

said findings shall be forwarded to the appropriate city agencies, private parties and/or corporations, as formal action of the Planning Board.

11. AMEND OR FAILURE TO COMPLETE PLAN

If the applicant seeks to amend and/or modify an approved Definitive Subdivision Plan, or fails to complete the Subdivision by the approved completion date, said Plan and other required materials shall be submitted to the Planning Board in compliance with the most recently adopted Land Subdivision Rules and Regulations.

III. DESIGN STANDARDS

A. GENERAL

Subdivisions shall be designed in accordance with the following specific standards.

B. STREETS

1. GENERAL SYSTEM AND LOCATION

- a. All streets in the subdivision shall be designed so that, in the opinion of the board, they will provide safe vehicular travel. Due consideration shall also be given to the attractiveness of the street layout in order to obtain the maximum livability and amenity of the subdivision. Proposed streets shall be designed to afford safe access to abutting lots and existing streets, including consideration of traffic factors, such as vision at corners, sight clearance, sight lines, existing obstructions, width of existing streets and similar considerations.
- b. The proposed streets shall conform to the Master Plan, adopted in whole or in part by the board.
- c. Streets shall be continuous and in alignment with existing streets, as far as practicable, and shall comprise a convenient system with connections adequate to insure free circulation of vehicular traffic.
- d. Streets in the subdivision shall connect to, and be accessible from, a public way or an existing private way open to the public, and in which the applicant has rights for purposes for which ways are intended and commonly used, and which ways are of adequate construction to provide safe and convenient travel for which ways are intended.
- e. There shall be provided at least two (2) recognized means of access, as noted above, for each subdivision, except those comprising only one dead-end street. In the case of an approved definitive subdivision plan under development, the board will not release a surety bond or deposit or in the case of a covenant, issue a release of covenant for a portion or section of the subdivision under development, unless there is provided and constructed first, except for a dead-end street, two means of access to said portion or section.
- f. Proposed streets, which are obviously in alignment with other streets already existing and named shall bear the names of existing streets. The names of all proposed streets shall be subject to the approval of the board.

- g. Temporary dead-end streets, laid out to permit future projection, shall conform to the provisions of alignment, width, and grade that would be applicable to such streets if extended.
- h. Reserve strips, prohibiting access to streets or adjoining property shall not be permitted, except where, in the opinion of the board, such strips are in the public interest.
- i. The cul-de-sac bulb is provided as a safety turnaround at the end of the cul-de-sac, of which the open-end width of the bulb shall be the same width as the right-of-way width of the connecting street.

2. ALIGNMENT

All reverse curves on major and collector streets shall be separated by a tangent at least one hundred (100) feet long. Additional information on alignment of roadways is contained in Table II.

3. INTERSECTIONS

- a. Streets shall be located to intersect as nearly as possible at right angles, and no street shall intersect any other street at less than sixty (60) degrees.
- b. Multiple intersections, involving the junction of more than two streets, shall be avoided. Where this proves impossible, in the opinion of the board, such intersections shall be designed with extreme care for both pedestrian and vehicular safety.
- c. Streets entering opposite sides of another street shall be laid-out, either directly opposite each other or with a minimum offset of one hundred and twenty-five (125) feet between their centerlines.
- d. Street lines at all intersections shall be rounded with a corner having a radius of not less than thirty (30) feet. However, when the intersection of two ways varies more than ten (10) degrees from a right angle, the radius of the curve at the acute angle may be less and at the obtuse angle shall be greater than thirty (30) feet to the extent approved or required by the board.

4. WIDTH

All streets shall be designed so as to provide safe travel for vehicles and pedestrians. Due consideration shall be given by the subdivider to the attractiveness of the street layout in order to obtain the maximum livability and amenity of the subdivision. The board will give due regard to the prospective character of different subdivisions, whether open residence, dense residence, business or industrial, nature of terrain and the prospective amount and type of travel upon various streets and footpaths therein. Subject to adjustment in light of such factors, streets shown on subdivision plans shall be classified as collector or minor streets.

- a. The minimum width of street right-of-ways shall be as follows:

Short Cul-de-sac ----- forty (40) feet

Minor streets:

Type I & II -----fifty (50) feet
 Type III -----sixty (60) feet
 Collector streets -----eighty (80) feet

- b. Alleys with a minimum width of thirty (30) feet may be required by the board at the rear of any lots designated or zoned for commercial use.
- c. Frontage or access serving any lot shall meet the requirements of the City of Woburn Zoning Ordinance, as now existing or hereafter amended.

5. GRADE

- a. Grades of all streets shall be the reasonable minimum, but shall not be less than one (1%) percent.
- b. The maximum center line grades shall be as follows:
- | | |
|--------------------|---------------------|
| Short Cul-de-sac: | eight (8%) per cent |
| Minor streets: | eight (8%) per cent |
| Collector streets: | six (6%) per cent |
- c. All changes in grade exceeding one (1%) per cent shall be connected by vertical curves of sufficient length to afford, in the opinion of the board, adequate sight distance.
- d. At the approach to an intersection, on any street, a leveling area shall be provided, having a maximum grade of one (1%) percent for a distance of thirty (30) feet, measured from the nearest gutter right-of-way line of the intersecting street.

C. BRIDGES

Bridges shall be designed in accordance with the Commonwealth of Massachusetts, Dept. of Public Works, Standards and Specifications.

D. STORM DRAINAGE

Purpose: The primary purpose for all subdivision stormwater drainage design is to maintain existing natural drainage conditions. Where such conditions adversely affect surrounding properties, alternative drainage designs shall be presented for the board's consideration.

Post development stormwater runoff conditions shall be contained within the boundaries of the subdivision in approved subterranean leaching systems or above grade detentions facilities. Retention basins or so-called artificial ponds shall be prohibited.

Lot development shall provide that each lot be prepared and graded in such a manner that development of one shall not cause detrimental drainage conditions on another lot or onto streets. If provision is necessary to carry drainage to or across another lot, a drainage easement shall be established and recorded as such with the Registry of Deeds.

1. DRAIN SYSTEM DESIGNS

Storm water runoff shall be disposed of through a combination of storage and controlled release. Drainage systems shall be designed according to the following principles and criteria.

- a. Peak Flows: Property shall be developed in such a manner as to maximize storm water recharge on the site and to minimize direct overland runoff into adjoining streets and watercourses. Peak flows and runoff at the boundaries of the sub-divisions shall be no higher following development than before development.
- b. Capacity: Drainage systems shall have adequate capacity to handle all storm water runoff presently flowing through the sub-division, as well as to dispose of any additional runoff generated by the proposed development up to and including the runoff from a one hundred (100) year storm using the following methods:
- c. The flow from storms of up to a twenty-five (25) year frequency and a twenty-four (24) hour duration shall be conveyed through the subdivision site, following natural drainage patterns wherever possible, in a manner which will maintain the ratio of runoff to infiltration at the same percentage as under natural conditions.
- d. Detention facilities shall be provided to handle all runoff which exceeds the percolation capacity of the site, up to and including the runoff generated by the one hundred (100) year, twenty-four (24) hour storm.
- e. Release Rate: The combination of storage and design release rate shall not result in storage duration of greater than seventy-two (72) hours. Maximum depth of storm water retention areas shall be four (4) feet. Detention area side slopes shall be kept as close as possible to natural land contours, ten (10%) percent or less wherever possible.
- f. Outlet Structures: Outlet control structures shall be designed as simply as possible and shall require little or no attention for proper operation.
- g. Emergency Overflow: Each storm water detention area shall be provided with a method of emergency overflow in the event of a storm in excess of the one hundred (100) year frequency type.
- h. Natural Patterns: Natural drainage patterns shall be used wherever possible. All existing watercourses shall be left open unless approval to close them is obtained through the Conservation Commission. All new open watercourses shall be appropriately seeded, sod installed, paved or rip-rapped.
- i. Alterations: Any alteration of land on the site shall be such that changes in existing patterns of drainage shall not adversely affect properties outside the subdivision by increasing the amount or rate of peak flow.
- j. Structured Systems: Where soil conditions or topography make natural drainage systems impractical, and where existing drains in adjacent streets or easements are adequate in capacity to accommodate the drainage flow from the subdivision, a structured system shall be used and appropriate connection to the existing city drainage system shall be made. In such instances, catch basins shall be required on both sides of the street, on continuous grade at intervals of not more than three hundred (300) feet, at low points in the street and near the corners at intersecting streets.
- k. Calculations: Hydraulic calculations, prepared by a Registered Professional Engineer, shall be submitted to substantiate all design features of any proposed drain-age system. Computations for runoff shall be made in accordance with standard engineering practice, acceptable to the City Engineer, and the method of calculation shall be noted.

l. Drainage Easements: Where it is necessary to carry drainage across lots within the subdivision, storm water easements shall be provided, and of such width and construction, as will be adequate to accommodate the volume and velocity of the runoff. However, in no case shall the easements be less than twenty (20) feet in width.

m. When a proposed drainage system will carry water across land outside the sub-division boundaries to an approved outfall, appropriate drainage rights shall be secured by the sub-divider and shall be referenced on the Definitive Plan.

2. DRAIN AND CHANNEL SIZES

a. Pipe drains, where used, shall have a minimum diameter of 12 in. In general, they should be designed to flow full with the hydraulic gradient at the crown. However, in flat slope areas surcharge may be allowed. In determining the capacity of concrete and high-density plastic drains, the Manning formula should be used, with the coefficient of friction "n" equal to 0.013. The minimum velocity at design flow should be 2.5 feet per second (fps) and the maximum 10 fps to avoid scouring.

b. Drainage systems shall be designed employing manholes on the trunk line at a minimum 300-ft. interval. Catchbasins shall be connected only to these-manholes. Catchbasin to catchbasin connections are prohibited.

c. In some cases, earth and stone-paved open channels should have a flat bottom and side slopes of one vertical on two horizontal with the top of the slope at least 1 ft. higher than the design water surface. The maximum velocity allowed in an open earth channel at design flow should be 6 fps. A coefficient of friction "n" equal to 0.030 should be used for both the earth and stone-paved channels.

3. CONNECTION TO PUBLIC SYSTEM

a. Where feasible, storm water should be directed to enter the nearest open stream channel. Storm water shall not be permitted to cross any roadway upon the surface, but must be piped underground. Storm water runoff, except in Type I subdivisions or in already existing open stream channels, shall not be permitted to flow upon the surface for more than 300 feet, before entering the underground system. Catchbasins shall be located on both sides of the roadway and on continuous grades, at intervals of not more than 300 feet, at all sags in the roadway and near the corners of the roadways at intersecting streets.

b. Proper connection shall be made with any existing public drainage system within 1,000 ft. of the subdivision. Where adjacent property is not subdivided, and no public drain is within 1,000 ft., provisions 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 protection.

4. NATURAL DRAINAGE AREAS

No open water body or pond shall be filled in under any circumstances and no wet or swampy area shall be filled unless approval is received from the Woburn Conservation Commission in accordance with MGL Chapter 131.

5. LOT DRAINAGE

Lots shall be prepared and graded with consistent drainage into the sub-division and in such a manner that the development of any lot shall not cause detrimental drainage on another or on areas outside the sub-division. If provision is necessary to carry drainage to or from a lot, an easement or drainage right-of-way of a minimum width of twenty (20) feet and proper side slope shall be provided.

E. WATER

1. Public water mains shall not be less than 8 inches in Types I and II Subdivisions and not less than 12 inches in Type III Subdivisions. Water mains shall be sized to convey fire demands in accordance with the Insurance Service Organization guidelines.

Each hydrant shall be served directly from the water main through a 6-inch lateral connection, provided the hydrant is not more than 50 feet away from the main, and provided no other services are connected thereto. It shall be gated with a 5-inch bottom valve, and shall have 2 1/2 inch hose outlets and one 5-inch pump outlet. Valves shall be located in such number and locations that the line, by individual block, may be isolated for maintenance purposes.

Hydrants shall be located in the center of the planting strip nearest the property every 300 ft. in industrial and 350 ft. in business and residential areas, measured along the centerline of the roadway. Regardless of the above, no building shall be located more than 350 ft. away from a hydrant.

2. The location of all hydrants is to be approved by the Fire Chief. Under no circumstances shall a new road be laid out or accepted without at least one hydrant location.

In apartment house complexes of more than 12 dwelling units, hydrants shall be installed within the apartment house property, regardless of the proximity of hydrants on the city streets.

3. Private community water systems are prohibited from connecting to the public system.

4. Water line looping of all subdivision water systems shall be required.

F. SEWAGE

1. Public sewers shall not be less than 8 inches in diameter, and shall be sized according to the standards required by the City Engineer. Note: Sewers shall be designed in accordance with the New England Water Pollution Control Commission TR-16.

2. Manholes shall be located at every change in grade, change in direction and not more than 300 ft. apart.

G. EASEMENTS

1. Where water, sewer and storm drain lines require, in the opinion of the City Engineer, a location outside of any street line, there shall be reserved, and shown on the plan, easements to accommodate such utilities. Such easements shall have a minimum width of twenty (20) feet, and shall be dedicated to the City.

2. Where a subdivision is traversed by watercourses, drainage ways, channels or streams, there shall be provided storm water easements or drainage right-of-ways reserved and conforming substantially with the lines of such watercourses and having such width to provide for construction or other necessary purposes. However, such easement width shall be a minimum of twenty (20) feet.
3. Where the side slopes hereinafter required will extend outside of the street right-of-way lines, suitable slope easements shall be provided of sufficient dimensions to accommodate all portions of the slope above or below the finished grade of abutting lots.
4. No structures shall be erected or trees planted within an easement.

H. LOTS

Building lots within a subdivision shall comply with all applicable zoning ordinances, as cited in the 1985 Woburn Zoning Ordinance, as amended, and in accordance with the Massachusetts General Laws, Chapter 41, Sections 81 M and 81 Q and with the terms of any variance(s) granted for said lots by the Board of Appeals.

Lots with double frontage should be avoided whenever possible. Corner lots should, whenever practical to do so, be wider than adjoining interior lots to permit greater flexibility in locating the home or structure of the lot, and for better layout of yards. Roads and road layouts should conform as close as possible to the natural contour of the land.

I. OPEN SPACES

Before approval of a plan, the board may require the plan to show a park(s) located within said proposed subdivision or other open space(s) to be reserved for conservation and/or recreation purposes. The Planning Board shall not require reserved open spaces to exceed more than 20 percent of the total area to be subdivided, and said reservations, in respect to size, location and prospective use, shall bear a reasonable relationship to the standards and proposals of the Woburn Master Plan and Open Space Plan.

J. LOAMING

The top 6-in. of planting strips and side slopes shall consist of good quality loam, screened, raked, and rolled with a hand roller to grade. The loam shall be seeded with lawn grass seed applied in sufficient quantity to assure adequate coverage, rolled when the loam is moist. The applicant shall be responsible for the continued maintenance of the planting strip and the adequate growth of the grass within the planting strip until such time as the City of Woburn accepts the right-of-way. Prior to the city's acceptance of the right-of-way, any damage resulting from erosion, gullies, washouts or other causes shall be repaired at the applicant's expense by filling with topsoil, tamping, refertilizing, reseeding or resodding.

K. MONUMENTS AND MARKERS

1. Monuments shall be installed at all street intersections; at all points of change in direction or curvature of streets; at other points as shown on the Definitive Plan and where, in the opinion of the board, permanent monuments are necessary. In addition a monument shall be installed at least every 1000 ft. within the subdivision boundaries.

2. Granite monuments shall be set to 6 in. above finish grade, and shown as such, on the plans. Said monuments shall be 4-ft. in length dressed to 6-in. square at the top with a 3/8 in. drill hole in the center, and not less than 4-in. square at the bottom.

3. No permanent monuments shall be installed until all construction, which could disturb or destroy the monuments, is completed.

4. Monuments shall be permanent and semi-permanent physical monuments upon each locus and connected with the survey in such a manner that they could be used at any future time to relocate the boundary lines as shown upon the plans. Granite monuments shall be set at each corner of the lot abutting the roadway. Said monuments shall be 4-ft. in length, dressed to 6-in. square at the top, with a 3/8-in. drill hole in the center and not less than 4-in. square at the bottom. If ledge is present at the corner(s) of the lot, a 1-inch diameter by 1-inch in depth drill hole shall be established on said corner(s). A permanent pipe or iron marker, at least 36-in. long, shall be installed at the corners of each lot not abutting the roadway and also at front corners if within 50-ft. of a changes of direction bounds, as shown on the Definitive Plan.

L. STREET LIGHTING

1. All subdivisions approved for either above or underground electrical service shall provide street lighting every 300-feet maximum along roadways and installed per the standards employed by the electric service company.

2. The developer shall bear the cost for the installation of all street-lighting apparatus.

3. Street light poles for underground service shall be concrete or aluminum. The height and number of lumens for each streetlight shall be determined by the Electrical Inspector. Said poles shall be shown on the plan and shall be installed at the back of the sidewalk in the planting strip.

M. CLEAN UP

The entire area must be cleaned-up, so as to leave a neat and orderly appearance free from stumps, debris and other objectionable materials. All catchbasins shall be properly cleaned-out. Following the completion of work of this nature, a final inspection (the fifth) shall be made. Burying of debris, rubbish, stumps, boulders, brush, or unused construction materials is prohibited.

IV. IMPROVEMENTS REQUIREMENTS

A. GENERAL

In subdivisions, the ways shall be constructed and municipal services installed in accordance with the following specific requirements. No deviation or changes from an approved Definitive Plan shall be authorized, except by written approval of such changes by a majority vote of the Planning Board. **No in the field changes shall be allowed.**

B. DRAINAGE

The construction of the drainage system, including methods of construction and quality of materials used, shall be in conformity with the Definitive Plan, and unless specifically accepted by the board, the details shall conform to those of the Massachusetts