS SHALL BE SUBMITTED WITH SHOP DRAWING SUBMISSION.
6. ALL CONCRETE SHALL BE 4,000 PSI.

DATE: DECEMBER 2016

**CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN**

GREASE TRAP DETAIL

NO SCALE

DRAWING D3-4

DIVISION 2 – SECTION 4

SEWER MANHOLES

4.01 GENERAL

- A. The Contractor shall construct manholes of precast reinforced concrete. Manholes shall be built at such points on the pipe lines and of such form and dimensions as are shown on the drawings or as may be directed.
- B. Manholes shall be built as pipe laying progresses. The Town may stop pipe laying work entirely if manhole construction is delayed to such an extent as to be hazardous to construction or the public.

4.02 PRECAST REINFORCED CONCRETE MANHOLES

- A. Precast reinforced concrete risers, eccentric cones and bases shall be in conformance with ASTM: Designation C 478. Joints between riser sections shall be fitted with an "O" ring rubber gasket, meeting the requirements of ASTM Designation C 443. Installation of risers shall be in accordance with manufacturer's recommendations under the supervision of the Town. Minimum compressive strength of precast concrete shall be 4000 psi at 28 days.
- B. Precast reinforced concrete base and riser sections shall be as manufactured by Atlantic Concrete Products Company, Virginia Precast Corporation, or equal.
- C. Interior and exterior joint spaces of all manhole risers shall be mortared prior to application of the exterior waterproofing. The water-stop mortar shall be ThoRoc Plug, as manufactured by ChemRex, or approved equal.
- D. Lifting holes in the walls of precast reinforced concrete risers will be allowed but shall be plugged with rubber stoppers and grouted flush with face of manhole wall after installation of manhole riser sections. Not more than two holes shall be cast in the walls of each riser section for the purpose of handling.
- E. The exterior surface of all precast manholes shall receive a minimum two coat application of a 68 percent solids coal tar type protective coating. The total average dry film thickness shall measure 24 mils with no single measurement to be less than 20 mils. Surfaces shall be prepared in accordance with the manufacturer's instructions and coatings applied in the field in a manner acceptable to the Town. The coating material shall be Bitumastic Super Service Black manufactured by Koppers Co., Inc., Pittsburgh, Pennsylvania, Tar-Jet Super Black XX-32-B-22 manufactured by Pennsbury Coatings Corp., New Britain, Pennsylvania, or approved equal.
- F. All pipe-to-manhole connections in the precast manhole shall be made by means of an integrally cast flexible connector which shall be Lockjoint flexible manhole sleeve as manufactured by Interpace Corp., Parsippany, New Jersey, or A-Lok

flexible manhole gasket as manufactured by A-Lok Corp., Trenton, New Jersey, or approved equal.

- G. Openings shall be made in existing manholes to receive new sewer main or lateral tie-ins with a concrete coring saw. Cored openings shall be clean cut circular openings with no irregularities along the perimeter of the opening. Pipe-to-manhole connections at cored openings shall be made by using Kor-N-Seal[®] I Connectors, as manufactured by E.J. Prescott, Inc.

4.03 FLOW CHANNELS

- A. All manhole flow channels and benches shall be constructed of "SS" sewer brick with care taken to secure smooth and even surfaces with full special mortar joints. Channel sections shall be built up to true line and radius, and curved sections shall provide a uniform transition in the flow direction.
- B. Materials and construction of flow channels shall be in accordance with appropriate sections for materials so used, as hereinafter specified.
- C. Manhole flow channels may be factory cast with prior approval from the Town.

4.04 CONCRETE

All concrete for manhole base slabs and cradles, encasements, blocking, etc., shall have a minimum compressive strength of 3000 psi at 28 days. Precast concrete shall have a compressive strength of 4000 psi in 28 days.

4.05 BRICK

All brick shall conform to the "Standard Specifications for Sewer Brick", ASTM Designation C 32, Grade 58, except that the maximum absorption for the average of five bricks shall not exceed 10 percent; and the individual brick maximum shall not exceed 14 percent.

4.06 MORTAR

- A. Cement shall be in accordance with the "Standard Specifications for Portland Cement", ASTM: Designation C 150 for Type II.
- B. Sand shall be composed of sharp, angular, silicious grains, coarse, or graded from fine to coarse with the coarsest grains predominating, and sensibly free from clay, loam, dirt, mica, organic matter, or other impurities. Sand containing more than 5 percent by weight of foreign material shall not be used.

This limit may be changed for special classes of work if hereinafter specified. Sand exhibiting more than an acceptable amount of matter or impurities may be required to be washed after delivery on the work or shall be rejected altogether.

Sand for mortar shall be screened to reject all particles of a greater diameter than 1/4-inch and shall not contain more than 5 percent by weight of a very fine material.

- C. Unless hereinafter specified otherwise, all mortar shall be composed of cement and sand of the character above specified. The proportion of volume shall be one part of cement to two of sand. One volume of cement shall be 94 pounds net. One volume of sand shall be 0.9 cubic feet, the sand not being packed more closely than by throwing it into a box in the usual way. Mortar shall be fresh mixed in small batches for the work in hand. Tight boxes or platforms made for the purposes shall be used. The sand and cement shall be thoroughly mixed dry, in the proper proportions, until a uniform" color has been produced, whereupon a moderate dose of water shall be added, so as to produce a stiff paste of the proper consistency.
- D. Sand obtained from the excavation shall not be used.

4.07 LAYING BRICK

- A. All brickwork shall be laid by competent professionals, i.e., master brick layers.
- B. All brick shall be laid in a full bed of mortar with all vertical and horizontal joints filled solid with mortar.
- C. Joints shall be not less than 3/8 inch or more than 1/2-inch wide except as otherwise specified in (E) below.
- D. No brickwork shall be laid when the temperature is below 40 degrees or when the indications are for lower temperatures within 24 hours. The contractor shall take such measures as may be approved to prevent brickwork from being exposed to freezing temperatures for a period of not less than five days after laying.
- E. Special care shall be taken in laying brick in inverts of manholes to insure a uniform flow of water through the sections. In such locations, joints shall not exceed 1/16-inch in thickness and each brick shall be laid in full mortar bed with joints on bottom side and end made in one operation. No grouting or working in of mortar after laying the brick will be permitted.

4.08 MANHOLE STEPS

- A. Manhole steps shall be made of 3/8 inch diameter (No.3) steel reinforcing bars, ASTM Designation A-615, Grade 60, encased in polypropylene plastic. Manhole steps shall have notched tread ridge with retainer lug on each side.
- B. Manhole steps shall be cast in place during manufacture of precast reinforced concrete manholes. Embedment length shall be suitable for minimum 5 inch thick, precast reinforced concrete riser walls.

- C. Manhole steps shall be OSHA approved and as manufactured by M.A. Industries, Inc., Peachtree City, Georgia, ICM, Inc., Jacksonville, Arkansas, or approved equal.
- D. Manhole steps shall be spaced 12-inches apart. The maximum spacing from top of manhole to the first step shall not exceed sixteen (16) inches.

4.09 MANHOLE FRAMES AND COVERS

- A. Frames and covers for manholes shall be set by the Contractor as the work progresses. The frame shall be well bedded in mortar. If directed by the Town, a 7' x 7' concrete collar with a minimum thickness of 4 inches and 6 x 6 W2.9xW2.9 WWF shall be poured around the manhole frame and cover. Set rim height at finished grade and finish concrete collar for positive drainage.
- B. Materials for frames and covers shall be in accordance with the standard specifications for gray iron castings ASTM A-48 for Class 35.
- C. Manhole stubs shall be extended 4 feet outside of the manhole wall unless otherwise required. Gasketed plugs shall be installed in the ends of the stubs.
- D. All frames and covers shall be of the sizes and types approved by the Town and with "SANITARY SEWER" and two pick holes cast into the cover.
- E. Provide HDPE or stainless steel inflow stopper inserts with double valves and lifting handle. (Parsons or equal)
- F. Manhole frames and covers shall be installed on grade to match the slope of the paved surface. Use brick adjustment courses or manufactured adjustment rings grouted in place between the cone and frame for adjustment to match the slope of the paved surface.
- G. Manhole frames and covers shall be model 1045, watertight assembly as manufactured by East Jordan Iron Works, Inc.; or, model R-1642, self-sealing application as manufactured by Neenah Foundry. Lids shall have "SANITARY SEWER" engraved in the top surface.

4.10 TESTS

- A. Manholes shall be vacuum tested at the discretion of the Engineer in accordance with ASTM C1244 *Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure Test Prior to Backfill*.
- B. Manholes shall be complete and ready for backfill prior to execution of the test. Expandable plugs shall be installed and inflated in all interior pipe openings. Bracing of plugs may also be required.

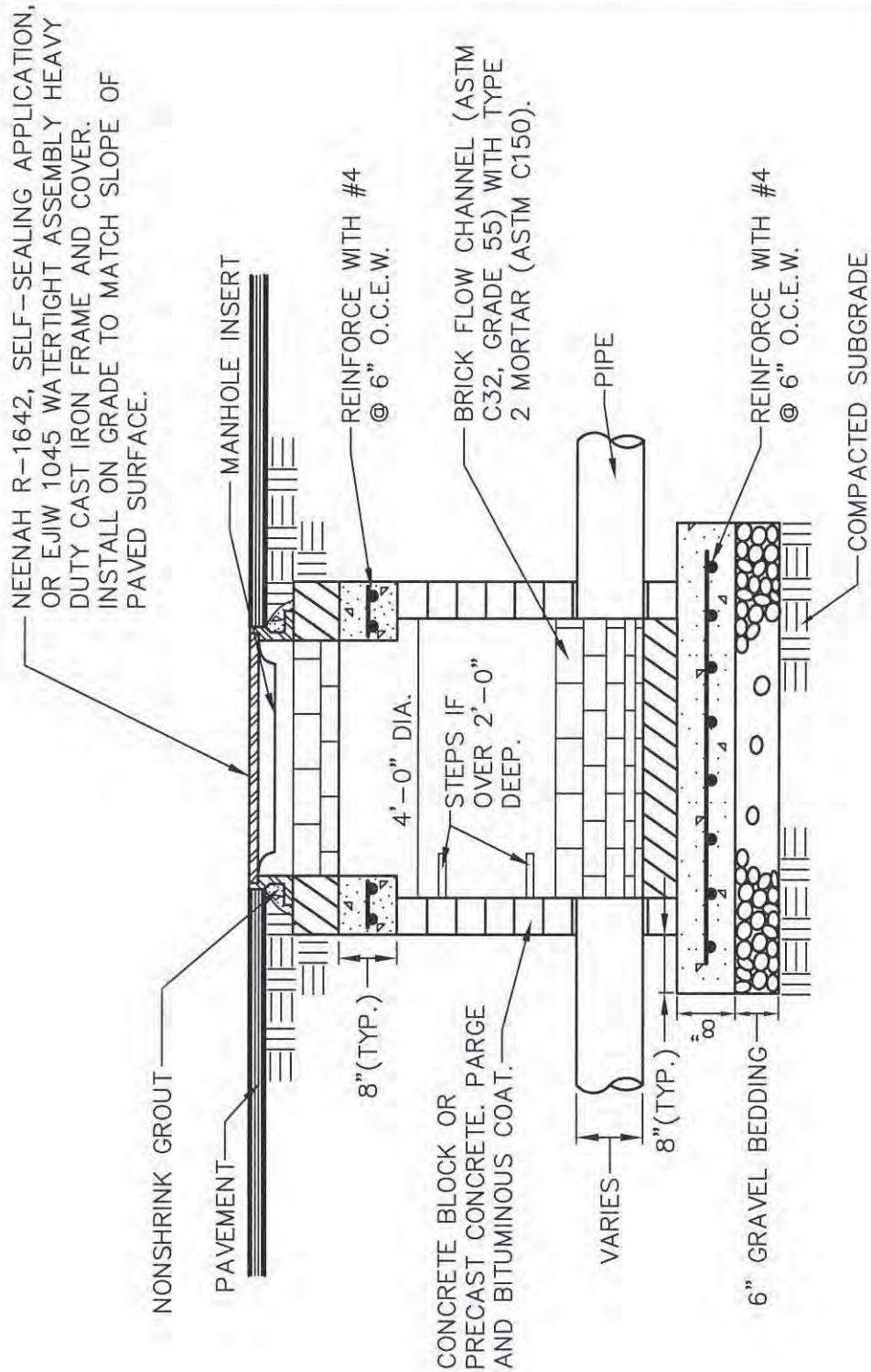
- C. Vacuum test pressure shall be 10 inches Hg, or 5 psi.
- D. The duration of the vacuum test shall be in accordance with the diameter and depth of the manhole and the table below.

Minimum Test Times for Manhole Vacuum Test

| Manhole Depth (feet) | Diameter (inches) | |
|-------------------------|-------------------|----|
| | 48 | 60 |
| | Time (seconds) | |
| 15 feet or less | 60 | 60 |
| Greater than 15 feet | 90 | 90 |

- E. The manhole shall pass the test if the vacuum pressure does not drop below nine (9) inches Hg, or 4.5 psi in the appropriate time in the table above.

END OF SECTION



DATE: FEBRUARY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

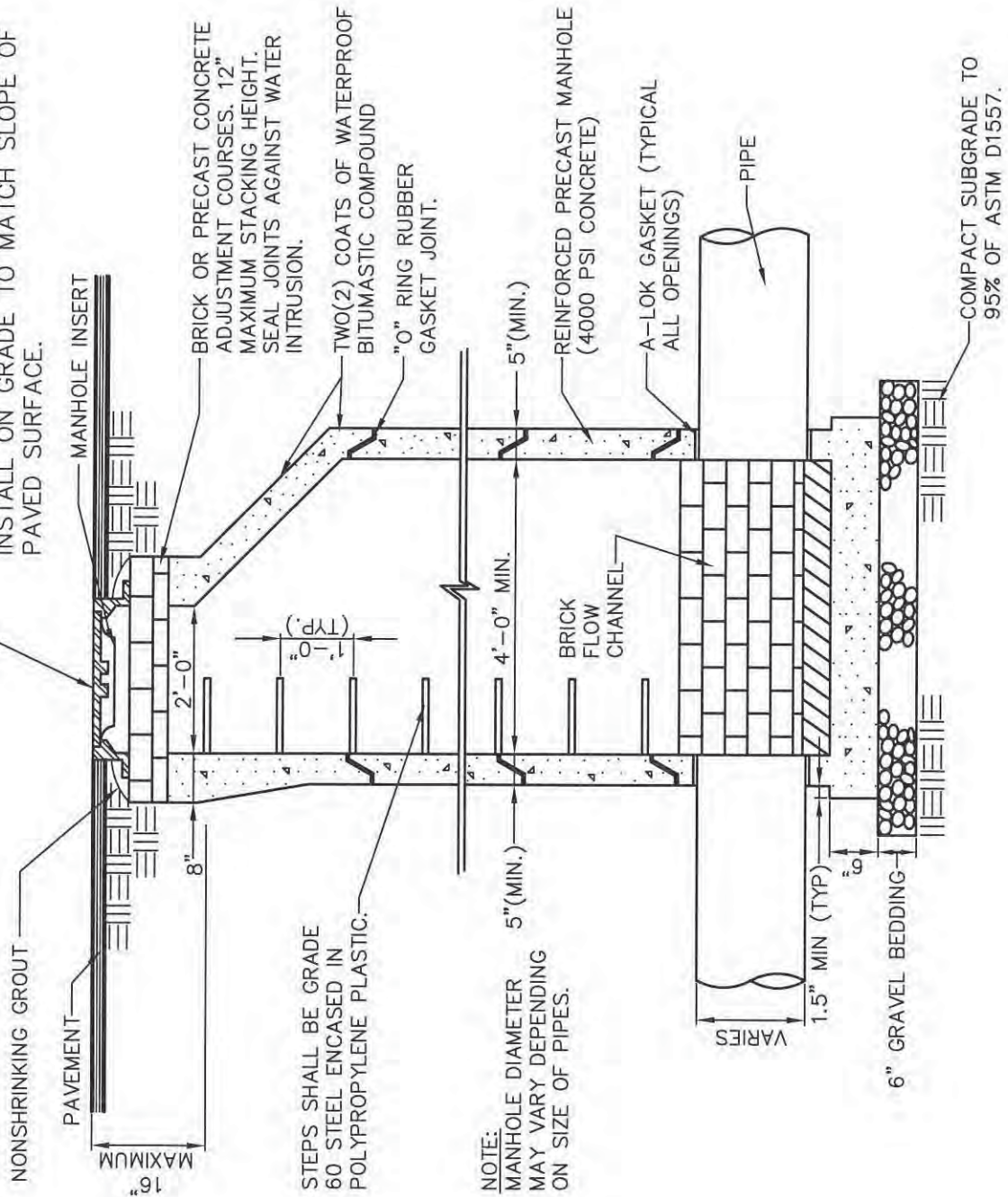
SHALLOW MANHOLE DETAIL

NO SCALE

SECTION - 4

DRAWING D4-1

NEENAH R-1642, SELF-SEALING APPLICATION,
OR EJIW 1045 WATERTIGHT ASSEMBLY HEAVY
DUTY CAST IRON FRAME AND COVER.
INSTALL ON GRADE TO MATCH SLOPE OF
PAVED SURFACE.



STEPS SHALL BE GRADE
60 STEEL ENCASED IN
POLYPROPYLENE PLASTIC.

NOTE:
MANHOLE DIAMETER
MAY VARY DEPENDING
ON SIZE OF PIPES.

DATE: FEBRUARY 2015

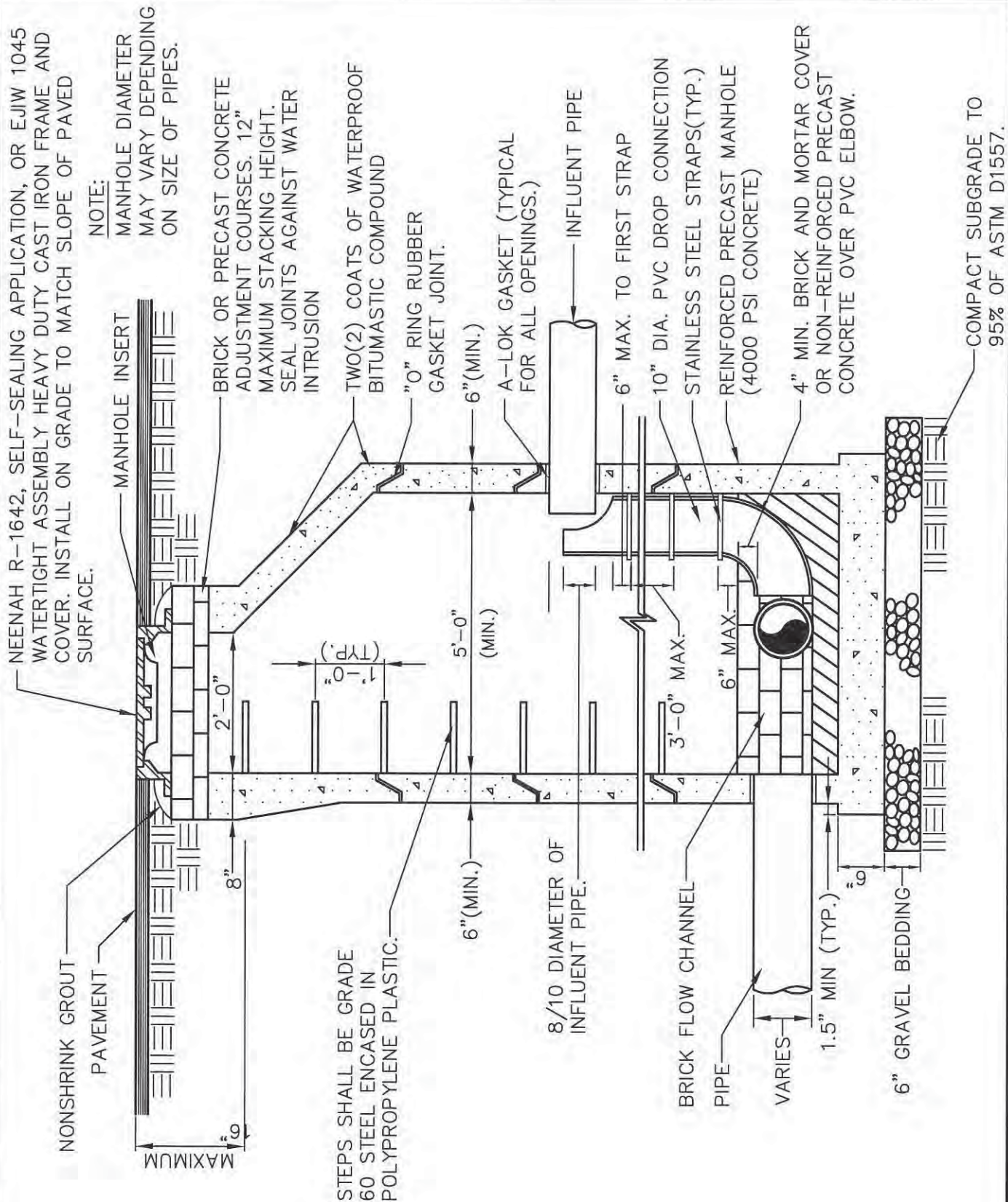
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

PRECAST CONCRETE MANHOLE DETAIL

NO SCALE

SECTION - 4

DRAWING D4-2



DATE: FEBRUARY 2015

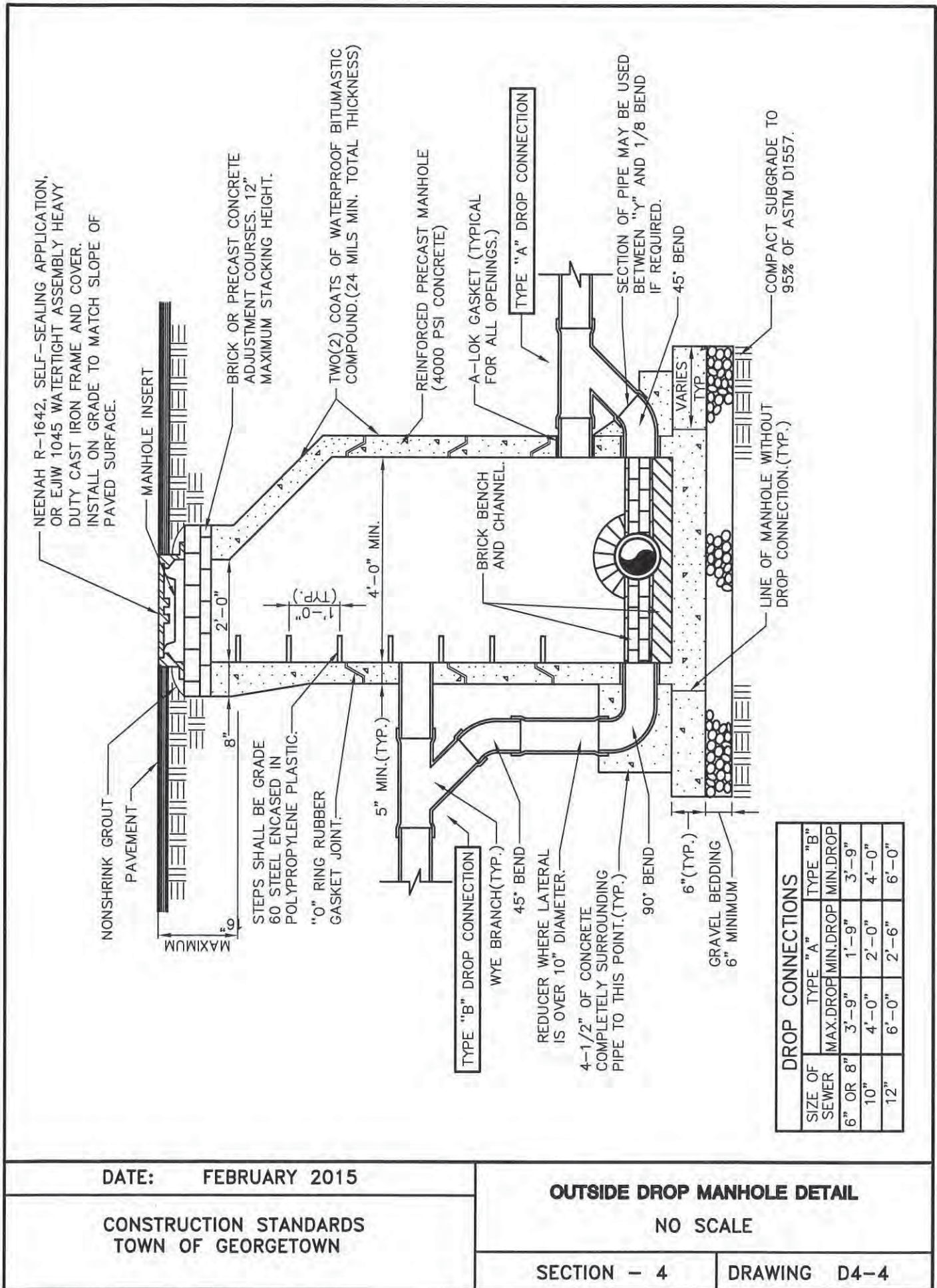
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

INSIDE DROP MANHOLE DETAIL

NO SCALE

SECTION - 4

DRAWING D4-3



| DROP CONNECTIONS | | | |
|------------------|----------|----------|----------|
| SIZE OF SEWER | TYPE "A" | | TYPE "B" |
| | MAX.DROP | MIN.DROP | MIN.DROP |
| 6" OR 8" | 3'-9" | 1'-9" | 3'-9" |
| 10" | 4'-0" | 2'-0" | 4'-0" |
| 12" | 6'-0" | 2'-6" | 6'-0" |

DATE: FEBRUARY 2015

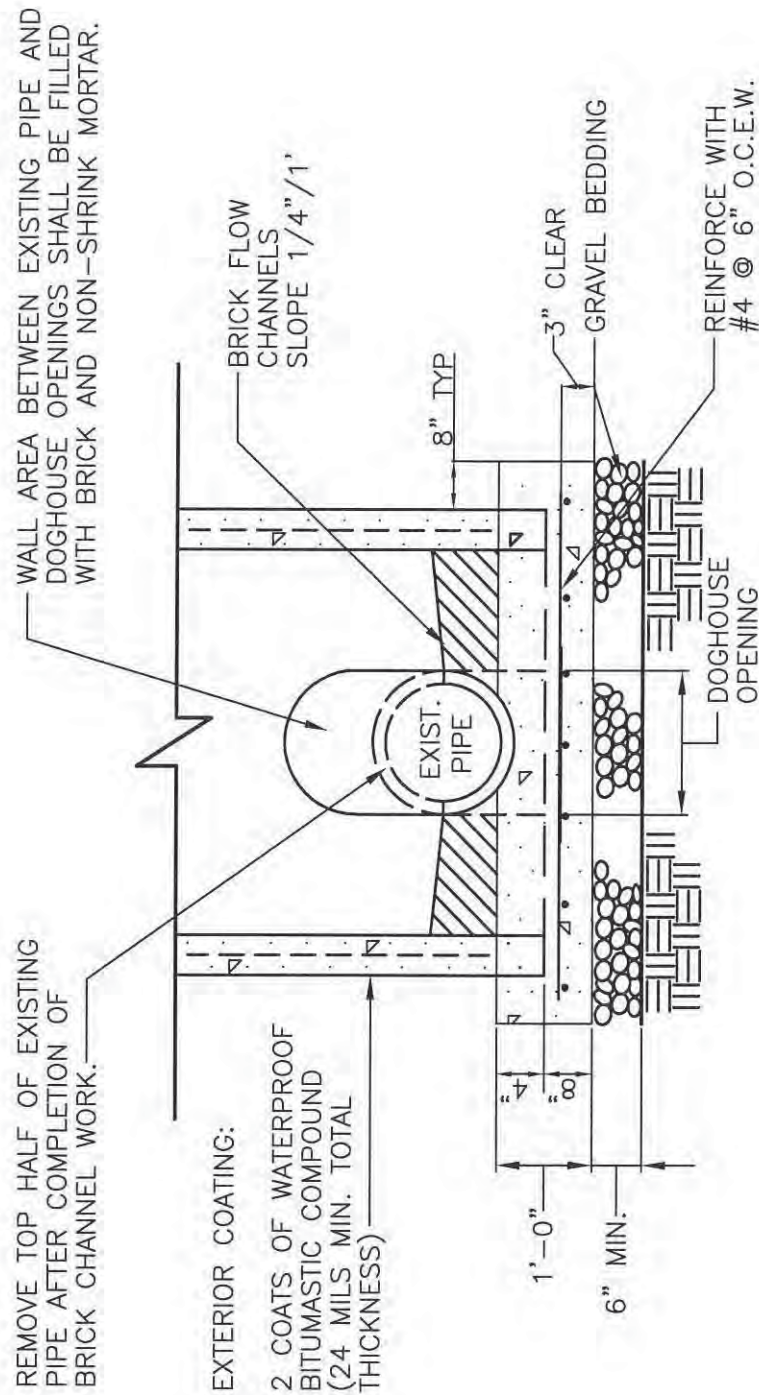
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

OUTSIDE DROP MANHOLE DETAIL

NO SCALE

SECTION - 4

DRAWING D4-4



NOTES:

1. CONCRETE COMPRESSIVE STRENGTH SHALL BE 4,000 P.S.I.
2. MANHOLE SHALL CONFORM TO ASTM-C478, LATEST REVISION.
3. ALL PORTIONS OF MANHOLE SHALL BE CONSTRUCTED AS DETAILED FOR PRECAST CONCRETE MANHOLE.

DATE: FEBRUARY 2015

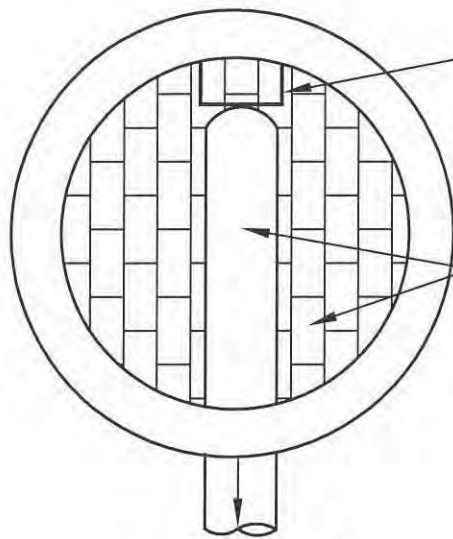
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

DOGHOUSE MANHOLE DETAIL

NO SCALE

SECTION - 4

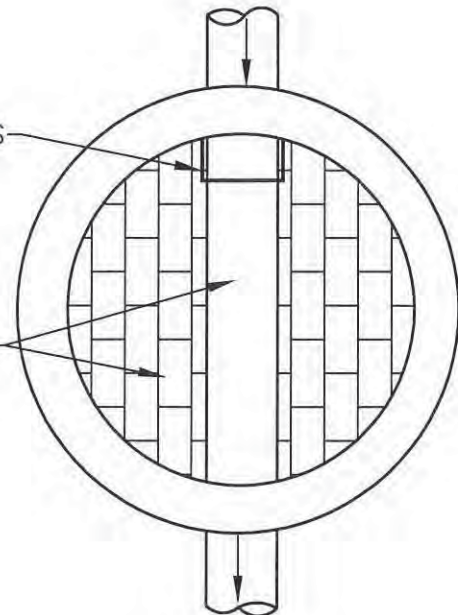
DRAWING D4-5



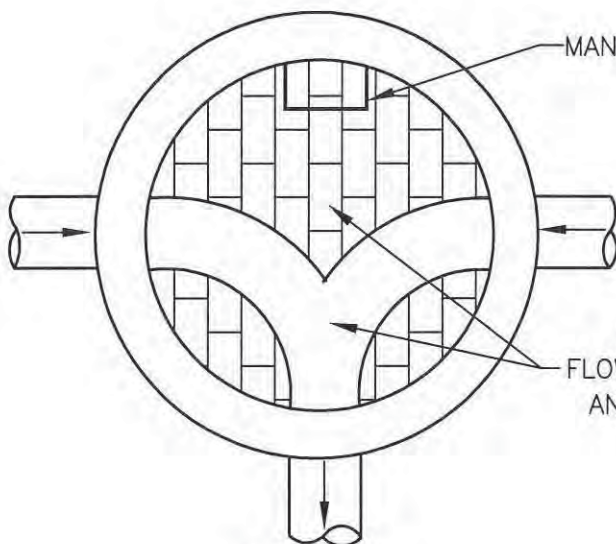
TERMINAL

MANHOLE STEPS

BRICK
FLOW CHANNEL
AND BENCH



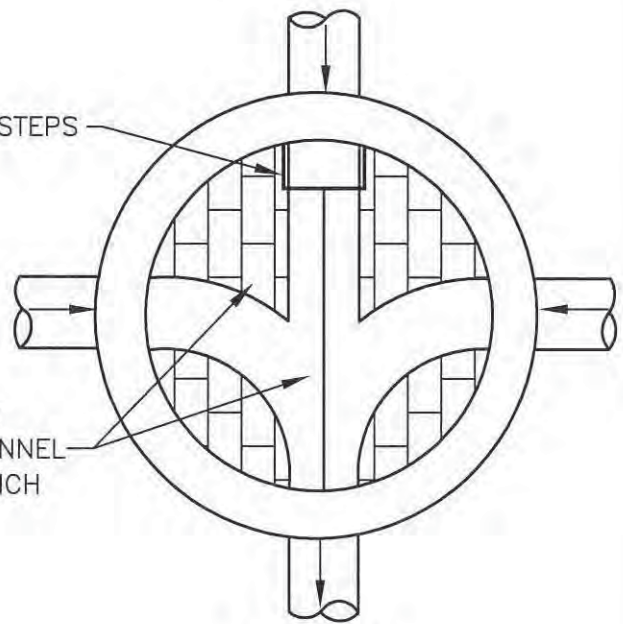
1-WAY



2-WAY

MANHOLE STEPS

BRICK
FLOW CHANNEL
AND BENCH



3-WAY

DATE: FEBRUARY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

TYPICAL MANHOLE FLOW CHANNEL DETAIL

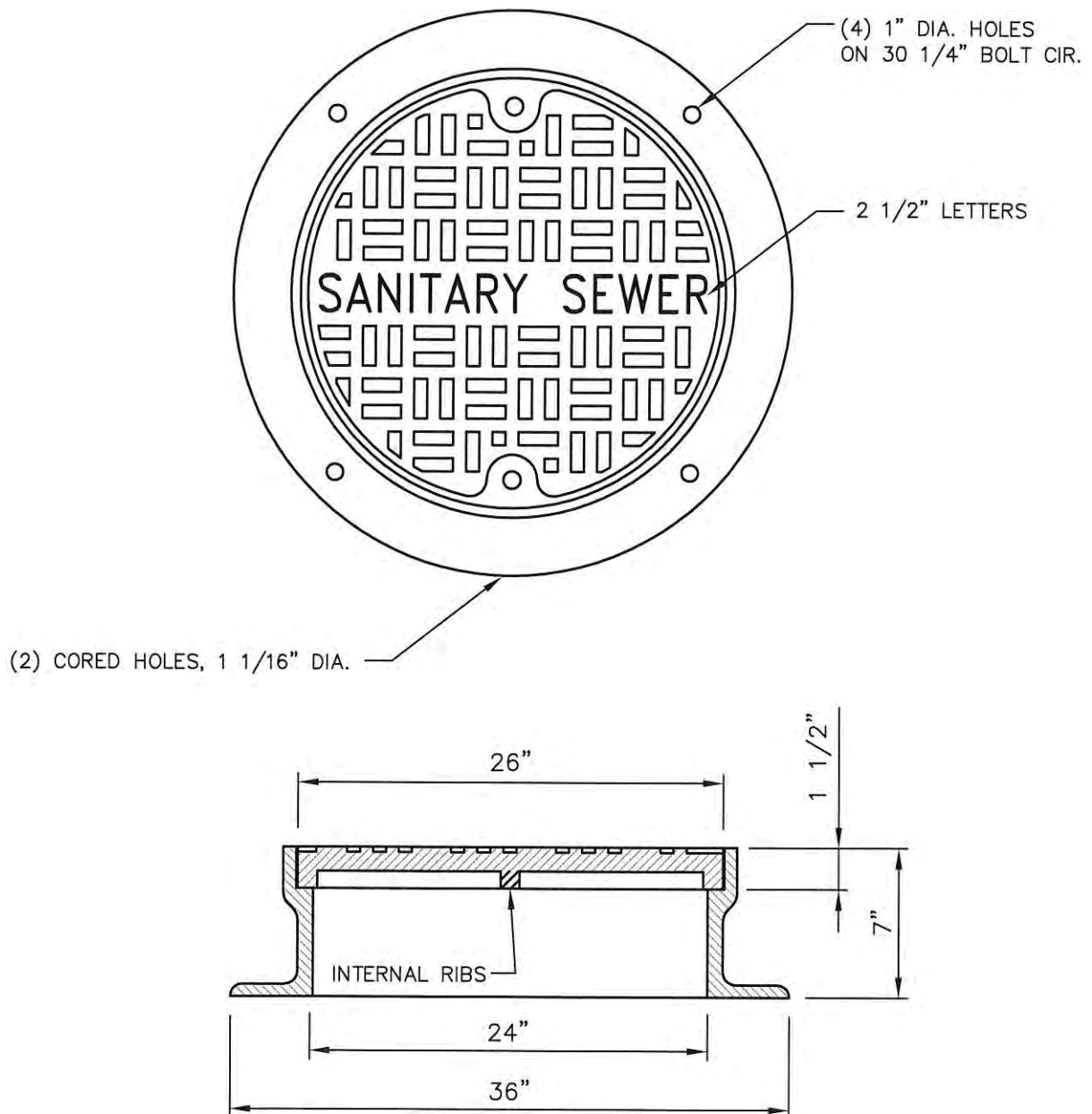
NO SCALE

SECTION - 4

DRAWING D4-6

NOTES:

1. FRAME AND COVER SHALL BE NEENAH R-1642 SELF-SEALING APPLICATION, OR EJIW 1045 WATERTIGHT ASSEMBLY.
2. MATERIAL — HEAVY DUTY CAST IRON ASTM A48, CL35 WITH MACHINED BEARING SURFACES.



DATE: FEBRUARY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

MANHOLE FRAME AND COVER DETAIL

NO SCALE

SECTION - 4

DRAWING D4-7

DIVISION 2 - SECTION 5

SERVICE PIPE AND APPURTENANCES

5.01 GENERAL

- A. The Contractor shall furnish and install all corporation stops, house service pipe, meter assemblies, covers, and valves and appurtenances as indicated on the drawings, and specified herein. All underground service lines, valves and fittings shall conform to ANSI/AWWA C-800, latest revision.
- B. The Contractor shall provide all tools, equipment and accessories required for tapping all existing and new water mains and installing water services.
- C. Pipeline tracer wire shall be installed along all proposed water services. See section 2.10, H for tracer wire requirements.

5.02 HOUSE SERVICES

- A. Each new dwelling and commercial building shall be provided with a minimum 2" SDR-9 HDPE service line and a dual meter pit to allow for both domestic and irrigation $5/8 \times 3/4$ meters. One 2" water main tap may service 2 dual pits at a common property line. No cutting of a new street (within 6 years) will be allowed for irrigation or other meters after the final surface pavement course has been applied. Water service pipe shall not cross water main that it is tapped into.
- B. Where there is no potential for irrigation, and only with prior approval from the Town, dwellings may use 1" SDR-9 HDPE service line. Service lines shall conform to AWWA C-901 and ASTM D-2737.
- C. Corporation stops shall be AWWA/CC taper thread inlet by pack joint outlet for plastic tubing (CTS), Ford F1000-4 for 1" and FB1000-7 for 2". Install stainless steel liner at compression connections to plastic service line. Liners shall be Ford Insert-52 or approved equal. Curb stops shall be Ford B44-444 for 1" and B44-777 for 2". Valve boxes shall be 4 1/4" Mueller roadway screw type with arch base.
- D. Cutting tools shall be of the hollow, shell bit type for removal of pipe plug. For tapping PVC mains use only Mueller Plastic Cutting Tool. On multiple taps, place corporation stops as recommended by pipe manufacturer. Furnish saddles with standard AWWA/CC corporation stop tapered inlet thread. Saddles shall be Ford banded stainless steel type FS303 for 1" tap on AWWA/C900 PVC water mains and Ford double strapped type F202 for 1" tap on for iron water mains. For 2" tapping saddles, see Section 5.03(B).
- E. Meter box covers shall be Ford A32 for single meter setters and Ford A3 for dual meter setters, or approved equals. Locate meters outside traffic areas and

sidewalks wherever possible. Lids shall be inset cast iron with the words "WATER METER" and plugs for remote reading precast into them. Lids shall include lifter worm locks with a standard pentagon bolt. Frames shall be 4" in depth. Three meter box lid wrenches will be supplied to the Town. Contractor shall verify fit and compatibility of assembly components prior to ordering.

- F. Prefabricated meter box assemblies shall not be installed in traffic areas. Meter box assemblies shall also not be installed in sidewalks unless approved by the Town. The box shall be 18" I.D. X 36" PVC for single meter setters and 20" I.D. X 36" PVC for dual meter setters. Meter support shall be by a lateral PVC brace. For 5/8" x 3/4" meter pit assemblies angle check valve shall be Ford HA 31-323. System shall also include an angle ball valve with lock wings. Valve shall be Ford BA13-332W. Coupling for inlet connection shall be 3/4" F.I.P. x 1" P/J CTS Ford C14-34 with stainless steel insert. Coupling for outlet connection shall be 3/4" F.I.P. x 3/4" P.J. CTS Ford C14-33 with stainless steel insert.

5.03 COMMERCIAL SERVICES

- A. All commercial services shall be Schedule 80 PVC (IPS) or SDR-9 CTS polyethylene tubing. Water service pipe shall not cross water main that it is tapped into.
- B. For 2"-3" taps in ductile iron pipe use double strap, iron service clamp Ford F202 or approved equal. For 2"-3" taps in PVC C900 pipe use Ford, stainless steel banded saddle FS202 or approved equal. For taps 4" and larger, see section 2.08.. Use Teflon tape and brass nipple for threaded service connections. Do not torque saddles or sleeves without water pressure in main.
- C. Use 2" Ford curb stop on all 2" services. Valve boxes shall be 4-1/4 inch Mueller roadway screw type with arch base.
- D. Meter pits and setters shall be as detailed on the approved plans. Pits shall be PVC. Covers shall be MC-30 by Ford, or approved equal, with lifter worm lock and precast hole for remote reading. Meter pit setters shall not be installed in traffic areas.

1.04 NON-RESIDENTIAL SERVICE BACKFLOW PREVENTERS

- A. Dual check backflow preventers shall be installed on all commercial, industrial, and institutional water service lines. The devices may be standard system pressure backflow preventers, or reduced pressure principle backflow preventers. The latter are to be used where health hazard contamination is possible and shall be required at the discretion of the Town.
- B. Backflow preventers shall be installed above grade; and, either inside a building or in an equipment room. The property owner shall be responsible for purchasing and installing the backflow preventer and he/she shall retain ownership once the device

is installed. The backflow preventer must be maintained and tested in accordance with the manufacturer's recommendations and the owner shall furnish the Town with maintenance and testing records upon request

- C. The backflow preventer shall be lead free, equipped with valves on either side of the device, and it shall be the same nominal size as the water meter. Backflow preventers shall be equipped with four test cocks for testing and certification.
- D. Backflow preventers shall be as manufactured by Apollo Valves, Watts Water Technologies, or approved equal.

5.05 GANG METER PITS (Up to Four (4) Meters)

- A. All service lines connecting gang meter pits to water mains shall be 2-inch Schedule 80 PVC threaded service pipe (IPS) or 2-inch SDR 9 CTS HDPE tubing. The manifold in the pit shall be Schedule 80 PVC pipe. The service pipes downstream of the pit shall be ¾-inch diameter SDR 9 CTS HDPE tubing..
- B. The gang meter shall be installed in a precast concrete meter pit by Penn-Cast Products, Inc., Model #448, or approved equal, top section only. The service piping or tubing must be installed through a wall sleeve.
- C. Tapping shall be as specified for 2" taps in section 5.03B of these specifications.
- D. Curb valve shall be Mueller 2-inch oriseal valve H-10291. The valve box shall be 4-1/4 inch Mueller roadway screw type with arch base.
- E. The setting shall be as detailed on the plans. Use Ford yoke 502P, Ford straight yoke ball valve B91-323W, Ford straight yoke check valve HS92-323, P/J coupling Ford C84-33 and Ford expansion connection EC-23W.
- F. Cover shall be Model R-1642, self-sealing application, as manufactured by Neenah Foundry; or, model 1045, watertight assembly, manufactured by East Jordan Iron Works.
- G. Gang meter pit vaults shall not be permitted to be installed in traffic areas unless approved by the Town. If vaults are permitted to be installed in traffic areas, they will be required to have a solid concrete bottom with an opening provided to permit drainage.

5.06 WATER METERS

- A. All water meters (residential or commercial) less than 2" shall be MasterMeter, multijet meters with DIALOG 3G, USG, and frost protection with external straight pipe thread. All meters shall register in U.S. gallons. Each meter shall be equipped with a stainless steel strainer. The contractor shall check all connecting fittings for compatibility prior to ordering.

- B. All water meters 2" and larger shall be MasterMeter Octave Ultrasonic with DIALOG 3G AMR, equipped with epoxy coated ductile iron body. All meters shall register in U.S. gallons. The contractor shall check all connecting fittings for compatibility prior to ordering.
- C. Contact the Town for information regarding meters larger than 2 inches that are approved for use.

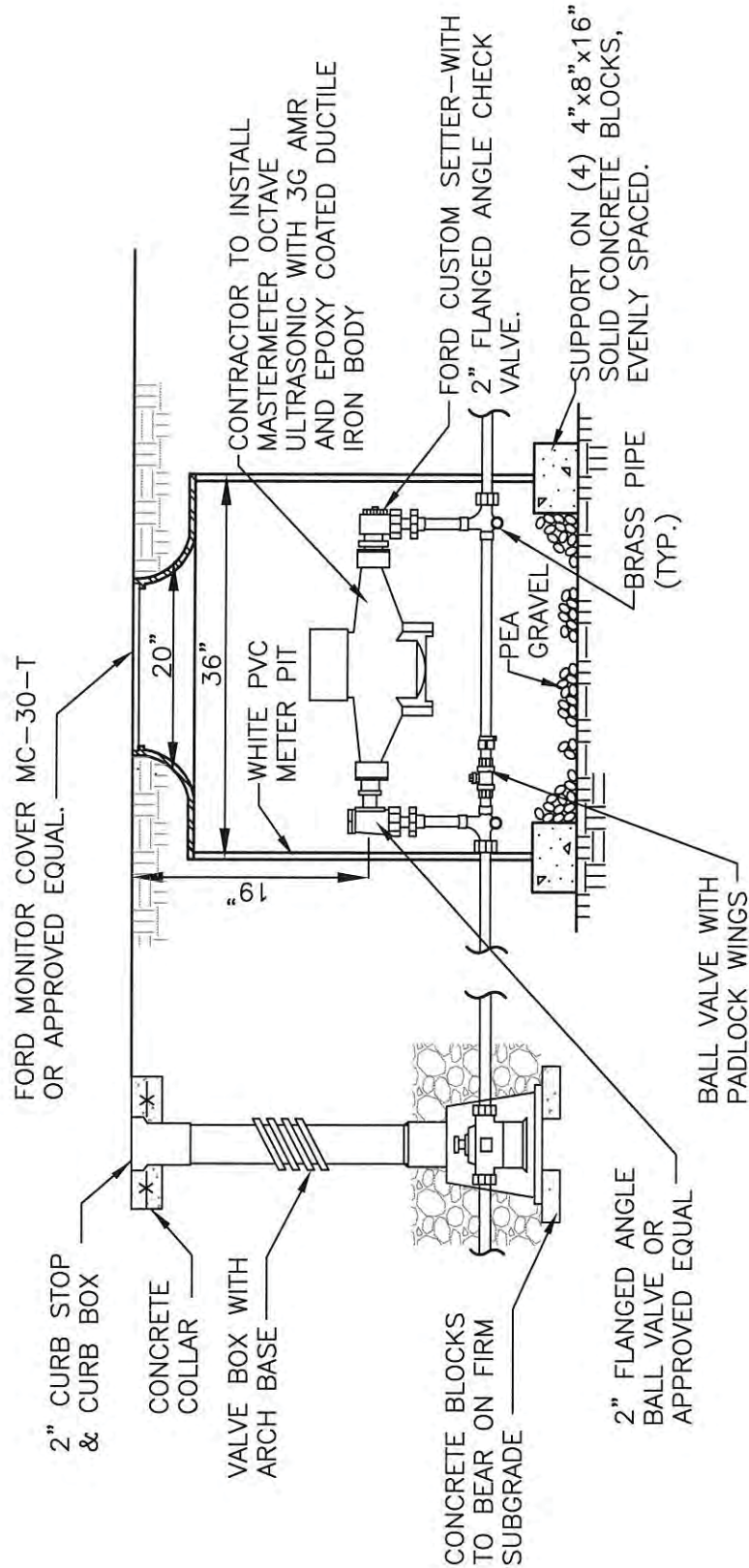
5.07 LAYING SERVICE PIPE AND APPURTENANCES

- A. All service pipe shall be carefully inspected for damaged areas. All damaged pipe shall be cut out and recoupled. Pipe installed during hot weather shall be allowed to contract to normal length before backfilling. Pipes and fittings shall be bedded on a solid foundation.
- B. Fittings and valves shall be kept clean, handled carefully and installed according to the manufacturer's recommendations.
- C. All new service lines shall be installed in the center of vacant lots with meter outside the sidewalk and driveways, unless otherwise directed by the Town.
- D. Service lines in streets shall be installed by open cutting or with an underground piercing tool such as an ACCU-punch or equal. Maximum diameter of piercing tool to be 2-1/2 inches. The Town may adjust the quantity of the various types of service installation as is its best interest.
- E. Installation of services by piercing tool shall be performed with all necessary devices to assure alignment accuracy. Such devices shall include a magnetic level, launcher, and aiming frame. The Contractor shall demonstrate installation procedures to the Town for approval prior to use.
- F. Service connections and meter boxes shall be installed immediately after the construction of the adjacent main. Postponement of construction of service lines will not be allowed.
- G. Requirements for sterilization and pressure testing of service connections shall be the same as specified for mains in this specification.
- H. The Contractor is responsible for locating and cutting existing services and reconnection with all necessary adaptors or sleeves within the unit price bid for service lines. The Contractor shall obtain and pay for the services of a licensed plumber if required by code.
- I. Pipeline tracer wire shall be installed along all proposed water services. See section 2.10, H for tracer wire requirements.

5.08 FIRE LINE DETECTOR CHECK VALVE

- A. The detector check shall be Mueller Model EDC-IV.
- B. All linkage parts shall be stainless steel. Body shall be formed, welded units in heavy steel. Individually test each unit before shipping and provide certification upon request. Epoxy coat per AWWA C550.
- C. Bypass meter shall be per Town Standard for residential meter.

END OF SECTION



NOTE: WRAP ALL THREAD
WITH TEFLON TAPE.

DATE: FEBRUARY 2015

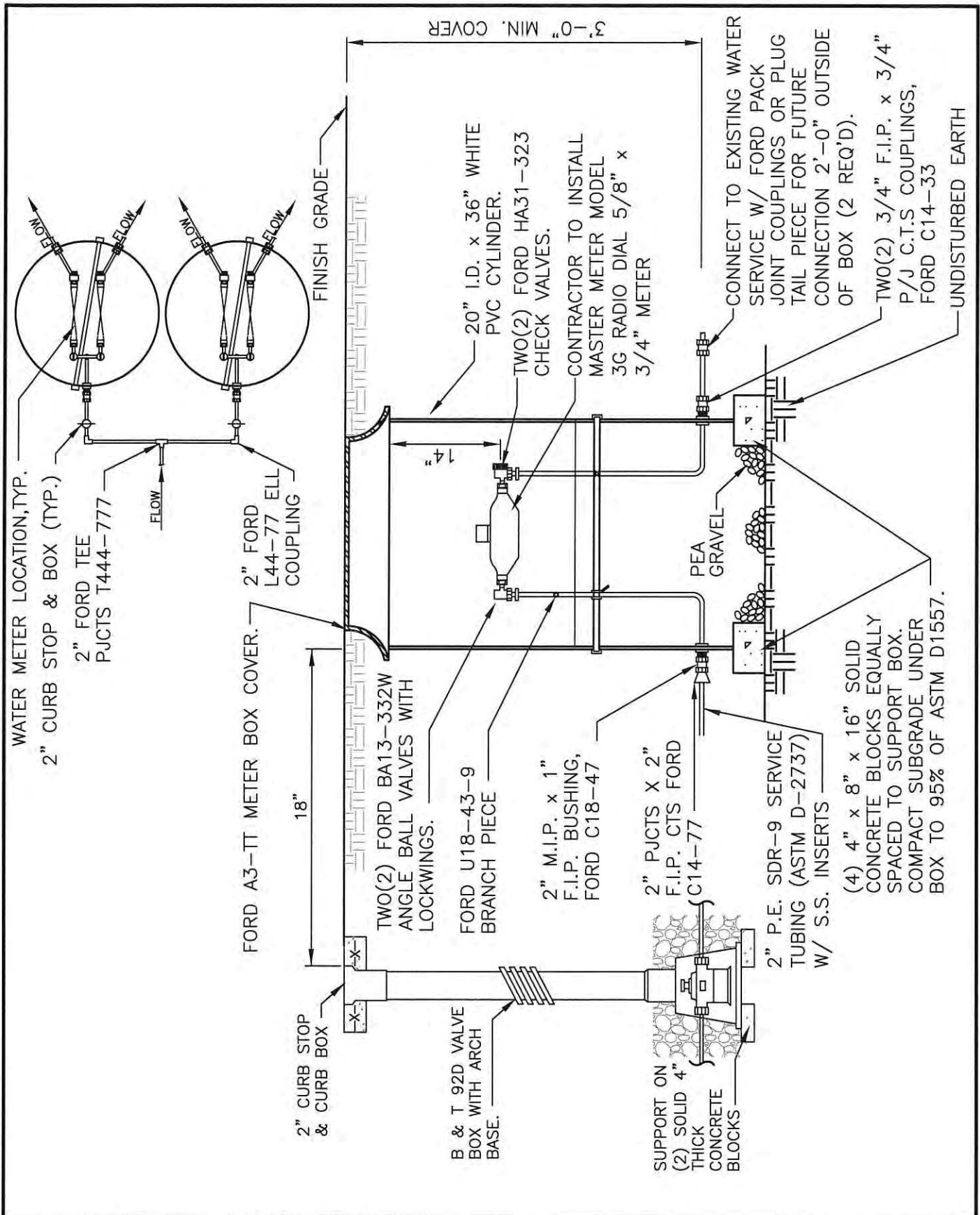
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

2" METER SETTER DETAIL

NO SCALE

SECTION - 5

DRAWING D5-2



DATE: FEBRUARY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

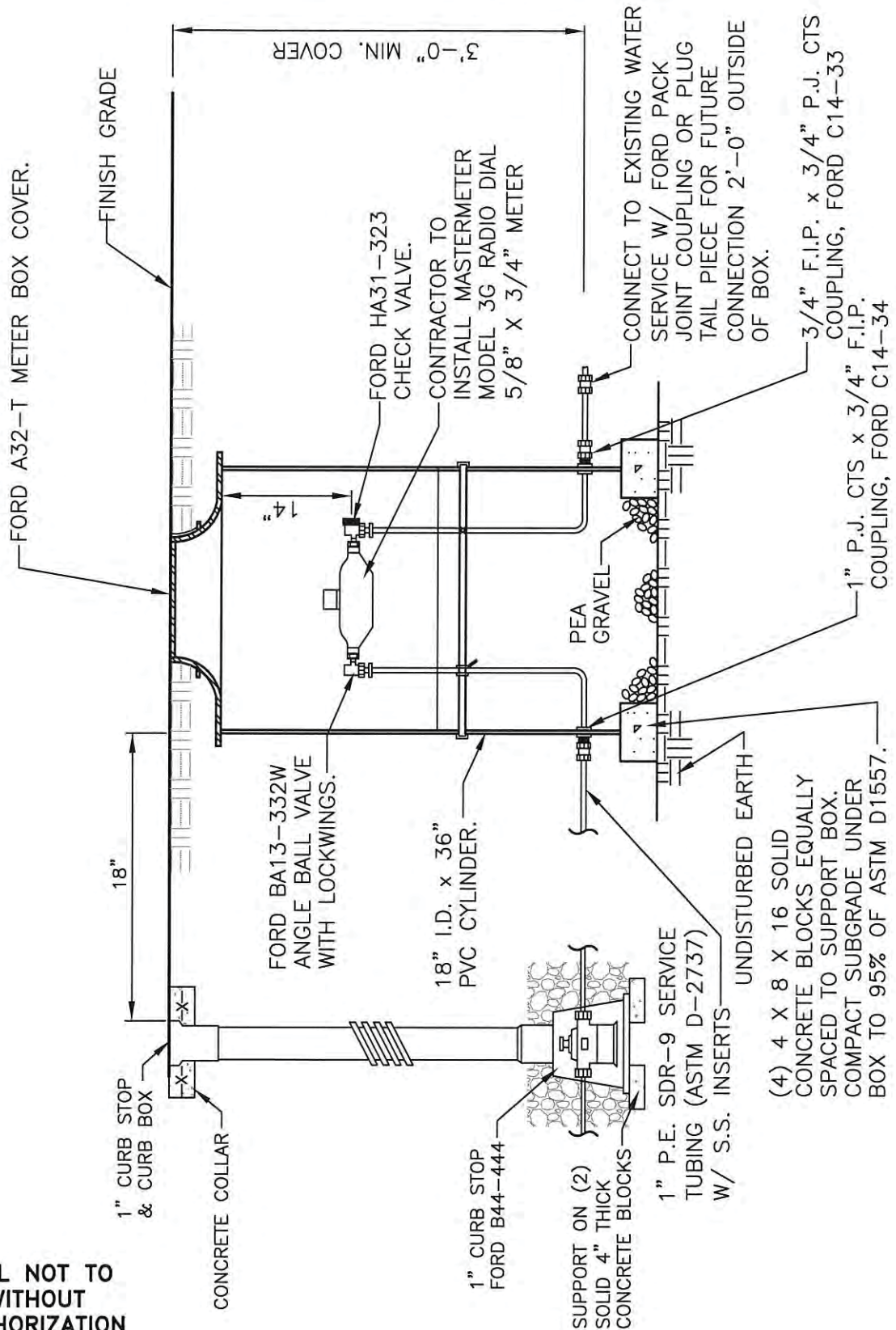
**STANDARD DUAL METER PIT (DOUBLE LOT)
DETAIL (PREFABRICATED)**

NO SCALE

SECTION - 5

DRAWING D5-3

THIS DETAIL NOT TO
BE USED WITHOUT
PRIOR AUTHORIZATION
FROM THE TOWN



DATE: FEBRUARY 2015

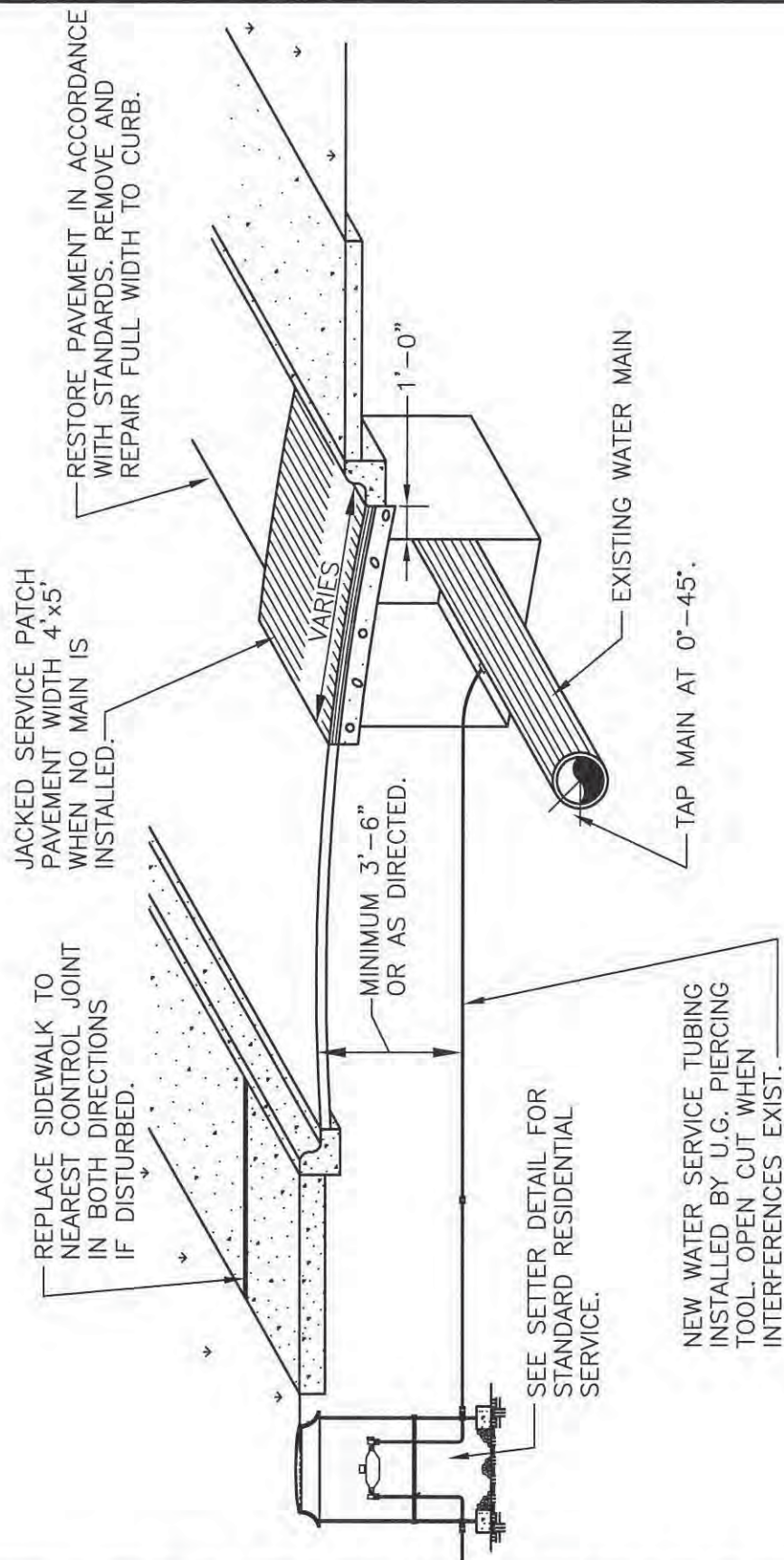
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

SINGLE METER PIT DETAIL (PREFABRICATED)

NO SCALE

SECTION - 5

DRAWING D5-5



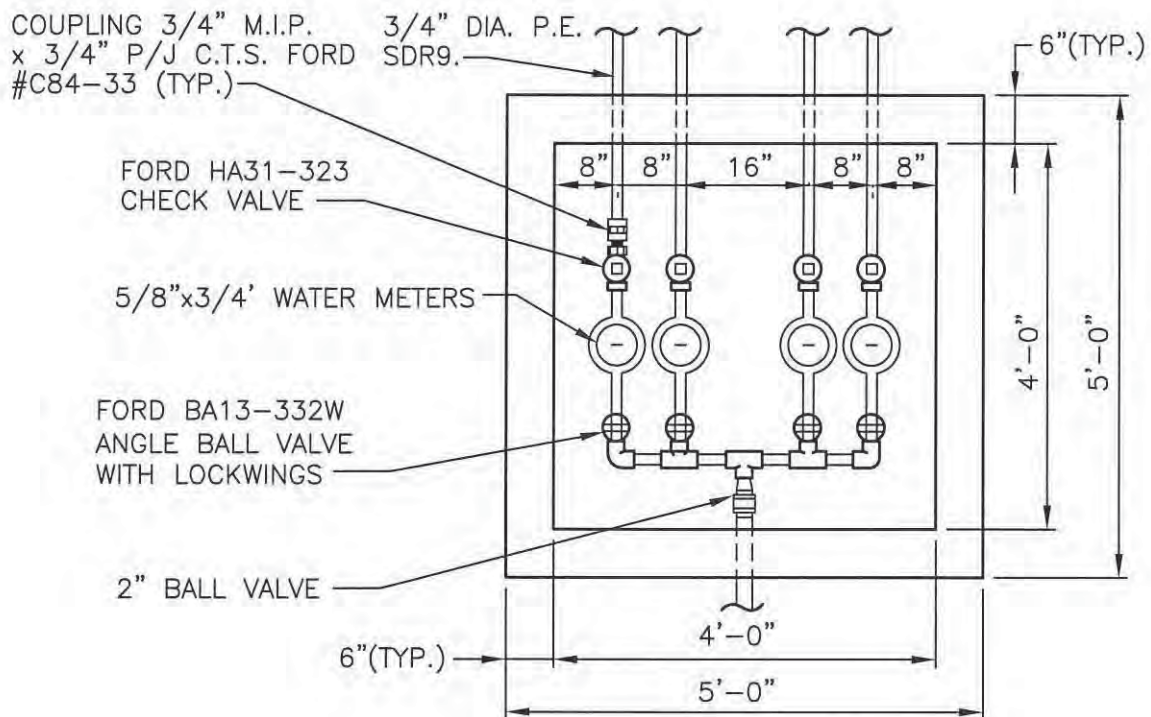
DATE: FEBRUARY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

**MOLED WATER SERVICE AND
RESTORATION DETAIL**
NO SCALE

SECTION - 5

DRAWING D5-6



ALL F.I.P SCH 80 PVC
FITTINGS SHALL BE SS
REINFORCED TYPE BY
SPEARS.

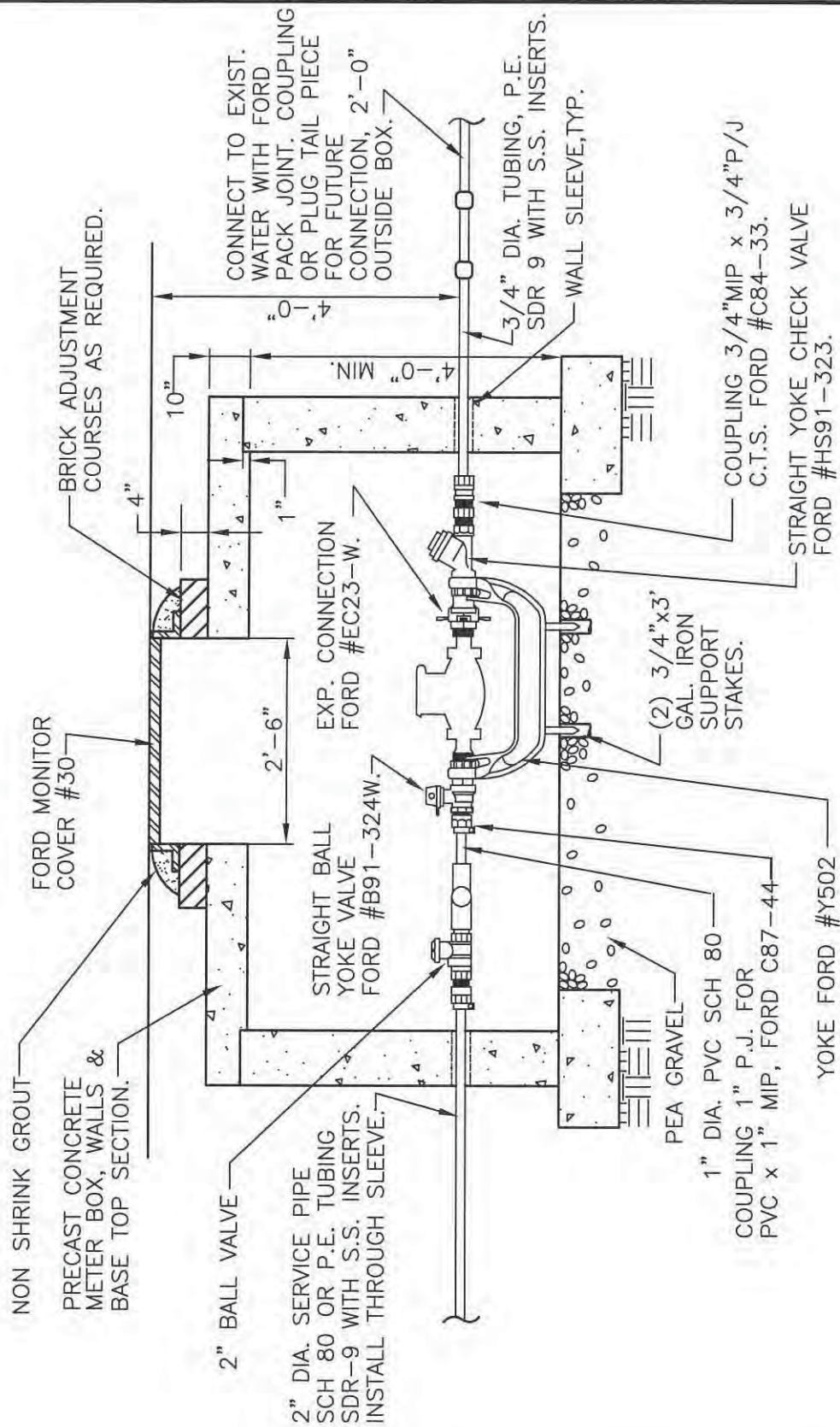
DATE: FEBRUARY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

GANG METER PIT DETAIL
PLAN VIEW
NO SCALE

SECTION - 5

DRAWING D5-7



NOTE
DESIGN FOR HS-20 TRUCK
IF IN PAVED AREA.

DATE: FEBRUARY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

GANG METER PIT DETAIL
SECTION VIEW
NO SCALE

SECTION - 5

DRAWING D5-8



DIVISION 2 – SECTION 6

STORM DRAINS AND APPURTENANCES

6.01 GENERAL

- A. This section covers storm sewer pipe, precast manholes, and precast catch basins.
- B. The Contractor shall furnish and install all storm drains and appurtenances as specified herein and as defined on the Drawings or as directed by the Town.
- C. The Contractor shall submit certifications to the Town that all pipe, fittings, and joints are as specified herein.

6.02 REINFORCED CONCRETE PIPE

- A. Pipe shall be manufactured without lifting holes and shall be handled at all times by means of slings or other methods approved prior to start of construction. Defective or damaged pipe shall not be utilized.
- B. Pipe manufactured shall meet the applicable strength requirements contained in ASTM Designation: C~76, Reinforced Concrete Culvert, Storm Drain and Sewer Pipe, minimum circumferential reinforcement shall be as prescribed for Class M. Class N pipe shall be provided where depth of cover is less than 2 feet.

6.03 HIGH DENSITY POLYETHYLENE PIPE (HDPE)

- A. HDPE pipe shall be smooth interior, AASHTO designation M252 and M294, with a maximum diameter of 48 inches.
- B. Pipe joints and fittings shall conform to AASHTO M252 and M294.
- C. HDPE pipe shall be manufactured by Advanced Drainage Systems, Inc., (ADS – N12); Hancor, Inc., (Hi-Q), or approved equal and shall be installed per manufacturer's guidelines.
- D. All pipe joints shall be watertight.

6.04 PIPE AND FITTINGS

- A. Pipe laying shall not begin until all stakeout and cut sheets have been approved by the Town.
- B. The Contractor shall utilize proper and suitable tools and equipment for the safe handling and laying of the pipe and fittings in accordance with the manufacturer's standards. Pipe and fittings shall be carefully handled and lowered into the trench.
- C. Should the pipe require cutting to fit in the line or to bring it to the required

location, the work shall be done without extra compensation, in a satisfactory manner so as to leave a smooth end perpendicular, to the axis of the pipe.

- D. Before making joints, each pipe shall be well bedded on a solid foundation and no pipe shall be brought into position until the preceding length has been thoroughly embedded and secured in place. No pipe shall be laid in wet trench conditions that preclude proper bedding or on a frozen trench bottom, or when, in the opinion of the Town, the trench or weather conditions are unsuitable for proper installation.
- E. In laying pipe, special care shall be taken to insure that each length shall abut against the next in such a manner that there shall be no shoulder or unevenness of any kind along the inside of the pipeline.
- F. No wedging or blocking will be permitted in laying any pipe unless by written order from the Town.
- G. Pipe and appurtenances shall be thoroughly cleaned before they are laid and shall be kept clean until the acceptance of the completed work. The open end shall be kept closed with a plug until the next length is laid. At the close of work each day, the end of the pipeline shall be tightly closed with an expansion stopper so that no dirt or other foreign substances may enter the line, and this stopper shall be kept in place until pipe laying is again resumed.
- H. Manholes shall be built as pipe laying progresses.

6.05 PRECAST CONCRETE MANHOLES AND INLETS

- A. The Contractor shall construct structures of precast reinforced concrete risers and base sections. All catch basins and junction boxes shall be constructed as per most recent DelDOT Standard Construction Details. Storm sewer manholes in outside of State right-of-way shall be constructed as per Town of Georgetown manhole details. Storm sewer manholes in DelDOT right-of-way shall be constructed as per DelDOT Standard Construction Details.
- B. Manholes and inlets shall be built at such points on the pipelines and of such form and dimensions as are shown on the drawings or as may be directed. Manholes and inlets shall be built as pipe laying progresses and the Town may stop work entirely on laying pipe if manhole and inlet construction is delayed to such an extent as to be hazardous to construction or the public.
- C. Precast reinforced concrete risers, eccentric cones and bases shall be as detailed on the plans and in conformance with ASTM Designation C-478. Joints between riser sections shall be fitted with an "O" ring rubber gasket, meeting the requirements of ASTM Designation C-443. Installation of risers shall be in accordance with manufacturer's recommendations.
- D. Precast reinforced concrete base riser sections shall be as manufactured by

Atlantic Concrete Company, Virginia Precast Corporation, or equal.

- E. Interior and exterior joint spaces of all manhole and inlet risers shall be filled prior to application of the exterior waterproofing. The interior and exterior joint shall be mortared with ThoRoc Plug, as manufactured by ChemRex
- F. Lifting holes in the walls of precast reinforced concrete risers will be allowed, but shall be plugged with rubber stoppers and grouted flush with face of manhole and inlet wall after installation of manhole and inlet riser sections. Not more than two holes shall be cast in the walls of each riser section for the purpose of handling.
- G. The exterior surface of all precast manholes and inlets shall receive a minimum two coat application of sixty-eight percent solid coal tar type protective coating. The total average dry film thickness shall measure 24 mils with no single measurement to be less than 20 mils. Surfaces shall be prepared in accordance with the manufacturer's instructions and coating applied in the field in an acceptable manner.
- H. Inlet flow channels and benches shall be constructed of brick or under the direction of the Town with care taken to secure smooth and even surfaces. Channel sections shall be built up to true line and radius, and curved sections shall provide a uniform transition in the flow direction. Materials and construction of flow channels shall be in accordance with appropriate sections for materials so used, as hereinbefore specified.
- I. Concrete utilized in poured in place structures shall have compressive strength of 3000 psi while precast concrete shall have a compressive strength of 4000 psi in 28 days.
- J. Manhole frames and covers shall be installed on grade to match the slope of the paved surface. Use brick adjustment courses or manufactured adjustment rings grouted in place between the cone and frame for adjustment to match the slope of the paved surface.

6.06 CASTINGS

- A. Frames and covers or grates for structures shall be set by the Contractor as the work progresses.
- B. Material, sizes, and types of frames and covers shall be as per current DelDOT Standard Construction Details and of the sizes and types specified on the plans.
- C. All catch basin grates shall be DelDOT Type 3.

6.07 BRICK AND MORTAR FOR INLET FLOW CHANNELS

- A. All brick shall conform to the "Standard Specifications for Sewer Brick", ASTM

C-32, Grade 88.

- B. Mortar shall be in accordance with the "Standard Specifications for Portland Cement", ASTM C-150 for Type II.

6.08 MANHOLE AND INLET STEPS

- A. Manhole and inlet steps shall be made of 3/8 inch diameter (No.3) steel bars, ASTM Designation A-615, Grade 60, encased in polypropylene plastic. Manhole steps shall have notched tread ridge with retainer lug on each side.
- B. Steps in structures shall be cast in place during manufacture of precast reinforced concrete risers and eccentric top sections. Embedment length shall be suitable for minimum five inch thick, precast reinforced concrete riser walls.
- C. Steps in structures shall be OSHA approved and as manufactured by M.A. Industries, Inc., Peachtree City, Georgia, ICM, Inc., Jacksonville, Arkansas, or approved equal.
- D. Steps on structures shall be spaced 12-inches apart. The maximum spacing from top of manhole to the first step shall not exceed 16-inches.

6.09 DETECTION TAPE

- A. Pipeline detectable tape shall be installed continuously along all storm drain. The tape shall be installed directly above drain and twelve inches from the ground surface.
- B. The tape shall be Lineguard Type III Detectable Tape as manufactured by Lineguard, Inc., of Wheaton, Illinois, or equal. The tape shall be a minimum of two inches wide, white in color, imprinted with the words, "CAUTION STORM DRAIN BELOW", and be capable of being detected with inductive methods.

END OF SECTION

DIVISION 2 – SECTION 7

SIDEWALKS, CURBS, GUTTERS, AND DRIVEWAYS

7.01 GENERAL

- A. Contractor shall provide all labor, materials and appurtenances for construction of concrete sidewalk and curb, and curb & gutter where indicated on the drawings and as specified.
- B. The Contractor shall furnish and install PVC pipe sleeves in sidewalk for street signs, where directed by the Town.

7.02 METHODS AND MATERIALS

- A. All materials and construction methods shall be in accordance with the Delaware Department of Highways and Transportation Standard Specifications, current edition, and Supplements thereto.
- B. Minimum ultimate compressive strength of concrete shall be 3,000 pounds per square inch at the end of 28 days. Submit mix design for approval. All concrete shall be air entrained.
- C. The Contractor shall retain the services of an independent testing agency to perform concrete testing. He shall schedule one (1) set of test cylinders for every 20 cubic yards of concrete placed as curb and gutter or sidewalk. The testing agency shall be responsible for sample preparation, transportation, testing and submission of testing reports. Testing shall include slump test, air content, ambient temp, concrete temp and 7-day and 28-day compression tests. Test results shall be submitted, in duplicate, direct by the testing agency, to the Town.
- D. Curbs shall be depressed at all existing and proposed driveway locations in accordance with DelDOT Standard Details, including proper preparation of subgrade and proper placing and spacing of joints and joint materials.
- E. The Contractor shall permanently repair or replace all curbs, sidewalks, and driveways that have been broken, or otherwise damaged during the course of executing any of the work under the contract or damaged by settlement of any backfilled excavation at any time prior to termination of the contract and guarantee period.
- F. Cost of reconstruction of curbs, sidewalks, and concrete driveways during construction shall be included within the appropriate unit *and/or* lump sum prices bid for furnishing and laying pipe and appurtenances.
- G. New curb and sidewalk, or curb and sidewalk being replaced because it has been damaged during construction, shall be installed in accordance with DelDOT Standard Construction Details. Install ADA compliant wheelchair curb ramps at

all street corners constructed.

7.03 SUBGRADE

Subgrade for concrete sidewalk, curb, and curb & gutter shall be clean, well graded soil compacted to at least 95 percent of maximum density at optimum moisture content as determined by the Modified Proctor Test per ASTM D1557-12.

7.04 SUBBASE

Subbase for standard 4-inch thick concrete sidewalk shall be 4 inches of compacted GABC (crusher run). Subbase for depressed concrete sidewalk, driveway aprons, curb, and curb & gutter shall be 6 inches of compacted GABC (crusher run). The GABC beneath curb and curb & gutter shall extend 6 inches beyond the back of curb, per DelDOT requirements.

7.05 CURB

- A. Entrance curb or any other curb within State right-of-way shall be of a type as directed by DelDOT.
- B. Curb along new streets within right-of-way to be dedicated to the Town shall be integral PCC curb and gutter Type 2 or Type 3, as directed by the Town. Curb along existing streets within Town right-of-way shall match existing unless directed otherwise by the Town.
- C. Curb within commercial, industrial, or institutional development and not within Town right-of-way may be integral PCC curb and gutter Type 2 or Type 3-6; or, it may be PCC curb Type 1-6.
- D. Current DelDOT curb types not listed above may be used along streets within right-of-way to be dedicated to the Town with prior approval from the Town.

7.06 RECONSTRUCTION OF PRIVATE DRIVEWAYS

Saw cut existing driveways if sections are acceptable for re-use. Upon completion of utility construction, the Contractor shall reconstruct private driveways in kind as follows:

- A. Concrete Driveways
 - 1. Concrete driveways shall be replaced and reconstructed upon a properly prepared, graded and compacted subgrade and in compliance with DelDOT Standard Specifications and Details.
 - 2. Residential concrete driveways shall be constructed to a minimum thickness of 6 inches and shall be reinforced with 6-inch by 6-inch wire mesh of 10-10 gauge. Commercial driveways shall be constructed of 8

inches concrete reinforced with 6-inch by 6-inch wire mesh of W1.4 x W1.4.

3. Restoration shall provide for a smooth transition from back of sidewalk or driveway construction to undisturbed areas and shall be free of all localized depressions or abrupt changes in grade that may trap or otherwise misdirect surface drainage or represent possible damage to vehicular travel.

B. Bituminous Concrete Driveways

1. Bituminous driveways and parking areas disturbed through the Contractors construction operations shall be restored by a minimum of 2 inches of hot-mix bituminous concrete pavement Type C, placed in a single lift onto a base course consisting of 4-inches of properly prepared and compacted graded aggregate base course. Match existing hot-mix thickness where condition exceeds minimum restoration.
2. The hot-mix bituminous concrete surface shall conform to DelDOT Standard Specifications for Type C asphalt.
3. The subgrade shall be properly prepared, graded, and compacted in accordance with Section 2 of these specifications.

7.07 SIDEWALK CONSTRUCTION

A. General

1. Concrete sidewalks damaged or removed during construction shall be replaced as required, or as directed, in accordance with DelDOT Standard Specifications. ADA compliant handicapped ramps shall be installed in all areas defined herein.
2. Sidewalks in areas not subject to vehicular loading shall have a minimum concrete thickness of 4 inches with fiber reinforcement and shall be placed upon a properly prepared, graded, and compacted 4-inch thick GABC subbase. The subbase shall be placed upon a properly graded and compacted subgrade.
3. Depressed sidewalk and sidewalks in residential vehicular loading areas shall have a minimum concrete thickness of 6 inches (8 inches in commercial vehicular loading areas) reinforced with 6 inch by 6 inch wire mesh of 10-10 gauge. Sidewalk in these areas shall be placed upon a properly prepared, graded, and compacted 6-inch thick GABC subbase. Subgrade shall be prepared as stated for non-load areas.
4. Replacement of partial sections of concrete sidewalk, where so directed,

shall be extended to the nearest existing joint in each direction.

5. Where sidewalk is replaced, it shall be replaced to a width equal to that existing prior to start of construction and such width shall be maintained throughout the entire length of the block. In no instance shall the constructed width be less than 4 feet.
6. A broom finish shall be applied perpendicular to the direction of traffic.

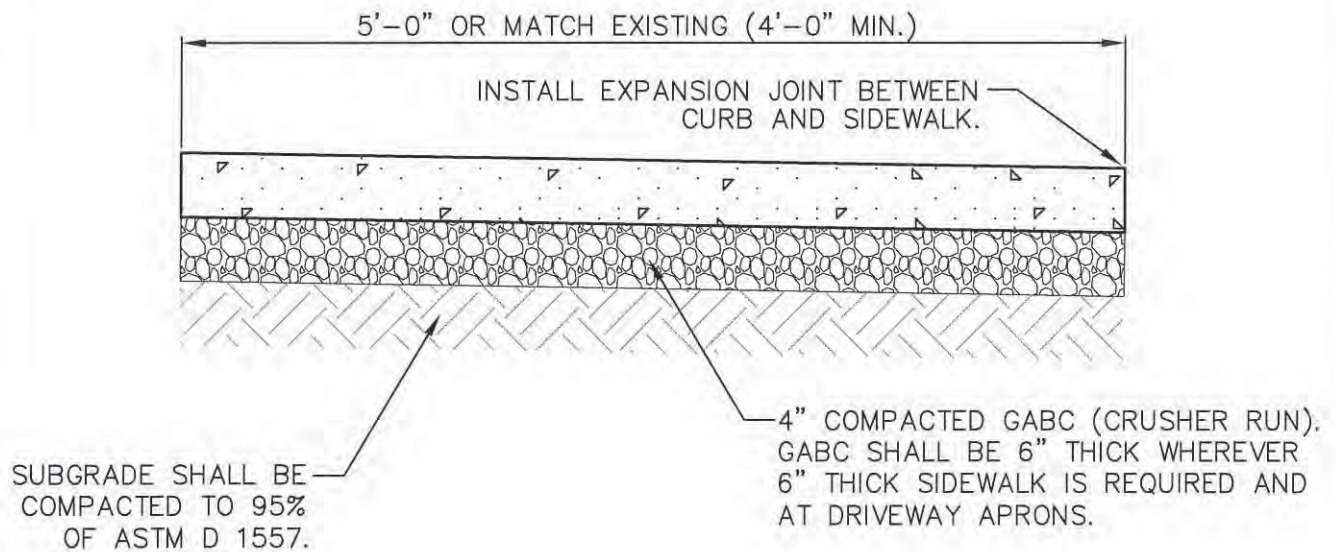
B. Sidewalks in New Subdivisions

1. Sidewalks shall be a minimum of 5 feet wide. A 1/2-inch expansion joint of an approved material shall be installed every 20 feet, at a minimum.
2. The sidewalk shall be marked into rectangular slabs 5 feet in length by scoring 1/4 inch deep with an approved edging tool which will create 1/4 inch (+/-) radii on the surface edges of the score. The surface edge of each slab shall be rounded to a 1/4-inch radius.
3. The sidewalk shall be installed as indicated on the plans or as directed by the Town. If sidewalk is to be installed against the back of curb, the curb shall be installed prior to installing the sidewalk and it shall be allowed to cure for a minimum of 24 hours. Monolithic curb/sidewalk installation shall not be permitted in public right-of-way
4. Areas in between the curb and sidewalk and/or behind the sidewalk shall be properly graded to provide drainage away from lot.
5. Grass shall be established in areas adjacent to the sidewalk in a minimum of 4 inches of topsoil.
6. Construction of sidewalks in new subdivisions must also adhere to Section 7.05A of these specifications.

END OF SECTION



WHEN ADJACENT TO
CONCRETE PAVEMENT,
INSTALL APPROVED
EXPANSION JOINT.



NOTES:

1. CONCRETE SHALL BE 3000 PSI WITH FIBER REINFORCEMENT (1 LB/CY).
2. STANDARD SIDEWALK SHALL BE 4" THICK. SIDEWALK ACROSS DRIVEWAYS; AT HANDICAP RAMPS, INCLUDING THE APPROACH, TO THE HANDICAP RAMP; AT AT DRIVEWAY APRONS SHALL BE 6" THICK.
3. ALL 6" THICK SIDEWALK AND DRIVEWAY APRONS SHALL INCLUDE 6" x 6", 10 GAUGE WIRE MESH REINFORCEMENT.
4. SEE SECTION 7 OF THE SPECIFICATIONS FOR ADDITIONAL SIDEWALK REQUIREMENTS.

| | | |
|----------------------------------------------|--------------------------|--------------|
| DATE: FEBRUARY 2015 | CONCRETE SIDEWALK DETAIL | |
| CONSTRUCTION STANDARDS TOWN OF GEORGETOWN | | |
| | NO SCALE | |
| | SECTION - 7 | DRAWING D7-2 |

DIVISION 2 – SECTION 8

SURFACE RESTORATION

8.01 GENERAL

- A. The Contractor shall restore all surfaces damaged by his or her operations to the widths and extent detailed or noted on the plans or specified herein.
- B. Surface restoration in streets and roads maintained by DelDOT shall be accomplished in accordance with DelDOT Standard Specifications current at the time of plan approval, or construction, if no plan submission was required.
- C. Existing pavement shall be saw cut to form a straight, clean edge for repaving. Saw cut pavement as shown on the drawings and as directed to obtain a clean pavement edge.
- D. No staggered or irregular longitudinal trench repair widths shall be permitted. Repairs shall be of a uniform width and in a straight line.
- E. Minimum pavement restoration width is five (5) feet including restoration along the edge of roads. Actual width shall be as detailed or as noted on the plans. Payment, where applicable, is limited to these widths. Should the Contractor damage or disturb larger areas, he or she shall replace the additional area at his or her cost.
- F. Surface course and concrete sections shall be cut into manageable sections and removed and shall not be broken out.
- G. Undetermined areas shall be grout filled or cut back.
- H. A temporary 1 ½ inch (compacted) layer of cold patch shall be placed on all utility trenches at the end of every workday.
- I. Metal plating may be used at the end point of the utility laying operation, with prior permission from the Town or DelDOT, whichever is applicable. Plates must be used to protect concrete patches during the curing process.
- J. All adjustments to existing utilities must be made prior to overlay operations and must be repeated if there is any damage due to rolling and compacting operations.
- K. Manhole or catch basins adjustments shall be made with brick courses or mortar layers. Screw-type multiple piece valve boxes shall be adjusted by rotating the upper section where adjustment is available, installing metal valve box adjustment rings, or replacing the valve box.

- L. All trenches must have a one (1) foot wide by 1 ½ inch (minimum or match repair surface course depth) surface mill for a paving tie-in on each side of the trench which adjoins existing paving.
- M. Skewed isolated patches will not be permitted; they shall be saw cut to form a square.
 - a. Permissible paving temperatures and asphalt lift thicknesses shall be as set forth in the current DelDOT Standard Specifications for the specific asphalt type being installed.
- N. Catch basins, inlets, curbs, and all other appurtenances shall be adequately covered and protected prior to application of bituminous materials. No earth or bituminous materials shall be allowed to enter any storm drainage system and suitable containment provisions shall be employed to prevent surface runoff of bituminous materials.
- O. The final surface except on overlays shall match approved grades or grades existing prior to construction and shall be such that a smooth transition free of abrupt changes in grade is made with adjacent pavements and/or sidewalks. No depressions or other misalignment shall obstruct, trap, or otherwise misdirect the flow of surface water drainage.

1.02 MAINTENANCE OF REFILLED EXCAVATIONS

- A. The Contractor shall maintain, at his or her own expense, all refilled excavations and surfacing in proper condition as specified herein. All depressions appearing in the refilled excavation, stabilized base, or temporary paving shall be properly refilled. If the Contractor fails to make repairs within 48 hours after receipt of written notice from the Town, the Town may refill said depressions and the cost thereof shall be billed to the Contractor. In case of emergency, the Town may refill any depression or protect with barricades without giving previous notice to the Contractor, and the cost of doing so shall be billed to the Contractor.
- B. The Contractor shall be responsible for any injury or damage that may result from lack of maintenance of any refilled excavation at any time.

8.03 PAVEMENT RESTORATION

- A. Bituminous Concrete Pavement Surface Course

Hot mix, hot laid bituminous concrete surface course shall consist of placing bituminous concrete courses of the specified or appropriate type on a prepared base, to the minimum compacted thickness shown on the drawings. Hot mix, hot laid bituminous concrete shall meet the provisions of DelDOT's Standard Specifications.

B. Base Courses

1. Graded Aggregate Base Course

Graded aggregate base course (GABC) shall be spread on prepared and compacted refilled excavations to the compacted depth shown on the drawing details. Materials and methods of construction shall meet the provisions of DelDOT's Standard Specifications.

2. Bituminous Concrete Base Course (Deeplift)

Deeplift bituminous concrete base course shall be spread on prepared and compacted GABC to the compacted depth shown on the approved details, or as directed. Materials and methods of construction shall meet the provisions of DelDOT's Standard Specifications.

3. Type B Bituminous Concrete Pavement

Type B bituminous concrete pavement shall be spread on prepared and compacted GABC or deeplift bituminous concrete pavement to the compacted depth shown on the details. Materials and methods of construction shall meet the provisions of DelDOT's Standard Specifications.

8.04 CONCRETE PAVEMENT

A. Concrete used in restoration of streets and roads shall be placed to the minimum thickness shown on the drawings. Concrete may be a base course with a bituminous concrete pavement overlay or a finished surface course as shown on the drawings.

B. Concrete pavement shall meet the provisions of DelDOT's Standard Specifications.

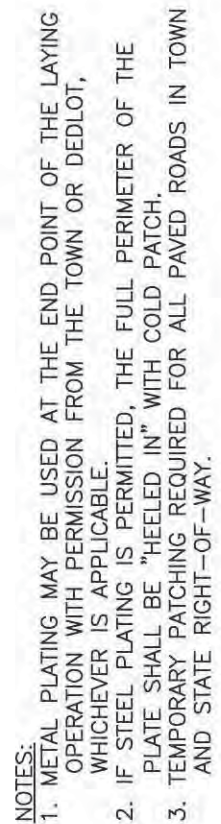
C. Concrete sidewalk, curb, gutter, and driveway restoration shall meet the provisions of DelDOT's Standard Specifications. During paving projects, all existing sidewalk corners or handicap ramps adjacent to the street shall be removed and replaced if they are not currently ADA compliant.

8.05 TOPSOIL AND SEEDING

A. Topsoil shall be placed in areas where grass has been disturbed by the Contractor's operations. Depth of topsoil shall be 4 inches minimum. When installing top soil, all materials and methods of construction shall meet the provisions of DelDOT's Standard Specifications.

- B. Seeding shall consist of furnishing and placing seed and soil supplements on topsoiled areas and at any other locations as directed by the Town. When seeding, all materials and methods of construction shall meet the provisions of DelDOT's Standard Specifications.
- C. Fertilizer shall be a recognized commercial fertilizer containing a minimum 5 percent nitrogen, 10 percent available phosphoric acid, and 10 percent soluble potash by weight. It shall be applied in sufficient amounts to provide 60 pounds of nitrogen per acre.
- D. Fertilizing and seeding application dates shall be in conformance with DelDOT's Standard. Seed shall be applied at a rate of four (4) to five (5) pounds per 1,000 square feet.
- E. Seeded areas shall be mulched if directed to do so by the Town, DelDOT, or if required per the details on the approved plans. Mulch shall consist of straw mulch as specified in DelDOT's Standard Specifications.

END OF SECTION



SEE NOTES 3 & 4 BELOW
FOR PAVING SECTION
DEPTH REQUIREMENTS

SAW CUT TO FULL DEPTH OF
ALL ASPHALT LAYERS,
EACH SIDE.

EXISTING ASPHALT
PAVEMENT SECTION

EXISTING STONE
SUBBASE

1'-0" MINIMUM
(TYPICAL)

WIDTH OF FULL DEPTH RESTORATION 5' MIN.

4' MINIMUM FOR EDGE OF
ROAD REPAIRS ONLY.

1'-0" PAVEMENT TIE-IN, EACH SIDE

GRADED AGGREGATE BASE
COURSE, 6" MINIMUM THICKNESS.

PLACE AND MECHANICALLY TAMP BACKFILL IN 8"
LAYERS, LOOSE MEASUREMENT. COMPACT EACH
LAYER TO 95% MAXIMUM DENSITY AT OPTIMUM
MOISTURE CONTENT (ACCORDING TO AASHTO T-180).
USE SUITABLE MATERIAL FROM EXCAVATION OR
SPECIAL BACKFILL.

60% OF PIPE O.D. ON UNDISTURBED SOIL OR
COMPACTED CRUSHED STONE IF REQUIRED.

DETECTOR TAPE

1'-0" PIPE

VARIES

NOT LESS THAN 2' PLUS
OUTSIDE DIAMETER OF
PIPE

NOTE:

1. MINIMUM FULL WIDTH OF RESTORATION AT SURFACE SHALL BE 7'-0",
OR 5'-0" MINIMUM FOR TRENCH ALONG EDGE OF ROAD.
2. IF PATCH FALLS WITHIN 2' OF EXISTING CURB OR EDGE OF PAVING,
CONTINUE RESTORATION TO CURB.
3. PAVING SECTION DEPTH REQUIREMENTS SHALL BE BASED ON THE
REQUIREMENTS OF SECTION 1E OF THE TOWN'S SPECIFICATIONS, OR
MATCH EXISTING SECTION IF IT IS GREATER. THE MINIMUM PAVING
SECTION SHALL BE 1 1/2" TYPE C ASPHALT OVER 3 1/2" TYPE B
ASPHALT, OVER 6" GABC (CRUSHER RUN).
4. PERMANENT PAVING RESTORATION REQUIREMENTS WITHIN DELDOT
RIGHT-OF-WAY SHALL BE APPROVED BY DELDOT.

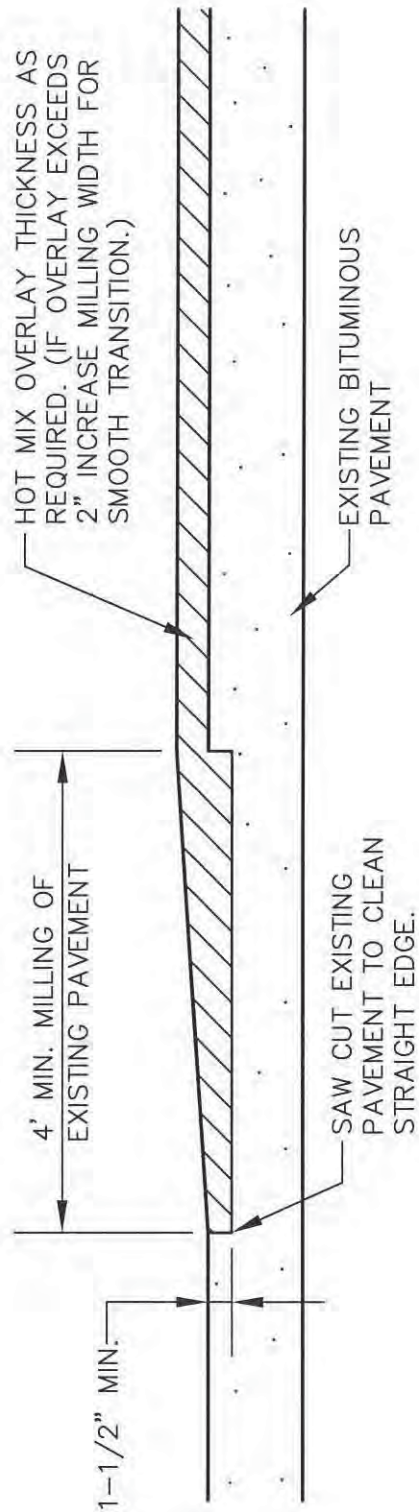
DATE: MAY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

**PERMANENT PAVEMENT RESTORATION DETAIL
FOR TOWN STREETS
NO SCALE**

SECTION - 8

DRAWING D8-2



| | | |
|----------------------------------------------|---------------------------------------------|--|
| DATE: FEBRUARY 2015 | TRANSITION PAVING DETAIL NO SCALE | |
| CONSTRUCTION STANDARDS TOWN OF GEORGETOWN | | |
| SECTION - 8 | DRAWING D8-3 | |

DIVISION 2 – SECTION 9

NEW SUBDIVISION STREETS AND ENTRANCES

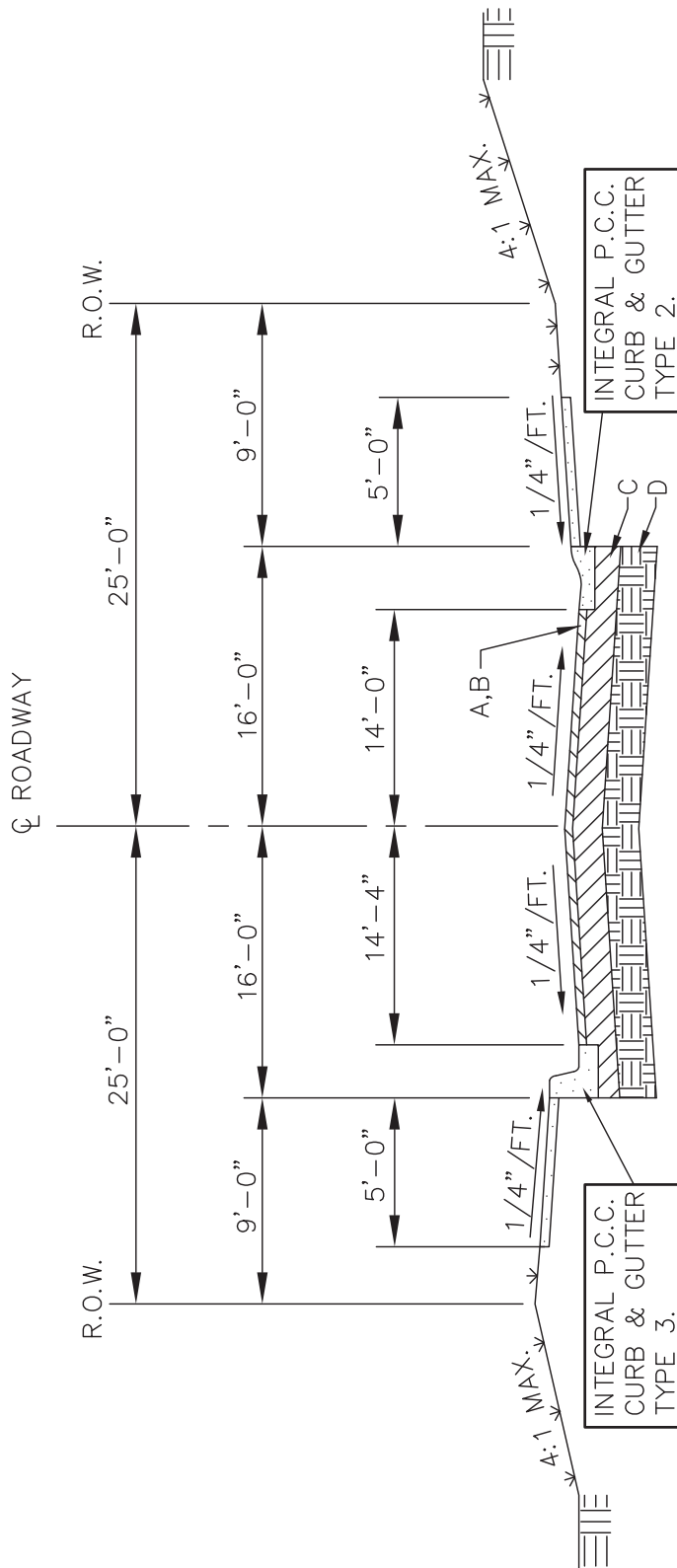
9.01 GENERAL

- A. All new subdivision streets within future Town right-of-way shall be designed and constructed in accordance with Division 1, Sections 1D & 1E of these standards. However, the minimum paving section shall be 1 ½ inches of Type C asphalt, over 3 ½ inches of Type B asphalt, over 6 inches of GABC (crusher run).
- B. All subdivision entrances connecting to State right-of-way shall be designed and constructed in accordance with DelDOT's *Development Coordination Manual*, latest edition.
- C. All subdivision entrances connecting to Town right-of-way shall be designed and constructed in accordance with Division 1, Sections 1D & 1E of these standards.
- D. All streets must have a minimum longitudinal slope of 0.3%. Cross slopes must be as detailed. Intersections must have valley gutters if slope is less than 0.3%
- E. Storm drain systems shall be designed per DelDOT standards.

9.02 LIGHTING

- A. All subdivision streets shall be lighted with decorative cast aluminum , Wadsworth-style lamp posts and Granville, classic style, borosilicate glass optical refractor, and 100W high-pressure sodium lamps, unless approved otherwise. Lighting fixtures must be approved by the Town Planning Commission.
- B. The wiring for the street lighting shall be directly buried and meet all applicable electrical codes.
- C. The lamps shall be 12 feet in height and have a maximum spacing of 150 feet. A lamp must be placed at every street corner and subdivision entrance.
- D. The lamps shall be placed in all cases between the back edge of the sidewalk and the right-of-way line. The maximum distance the lamps shall be placed behind the sidewalk is one foot.
- A. Developers shall coordinate subdivision street lighting with Delmara Power's outdoor lighting program.

END OF SECTION



NOTES:

1. 4" TOPSOIL SEED AND MULCH.
 2. REFER TO SECTION 7 FOR CURB AND SIDEWALK DETAILS AND SPECIFICATIONS.
 3. REFER TO SECTION 9 FOR PAVING SECTION DESIGN. SEE NOTES AT RIGHT FOR MINIMUM ASPHALT AND GABC (CRUSHER RUN) THICKNESSES.
- A - 1 1/2" TYPE C HOT MIX, MINIMUM.
 B - 3 1/2" TYPE B HOT MIX, MINIMUM.
 C - 6" GRADED AGGREGATE BASE COURSE (CRUSHER RUN), MINIMUM, COMPACTED TO 98% OF ASTM D1557. MODIFIED PROCTOR METHOD AND 8" COMPACTED DEPTH.
 D - APPROVED SUBGRADE COMPACTED TO 95% OF ASTM D1557.

DATE: MAY 2015

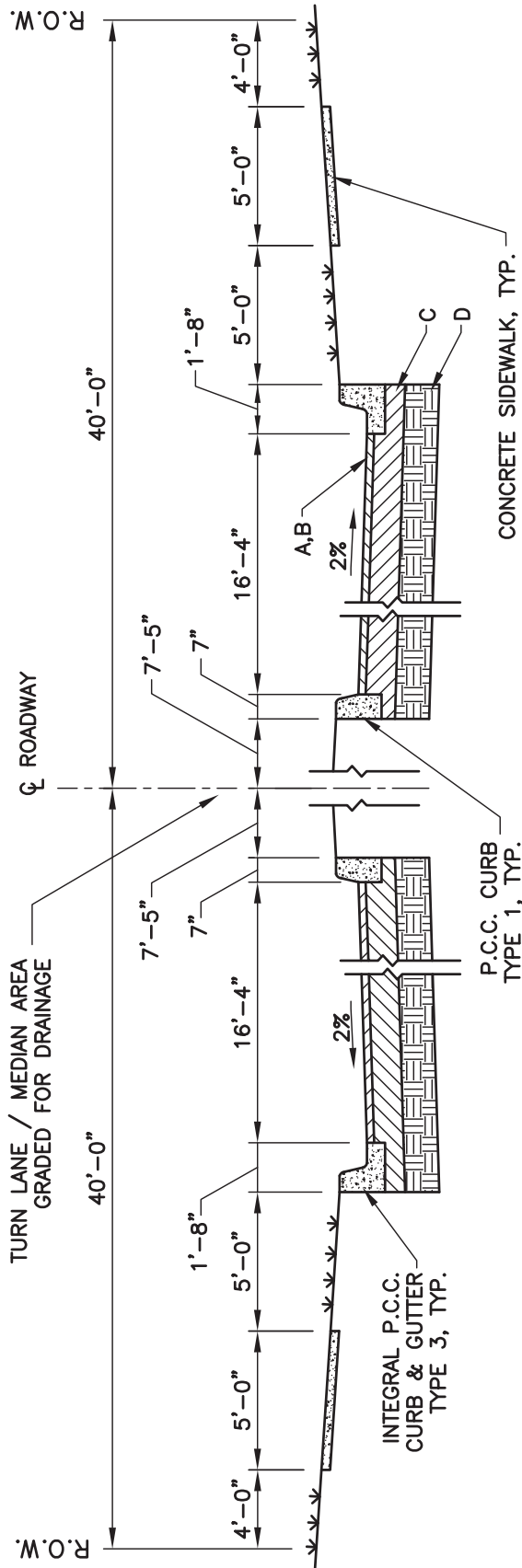
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

MINOR STREET TYPICAL SECTION

NO SCALE

SECTION - 9

DRAWING D9-1



NOTES:

1. ↘ ↘ ↘ 4" TOPSOIL SEED AND MULCH.
 2. REFER TO SECTION 7 FOR CURB AND SIDEWALK DETAILS AND SPECIFICATIONS.
 3. REFER TO SECTION 9 FOR PAVING SECTION DESIGN. SEE NOTES AT RIGHT FOR MINIMUM ASPHALT AND GABC (CRUSHER RUN) THICKNESSES.
 4. NO RESIDENTIAL DRIVEWAY ACCESSES UNLESS APPROVED BY THE TOWN.
- A - 1 1/2" TYPE C HOT MIX, MINIMUM.
 B - 3 1/2" TYPE B HOT MIX, MINIMUM.
 C - 6" GRADED AGGREGATE BASE COURSE (CRUSHER RUN), MINIMUM, COMPACTED TO 98% OF ASTM D1557. MODIFIED PROCTOR METHOD AND 8" COMPACTED DEPTH.
 D - APPROVED SUBGRADE COMPACTED TO 95% OF ASTM D1557.

DATE: MAY 2015

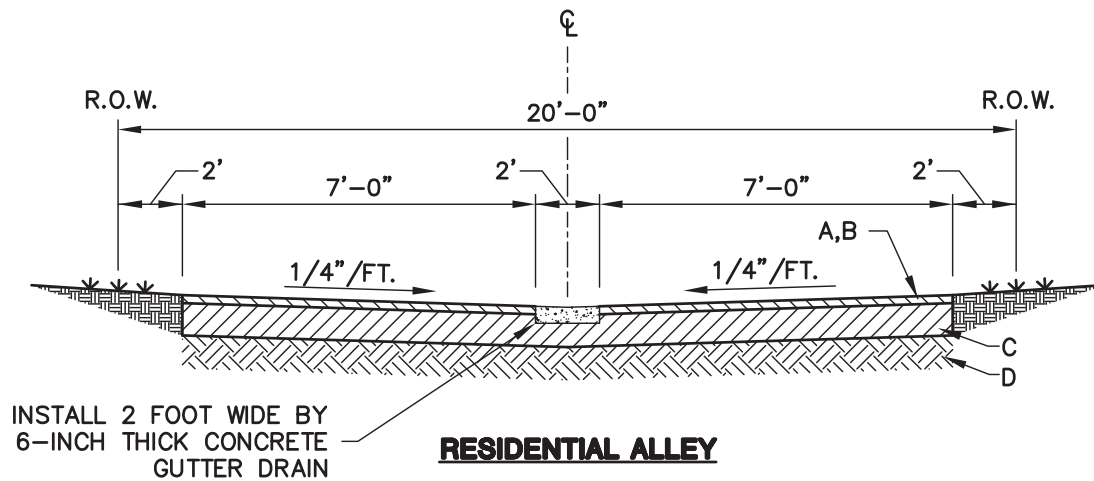
CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

DUAL LANE BOULEVARD TYPICAL SECTION

NO SCALE

SECTION - 9

DRAWING D9-3



NOTE:

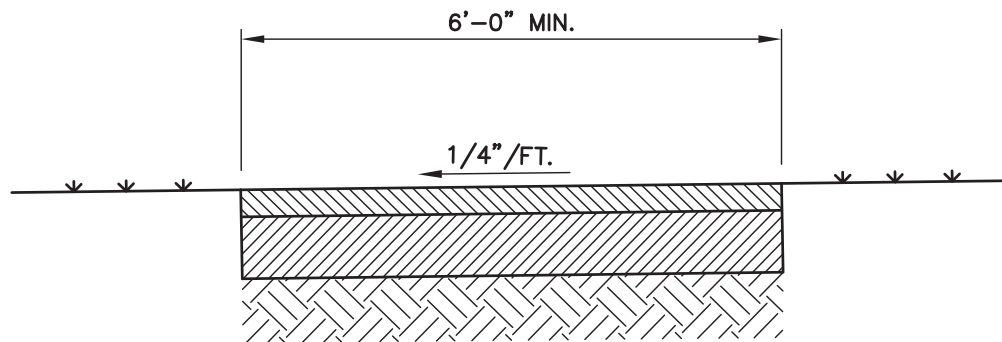
4" TOPSOIL SEED AND MULCH.

A – 1 1/2" TYPE C HOT MIX.

B – 3 1/2" TYPE B HOT MIX.

C – 6" GRADED AGGREGATE BASE COURSE (CRUSHER RUN), COMPACTED TO 98% OF ASTM D1557. MODIFIED PROCTOR METHOD AND 8" COMPACTED DEPTH.

D – APPROVED SUBGRADE COMPACTED TO 95% OF ASTM D1557.



NOTES:

1. 2" OF TYPE C ASPHALT OVER 4" OF A GABC (CRUSHER RUN) COMPACTED TO 95% ASTM D1557 MODIFIED PROCTOR, OVER SUBGRADE COMPACTED TO 95% ASTM D1557 MODIFIED PROCTOR.
2. GRADING SHALL SLOPE AWAY FROM EITHER SIDE OF BIKE PATH, OR GRADING SHALL PROVIDE FOR DRAINAGE ACROSS BIKE PATH.

DATE: MAY 2015

CONSTRUCTION STANDARDS
TOWN OF GEORGETOWN

RESIDENTIAL ALLEY & MULTI-USE TRAIL

NO SCALE

SECTION – 9

DRAWING D9-4