

# APPENDICES:

- A. STREET DESIGN AND CONSTRUCTION STANDARDS
- B. STORMWATER MANAGEMENT AND EROSION CONTROL
- C. CRITERIA FOR DETERMINING REGIONAL IMPACT

**APPENDIX A:  
STREET STANDARDS**

**A. PURPOSE AND INTENT**

The purpose of these standards is to provide design and construction guidance for both existing and new streets, whether public or private. These standards reflect the most up-to-date technical standards available at this time, as well as design standards that are intended to provide not only safe and efficient streets, but also streets that contribute to a sense of neighborhood and livability.

**B. GENERAL DESIGN STANDARDS**

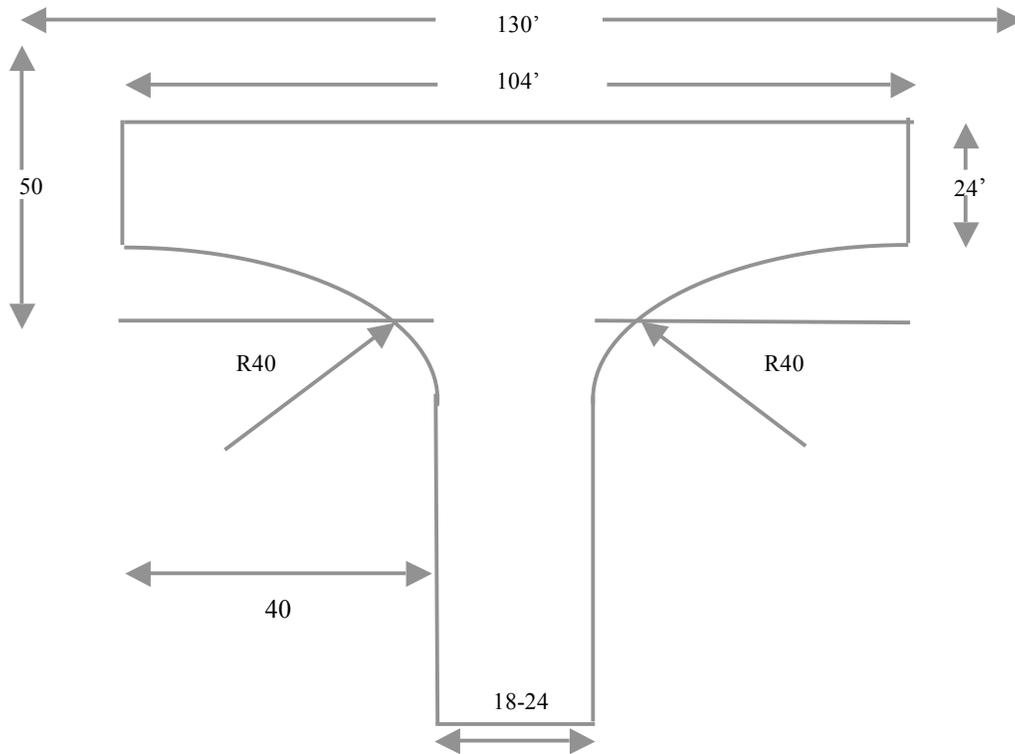
(1) **GENERAL STREET PLAN.** Approval of the general development street plan is required before construction of any phase of the plan. The street plan shall conform to References (1), (3), and (6) except as described at the end of this document. Any other variation shall be justified by engineering judgment and approved by the Board.

(2) **STREET LAYOUT.**

- General. All subdivisions shall have adequate provision for a safe and suitable access to a Class V or better road, or shall make provisions for the construction and dedication of a Class V or better road, to obtain safe and suitable access to the subdivision. Where the Board determines an existing access street to be substandard, it may require the upgrading of said street. Where traffic from a proposed subdivision will adversely impact a nearby street or intersection, provisions shall be made for the mitigation of said impacts. Proposed streets shall be of suitable location, width, grade, and improvement to accommodate prospective traffic and afford satisfactory access to police, fire fighting, emergency equipment, snow removal, sanitation, and road maintenance equipment. The arrangement and character of all streets in a subdivision shall conform to the Master Plan, and any and all other Town regulations, and shall compose a safe and convenient system in relation to other existing and planned streets, to topographic conditions, and to the proposed uses of land to be served by the street. Existing stonewalls shall be retained where possible or relocated and restored as required by the Board.
- Access. No subdivision shall be approved unless the property to be subdivided shall have frontage on from an existing Class V or better road, or a private road approved by the Planning Board. Each lot shall have a safe, independent and direct access.
- Arrangement. Streets shall be laid out so as to intersect at right angles as nearly as possible. No street shall intersect another street at less than 60 degrees. Streets shall be continuous and in alignment with existing streets as much as possible. All streets shall be integrated with the existing and proposed street system where possible. The Applicant shall provide for a circular terminus at the end of all proposed roads for all phases and situations where through streets are not provided in the design. Where extension of existing roadways is proposed, the existing turnaround shall be removed in its entirety.

(3) **DEAD-END (HAMMERHEAD) STREETS.** Except where near-future connections may be probable, dead-end streets shall be avoided whenever possible. Said streets shall not exceed 600 feet, and shall be constructed according to the graphic on the following page. No other dead-end streets are permitted off of a dead-end street. Consideration shall always be given to potential future connections and, when a street cannot feasibly be connected to an existing street, every attempt shall be made to provide a loop road rather than a dead-end road.

Figure #1:  
Hammerhead Design



- (4) STREET NAMES. All streets shall be named to comply with the provisions of the “Enhanced 911 System” (RSA 106-H: 2 and RSA 106-H: 10), and shall be subject to the approval of the Fire Department and Selectmen.
- (5) STREET SIGNS. The location and type of sign to be installed shall be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD).
- (6) STREET LIGHTS. Street lights shall be provided if required by the Board.

### C. CONSTRUCTION STANDARDS

- (1) RIGHT-OF-WAY. The minimum width of right-of-way shall be 50 feet. A greater width may be required to construct roads and ditches of the widths as described in the attached “Geometric Cross Section Design.” The Board may require greater right-of-way width where, in its judgment, the width is warranted due to present or future demands.
- (2) HIGHWAY RIGHT-OF-WAY BOUNDS. Highway bounds, of a type approved by the Board, shall be installed at each point of curvature (PC), point of tangent (PT), and changes in property at all intersection of streets, at all points of change in direction and at any other points the Board may deem necessary to designate the street lines.

- Type

- a. Stone or Concrete Bounds shall be of concrete or stone, not less than thirty-six (36) inches in length, not less than four (4) inches square or five (5) inches in diameter, and marked on top with a cross, brass plug, iron rod, or other durable material securely imbedded.

b. Iron Pipes shall be at least thirty-six (36) inches long and seven-eighths (7/8) inch in diameter or square.

- Location

a. Bound Locations. The external boundaries, rights-of-way lines, block corners, etc. of a subdivision shall be monumented on the field by bounds. These bounds shall be placed not more than 1,400 feet apart in any straight line and at all corners, at each end of all curves, at the point a curve changes its radius, at all angle points in any line, said points to be not less than twenty (20) feet from the bank of any river or stream.

b. Iron Pipe Locations. The lines of all lots and any other points not monumented by bounds shall be monumented by iron pipes. Those iron pipes located along rivers and streams shall be located along the meander line.

- Placement. Bounds shall be set flush with finished grade. No permanent bounds shall be set until all construction that would disturb or destroy the monuments is completed. All bounds shall be set under the direction of a registered professional engineer or a registered land surveyor.

(3) ALIGNMENT AND GRADES. See Table #1.

- Exception. Where, in the opinion of the Board, and where it has been demonstrated to the satisfaction of the Board by the Applicant that adherence to the maximum grade specified in Table 1 will cause local streets to be constructed in what the Board considers to be excessive cuts or fills, a waiver from the above specified maximum grade may be granted, provided:

a. The maximum allowable grade is eight percent (8%);

b. The maximum length of such grade, measured between vertical points of intersection (PVI) is five-hundred (500) feet; and

c. No other such slope greater than six percent (6%) occurs within five-hundred (500) feet measured along the centerline of the road from PVIs.

(4) PEDESTRIAN AND BICYCLE ACCESS. The Board may require construction of sidewalks for pedestrian access to schools, parks, shopping areas and transit stops or where population density and/or traffic volume conditions are such that the Board determines the construction of sidewalks to be prudent. In commercial and industrial districts, sidewalks may be required on both sides of the street. In residential districts, sidewalks may be required on one side of the street. Where the Board determines that a sidewalk is not practical, an area within the right-of-way will be kept clear of obstructions to allow for pedestrian and bicycle travel. Where practical, pedestrian and bicycle access within and between adjacent development should be provided.

(5) BASE COURSE. The road base course shall be of suitable materials, and at least the widths and thicknesses indicated in the attached "Geometric Cross Section Design" (Figure #2). Crushed gravel shall conform to Pay Item 304.3 in State Specification Section 304. Gravel shall conform to Pay Item 304.2 in State Specification Section 304, except that the maximum size stones shall be 3 inches. All other provisions of State Specification Section 304 are part of these standards.

(6) ASPHALT SURFACE. Where designated in the attached "Geometric Cross Section Design," "Asph. Surf Treated" surfaces shall be a two-layer Bituminous Surface Treatment in accordance with State Specification Section 410. "Hot Mix" surfaces shall be Hot Bituminous Pavement in accordance with State Specification Section 403. Widths and thicknesses shall be at least as indicated in "Geometric

Cross Section Design.” At least a 44-foot wide pavement is required in areas where on-street parking is expected on both sides of the travel way. Angle parking is not allowed.

- (7) GRAVEL SURFACE. In cases of very low traffic volumes, defined herein as up to 50 vehicles per day, where the Board determines an asphalt surface is not required, the total usable roadway width may be a minimum of 18 feet with two feet of shoulders. Provision for a wider section should be considered to allow for future upgrading to an asphalt surface as recommended above. The gravel-wearing course shall conform to State Specification 304.2, except that the maximum size stones shall be 1¼ inches. All other provisions of State Specification Section 304 are part of these standards.
- (8) GRAVEL SHOULDERS. Gravel shoulders, and their base courses, shall be at least the depths, widths, and thicknesses indicated in the attached “Geometric Cross Section Design.” Gravel shall conform to State Specification 304.33. All other provisions of State Specification Section 304 are part of these standards.
- (9) BRIDGES. Bridges, as defined by State Law (RSA 234:2), are structures of 10.0 feet or greater clear span, and shall be designed to MS- 18 (HS-20) loading (AASHTO Specifications). The minimum roadway width shall be 24 feet Bridges shall be designed by a professional engineer, and constructed in accordance with that design.
- (10) ENVIRONMENTAL IMPACTS AND PERMITS. The Applicant shall be responsible for determining the applicability of any and all environmental regulations that apply to this project, for acquiring the necessary permits, for taking whatever action is necessary to comply with applicable regulations and permits, and, if necessary, for terminating the necessary permits. The applicable work could include, but not be limited to:
  - Any fill, dredge, excavation, etc that impacts wetlands or other jurisdictional areas;
  - All temporary and permanent measures and treatment devices necessary. to prevent erosion and control sediment during and after construction;
  - Any construction activity proposed to disturb, one (1) or more acre of land, as defined by US EPA National Pollutant Discharge Elimination System program.
  - Any disturbance of more than 100,000 square feet of terrain (50,000 sq. feet. if within the protected shoreland) as defined by NHDES rules for a “Site Specific” permit.
- (11) UTILITIES. Utility poles should be kept close to the right-of-way line, in no case closer than the ditch back slope and always well back of a curb. Water and sewer mains should be constructed outside the surface area, and preferably outside the ditch line.

#### **D. PRIVATE ROADS**

Private roads may be approved by the Planning Board, as allowed by the Zoning Ordinance, if the application meets the following criteria:

- (1) The application must be for a residential development.
- (2) A neighborhood association must be formed, consisting of all owners of properties that are accessed by the private road(s). The association shall have the responsibility of all repairs, maintenance and plowing of said roads and the responsibility for the repair and maintenance of the associated drainage system. The neighborhood association documents shall specifically state that the Town of Greenfield assumes no responsibility or liability for maintenance or repair of the private roads; that in the event that the homeowners wish to have the town take over the road(s), the neighborhood association is

responsible for the total cost of rebuilding the road to meet the road construction specifications as stated in the Subdivision Regulations in effect at that time and that the town will not take action on the request until the improvements have survived one winter to the satisfaction of the Planning Board or its designee. No private road shall be approved by the Planning Board until Town Counsel has reviewed and approved the contents of the legal documents for the neighborhood association.

- (3) All private roads shall have access from public roads and internal circulation shall be designed to provide for vehicular and pedestrian safety and convenience, emergency and fire equipment, snow clearance and delivery and collection services. If necessary, turnout areas shall be provided to allow passing room for large vehicles. Parking shall be provided on each lot.
- (4) Private roads shall be constructed according to the standards of this section; however, the Planning Board may waive or modify these standards, as allowed by Article VII, B. of this Regulation.
- (5) Private roads shall be posted as such.

**Table #1:  
Roadway Geometric Design Standards**

<b>Note:</b> All standards should be considered minimums, except as otherwise noted.	<b>Average Daily Traffic (vehicle trips per day)</b>		
	<b>0 - 200</b>	<b>200 - 1500</b>	<b>1500 and over</b>
Right-of-way Width	50 feet	50 feet	60 – 80 feet
Traveled way Width	18 - 20 feet	20 - 22 feet	24 feet
Shoulder Width	2 feet	3 feet	4 - 10 feet
Minimum Grade	1%	1%	1%
Maximum Grade	8.0%	8.0%	8.0%
Maximum Grade within 100 feet of Intersections	2.0%	2.0%	2.0%
Angle of Intersection	75	75	75
Centerline Radii	200 feet	200 feet	300 – 600 feet
Intersection Radii: 0 – 200 ADT 200 – 1500 ADT 1500 and over ADT	30 feet 30 feet 30 feet	30 feet 30 feet 30 feet	30 feet 30 – 50 feet 50 feet
Rate of Super Elevation (Use AASHTO Chart)	.04 feet	.04 feet	.08 feet
Rate of Super Elevation through intersection	.04 feet	.04 feet	.04 feet
Cross Slope of Pavement	2%	2%	2%
Slope of Shoulder	5%	5%	5%