

## **APPENDIX A**

### **ROADWAY CONSTRUCTION SPECIFICATIONS AND STANDARDS**

The following specifications shall govern the construction of all streets within the right-of-way (R.O.W.) lines of a proposed subdivision under the Rules and Regulations governing the Subdivision of Land, adopted by the Duxbury Planning Board.

Whenever the term "State Specifications" is used in this section in reference to materials and methods of construction, it shall mean the Standard Specifications for Highways and Bridges of the Massachusetts Highway Department, dated 1988, including amendments.

The contractor shall notify the D.P.W. Director in writing at least forty-eight (48) hours in advance of beginning any construction within a public way.

#### **1.0 ROADWAYS**

##### **1.1 Clearing and Grubbing**

All areas to be cleared and grubbed within the roadway R.O.W. lines of a subdivision shall be clearly shown on the definitive plan in conjunction with the proposed landscaping. The intent of the Board is to maintain as much of the original natural vegetation as possible within a subdivision. Clearing and grubbing shall be required as follows:

- a) A minimum of eight (8) feet beyond the back of roadway berm
- b) A minimum of four (4) feet beyond the back of sidewalk
- c) Within areas required for grading purposes
- d) Within ten (10) feet of an underground utility
- e) As required to maintain sight lines

Areas to be cleared and grubbed shall be cleared of all stumps, brush, roots, boulders and trees not designated for preservation. Trees to be preserved shall be physically protected from construction operations in a manner satisfactory to the Duxbury Tree Warden. All resulting debris from clearing and grubbing operations shall be properly disposed of off-site in accordance with all local, state and federal regulations. Stump dumps shall not be permitted within a subdivision.

## **1.2 Excavation and Subgrade Preparation**

All topsoil shall be removed for the full width of the paved roadway, under the six (6) foot wide grass shoulders and under sidewalks, regardless of whether the finished grade is above or below existing grade. All other material shall be removed for the full length and width of roadway to the proposed roadway subgrade. If the soil below the proposed subgrade contains undesirable material which will affect the structural integrity of the pavement such as clay, soft or spongy material, sand pockets, tree stumps, or other material detrimental to the subgrade, such material shall be excavated and removed as required by the Board's Engineer and/or the DPW Director. Excavation below subgrade shall be backfilled with processed gravel per Section M1.03.1 of the "State Specifications" and compacted.

## **1.3 Grading**

All roadways shall be brought to a finished grade as shown on the vertical roadway profiles of a Definitive Plan. Before sub-base material is spread, the subgrade shall be shaped to a true surface conforming to the proposed cross section of the roadway and sidewalk and compacted in accordance with Section 170 in the "State Specifications". Roadway crown shall be a minimum of 1/4 inch per foot.

## **1.4 Pavement Sub-Base**

After the roadway subgrade has been carefully graded and compacted, a pavement sub-base layer consisting of the following shall be spread and compacted:

- a) Eight (8) inches of processed gravel for sub-base meeting the requirements of Section M1.03.1 of the "State Specifications" except that the maximum stone size shall be two (2) inches. Spread and compact the material in accordance with the requirements of Section 405 of the "State Specifications".
- b) Four (4) inches of dense graded crushed stone for sub-base meeting the requirements of Section M2.01.7 of the "State Specifications". Spread and compact the material in accordance with Section 402 of the "State Specifications".

The sub-base material shall continue beyond the back of berm a distance of six (6) feet to provide a stabilized shoulder for occasional parking of vehicles.

## **1.5 Pavement and Wearing Surface**

After the pavement sub-base has been carefully graded and compacted, the pavement shall be constructed. The pavement shall consist of the following:

- a) Two (2) inches of Class I Bituminous Concrete Base Course, Type I-1 meeting the requirements of Section 420 of the "State Specifications".

b) One and 1/2 inches of Class I Bituminous Concrete Pavement, Type I-1 meeting the requirements of Section 460 of the "State Specifications". An RS-1 emulsion shall be applied between the base and top courses.

The final top course shall be applied when a substantial portion of the construction on adjacent lots is completed as determined by the Board and/or DPW Director.

## **2.0 SIDEWALKS**

2.1 Location, section and dimensions of concrete sidewalks shall be as shown in Figures 2 and 3. Sidewalks shall be at least six (6) inches higher than the adjacent roadway and at least 4'-6" wide. Sidewalks shall be installed with the placement of the final top course pavement.

2.2 Sidewalks shall be constructed of four (4) inches of cement concrete on a minimum eight (8) inch gravel borrow sub-base conforming to the requirements of Section 701 of the "State Specifications". Concrete shall have a minimum 28 day compressive strength of 4,000 psi with maximum 3/4 inch aggregate. One layer of No. 4, 4 by 6 welded wire mesh shall be provided at mid depth. The walking surface shall be broom finished. Concrete surfaces shall be coated on the top and sides with an approved sealer. Expansion joints (1/2 inch open) shall be provided at least every twenty (20) feet, with score joints at four (4) foot intervals. All expansion joints shall use a preformed expansion joint filler conforming to Section 9.14.0 of the "State Specifications".

2.3 Sidewalks may meander to avoid destruction of existing major trees.

2.4 All driveway aprons that cross proposed sidewalks shall be concrete to match the concrete sidewalk. Concrete driveway aprons shall be installed with the installation of sidewalks.

## **3.0 GRASS STRIPS AND CLEARED AREAS**

3.1 All areas disturbed by construction and grading operations adjacent to the pavement and sidewalk, within the limits of the Right-of-Way shall be seeded. A minimum of six (6) inches of loam (depth after compaction) shall be applied and the areas shall be seeded with grass seed. Composition of seed mixture must be indicated on the Definitive Plan Landscape Plan. A dense robust vegetated area must be established and maintained until the development is certified as complete by the Board. These areas shall be periodically mowed and watered as required to maintain a neat appearance during construction of houses in the development.

#### **4.0 UNDERGROUND UTILITIES**

4.1 All underground utilities shall be marked with continuous plastic detector tape located in the backfill six (6) inches above the utility.

4.2 Water mains, hydrants and house lateral connections shall be constructed in accordance with the requirements of the Duxbury Water Department.

## **APPENDIX B**

### **DRAINAGE MATERIALS AND INSTALLATION SPECIFICATIONS**

#### **1.0 GENERAL**

##### **1.1 DESCRIPTION**

- a) This section specifies the materials and methods of construction required for the construction of a storm drainage system for a proposed development
- b) An applicant may propose alternate materials and methods of construction which deviate from the requirements of these specifications provided that such proposed alternates are of equal or better quality to the materials and methods of construction specified in this section. The Board will be the sole judge as to the acceptability of any proposed alternate.

##### **1.2 STATE SPECIFICATIONS**

Whenever the term "State Specifications" is used in this section in reference to materials and methods of construction, it shall mean the Standard Specifications for Highways and Bridges of the Massachusetts Highway Department, dated 1988, including amendments.

##### **1.3 NOTIFICATION**

The contractor shall notify the D.P.W. Director in writing at least forty-eight (48) hours in advance of beginning any construction within a public way.

#### **2.0 MATERIALS**

##### **2.1 PIPE**

- a) Pipe for storm drainage systems shall be either reinforced concrete pipe (Class III minimum) or corrugated plastic meeting the requirements of Sections M5.02.1 and M5.03.10 of the "State Specifications", respectively. Minimum pipe size shall be twelve (12) inch diameter. Corrugated plastic pipe shall not be used as flared ends or in other applications where the pipe is exposed to vandalism or ultraviolet radiation. Corrugated plastic pipe shall have a smooth interior.
- b) Pipe joint material for reinforced concrete pipe shall be rubber ring or plastic gaskets made of tough, flexible, chemical-resistant material of such size and shape to ensure satisfactory, water-tight pipe joints in conformance with ASTM-C443. Gaskets for joining pipe shall be compatible with the pipe system. Corrugated plastic pipe shall be

firmly joined by an approved coupling. Methods for joining pipe shall be approved by the DPW Director.

## **2.2 MANHOLES AND CATCH BASINS**

a) Manholes and catch basins shall be precast concrete units conforming to the requirements of Section M4.02.14 of the "State Specifications. Concrete for precast units shall have a minimum 28 day compressive strength of 4,000 psi. Precast units shall be designed for HS-20 loading. Joints between sections shall be tongue and groove, sealed with a rubber joint material conforming to ASTM C361. Exterior surfaces of precast units shall be sealed with a cold applied bituminous sealer. Size and dimensions of manholes and catch basins shall be approved by the DPW Director.

b) Castings for frames, grates, covers and hoods shall conform to the requirements of ASTM A48, Grade 30, minimum. All castings shall be coated with an approved black asphaltum.

c) Brick and mortar for field adjusting collars shall conform to the requirements of Sections M4.05.02 and M4.02.15 of the "State Specifications," respectively.

d) The minimum diameter of manholes shall be forty-eight (48) inches. Manholes shall have cast iron or reinforced plastic step rungs at twelve (12) inch spacing for access to the bottom. Steps shall be designed for a minimum load of 300 pounds. Manhole covers shall have the word "DRAIN" embossed on the cover unless otherwise directed by the DPW Director.

e) Catch basins shall have a minimum 3'-0" sump provided. Cast iron hoods shall be provided on all outlet pipes to prevent floating oil and debris from entering the drainage pipe.

## **2.3 PIPE OUTFALLS**

a) Flared end sections of pipe shall be reinforced concrete precast sections (Class III) conforming to the requirements of Sections M5.02.0 of the State Specifications".

b) Headwalls and wingwalls for end sections shall be constructed of reinforced concrete with a minimum 28 day compressive strength of 4,000 psi conforming to the requirements of Sections M4.02.00 (4,000 psi, 3/4 inch, 610 pound cement) of the "State Specifications." Steel bar reinforcement shall be ASTM A615, Grade 60. Headwalls and wingwalls shall be designed in accordance with the requirements of the AASHTO Standard Specifications for Highway Bridges, latest edition.

c) All pipe outfalls shall be protected from erosion with stone for pipe ends conforming to the requirements of Section M2.02.3 of the "State Specifications".

### **3.0 CONNECTIONS TO EXISTING STRUCTURES**

3.1 Cut holes in existing structure walls for new pipe connections to the minimum size required for pipe installation. Completely fill the space around the pipe with stiff cement mortar for the full thickness of the wall. All pipes shall be cut flush with the inside of structure.

3.2 Rim elevations of existing drainage structures shall be adjusted as required to meet new finished grades. Grade adjustments shall be made in the masonry leveling course.

### **4.0 EROSION CONTROL DURING CONSTRUCTION**

4.1 The drainage system shall be made operational as soon as it is complete. At no time shall a completed drainage system be prevented from operating. Until adjacent embankment cut and fill slopes are stabilized to prevent erosion, and during construction on adjacent lots, the contractor shall employ temporary erosion control measures as necessary to prevent sediment from entering the drainage system.

4.2 The type and design of erosion control measures that will be required will vary from site to site and the specific cause of environmental degradation. The protective measures may consist of, but are not limited to:

- a. Temporary sedimentation pools for the protection of rivers, lakes, streams and ponds
- b. Temporary earth berms and slope drains to control and channel heavy runoff, thus preventing washouts
- c. Ditches and swales at bottoms of slopes
- d. Check dams in swales and ditches to slow runoff
- e. Filters at drain inlets
- f. Energy dissipators at culvert outlets such as splash pads and rip rap
- g. Silt fences with or without hay bales
- h. Haybales

4.3 An erosion control plan describing materials and specific methods of erosion control must be submitted as part of the definitive plan submittal and shall be approved by the Board.

4.4 If the final top course of pavement will not be applied immediately, the catch basin grates shall be temporarily set at the base course elevation to allow storm water to enter the drainage system. When the final top course of pavement is applied, the grate elevations shall be adjusted to meet the final grades.

## **5.0 FINAL ACCEPTANCE**

Prior to final acceptance of the drainage system, all pipes, drainage structures, basins and swales shall be flushed and cleaned to remove any accumulated sediment and debris. All temporary erosion control measures shall be removed.

Until a roadway is accepted by the Town, the developer shall be responsible for snow plowing and sanding during inclement weather. In the case of a public safety emergency, should the Town Department of Public Works be required to address any accessibility issue, due to weather relating conditions, the developer shall be responsible for all costs incurred by the Town for failure to maintain safe and adequate access.

**APPENDIX C**  
**INSPECTION AND TESTING OF REQUIRED IMPROVEMENTS**

**1.0 GENERAL**

- 1.1 All work shall be reviewed by the Board and shall be approved and accepted or disapproved, rejected, and re-done correctly. The Board will employ a Registered Professional Engineer to act as its agent in the inspection of work to ensure compliance with these Subdivision Rules and Regulations. The Board's engineer shall make a report to the Board to approve or disapprove the work, citing specific reasons. The Board's engineer will make inspections as required in Section 3.0 below and as requested by the Board to check the adequacy of the work at various stages of work. The Board, its engineer, and others the Board may designate shall have the right to inspect the work at any time. The applicant shall provide safe and convenient access to all parts of the work for inspection by the Board or its authorized agents.
- 1.2 Work which has been disapproved or is not acceptable to the Board shall be corrected to comply with the approved plans. Work covered by subsequent work prior to acceptance or otherwise not available for inspection shall be considered not acceptable. Such work shall be removed as directed by the Board to insure availability for inspection as required.
- 1.3 Construction of the required improvements shall be inspected by the Board's Engineer or authorized agent, and unless the work is approved, including approval of materials, no further work shall be commenced. Inspections may include sampling for laboratory analysis or testing. Where samples are removed from the completed work, the applicant shall replace and restore such work, to the satisfaction of the Board's Engineer.

The Board's engineer may require certified copies of delivery receipts or bills of lading or other certification describing materials used. Samples shall be furnished at the expense of the applicant, and the applicant shall be liable for all costs and fees incurred by the Board as a result of transporting and testing materials.

**2.0 NOTIFICATION TO THE APPLICANT**

- 2.1 The Board will notify the applicant of the name and address of the Engineer designated as its representative. The applicant shall keep the Planning Director fully informed as to the status and progress of the work and shall notify the Planning Director directly in writing at least forty-eight (48) hours in advance, that the work has progressed to a stage that an inspection is required.

2.2 If the Board's Engineer is unable to make required inspections for forty-eight (48) hours after the work is ready for inspection, the applicant shall notify the Planning Director so an alternate to may make the inspection.

2.3 The applicant shall be liable for all costs and fees incurred by the Board as a result of requests by the applicant for an inspection of the work.

### **3.0 INSPECTION OF REQUIRED IMPROVEMENTS**

The following inspections to the required improvements must be made by the Board's Engineer or authorized agent. There may be additional inspections required by the Board.

3.1 First inspection: An inspection will be made upon completion of all clearing, grubbing and excavation. No fill shall have been placed at the time of this inspection.

3.2 Second Inspection: An inspection will be made of the completed drainage system (without backfill) as shown on the Definitive Plan. At the same time, an inspection will be made of the completed utility services (without backfill) as shown on the Definitive Plan. The inspection of the required utility services will be made by the agency responsible for the particular service. Each agency so involved will notify the Board's Engineer of the approval of such work.

Backfill of any portion of the drainage system or municipal services shall not be made until after receipt of notification of approval or acceptance by the Board's Engineer or agency responsible.

The inspection of the construction of the ways shall include the inspection of the back-filling and compaction of all utility trenches as may be installed by utility companies, and such work shall be performed in the manner as required by these Subdivision Rules and Regulations. It shall be the applicant's responsibility to insure compliance with these requirements.

3.3 Third Inspection: An inspection will be made of the compacted fill required to bring the roadways to their proposed grades. The applicant shall notify the Board's Engineer of his source of gravel for fill so that samples may be taken and analyzed if necessary. The applicant is advised not to proceed with the filling until the Board's Engineer notifies the applicant that the gravel is acceptable. If the applicant proceeds with the fill prior to such notice he does so at his own risk. The applicant shall not use a gravel source other than the one designated without prior approval from the Board's Engineer.

3.4 Fourth Inspection: An inspection will be made of the compacted roadway foundation. Gravel samples may be taken at the option of the Board's Engineer, in the same manner as detailed for the Third Inspection.

3.5 Fifth Inspection: An inspection will be made of the completed Class I Bituminous Concrete Base Course Type-I-1 for the roadway surface. Samples of the mix may be taken by the Board's Engineer for the purposes of performing an extraction test to compare the sample with the job-mix formula previously submitted.

3.6 Sixth Inspection: An inspection will be made of all work as required on bituminous concrete pavement sidewalks, curbing, grass plots, side slopes, monuments, bounds and street signs.

3.7 Seventh Inspection: A final inspection will be made of all subsequent work as required herein or on the Definitive Plan, including the final clean-up.

#### **4.0 ENGINEER'S REPORT**

4.1 The Board's Engineer will report that the work has been performed in accordance with these Subdivision Rules and Regulations and the Definitive Plan. The Board's Engineer will advise the Board when the work is not acceptable citing the reasons therefore.

4.2 At any time during the progress of the work, the Board's Engineer shall advise the Board immediately of any factors which may adversely affect the progress of the work.