

SECTION 4

DESIGN STANDARDS

A. General

Plans for a subdivision will not be approved unless the subdivision and its ways are laid out in compliance with the requirements of these design standards. It should be noted that these design standards are considered as a minimum acceptable to the Board under its Rules and Regulations for subdivision control. Applicants are encouraged to design the subdivision at a level above these standards so as to create an attractive subdivision with the maximum livability, usefulness, and amenity.

It was not intended that these design standards would be applicable to all possible situations which may arise in the design of a particular subdivision. In situations not covered herein, and particularly in the case of subdivisions for business or industrial purposes, planned unit development, multifamily development, and similar large scale developments, the subdivision shall be designed to the satisfaction of the Board in accordance with such design standards as will satisfy the purpose of the Subdivision Control Law. In such cases, due consideration will be given to the prospective character of the subdivision, the anticipated amount of travel upon the ways therein, and/or to the relevant factors of the particular situation.

B. Streets (or Ways)

(1) Types of Streets

The following types of streets are hereby established for the purpose of developing design criteria in accordance with the expected use and type of traffic anticipated thereon.

- (a) Major Streets A street which, in the opinion of the Board is being used or will be used as a thoroughfare between different portions of the Town of Hingham, or which will be the principal access to a business or industrial subdivision.
- (b) Secondary Street A street intercepting several minor streets and which, in the opinion of the Board may carry traffic from such minor streets to a major street or community facility, including the principal access streets or principal circulation streets of residential subdivisions, and including all streets, except those designated as major streets, or a business or industrial subdivision.

- (c) Minor Street A street which, in the opinion of the Board is being used or will be used primarily to provide access to abutting lots, and which is not intended for use by through traffic.
- (d) Limited Residential Street A street, or network of streets, less than 400' in length measured from the right of way of the nearest through street to the end of the proposed right of way, ending in a turnaround to be in accordance with the International Fire Code (IFC), as shown in Appendix D, and which intersects no other streets except at its origin, which may never serve more than 7 lots, which in the opinion of the Board is of such topography that its layout and design in accordance with the Minimum Design Standards for limited residential streets creates no risk to the public safety or convenience, and which the developer agrees will never be lengthened. The requirements of this section shall be guaranteed by a covenant running with the land of the subdivision and each lot thereof. The Board will not entertain any request for waiver of the length limitation for such a street.
- (e) Private Local Street A street, no more than 300' in length measured from the right of way of the nearest through street to the end of the proposed right of way, ending in a turnaround, to be in accordance with the International Fire Code (IFC), as shown in Appendix D which intersects no other streets except at its origin, which may never serve more than 3 lots, which in the opinion of the Board is of such topography that its layout and design in accordance with the Minimum Design Standards for private local roadway creates no risk to the public safety or convenience, and which the developer agrees will never be lengthened. All lots, including existing developed lots that are part of the locus parcel are required to access the new roadway. The requirements of this section shall be guaranteed by a covenant running with the land of the subdivision and each lot thereof. The road is to remain private in perpetuity. The Board will not entertain any request for waiver of the length limitation for such a street.

(2) Location of Streets

- (a) General The streets shall be designed and located so as, in the opinion of the Board, to be continuous and in alignment with existing streets; to provide adequate access to all lots in the subdivision, by streets that are safe and convenient for travel; to lessen congestion in such streets and adjacent public streets; to reduce danger from the operation of motor vehicles; to secure safety in case of fire, flood, panic and other emergency; to insure compliance with applicable Zoning By-laws; to secure adequate provision for proper drainage and water, sewers and other municipal services, compatible with existing town municipal services and waterways; and to coordinate the streets in the subdivision, with each other and with the existing street system of the Town, and the streets in neighboring subdivisions.

- (b) The proposed streets shall be designed and located so as to conform so far as practicable to the Master Plan if any, as adopted in whole or in part by the Board.
- (c) Provision, including grant of legal right, satisfactory to the Board shall be made for the proper projection of streets, or for access to adjoining property which is not yet subdivided. Where, in the opinion of the Board, access, safety and congestion considerations necessitate, a developer shall be required to construct or improve at his own expense, private ways outside the subdivision to connect adequately with public ways.
- (d) Due consideration will be given by the Board to the attractiveness of the layout and to the conformance of the ways to the topography.
- (e) Reserve strips prohibiting access to streets or adjoining property shall not be permitted, except where, in the opinion of the Board, such strips shall be in the public interest.
- (f) In case access to a subdivision crosses land in another municipality, the Board may require certification, from appropriate authorities, that such access is in reasonable accord with the Master Plan and conforms to subdivision requirements of such municipality and that a legally adequate performance bond has been duly posted or that such access is adequately improved to handle prospective traffic.
- (g) The intersection of proposed streets of the subdivision with existing private or public ways must conform to all design standards of these Rules as if the intersection were entirely within the subdivision.

(3) Width, Alignment and Grades of Streets

- (a) The criteria contained in Table 1 shall be referenced to AASHTO chapters observed in the design of streets. The layout shall be designed to achieve the following minimum stopping sight distances within the subdivision unobstructed visibility: for (a) limited residential streets, 150 feet; (b) minor through streets and secondary streets, 250 feet; and (c) major streets, 500 feet. Adequate sight distance shall be provided and maintained at all intersections with existing and proposed roadways.
- (b) Required Sight Distance. The required intersection and stopping sight distances shall be calculated using the methodology defined in the latest edition of the American Association of State Highway and Transportation Officials, "A Policy On Geometric Design of Highways and Streets", and based on the higher of either: a) the measured 85th-percentile speed of the major roadway; b) the posted speed limit; or c) the regulated travel speed

pursuant to M.G.L. Chapter 90, Section 17. The 85th percentile speed shall be determined from an acceptable engineering speed study conducted over a minimum of 48-hours.

- (d) Required Plan Details to Allow Sight Distance Evaluation. The Definitive Subdivision Plan shall detail existing trees (of a caliper greater than 6 inches), stone walls, fences, topography, driveways and streets within 400 feet and pavement limits so as to allow the Planning Board's technical consultant to adequately evaluate intersection sight distance. The Definitive Subdivision Plan shall include the measured sight distance triangles and any applicable approach grades. Sufficient sight easements shall be provided before a plan is approved.

Table 1
Minimum Design Standards for Streets

Type of Street Way	Width of Right of Way	Width of Traveled	Edge Treatment	Sidewalk	Minimum Centerline Radii	Maximum Centerline Grade	Minimum Centerline Grade	Maximum Curb Radius at Street Intersection	Minimum Length of Tangent Between Reverse Curves	Depth of Pavement	Sub-base
Major	70'	40' *	24" CCB ES or VGC with 2" SS	5' ES	500'	5%	1%	50'	150'	3" Base 3" Top	24" - 8" Lifts
Secondary	55'	28' *	24" CCB ES or VGC with 2" SS	5' OS	300'	5%	1%	30'	100'	3" Base 1.5" Top	24" - 8" Lifts
Minor	46'	22' *	12" CCB ES	5' OS	200'	8%	1%	30'	0	3" Base 1.5" Top	24" - 8" Lifts
Limited Residential	40'	20' *	12" CCB ES	0	150'	8%	1%	30'	0	3" Base 1.5" Top	24" - 8" Lifts
Private Local	40'	20'	12" CCB with 4' SS ES	0	150'	5%	1%	30'	0	3" Base 1.5" Top	12" - 6" Lifts

LEGEND: CCB = CAPE COD BERM ES = EACH SIDE OS = ONE SIDE VGC = VERTICAL GRANITE CURB SS = STABILIZED SHOULDER

These design specifications represent minimum standards. More stringent design criteria shall be required by the Board when deemed necessary for present and future vehicular traffic.

Notes:

* The Board may require that the traveled way be separated by a raised median strip with a width to be determined by the Board. In this case, the traveled way shall consist of two roadways, each with a minimum width of 20 feet or such greater width as the Board may specify.

Major and secondary streets shall be super elevated in the cross section in the horizontal curve in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Policy on Design of Urban Highways and Arterial Streets as most recently amended. The maximum super elevation shall be 0.06 ft. per foot

(6 percent). Secondary streets shall be designed for a speed of not less than 30 mph and major streets for a speed of not less than 40 mph.

- (b) The Board may require delineation of adequate easements of slope on adjoining land in proper cases.
- (c) Streets shall be laid out so as to intersect as nearly as possible at right angles. No street shall intersect any other street at less than sixty (60) degrees.
- (d) Streets intersecting another street shall be laid out opposite one another or shall be a minimum of two hundred (200) feet between centerlines measured along the centerline of the intersected street whether the intersecting roadway is on the same or opposite side of the street.
- (e) Where the angle of intersection between two streets varies more than ten (10) degrees from a right angle, the radius of the curve at the curb line at the obtuse angle shall be less and at the acute angle shall be correspondingly greater than the radius specified in Section 4,B.,(3),(a) above to the extent approved or required by the Board.
- (f) A leveling area shall be provided having not greater than three (3) percent grade for a distance of one hundred (100) feet, measured from the nearest right-of-way line of the intersecting street.
- (g) All changes in grade exceeding five tenths (0.5) of one percent shall be connected by vertical curves of sufficient length to afford the sight distances required in sub-paragraph (3),(a) above.
- (h) In the case of a subdivision in which connections to the Town sewer system are required, the sanitary sewer system within the subdivision shall be subject to the approval of the Sewer Commissioners.

(4) Dead-End Streets

- (a) Dead-end streets, excepting limited residential streets and private local streets, shall not be longer than 800' in length. All dead-end streets shall be measured from the nearest point of multiple access (throughway) and then along the centerline or centerlines of the street or streets to the furthest limit or limits of the right-of-way of the required turnaround. For the purposes of this regulation, the point of multiple access shall be the intersection of the dead-end street's centerline with the right-of-way limit of the intersected way or ways.
- (b) Dead-end streets shall be provided at the closed end with a turnaround having an exterior line (way line) radius of at least sixty-five (65) feet, the roadway to have a radius of at least fifty-five (55) feet. An island of 25 feet in radius, suitably landscaped with grass, ground cover, trees, natural rock and/or elements blending with the surroundings shall be provided in the center of the turnaround. The island shall be enclosed with sloped granite curbing with 6" reveal from the roadway pavement. (See Figure 2 for

Turnaround and Island Plan). An island shall not be required in a temporary turnaround; however, the turnaround shall be paved. When the dead-end street is extended, the turnaround easement shall terminate, and the applicant shall be required to remove, regrade, and restore the turnaround area to the satisfaction of the Planning Board.

C. Subsurface and Storm Drains

(1) Compatibility and General Design

All subsurface drains and storm drains and systems thereof shall be constructed in a manner which will ensure their complete compatibility with the existing town municipal services, wetland resource and flood plain areas and waterways. The drainage systems shall be designed to the satisfaction of the Planning Board with provision for such facilities and arrangement thereof as in the Board's opinion are reasonably necessary to provide adequate disposal of surface water from all streets and land within and adjacent to the subdivision.

Drainage systems shall be designed so as to avoid the flooding of downstream properties through the maintenance of existing rates of runoff. Where site or downstream flooding currently exist, the proposed drainage system shall be designed such that the existing volume of storm water passing from the proposed subdivision shall be maintained during the downstream flood period. These Regulations specifically prohibit retention or direct subsurface discharge of storm water.

(2) Groundwater Interception

Subdivision roads shall be designed in a manner which ensures that roadway storm drains and structures are placed above high groundwater. Evidence of high groundwater in low or cut areas shall be observed by the Planning Board's engineer and be provided to the Board as part of the definitive subdivision application. Subdrains shall be installed in all ledge cuts and shall extend at least fifty (50) feet beyond the limits of such cuts. The subdrain shall consist of a minimum of one longitudinal drain for each side of the paved roadway. In addition, laterals may be required as directed by the Board in areas in which an undue amount of water could accumulate in the subgrade. The system of subdrains shall be discharged into the storm drain system or be disposed of in a manner satisfactory to the Board.

(3) Storm Drains

A complete storm drain system shall be designed for each street of the subdivision to the satisfaction of the Board and shall be so laid out and of sufficient size to permit unimpeded flow of all portions of the street system so that water does not accumulate thereon, to intercept storm water runoff from the adjacent lots of the subdivision, and to eliminate undesirable or unnatural accumulation of water on any portion of the subdivision or surrounding property, and to be completely compatible with the existing town municipal services and waterways. Those conditions which result from a ten (10)

year storm shall be assumed as a basis for the design of the street drains. Twenty five (25) year conditions shall be the basis for design of stream culverts passing beneath roadways. Design for larger storms may be required in cases where the overall hydrology model relies on the storm sewer network to convey runoff counter to natural grades. Stormwater connections from abutting property into roadway drain systems is prohibited. The storm drain system shall include berms, gutters, catch basins, manholes, culverts, drain lines, concrete headwalls, detention areas and such other items as may be required to complete the system to the satisfaction of the Board.

- (a) Catch basins shall be used exclusively for the roadway drain system's intake of surface storm water and shall be located in pairs, one on each side of the roadway, at all low points or sag curves in the roadway, at intervals of not more than three hundred (300) feet on continuous grades of the roadway, not more than one hundred fifty (150) feet to either side of a low point, at or near the corners of the roadway at intersecting streets, and at the end of turnarounds pitched toward the dead end or at the neck if pitched toward the open end of road. Invert and rim elevations shall be shown on both plan and profile.
- (b) Manholes shall be located at all changes in direction of a drain line, either horizontally or vertically, or at the intersection of two (2) or more drain lines, or so located that no drain line greater than three hundred (300) feet in length would exist without a manhole. Manhole inlet and outlet inverts shall be at the same elevation. Manholes shall not be used to slow the flow of storm water. Invert and frame elevations shall be shown on both plan and profile.
- (c) Culverts shall be designed on the assumption that the entire drainage area is built up to that density and in the manner which the applicable section of the Zoning By-Law allows. All culverts shall have a standard concrete or masonry headwall at each end, and any culvert over thirty (30) inches in diameter shall have standard concrete wing walls. Culverts having inside diameters of eighteen (18) inches or greater shall be enclosed at each end with a secure metal grille.
- (d) All the drains shall be a minimum of twelve (12) inches in diameter and shall be laid on a slope of not less than one-half of one (0.5) percent. The designed maximum velocity shall not exceed twelve (12) feet per second, and the minimum velocity designed for shall not be less than two (2) feet per second. All outfalls shall extend to, and be compatible with, either a natural waterway or an existing drainage system. Where detention areas are used to control storm water runoff, the detention area shall be considered a part of the drainage system. Discharges into detention areas shall be above the area's 10 year flood elevation. The ground elevation of all outfall pipes, swales, channels or drainage ditches discharging to a stream, brook, pond, marsh or other wetland shall be at or above the 10 year flood elevation; or at higher elevations if required by the Planning Board because of special

local situations based on consultation with the Conservation Commission and others (see 3,C.,2,(j)). Provision shall be made for the disposal of surface water intercepted or collected by the system in such manner that no flow is conducted over Town ways, or over the land of others unless a drainage easement is obtained. Where adjacent property is not subdivided, provision shall be made for extensions of the system by continuing appropriate drains to the boundary of the subdivision at such size and grade as will allow their proper projection.

- (e) A standard concrete or masonry headwall, with wing walls where required, shall be provided at the outfall end of all drains.
- (f) A tide gate shall be provided at the discharge end of all drainage outlets into tidal waters.
- (g) Proper connections shall be made with the existing public drainage system. Where adjacent property is not subdivided or developed, provision shall be made for extension of the system by continuing appropriate drains to the exterior boundaries of the subdivision at such size and grade as will allow for their proper projection. Where the Planning Board determines that the public interest and the best interest of the Town and the subdivision will be served by extension of the drainage system outside the boundaries of the subdivision, the Planning Board may require the Applicant, at his own expense, to continue the layout and construction of the drainage system to a point outside the boundaries of the subdivision where the drainage system may be connected to, and be compatible with, either a natural waterway or an existing public drainage system.

D. Open Drainage Systems

Open drainage systems of swales, ridges and slopes shall be designed to fit the natural contour of the land as much as possible. Disturbed land shall be landscaped to conform to the surrounding area and planted to eliminate the possibility of erosion and siltation. In no case shall side slopes in disturbed areas be greater than twenty-five (25) percent. Swales and drainage channels shall have a minimum grade of one-half (0.5) percent and a maximum grade of four (4.0) percent, although for small areas draining not more than one half acre, grades of up to ten (10) percent are permissible. The ground shall be sloped so that there is no stagnant water or artificial pools on the site attributable to the open drainage system. Drainage channels and swales shall be provided with easements which shall also permit access by the Town of Hingham for maintenance purposes. Easements shall conform to Section 4,E. of these Rules and Regulations.

Where the Planning Board determines that the public interest and the best interest of the Town and the subdivision will be served by extension of the drainage system outside the boundaries of the subdivision, the Planning Board may require the Applicant, at his own expense, to continue the layout and construction of the drainage system to a point outside the boundaries of the subdivision where the drainage system may be connected

to, and be compatible with, either a natural waterway or an existing public drainage system.

E. Stormwater Management Structures

Storm water management structures for detention and/or retention of stormwater shall be located on a separate lot which shall, in the case of accepted roadways be conveyed to the Town and in the case of a private roadway be conveyed to a Homeowner's Association. Stormwater management structures for detention and/or retention of stormwater shall be open basins constructed of natural earth material with loam and seed surface treatment and shall be designed so as to blend into the existing topography. Side slopes shall not exceed twenty-five percent (25%) 4H:1V and shall be placed beyond the limit of wetland and flood plain resource areas and above high ground water elevations. Groundwater separation shall comply with Department of Environmental Protection requirements for infiltration systems and be a minimum of 12 inches for detention systems. The lot in which stormwater structures are located need not comply with zoning requirements for a buildable lot but shall have a minimum of 20 feet of frontage for access and shall include the access, slopes necessary to construct the basin and the outlet including erosion protection at the outlet and the path of flow to the property line. For Private Local Streets stormwater detention/retention systems do not have to be on a separate lot and can be designed as surface or subsurface systems, subject to an adequate Homeowner's Association to assure maintenance and replacement. Easements for stormwater structures not on a separate lot will be required for a Private Local Street. Easements on private lots shall not be included in the calculation of minimum lot area.

F. Easements

(1) Easements for municipal services shall be provided as required and shall be at least twenty (20) feet wide (exclusive of underground services) and centered on the lot line where practical, unless otherwise specified.

(2) Where a subdivision is traversed by a water course, drainage way, channel or stream, the Board may require that there be provided a storm water easement or drainage right-of-way of adequate width to conform substantially to the lines of such water courses, drainage way, channel or stream, to provide for construction, maintenance, or other necessary purposes.

G. Sidewalks

Sidewalks of adequate width (Figure 1) shall be constructed beside the roadway along each way in a subdivision as follows:

Major Streets - both sides

Secondary Streets - one side

Minor Streets - one side

Limited Residential Streets - no sidewalks

Private Local – no sidewalks

H. Lots

All lots within a subdivision shall comply with the Zoning By-Law of the Town of Hingham, or with the terms of any variance from such requirements which may have been specifically granted by the Board of Appeals. Percolation tests shall be required in accordance with the Supplementary Rules and Regulations for the Disposal of Sanitary Sewage of the Hingham Board of Health.

I. Open Space

Before approval of a plan the Board may also, in proper cases, require the plan to show a park or parks suitably located for playground or recreation purposes, or for providing light and air. The park or parks shall not be unreasonable in area in relation to the land being subdivided and to the prospective uses of such land. The Board may, by appropriate endorsement on the plan, require that no building be erected upon such park or parks for a period of not more than three years without its approval.

Open space areas shall be bounded prior to the release of any lots.

J. Protection Of Natural Features

Due regard shall be shown for all natural features, such as large trees, water courses, scenic points, historic spots and similar community assets which, if preserved, will add attractiveness and value to the subdivision or to the Town. Preservation areas that are deed restricted in perpetuity are strongly encouraged as a tool to retain the natural landscape features.

K. Cases In Which Ways Are Not Adequate

In any case in which the Board deems that ways either within or outside of the subdivision not adequate, it may approve the plan on conditions limiting the lots upon which buildings may be erected and the number of buildings that may be erected on particular lots without further consent by the Board to the access provided, and in each such case shall endorse such conditions on the plan to which they relate, or set them forth in a separate instrument attached thereto to which reference is made on the plan and may require the applicant to record a covenant running with the land of the subdivision and each lot thereof guaranteeing the limitations set as a condition of its approval as set forth in this section. The Board may deem said ways to be not adequate if such ways, either within or outside the subdivision, fail to meet the Design Standards set forth in these Rules.

L. Municipal Services

- (1) The Board will require that the plan show municipal services of the kinds existing in the public ways nearest to the subdivision, or which in the opinion of the Board

are likely to be laid in such public ways within the reasonably near future, and which will be necessary for the health, safety, or convenience of the prospective occupants of the subdivision.

- (2) The municipal services and sleeves for house connections shall be located as shown on the "Typical Road Cross Sections". The number and type of sleeves for house connections will be as directed by the Board.
- (3) The design of the sewer system, if required, shall be as directed and approved by the Sewer Commissioners.
- (4) The design of the water system and provision for hydrant service shall be as directed or approved by the Manager of Aquarion Water Company.
- (5) Where adjacent property is not subdivided or developed, provision shall be made for proper projection of the sewer system, if required, by continuing appropriate mains to the exterior boundaries of the subdivision at such size and grade as will allow for the projection.
- (6) The location and type of hydrants, and size of pipe serving the hydrants, shall be as directed or approved by the Chief of the Fire Department and/or the Fire Marshal and in accordance with Article 32 Section 9 of the General Bylaws of the Town. A minimum flow of 1,000 gallons of water per minute shall be required at the hydrant. Proper and compatible connections shall be made with the existing public water, and where required, sewer systems. Where in the opinion of the Planning Board the capacity of an existing public system is inadequate to accommodate the entire subdivision, the Planning Board may, at its option, either (i) approve only that portion of the subdivision which in its opinion can be adequately accommodated, or (ii) require the Applicant to make arrangements satisfactory to the Board for connecting the subdivision water pipes with a proper water supply.
- (7) The design, layout and location of the electric power system shall be designed by the Hingham Municipal Lighting Plant, and the design and location of street lighting shall be as agreed upon by the Hingham Municipal Lighting Plant and the Planning Board.
 - a. Hingham Municipal Lighting Plant requires a 10' wide electric easement in and around all HMLP infrastructure.
 - b. Hingham Municipal Lighting Plant will provide the easement documents to be registered at the Plymouth County Registry of Deeds.
 - c. Hingham Municipal Lighting Plant requires AutoCAD of the land to provide the electric layout of the new development.
- (8) The applicant shall consult with the Telephone Company relative to the installation of telephone service.

- (9) All electrical, telephone and other utility wires shall be placed below ground in every subdivision unless the Board determines that such placement is not feasible or is not in the best interest of the Town.

M. Soil Surveys

Where appropriate, the Planning Board may require soil surveys to establish the suitability of the land for the proposed storm and sanitary drainage installations. Soil testing as required shall be performed by a Certified Soil Evaluator and witnessed by an agent of the Planning Board.

N. Foot Paths, Bridle and Bicycle Paths

The location and width of foot paths, bridle and bicycle paths will be designed to maximize the safety of the path users and to minimize interference with public and private ways. Off roadway foot paths, bridle and bicycle paths shall be constructed prior to the release of any abutting lots.