

SECTION VII IMPROVEMENTS

The Applicant shall arrange, perform or contract and pay for all services and material needed for the installation of municipal services, including storm drains, sewerage, street lighting, water supply and fire alarm and their appurtenances and for the construction of streets, including roadbed preparation, pavement, driveway aprons, sidewalks, grass plots, curbing, non-regulating street signs, bounds, fences and guard rails, retaining walls, and erosion and sedimentation control devices and roadside improvement such as slopes and trees. All of these required improvements shall be installed or constructed in accordance with applicable provisions of these Rules and Regulations and as shown on approved definitive plans or as specified in the certificate of Planning Board's approval or in any covenants and agreements executed by the applicant and accepted or approved by the Board. Once municipal services are installed, the Applicant is responsible for operation and maintenance costs of these services until the road is accepted by the Town.

Construction activities are to occur only during the hours of 7 am through 7 pm, Monday through Saturday.

A. STREETS AND ROADWAYS

1. The entire area of each street or way shall first be cleared of all stumps, brush, roots, boulders, like material and all trees not intended for preservation. Stumps and trees not intended for preservation shall be cleared and shall not be buried. All loam and other yielding material shall be removed from the roadway area to the depth encountered and for the full width of the traveled way. Rock and boulders shall be taken away or broken off to a depth of not less than 12" below the bottom of the sub grade. All drains, public utilities and water mains including individual service laterals shall be installed prior to any further construction of the roadway.
2. All roadways shall be constructed in accordance with the West Boylston Department of Public Works Standard Specifications and shall be brought to a finished grade as shown on the profiles of the Definitive Plan and in accordance with the cross section adopted by the Planning Board, constructed as follows: At least 18 inches of good, clean bank gravel with no stones larger than 4 inches in diameter shall be in place and compacted. The surface shall be wet during compaction to bond the material. Thereafter the roadway shall receive a layer of select gravel of at least 4 inches in thickness, free of all stone over 1-1/2 inches in diameter and free from loam or other foreign material. This layer shall also be wet and compacted. All layers shall be compacted to not less than 95% of the maximum dry density of the material as determined by the standard AASHTO Test Designation T99 compaction test method C at optimum moisture content. All tests are at the applicant's expense.
3. After the roadway has been finished with the top gravel coat and inspected it shall receive the following surface treatment: The roadway shall be paved to a thickness of 3

inches measured after compaction with 2 courses of Class One Bituminous concrete pavement, Type I-I consisting of a 1-inch wearing course and 2-inch binder course. The aggregate shall be composed, mixed and laid hot in two courses as specified in the "Massachusetts Public Works Specifications, Section 460 for Class I Bituminous Concrete Pavement" as specifically set forth in Section 460.20 to 460.82 or as amended.

4. After road acceptance there shall be no street cuts for five years except in the case of, in the opinion of the Planning Board and the Director of the Department of Public Works, an emergency.

B. MUNICIPAL AND UTILITY SERVICES

1. All utilities within a subdivision shall be placed underground. Adequate provisions for street lighting shall be made where underground electrical service is provided.
2. Drains, sewer pipes and related equipment, such as manholes and catch basins, shall be constructed in conformity with specifications of the "Standards Specifications for Highways and Bridges," Department of Public Works, Commonwealth of Massachusetts, 1988, as amended.
3. Water pipes and related facilities such as hydrants, blow-offs and shut-off valves shall be installed within the subdivision as necessary, providing all lots on each street with adequate water supply for domestic and fire protection use. Hydrants shall be not farther than 500 feet apart. The cost for materials, labor and installation shall be borne by the Applicant. Materials and supplies used in such installation shall conform to West Boylston Water District specifications. Water mains shall be no less than 8 inches in diameter and shall be of larger size when required by the Board. All water pipe and facilities required by the Town's Consultant Engineer, including thrust blocks and curb stops shall be constructed prior to the finish grading of the roadway.
4. Adequate disposal of surface water shall be provided in the following manner:
 - a. Each drainage plan submitted for approval shall be accompanied by a design analysis prepared by a qualified Registered Professional Engineer. The analysis shall clearly indicate all the computations for the drain including determination of pipe size and strength, channel size and stability, and a statement concerning the disposition of flow. If the flow is discharged to the ground surface on land not belonging to the applicant then a drainage easement over the ground subject to flow shall be obtained by the applicant, and a statement to that effect shall be included with the design analysis.
 - b. The rational method shall be used with a rainfall event having a recurrence interval of 10 years for design computations for drain lines. This storm has an

intensity of 5.4 inches for a 5 minute time of concentration. Intensities for small areas correspond to the time of concentration for the area. A rainfall event having a recurrence interval of 50 years shall be used for roadway culvert design.

- c. The curve number or "C-value" used to calculate 'existing conditions' flows shall be based on a wooded or grassed land use and the appropriate hydrologic soil group. Runoff analysis shall be based on NRCS(SCS) methodology presented in TR-55 or TR-20. Pre- and post-development runoff for 2, 10 and 100 year-24 hour, Type III storm events shall be compared.
- d. The proper drain size may be calculated by using "Manning's Formula" with a "Kutter's" "n" value of 0.010 for smooth plastic pipe, 0.013 for concrete pipe, and 0.024 for corrugated metal pipe. For culverts, the minimum size of pipe shall be 12 inches in diameter. The culverts and drains shall be large enough to pass the design storm without surcharge.
- e. All storm drains shall be High Density Polyethylene (HDPE-N12) or reinforced concrete of adequate strength, except that, if approved by the Planning Board, bituminous coated, galvanized, corrugated metal pipe or pipe arch or other material may be used in off-street locations. Piping shall be in conformance to the State of Massachusetts Standard Specifications for Highways and Bridges, as amended.
- f. All storm drain pipes shall be laid on a slope so that the minimum design velocity shall be 3.0 feet per second. Consideration will be given to flatter slopes if adequate provisions are made for cleaning the pipes. All plans having drains with slopes which will produce pipe velocities less than 2.0 feet per second, flowing full, shall be accompanied by a letter stating the reason for the flat slope. The letter shall have a space for approval by the Planning Board or its Agent or Consultant Engineer, and the drain shall not be constructed until the letter has been approved. The maximum allowable velocity with the pipe flowing full shall be 15 feet per second.
- g. Inlets shall have an adequate waterway opening to pass the design storm with not more than 0.2 feet of surcharge. Grates and frames shall be "American made," of cast iron suitable for the loads which can occur either during the construction or afterward. Inlets shall be constructed either of brick and mortar with 8" thick walls, precast segmental concrete blocks not less than 6" thick mortared in place, or of precast pipe sections. Inlets shall be set on a base of either poured concrete 8" in thickness, or precast segmental base blocks not less than 4 inches in thickness. Inlets shall be used in off-street locations and the grate frame shall be mortared in position with the rim 0.2 feet below the grade of the finished ground surface. Side openings may be used in lieu of a grate if

the quantity of runoff exceeds the capacity of a grate of reasonable size as approved by the Planning Board or its Agent or Consultant Engineer. Inlets shall be 5.0 feet inside diameter, with a 4' sump and watertight hood or "T" over the outlet, and discharge to a manhole.

- h. Catch basins shall be installed on both sides of the roadway on continuous grades at intervals not to exceed 250 feet, at low points and sags in the roadway, near the corners of the roadway at intersecting streets. Such catch basins shall have a five foot inside diameter with a four foot sump and a watertight hood, and shall be provided with curb inlets. Drain pipes shall extend through manholes to the point of discharge, with a manhole being required at every change in direction, slope or diameter in the drain pipe, and at every intersection of drain pipes (see Plates 2 and 2A). All catch basins shall discharge into the drain system through a manhole.
- i. The pipe trench shall be excavated to the required line and grade shown on the approved plan including earth, boulders and ledge. Trenches for storm drains shall be no wider than the outside diameter of the pipe plus 16 inches for pipes through 18 inches nominal diameter, and the outside diameter plus 24 inches for pipe larger than 18 inches. This trench width shall apply from the top of the pipe to the bottom of the trench. Above the top of the pipe the trench may be as wide as necessary to properly install the pipe. Trenches with side slopes steeper than the natural angle of repose of the soil shall be sheeted as necessary to avoid cave-ins and sloughing.

All excavations shall be properly barricaded and lighted at night where they are close to pedestrian or vehicular traffic. Before any pipe is placed in newly constructed fill, the Contractor shall, as directed, place the fill 2 feet above the top of the pipe after which the pipe trench may be excavated. If any cross pipes, conduits, drains or other unforeseen obstacles are encountered in the excavation which cannot be relocated, the drain shall be redesigned to avoid the obstruction in a manner suitable to the Planning Board or its Agent or Consultant Engineer. Possible obstructions to the line shall be investigated prior to the construction of the drain in its immediate vicinity.

- j. Trenches may be excavated with a flat bottom, but the full length of the pipe, except the bell, must rest upon undisturbed soil except as hereinafter specified. Where trenches have been over-excavated, a selected earth or gravel foundation, thoroughly compacted, shall be provided for proper pipe bedding. Soil, which is considered to be unstable by the Planning Board or its Agent or Consultant Engineer, shall be removed to a depth of not less than 2 feet below the bottom of the pipe and replaced with compacted sand and gravel to the bottom of the pipe. Unstable soil or other excavated material shall be disposed

of off site. When PVC or HDPE pipe is used, bedding and backfill shall be brought to the springline of the pipe.

- k. Pipe shall be laid starting with the downstream end. Grade boards or other approved devices shall be provided to insure that the pipe is laid true to line and grade. Reference bench marks shall be clearly marked to enable the Inspector to quickly check the grade and invert elevations. The joints of all pipes shall be filled with mortar composed of one part Portland Cement to three parts clean sharp sand. Jute shall be required on joints of all pipes 15 inches or larger. Lime may be added up to 25 percent of the cement and enough water to make a workable mix. The downstream pipe shall be laid with groove or bell end facing upstream in the proper position, and a dab of mortar shall be placed in the bell or groove. The spigot or tongue end shall be placed in the bell or groove, such that the inverts match and, the peripheral space shall be filled with stiff mortar. All mortar squeezed out on the inside of the pipe shall be removed before it sets.
- l. After the pipe has been laid and inspected, the trench shall be backfilled. The space under the pipe haunches shall be carefully filled with selected material, free from stones or frozen earth, and compacted carefully to prevent the pipe from moving. The layer of backfill up to 12 inches over the top of the pipe shall also be of select material free from stones and frozen earth, and compacted. The remainder of the trench shall be backfilled in 12 inch layers except as noted below, and each layer shall be fully compacted in an approved manner. Under roads or other traffic areas the trench shall be backfilled in 6 inch layers with each layer compacted to the density of the surrounding soil. Pavement and base course materials removed during the excavation process shall be replaced with pavement and base course to match those removed. No old pavement shall be backfilled into trenches. When, in the opinion of the Planning Board or its Agent or Consultant Engineer, the excavation is deep enough to warrant it, temporary pavement shall be provided as directed. Trenches not in pavement shall be left in mounded condition as directed by the Planning Board or its Agent or Consultant Engineer.
- m. Security bars shall be provided at the entrance and outfall of all culverts or open pipe drains greater than 12" diameter. Bars shall be constructed such that it will not pass an 8" diameter sphere or become easily clogged, or of a design approved by the Planning Board or its Agent or Consultant Engineer, and the grate shall be installed in a manner approved by the Planning Board or its Agent or Consultant Engineer. A suitable drawing of the grate and method of installation shall be submitted for approval with the plans for the drains and appurtenances.

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- n. Concrete or Field Stone masonry headwalls shall be provided at both ends of culverts and the discharge ends of storm drains. They shall conform to the table on Plate 3 and 3A.
- o. The discharge ends of all drains with flowing full velocities of 4 feet per second or more shall be protected with bank/apron protection of a width not less than 10 times the nominal pipe diameter from the end of the discharge pipe. The bank/apron protection for exit velocities of 4 to 10 feet per second shall be composed of a minimum of a 12 inch thick layer of stones placed upon a bed of sand and gravel 6 inches in thickness, or an appropriate geotextile membrane: The stones shall be sized so that not less than 60 percent shall have a dimension of 12 inches or more. The stones after being laid shall be carefully chinked by hand to make a reasonably smooth and shaped surface. Where exit velocities are greater than 10 feet per second, the thickness of stones and the dimensions of the individual pieces shall be sized to prevent displacement by the flow. In this case, details shall be submitted to the Planning Board or its Agent or Consultant Engineer for approval. In addition, bank/apron protection will be required for all drainage channels having design flow velocities greater than five (5) feet per second and for any change in direction or intersection of drainage channels. Methods other than using stone are encouraged, and specifications and details need to be submitted.

C. SIDEWALKS AND BIKEWAYS

- 1. All sidewalks shall be designed in conformance with conditions specified by the Architectural Access Board and the *Americans with Disabilities Act of 1990, 42 U.S.C. §1201 et seq.* All sidewalks will have a 5-foot minimum width.
- 2. Sidewalks and bikeways shall be in accordance with the specification below:
 - a. Concrete sidewalks: 4" thick cement concrete, reinforced with No. 4, 4" x 4" mesh, 2,500 lb. concrete, wood float finished, laid on a base of at least 6" of well compacted bank gravel. An expansion joint (3/4" open) shall be provided at least every 20' dividing joints shall be scored into walk every 4'. Base gravel material shall be in accordance with the specifications outlined above for street construction, provided that no stone shall have a dimension in excess of 2 ". It shall be thoroughly compacted.
 - b. Asphaltic concrete sidewalks and bikeways: The foundation shall be 6" of bank gravel as specified in Section (a) above. The wearing surface shall be laid in two courses, a 1" bottom course and a 1" top course, the thickness to be measured after compaction. The material and application shall conform to the

specifications for roadway surfacing. All edges of the walks shall be formed with wood screeds which are securely anchored and left in place.

- c. Use of permeable pavement, as approved by the Planning Board, shall be designed in accordance with the Massachusetts Stormwater Technical Handbook (as amended) or equivalent design guidelines and specifications approved by the Planning Board. Runoff shall be directed away from permeable paving surfaces as the introduction of dirt or sand onto the permeable paving surface when transported by runoff from elsewhere will contribute to premature clogging and failure of the paving. Permeable paving should be one of the last items to be constructed on a development site, after most heavy construction vehicles are finished and after the majority of the landscaping work is completed. Permeable pavement shall not be used on slopes steeper than 5%. Permeable pavements are not appropriate for gas stations, truck stops, or areas in which high concentrations of hydrocarbons or other pollutants can be leached into soil.
3. The following design guidelines shall be observed during the construction of bikeways:
 - a. Minimum pavement width: 8 feet;
 - b. Maximum grade: 8%;
 - c. Minimum center line radius: 25 feet;
 - d. Vertical curves shall be required for changes in grade which exceed 2%;
 - e. Curb cuts shall be provided at the intersection of bikeways and streets.
 - f. Signs of a design approved by the Board shall clearly mark each "Bikeway."

D. CURBS

1. Curbing is required on both sides of all roadways with piped drainage systems and shall be one of the types specified by the Planning Board except that type VA4 granite curb shall be used in the following cases:
 - a. All finished grades over 6%.
 - b. All headers with transition section at each end for catch basins.
 - c. All street intersections along turning radii and extending 6 feet tangent along each side of each roadway at the intersection.

2. Approved types of Curbing:
 - a. Sloped granite edge stone type SB.
 - b. Granite curbing type VA4.
 - c. Bituminous concrete berm "Modified Cape Cod Berm".
3. Terminal Curb: tapered terminal curb section of vertical granite curb construction having a minimum length of 4 feet and a tapered section 2 feet in length will be required as the first and last stones along each section of granite curbing and adjacent to each separately placed curb inlet.

E. SIDE SLOPES AND PLANTINGS

1. The area in back of the sidewalk shall be sloped at the rate of three to one (maximum) to a point where it precisely coincides with the finished grade of abutting lots.
2. On all areas within roadway, walkway, and bikeway right of-ways except areas not receiving surface treatment or areas requested by the Board to be left in a "natural condition" the ground shall be cleared and grubbed and at least 6 inches of an approved loam topsoil shall be applied. These areas shall be protected from erosion and seeded with an acceptable uniform, and healthy growth and until building construction has been completed.
3. No removal of loam from the development shall be made until a 6 inch thickness of loam shall be provided throughout the entire area of all lots and on the planting strips along the roadway. Only such areas as roadways, driveways, building sites and areas requiring filling may be stripped of topsoil. Areas on a lot where cut or fill is not required for construction of the buildings on that lot shall not be stripped of topsoil. Only after the above requirements have been met may surplus loam be disposed of in accordance with the Earth Removal Bylaw of the Town.

F. STREET LIGHTS AND SIGNS

1. The Applicant shall be responsible for furnishing and erecting street lights at locations and the type approved by the Planning Board and the West Boylston Municipal Lighting Plant. Lights shall be partial- or full-cutoff style with low-glare luminaires.
2. Street signs shall be erected at all intersections. These signs shall meet the specifications established by the Board of Selectmen, and shall be erected prior to the construction of the first building on the street. From the time of rough grading until

such time as each street is accepted by the Town as a public way, the sign posts at the intersection of such street with any other street shall have affixed thereto a sign designating such street as a private way. The lettering shall be so arranged that the word "Private" may be painted out or removed when the street is accepted by the Town as a public way. Street sign posts shall be seated on concrete.

3. Street names shall be approved by the Planning Board. The applicant shall contact the Historic Commission for recommendations.

G. TREES

1. The Applicant shall provide and plant at approximately 75-foot intervals and ten (10) feet off the right of way at least one suitable shade tree, having a minimum height of 10 feet. Both the species and the location of which trees are to be planted shall be approved by the West Boylston Tree Warden. Existing trees of at least equal size that have been preserved within the right-of-way may be substituted to fulfill this requirement.
2. If the Applicant finds it necessary to remove any tree owned by the Town, or if the Planning Board finds it necessary to have the Applicant remove any such trees, the Applicant may do so with the approval of the Tree Warden, and shall replace any and all at his own expense with new plantings of a size and species approved by the Tree Warden. The locations for these plantings shall be designated by the Tree Warden, and shall be guaranteed by the Applicant for a period of one year.

H. MONUMENTS

1. Monuments shall be made of granite and installed at all way intersections, at all points of change in direction or curvature of ways and at other points where, in the opinion of the Planning Board, permanent monuments are necessary. Concrete monuments shall be installed at all points of change in direction or end points of easements. All monuments shall be a minimum of 4 inches square by 4 feet long and shall be set 4 inches above the proposed grade. No permanent monuments shall be installed until all construction which could destroy or disturb the monuments is completed.
2. The Planning Board shall require a certificate by a registered land surveyor to be obtained at the Applicant's expense, indicating that these monuments are in place and accurately located. The certificate is to be presented to the Consultant Engineer prior to acceptance of the road by the Town.

I. DRIVEWAYS

Driveways shall be installed in conformity with the Town of West Boylston Driveway Location Rules and Regulations, dated February 1, 2004, or as amended, and compliant with the design specifications on the Typical Driveway Detail. A Street Access Permit shall be required from the Department of Public Works for all driveways.

J. CLEAN UP

The entire area must be kept clean during construction and cleaned up so as to leave a neat and orderly appearance free from debris and other objectionable material.