

## II. STREETS AND HIGHWAYS

### A. General

New roadways proposed for construction within the Milton City limits shall be classified as arterial, collector, local roads and streets or alleys. The functional classification of each proposed roadway within a new development shall be confirmed during the application for development approval process. The definitions for each functional classification are as presented in the Florida Department of Transportation “Uniform Minimum Standards for Design, Construction & Maintenance for Streets & Highways”, Latest Edition. These definitions are presented below:

1. **Arterial** – A route providing service which is relatively continuous and of relatively high traffic volume, long average trip length, high operating speed, and high mobility importance. In addition, all United States numbered highways shall be arterial roads.

2. **Collector** – A route providing service which is of relatively moderate traffic volume, moderately average trip length, and moderately average operating speed. These routes also collect and distribute traffic between local roads or arterial roads and serve as linkage between land and mobility access needs.
3. **Local Roads and Streets** – Routes providing service which is of relatively low average traffic volume, short average trip length or minimal through traffic movements and high land access for abutting property.
4. **Alleys** – A private or public way which affords a secondary means of access to an abutting property.

A schematic illustration of the functional classification concept is provided in Figure II – I.

**B. Arrangement**

The arrangement, character, extent and location of all streets shall conform to the comprehensive plan. The relation of proposed streets to existing and planned streets, to topographical conditions and to the proposed uses of land to be served by such streets, shall be considered in the development of proposed street arrangements. The arrangement of all proposed streets shall promote public safety, public convenience, and should allow the most advantageous development of the surrounding neighborhood.

1. Where such is not shown in the comprehensive plan, the arrangement of streets in a subdivision shall either:
  - a. Provide the continuation or appropriate projection of existing principal streets in surrounding areas or,
  - b. conform to a plan for the neighborhood adopted by the planning board.
2. Where a subdivision abuts or contains an existing or proposed arterial street, the development approval authority, as provided for in Article II, Administration, of the Milton Land Development Regulations, may require marginal access streets, reverse frontage with screen planting contained in a non-access reservation along the rear property line, deep lots with rear service alleys, or such other treatment as may be necessary for adequate protection of residential properties and to afford separation of through and local traffic.

3. Reserve strips controlling access to streets shall be prohibited except where their control is definitely placed in the City under conditions approved by the development approval authority.
4. Half streets shall be prohibited, except where essential to the reasonable development of a subdivision in conformity with the other requirements of the regulations, and where the development approval authority finds it will be practicable to require the dedication of the other half when the adjoining property is subdivided. Whenever a half street is adjacent to a tract to be subdivided, the other half street shall be platted within such tract.
5. Permanent dead-end streets (cul-de-sacs) which are not to be extended by either the subdivider or the adjoining property owner shall be provided at the closed end with a turn around having a minimum paved outside diameter of one hundred feet (100') and a minimum right-of-way diameter of one hundred twenty feet (120'). The maximum length of a dead-end street shall be 1000' as depicted in Figure II-2.
6. Street jogs with center line offset of less than one hundred twenty five feet (125') shall be avoided.

**C. Street Names, Street Markers & Other Marking Requirements**

**1. Street Names**

A proposed new street, which is in alignment with a continuation of an existing street, shall have the same name as the existing street. IN no case (including numbered or lettered streets) shall new streets have names or numbers which duplicate or are phonetically similar to existing street names regardless of the prefix or suffix used such as Avenue, Boulevard, Court, Crescent, Drive, Place, Street, and Terrace. All street names shall be subject to the approval of the City Council

**2. Street Name Signs**

Street name signs shall be installed by the developer at street intersections, designating the names of the existing streets. Street name signs shall be erected in urban areas at all street intersections regardless of other route marking that may be present and should be erected in rural districts to identify important roads not otherwise marked.

Supplementary lettering to indicate the type of street (e.g., Street, Avenue, Road, etc.) or section of city (e.g., N. W.) may be in similar lettering, at least 2 ½” inches high. Conventional abbreviations are acceptable except for the street name itself.

Street name blades on street name signs located at city, county or stated road intersections shall be nine (9”) inches in height with a green background. Lettering on these signs shall be white, six (6”) inch high letters.

Any circular street shall be required to notate the address ranges on the street name sign for emergency response purposes.

The street name sign shall be reflectorized via a high intensity grade reflective background material or illuminated. The legend and background shall be of contrasting colors and should have a white message and border on a green background. Some districts may use a different color scheme. In these districts the City council of the City of Milton shall have final approval authority for variations to the color scheme.

In business districts and on principal arterials, street name signs should be placed at least on diagonally apposite corners so that they will be on the far right-hand side of the intersection for traffic on the major street. Signs naming both streets should be erected at each location. They should be mounted with their faces parallel to the streets they name.

In residential districts, at least one street name sign should be mounted at each intersection. In instances where same name street loops or has 90 degree curves, additional street name signs will be required.

The sign supports shall be constructed as shown in Figure II-3.

All sign supports shall be galvanized and installed with vandal – proof hardware consisting of stainless steel brackets and bolts. All signs shall be of the aluminum type backing with high intensity sheeting. See Figure II – 3.

Developer is responsible for installing speed limit, warning and other signs as deemed necessary by the City of Milton. All signage shall comply with the latest edition of the MUTCD or FDOT standards.

### **3. Other Street Marking Requirements**

Developer shall install solid double yellow six (6) inch line at each stop intersection. Said lines shall extend a minimum of seventy –five (75) feet from the stop bar to divide the traffic lanes.

Stop bars shall be placed at all intersections where a stop sign is present or proposed. Said stop bar shall be an eighteen (18) inch wide solid white in subdivision developments. Twenty four (24") inch solid white stop bars shall be placed where stop signs are present or proposed at the intersection of city, county or state roads.

Developer shall install the work “STOP” on the pavement twenty-five (25) feet prior to the stop bar. Letters shall be ninety six (96") inches high. Thermoplastic paint shall be used for all pavement painting/markings.

Developer shall install, on the centerline of the street, a blue raised pavement marker at each fire hydrant location.

### **D. Geometric Design**

Geometric design is defined as the design or proportioning of the visible elements of the street or highway. The geometry of the roadway is of central importance since it provides the framework for the design of other elements.

In order to achieve a total design, which is consistent and safe, the design of roadway geometry must be conducted in close coordination with the other design elements. These other elements would include: pavement design, roadway lighting, traffic control devices, drainage and structural design. The design should consider safe roadside clear zones, pedestrian safety, emergency response and maintenance capabilities. The safety characteristics of the design should be given primary consideration.

The minimum standards presented in this section shall not automatically become the standards for geometric design. The designer should continuously use his initiative and ability to provide a consistent design with superior safety characteristics.

The major objective in geometric design is to establish a vehicle path and environment that provides a reasonable margin of safety for the motorist, bicyclist and pedestrian under the expected operating conditions and speed.

The achievement of this objective may be realized by meeting certain specific objectives, which include the following:

- Provide the simplest geometry attainable, consistent with the physical constraints.
- Provide a design that has a reasonable and consistent margin of safety at the expected operating speed.
- Provide a design that is safe at night and under adverse weather conditions.
- Provide a facility that is adequate for the expected traffic conditions.
- Allow for reasonable deficiencies in the driver such as:
  - Periodic inattention
  - Reduced skill and judgement
  - Slow reaction and response
  - Provide a hazard-free environment that is “forgiving” to a vehicle that has deviated from the travel path or is out of control.

## **1. Cross Section Elements**

The design of the roadway cross section should be predicated upon the design speed, terrain, adjacent land use, classification, and the type and volume of traffic expected. The cross section selected should be uniform throughout a given length of street or highway without frequent or abrupt changes. See Figure II – 8

### **a. Right of Way**

The acquisition of sufficient right-of-way is necessary in order to provide space for a safe street or highway. The width of the right-of-way required depends upon the design of the roadway, the arrangement of bridges, underpasses and other structures, and the need for cuts or fills. The right-of-way acquired should be sufficient to:

1. Allow development of the full cross section including adequate medians and roadside clear zones.

2. Provide for the layout of safe intersections, interchanges and other access points.
3. Allow for adequate sight distance at all points, particularly on horizontal curves at an intersection and other access points.
4. Provide, where appropriate, additional buffer zones to improve roadside safety, noise attenuation and the overall esthetics of the street or highway.
5. Provide adequate space for placement of necessary pedestrian and bicycle facilities.
6. Allow for future lane additions, increases in cross section or other improvements. Frontage roads should also be considered in the ultimate development of many high volume facilities.
7. Provide for construction of future grade separations or other intersection improvements at selected crossroads.

The acquisition of wide rights-of-way is costly, but it is necessary to allow for the construction and future improvement including vehicular access, as well as utility installations and safety considerations. The minimum right-of-way shall be as specified in Table II – 1. For pre-existing conditions when the existing right-of-way is less than 60 feet, efforts should be made to obtain the necessary right-of-way. The right-of-way for frontage roads may be reduced depending on the typical section requirements and the ability to share right-of way with the adjacent highway facility.

**b. Pavement**

The paved surface of all travel lanes shall be designed and constructed in accordance with the requirements set forth in Section II-E BASE AND PAVEMENT DESIGN AND CONSTRUCTION.

**1. Pavement Width**

Traffic lanes shall be 12 feet in width, not including curb & gutter widths. Streets with significant truck traffic should have minimum traffic lanes of 12 feet. For

minimum lane width, see Table II – 2, Table II-3 and Figure II – 8.

## **2. Pavement Cross Slope**

The selection of pavement cross slope should be a compromise between meeting the drainage requirement and providing for smooth vehicle operation. The cross slope shall not be less than 0.02 feet per foot and not to exceed 0.03 feet per foot. The street shall be crowned at the centerline.

### **c. Roadside Clear Zone**

The roadside clear zone is that area outside the traveled way, available for use by errant vehicles. No obstruction to vehicle traffic may be located within this clear zone.

The primary function of the clear zone is to allow space and time for the driver to retain control of his vehicle and avoid or reduce the consequences of collision with roadside objects.

The design of the roadside must provide for adequate drainage of the roadway. Drainage swales within the clear zone should be gently rounded and free of discontinuities. When large volumes of water must be carried, the approach should be to provide wide rather than deep drainage channels. Side slopes and drainage swales lie within the clear zone shall be free of protruding drainage structures.

#### **1. Roadside Clear Zone Width**

The width of the clear zone should be as wide as is practicable. The minimum permitted widths are six feet for all roadways with design speeds less than or equal to 25 mph. For design speeds greater than 25 mph, the minimum clear zone widths shall be six feet for local roads, 10 feet for collector roads, and 14 feet for arterials. These are minimum values only and should be increased wherever feasible.

In rural areas it is desirable, and frequently economically feasible, to substantially increase the width of the clear zone. Where traffic volumes and speeds are high, the width should be increased. The clear zone on the outside of horizontal curves should be increased due to the high probability of vehicles leaving the roadway at a high angle.

## **2. Roadside Slopes**

The slopes of all roadsides should be as flat as possible to allow for a safe traversal by out-of-control vehicles. The transition between the shoulder and adjacent side slope should be rounded and free from discontinuities. The adjacent side slope within the clear zone shall not be steeper than three to one (3:1). The side slopes should be reduced on the outside of horizontal curves.

Where roadside ditches or cuts require back slopes, the steepness of the back slope should normally not (within the clear zone) exceed a ratio of four to one (4:1). Ditch bottoms should be at least four feet wide and can be flat, or gently rounded.

## **3. Criteria for Guardrail**

If space and economic constraints are severe, it is permissible, but not desirable, to use guardrails in lieu of the requirements for width and slope of clear zone. Where the previously described requirements for clear zone are not met, guardrails (or other longitudinal barriers) should be used. Guardrails should also be considered for protection of pedestrian pathways or protection from immovable roadside hazards.

### **d. Curbs and Gutters**

Curbs and gutters shall be installed on all streets utilizing either layback or barrier curb as shown in Figure II-4. Note: 3/8" inch expansion joints are required at the beginning and end of each radius, every 50' feet continuous thereafter, and at any abutments or grade change. Stormwater shall be conveyed through curb inlets and underground piping.

### **e. Cleaning, Grubbing and Grading**

Clearing and grubbing shall be for the full width of the right-of-way except as approved by the City Manager or designee. Grading shall be done according to approved plans. All cleared areas shall be seeded and mulched per FDOT standards or an approved equal method to insure stabilization of the roadway shoulders on a permanent basis. The developer/owner/permit holder shall be responsible to maintain stabilization until the site or lot is sold and/or developed.

**f. Parking**

Parking on street right-of-way shall be prohibited on 24' paved streets.

**g. Sidewalks**

If sidewalks are included in the project, they shall be five feet in width and a minimum of four inches in thickness. All sidewalks shall be constructed of reinforced concrete having a minimum compressive strength of 3000 psi. The contractor may use forms or an approved automatic extrusion type paving machine. Any automatic extrusion machine considered must be demonstrated to produce a consolidated concrete section conforming to the required cross-section and dimensions.

Sidewalks shall be placed true to line and grade upon uniformly compacted sub grade. Control joints providing a groove approximately one-half (1/2) inch in depth with rounded edges shall be provided every six (6) feet. Expansion joints, three eighths (3/8) inch in thickness shall be placed where walks join other concrete units with additional interior expansion joints provided for each 60 feet and at all radius changes.

All sidewalks shall have a broom finish and shall be sloped at drives, ramps and access points in accordance with handicapped access requirements.

Reinforcement shall be wire mesh (W1.4xW1.4x10x10) or approved fiber mesh additive.

**2. Design Speed**

The design speed is defined as the maximum safe speed that can be maintained over a given section of highway when weather, light and traffic conditions are such that the design features of the highway govern. The basic purpose in using the design speed concept is to achieve consistency in the various design elements that influence vehicle operations. Since many critical design features (e.g. sight distance and curvature) are predicated upon design speed, the selection of the proper value is essential to allow for the safe design of a street or highway.

The selection of an appropriate design speed is dependent upon the predicted driver behavior and is, therefore, rather complex. This selection of design speed should receive considerable preliminary

investigation and thought so that safety will be realized from the design.

The primary basis for selecting the design speed should be a rational prediction of the probable maximum operating speed (by approximately 90 percent of the vehicles) on the street or highway. The “average running speed” is not acceptable as a design speed. Recommended minimum values for design speed are given in Table II-4. These values should, however, be considered as general guidelines only. The maximum normal operating speed is dependent upon many variables including: the topography, the general roadway geometry the surrounding land use, the degree of access, the frequency of traffic signals or other traffic control devices, the posted speed limit and the degree of enforcement. The driver does not necessarily adjust his speed to the classification or importance (or lack of) of the street or highway.

### **3. Sight Distance**

The provision for adequate horizontal and vertical sight distance is an essential factor in the development of a safe street or highway. An unobstructed view of the upcoming roadway is necessary to allow time and space for the safe execution of passing, stopping, intersection movements and other normal and emergency maneuvers. It is also important to provide as great a sight distance as possible to allow the driver time to plan for future actions. The driver is continuously required to execute normal slowing, turning and acceleration maneuvers. If he can plan in advance for these actions, traffic flow will be smoother and less hazardous. Unexpected emergency maneuvers will also be less hazardous. Unexpected emergency maneuvers will also be less hazardous if they are not combined with uncertainty regarding the required normal maneuvers.

Future obstruction to sight distance that may develop (e.g., vegetation) or be constructed should be taken into consideration in the initial design. Areas outside of the highway right-of-way that are not under the highway agency’s jurisdiction should be considered as points of obstruction. Planned future construction of median barriers, guardrails, grade separations or other structures should also be considered as possible sight obstructions.

#### **a. Stopping Sight Distance**

Safe stopping sight distance shall be provided continuously on all streets and highways. The factors which determine the minimum distance required to stop include: the vehicle speed, the driver’s total reaction time,

the characteristics and conditions of the vehicle, the friction capabilities between the tires and the roadway surface, and the vertical and horizontal alignment of the roadway. It is desirable that the driver be given sufficient sight distance to avoid an object or slow moving vehicle with a natural, smooth maneuver rather than an extreme or panic reaction. The determination of available stopping sight distance shall be based upon a height of the driver's eye equal to 3.50 feet and a height of obstruction to be avoided equal to 0.50 feet. It would, of course, be desirable to use a height of obstruction equal to zero (coincident with the roadway surface) to provide the driver with a more positive sight condition. Where horizontal sight distance may be obstructed on curves, the driver's eye and the obstruction shall be assumed to be located at the centerline of the travel lane on the inside of the curve.

The stopping sight distance shall be no less than the values given in Table II-5.

#### **b. Passing Site Distance**

Should a roadway be proposed which would provide for passing movements, the passing side distance requirements shall be as set forth in the appropriate section of the Florida Department of Transportation "Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways".

#### **c. Sight Distance at Decision Points**

It is desirable to provide sight distances exceeding the minimum at changes in geometry, approaches to intersections, entrances and exits, and other potential decision points or hazards. The sight distance should be adequate to allow the driver sufficient time to observe the upcoming situation, make the proper decision and take the appropriate action in a normal manner.

Minimum stopping sight distance does not provide sufficient space or time for the driver to make decisions regarding complex situations that require more than a simple perception-reaction process. In many cases, rapid stopping or lane changing may be extremely undesirable and cause hazardous maneuvers (e.g., in heavy traffic

conditions); therefore, it would be preferable to provide sufficient sight distance to allow for a more gradual reaction.

#### **d. Intersection Sight Distance**

Sight distances for intersection movements are given in the general intersection requirements.

### **4. Horizontal Alignment**

#### **a. General Criteria**

- (1) The standard of alignment selected for a particular section of highway should extend throughout the section with no sudden changes from easy to sharp curvature. Where sharper curvature is unavoidable, a sequence of curves of increasing degree should be utilized.
- (2) Winding alignment consisting of sharp curves is hazardous, reduces capacity and should be avoided.
- (3) The use of the maximum degree of curvature permitted for a given design speed should be avoided wherever possible. The use of flatter curves is not only less hazardous but also frequently less costly due to the shortened roadway.
- (4) Maximum curvature should not be used at the following locations:
  - (a) On high fills or elevated structures. The lack of surrounding objects reduces the driver's perception of the roadway alignment.
  - (b) At or near a crest in grade.
  - (c) At or near the low point in a sag or grade.
  - (d) At the end of long tangents.
  - (e) At or near intersections or points of access or egress.
  - (f) At or near decision points.

- (5) The “broken back” arrangement of curves (short tangent between two curves in the same direction) should be avoided. This arrangement produces an unexpected and hazardous situation. Minimum tangent shall be 50’ between curbs.
- (6) When reversals in alignment are used in a sufficient length of tangent between the reverse curves is required for adequate super elevation transition. In no case shall the tangent length between reverse curves or arterioles or collector streets be less than 100 feet.
- (7) Compound curves should be avoided, especially when curves are sharp. They tend to produce erratic and dangerous vehicle operation. When compound curves are necessary, the radius of the flatter curve should not be more than 50 percent greater than the sharper curve.
- (8) The transition between tangents and curves should normally be accomplished by the use of appropriate straight-line transitions or spirals. This is essential to assist the driver in maintaining his vehicle in the proper travel path.
- (9) For small deflection angles, curves should be suitably lengthened to avoid the distracting appearance of a kink. Curves should be at least 900 feet long for a central angle of one degree or 500 feet long for a central angle of five degrees.
- (10) Gently flowing alignment is generally more pleasing in appearance, as well as superior from a safety standpoint.

**b. Super Elevation**

Super elevation shall not be allowed in residential subdivision design. In the design of highway curves, it is necessary to establish proper relationship between curvature of the roadway and design speed. The use of super elevation (rotation of the roadway about its axis) is employed to counteract centrifugal force and allow drives to comfortably and safely travel through curves at the design speed.

Although super elevation is advantageous for traffic operations, various factors often combine to make its use impractical in many built-up areas. Such factors include wide pavement areas, need to

meet grade of adjacent property, surface drainage considerations, and frequency of cross streets, alleys, and driveways. Therefore, horizontal curves on lower-speed streets in subdivision and urban area are usually designed without super elevation, only side friction being used to counteract the centrifugal force. Should it be determined that super elevation is necessary for a proposed road, it shall be designed in accordance with the appropriate sections of the Florida Department of Transportation “Uniform Minimum Standards for Design, Construction & Maintenance for Streets & Highways”.

**c. Curvature**

Where a directional change in alignment is required, every effort should be made to utilize the smallest degree (largest radius) curve possible. The use of the maximum degree of curvature should be avoided when possible. Design speed maximum degree of curvature should be avoided when possible. Design speed maximum degrees of curve relationships are given in Table II-6. The use of sharper curvature for the design speeds shown in Table II-6 would call for super elevation beyond the limit considered practical or for operation with tire friction beyond the limit considered practical or for operation with tire friction beyond safe or comfortable limits or both. The maximum degree of curvature is a significant value in alignment design.

**5. Vertical Alignment**

**a. General Criteria**

1. The selection of vertical alignment should be predicated to a large extent upon the following criteria:
  - a) Obtaining maximum sight distances.
  - b) Limiting speed differences (particularly for trucks) by reducing magnitude and length of grades.
2. A “hidden dip” which would not be apparent to the driver must be avoided.
3. Steep grades and sharp crest vertical curves should be avoided at or near intersection.
4. Flat grades and long gentle vertical curves should be used wherever possible.

**b. Grades**

To facilitate adequate drainage, the minimum grades for vertical alignment on curb and gutter roadways should be 0.4 percent. The grades selected should be as flat as possible, and should not be greater than the value given in Table II-7.

**c. Vertical Curves**

Changes in grade should be connected by a parabolic curve (the vertical offset being proportional to the square of the horizontal distance). Vertical curves are required when the algebraic difference of intersecting grades exceeds the values given in Table II-8. The length of vertical curve on a crest as governed by stopping sight distance is obtained from Figure II-5. The minimum length of a sag vertical curve as governed by vehicle headlight capabilities is obtained from Figure II-6.

Wherever feasible, curves longer than the minimum should be considered to improve both esthetic and safety characteristics.

**6. Alignment Coordination**

Horizontal and vertical alignment should not be designed independently. Poor combinations can spoil the good points of a design. Properly coordinated horizontal and vertical alignment can improve appearance, enhance community values, increase safety and encourage uniform speed. Coordination of horizontal and vertical alignment should begin with preliminary design, during which stage adjustments can readily be made.

Proper combination of horizontal alignment and profile can be obtained by engineering study and consideration of the following general controls.

- a. Curvature and grades should be in proper balance. Tangent alignment or flat curvature with steep grades, and excessive curvature with flat grades are both poor design. A logical design is a compromise between the two conditions. Wherever feasible, the roadway should “roll with” rather than “buck” the terrain.
- b. Sharp horizontal curvature should not be introduced at or near the top of a pronounced crest vertical curve. Drivers cannot perceive the horizontal change in alignment

especially at night. This condition can be avoided by setting the horizontal curve so that it leads the vertical curve or by making the horizontal curve longer. Suitable designs can be made by using design values well above the minimums.

- c. Sharp horizontal curvature should not be introduced at or near the low point of a pronounced sag vertical curve to prevent an undesirable distorted appearance. Vehicle speeds often are high at the bottom grades and erratic operation may result, especially at night.
- d. Horizontal alignment and profile should be made as flat as possible at interchanges and intersections where sight distance along both highways is important. Sight distances above the minimum are desirable at these locations.
- e. In residential areas, the alignment should be designed to minimize nuisance to the neighborhood.

## **7. Access Control**

All new facilities should have some degree of access control since each point of access produces a traffic conflict, thereby substantially increasing the accident potential.

The control of access is one of the most effective, efficient, and economical methods for improving the capacity and safety characteristics of streets and highways. The reduction of the frequency of access points and the restriction of turning and crossing maneuvers, which should be primary objectives, is accomplished more effectively by the design on the roadway geometry than by the use of traffic control devices. Design criteria for access points are presented under the general requirements for intersection design.

### **a. Justification**

The justification for controls of access should be based upon several factors including safety, capacity, economics, and esthetics.

### **b. General Criteria**

#### **(1) Location of Access Points**

- (a) All access locations should have adequate sight distance available for the safe execution of entrance, exit, and crossing maneuvers.
- (b) Locations of access near structures decision points or the termination of highway lighting should be avoided.
- (c) Driveways should not be placed near intersections or other points that would tend to produce traffic conflict.

**(2) Spacing of Access Points**

- (a) The spacing of access points should be adequate to prevent conflict or mutual interference of traffic flow.
- (b) Adequate spacing between access and decision points is necessary to avoid burdening the driver with the need for rapid decisions or maneuvers. Spacing and location of access points shall be established consistent with Section V-3 Access Management, or the Land Development Regulations.
- (c) The use of a frontage road or other auxiliary path is recommended on minor materials and higher classifications where the need for direct driveway or minor road access is frequent.

**(3) Restrictions of Maneuvers**

- (a) Where feasible, the number and type of permitted maneuvers (crossing, turning, slowing, etc.) should be restricted.
- (b) The restriction of crossing maneuvers may be accomplished by the use of grade separations, and continuous medians.
- (c) The restrictions of left turns are achieved most effectively by continuous medians.

- (d) Channelization should be considered for the purposes of guiding traffic flow and reducing vehicle conflicts.

**(4) Turn Lanes**

- (a) Deceleration lanes for right turn (and left turn where permitted) exits should be provided on all collector facilities.
- (b) Storage (or deceleration lanes) to protect turning vehicles should be provided, particularly where turning volumes are significant.
- (c) Acceleration lanes are desirable for entrance maneuvers onto high-speed streets and highways.
- (d) Special consideration should be given to the provisions for deceleration, acceleration, and storage lanes in commercial or industrial area with significant truck traffic.

**c. Control of Urban Streets**

The design and construction of urban, as well as rural, highways should be governed by the general criteria for access control previously outlined. In addition, the design of urban streets should be in accordance with the criteria listed below:

- (1) The general layout of local and collector streets should follow a branching network, rather than a highly interconnected grid pattern.
- (2) T-intersections in branching networks are recommended, particularly for local and collector streets. Street jogs with centerline offsets of less than 125 feet shall be avoided.
- (3) The street network should be designed to reduce, consistent with origin/destination requirements, the number of crossing and left turn maneuvers.
- (4) Where practical, one-way street patterns should be considered.

- (5) The design of the street layout should be predicated upon reducing the need for traffic signals.
- (6) U-turns should be discouraged.
- (7) The use of a public street or highway as an integral part of the internal circulation pattern for commercial property should be discouraged.
- (8) The number of driveway access points should be restricted as much as possible through area of strip development.
- (9) Special consideration should be given to providing turn lanes (auxiliary lane for turning maneuver) where the total volume or truck volume is high.
- (10) Major traffic generators may be exempted from the restrictions on driveway access if the access point is designed as a normal intersection adequate to handle the expected traffic volume.

These are minimum requirements only, and it is generally desirable to use more stringent criteria for control of access.

## **8. Intersection Design**

Intersections increase traffic conflicts and the demands upon the driver, and are inherently hazardous locations. The design of an intersection should be predicated upon reducing motor vehicle, bicycle and pedestrian conflicts, minimizing the confusion and demands upon the driver for rapid and /or complex decisions and providing for smooth traffic flow. The location and spacing off intersections should follow the requirements presented in Section II.D.7. **Access Control.**

The additional effort and expense required to provide a high-quality intersection is justified by the corresponding safety benefits. The overall reduction in accident potential derived from a given expenditure for intersection improvements along an open roadway. Poor intersections also reduce the traffic capacity, thereby limiting the overall capacity and economic value of the street of highway.

The requirements and design criteria contained in this section are applicable to all driveways, intersections, and interchanges. All entrances to, exits from, or interconnections between streets and highways are subject to these design standards.

**a. General Criteria**

The layout of a given intersection may be influenced by constraints unique to that particular location or situation. The design shall, however, conform to sound principles and criteria include the following:

- (1) The layout of the intersection should be as simple as is practicable. Complex intersections, which tend to confuse and distract the driver, produce inefficient and hazardous operation.
- (2) The intersection arrangement should not require the driver to make rapid and/or complex decisions. The provision of a spacious or open intersection or interchange generally increases the distance between successive decision points.
- (3) The layout of the intersection should be clear and understandable so that proliferation of signs, signals or marking is not required to adequately inform and direct the driver.
- (4) The design of intersections, particularly along a given street or highway, should be as consistent as possible.
- (5) The approach roadways should be free from steep grades or sharp horizontal or vertical curves.
- (6) Intersections with driveways or other roadways should be as close to right angles as possible. No street shall intersect any other at an angle less than sixty degrees.
- (7) Adequate sight distance should be provided to present the driver a clear view of the intersection and to allow for safe execution of crossing and turning maneuvers.
- (8) The design of all intersection elements should be consistent with the design speeds of the approach roadways.
- (9) The intersection layout and channelization should encourage smooth flow and discourage wrong-way movements.

- (10) Special attention should be directed toward the provision of safe roadside clear zones.
- (11) The provision of special turn lanes should be in conformance with the criteria set forth in Section II.D.7. **Access Control.**
- (12) The requirements for bicycle and pedestrian movements should receive special consideration.

**b. Sight Distance**

Inadequate sight distance is a contributing factor in the cause of a large percentage of intersection accidents. The provision of adequate sight distance at intersections is, therefore, absolutely essential and should receive a high priority in the design process.

**(1) General Criteria**

General Criteria to be followed in the provision of sight distance include the following:

- (a) Sight distance exceeding the minimum stopping sight distance should be provided on the approach of all intersection (entrances, exits, stop signs, traffic signals and intersection roadways). The use of proper approach geometry free from sharp horizontal and vertical curvature will normally allow for adequate sight distance.
- (b) The approaches to exits or intersection (including turn, storage and deceleration lanes) should have adequate sight distance to allow for safe speed and lane change maneuvers.
- (c) Adequate sight distance should be provided on the through roadway approach to entrances (from acceleration or merge lanes, stop or yield signs, driveways or traffic signals) to provide capabilities for defensive driving.  
This lateral sight distance should include as much length of the entering lane or intersecting roadway as is feasible. A clear view of entering vehicles is necessary to allow through traffic to aid merging maneuvers and to avoid vehicles which have “run”

or appear to have the intention of running stop signs or traffic signals.

- (d) Approaches to school or pedestrian crosswalks should have sight distance exceeding the minimum values. This should also include a clear view of the adjacent pedestrian pathways.
- (e) Sight distance in both directions should be provided throughout all intersections, including turn lanes, speed change lanes and turning roadways.

**(2) Obstructions to Sight Distance**

The provisions for sight distance are limited by the highway geometry and the nature and development of the area adjacent to the roadway. Where line-of-sight is limited by vertical curvature of obstructions, stopping sight distance shall be based upon an eye height of 3.50 feet and an object height of 0.50 feet. At exits or other locations where the driver may be uncertain as to the roadway alignment, a clear view of the pavement surface should be provided. At locations requiring a clear view of other vehicles or pedestrians for the safe execution of crossing or entrance maneuvers, the sight distance should be based upon a driver's eye height of 3.50 feet and an object height of 3.00 feet (preferably 1.50 feet). The height of eye for truck traffic may be increased for determination of line-of-sight obstructions for intersection maneuvers. Obstructions to sight distance at intersections include the following:

- (a) Any property that is not within the right-of-way shall be considered as an area of total sight distance obstruction.
- (b) Areas which contain vegetation (trees, shrubbery, grass, etc.) that cannot easily be trimmed or removed by regular maintenance activity should be considered as sight obstructions.
- (c) Parking lanes shall be considered as obstructions to line-of-sight. Parking shall be prohibited within clear areas required for sight distance at intersections.

- (d) Large (or numerous) poles or support structures for lighting, signs, signals or other purposes may constitute sight obstructions. The adverse effect upon sight distance created by poles and signs near intersections should be carefully investigated.

### **(3) Stopping Sight Distance**

The provision for safe stopping sight distance at intersections and on turning roadways is even more critical than on open roadways. Vehicles are more likely to be traveling in excess of the design or posted speed, and drivers are frequently distracted from maintaining a continuous view of the upcoming roadway.

#### **(a) Approach to Stops**

The approach to stop signs, yield signs or traffic signals should be provided with a sight distance no less than values given in Figure II.7. These values are applicable for any street, highway or turning roadway. The driver should, at the required distance, have a clear view of the intersecting roadway as well as the sign or traffic signal.

Where the approach roadway is on a grade or vertical curve, the sight distance should be no less than the values shown in Figure II-7. In any situation where it is feasible, sight distances exceeding those should be provided.

This is desirable to allow for more gradual stopping maneuvers and to reduce the likelihood of vehicles running through the stop signs or signals. Advance warning for stop signs and signals is desirable.

#### **(b) On Turning Roadways**

The required stopping sight distance at any location on a turning roadway (loop, exit, etc.) shall be based upon the design speed at that point. Ample sight distance should be provided since the driver is burdened with negotiating a curved travel path and the available friction factor for stopping has been reduced by the roadway curvature. Wherever feasible, the sight distances given in Table II-9 or Figure II-7 should be provided. The available sight

distance shall, however, be no less than the minimum values obtained from the latest publication of AASHO. Due to the inability of vehicle headlights to adequately illuminate a sharply curved travel path, roadway lighting should be considered for turning roadways.

**(4) Sight distance for Intersection Maneuvers (Non-Signalized Intersections)**

Sight distance provided for intersection maneuvers at non-signalized intersections shall be as specified in the appropriate sections of the Florida Department of Transportation “Manual of Uniform Standards for Design, construction and Maintenance for Streets and Highways”.

**(5) Auxiliary Lanes**

Auxiliary lanes are desirable for the safe execution of speed change maneuvers (acceleration and deceleration) and for the storage and protection of turning vehicles. Auxiliary lanes for exit or entrance turning maneuvers shall be provided in accordance with the requirements set forth in Section II.D.7. **Access Control.** The pavement width and cross slopes of auxiliary lanes should meet the minimum requirements for all travel lanes. Shoulders and clear zones should be provided in accordance with the same requirements for all travel lanes.

**(6) Acceleration Lanes**

Acceleration lanes are required for entrances to all high-speed (design speed greater than 50 mph) facilities and locations with heavy traffic volumes. Any street or highway with a large percentage of truck traffic should be considered for acceleration lane entrances.

The distance required for an acceleration maneuver is dependent upon the vehicle acceleration capabilities, the grade, the initial entrance speed and the final speed at the termination of the maneuver. The distances required for acceleration on level roadways for passenger cars are given in Table II-10. Where acceleration occurs on a grade, the required distance is obtained by using Tables II-10 and II-11.

**(7) Exit Lanes**

Auxiliary lanes for exiting maneuvers provide space outside of the through lanes for vehicle deceleration for the protection and storage of turning vehicles.

**(8) Deceleration Lanes**

The primary function of deceleration lanes is to provide a safe travel path for vehicles deceleration from the operation speed on the through lanes. Deceleration lanes are required on all high-speed (design speed greater than 50 mph) streets and highways.

The distance required for deceleration of passenger cars is given in Table II-10. The required distance for deceleration on grades is obtained from Table II-10 and II-11. The length of deceleration lanes shall be no less than the values obtained from Tables II-10 and II-11 and should be increased wherever feasible. The initial speed should, desirably, be taken as the design speed of the highway. The final speed should be the design speed at the exit (e.g. a turning roadway) or zero if the deceleration lane terminates at a stop or traffic signal. A reduction in the final speed to be used is particularly important if the exit traffic volume is high, since the speed of these vehicles may be significantly reduced.

**(9) Storage Lanes**

Were exit lanes are required (see Section II.D.7.**Access Control**) or desirable on low-speed streets and highways, storage lanes may be used in place of or in conjunction with deceleration lanes. Storage lanes should be used on all facilities. Although the primary function of a storage lane is to provide protection and storage for turning vehicles, it is of course, desirable to provide sufficient length to allow for deceleration capabilities.

At unsignalized intersections, the storage length, exclusive of taper, may be based on the number of turning vehicles which are likely to arrive in an average 2-minute period within the peak hour, )storage in feet =  $2 \times 25/60 \times$  number of turning vehicles per hour). As a minimum requirement, storage for at least two passenger cars should be provided.

**c. Property Line, Radius as Intersections**

Property lines at street intersections shall be rounded with a radius of 35 feet or of greater radius where the City Council may deem it necessary.

**E. Base and Pavement Design and Construction**

**1. Base Courses**

- a.** Types of base courses approved for use are listed below. Other types may be considered, but shall require written approval from the City Manager or his/her designee. Any alternate base course proposed shall be structurally equivalent to those described herein. See Figure II-9.

The base course shall be constructed six-inch (minimum) thick on a stabilized subgrade having a minimum Limerock Bearing Ratio (LBR) of 40 and compacted to 95% of the maximum dry density (ASTM D-698). Compaction tests of sub grade shall be completed prior to the installation of the curb and base.

The developer shall notify the City of Milton Planning & Development Department at least 48 hours in advance of all compaction tests so that a city representative may be present for the testing

Developer shall provide the City of Milton compaction test results as construction progresses if problems are encountered or as requested by the city. Copies of all test results shall be submitted with the “as built” drawing or prior to development of the parcel. Compaction tests shall provide a representative sample in all areas but shall be completed at least every three-hundred (300) feet. Location of testing sites is to be coordinated with city staff. In areas of questionable soils, more stringent requirements may apply.

Construction plans shall include road sections every four hundred (400) feet and at all critical road sections of maximum cut or fill. For subdivisions with grade differences equal to or greater than 4/1 slopes, sections shall be provided every 100 feet and reflect the gradient to the building setback line.

All roads shall be designed to discharge stormwater to a positive discharge system.

All base materials specified herein shall be in accordance with the requirements (both materials & compaction) of the Florida Department of Transportation “Standard Specifications for Road and Bridge Construction” – most recent edition.

The following base types are approved for use:

- (1) Shell
- (2) Soil-Cement
- (3) Sand-Clay Base
- (4) Lime Rock Base
- (5) Graded Aggregate Base

All methods of construction for base courses shall be in strict accordance with the Florida Department of Transportation “Standard Specifications for Road and Bridge Construction” – most recent edition.

#### **b. Priming and Protection of Base**

Priming, in accordance with the requirements of the Florida State Department of Transportation, Standard Specifications for the priming of the particular base and using the materials specified therein, will be required for all of the bases.

All newly constructed bases shall be protected from traffic where rutting or other damage might occur, and wherever traffic of any type has access to the primed base prior to the proper curing period. The primed base shall be sanded with clean, sharp sand, which shall be subsequently swept from the surface after the prime coat is properly cured and before the surface is applied.

## **2. Paved – Surface Course**

All bases listed herein shall be surfaced.

Approved types of surface courses and the minimum acceptable compacted thickness of each shall be as shown herein. If other types are proposed for use, such may be authorized only if approved in

writing by the City Manager or his/her designee, and the minimum thickness of such shall be equivalent to the thickness shown for the following type:

### **Type S-1- Asphaltic Concrete Surface Course**

This surface course shall be composed of a mixture of aggregate, mineral filler (when required), and asphalt cement, mixed hot in a plant and applied upon the prepared base.

All materials and requirements as called for in the Florida State Department of Transportation Standard Specifications latest revision for those surface courses shall be as specified therein, and the minimum acceptable compacted thickness shall be one and one-half (1 ½) inch.

A prime coat will be required on the prepared and clean surface of the underlying base course prior to the application of the above surface courses. Such prime coat shall be as specified in the Florida Department of Transportation Standard Specifications.

## **F. Other Design Factors**

### **1. Pedestrians and Bicycle Facilities**

Provisions for expected pedestrian and bicycle traffic should be incorporated in the original highway design. All new highways, except controlled access highways, should be designed and constructed under the assumption that they will be used by bicyclists. Roadway conditions should be favorable for bicycling. This includes safe drainage grades and railroad crossings, smooth pavements, and signals responsive to bicycles. In addition, the desirability of adding facilities such as bicycle lanes, bicycle routes, shoulder improvements, and wide curb lanes should be included to the fullest extent possible. Specifically, all rural arterial and collector sections within one mile of an urbanized area should be given consideration for the construction of four lanes or marked bike lane. Generally, such facilities shall not be marked to attract bicycle traffic. All bicycle facilities shall be designed in accordance with the Florida DOT Bicycle Facilities Planning and Design Manual (most recent revision).

Pedestrian pathways should be separated from the roadway as far as is practical. Intersections of pedestrians and vehicle paths should be carefully designed with regard to providing adequate mutual sight distance. Pedestrian overpasses should be used where crossing volumes are high. These overpasses should have sufficient vertical

clearance due to the potential consequences of being struck by a vehicle. Pedestrian overpass should also be covered with a screen or other device to reduce the likelihood of objects being thrown onto passing vehicles.

## **2. Utilities**

Where it is necessary to locate utilities within the highway, street or road, the placement and location shall not be in contradiction to or fail to meet the intent of the design requirements of this manual. Poles or other above ground utility structures are not generally permitted in medians or within the roadside clear zones. Underground utilities should not be buried under the pavement when other space is available within the right of way. Unavoidable crossing of the roadway should be designed to allow for repairs and modifications without unnecessary disruption or hazard to traffic, with the exception of local residential streets. The placement of access manholes within the pavement, shoulders, or medians should be avoided.

## **3. Driveways**

- a. All driveways shall be constructed using concrete unless specifically allowed by the Planning & Development Department.
- b. All concrete driveways shall be constructed using 3000 psi concrete with a depth of not less than 3 ½". Driveways shall be reinforced with wire mesh or a fiber additive.
- c. The curb and gutter will be saw cut and ½" expansion joints shall be placed where new concrete curb abuts the old concrete curb.
- d. Curb cuts for driveways shall remove at least the existing curb. Should the remaining curb be less than five (5) feet to the next expansion joint then the remaining distance to the expansion joint shall be removed and replaced as a part of the driveway.

The first section of the driveway shall, at its joint, be equal to or higher than the highest point of the curb. Design and installation shall be such that the gutters integrity is maintained as a stormwater control system. Should the finished floor elevation of the new structure be below the highest point of the curb measures shall be provided to prevent stormwater flow from the driveway to enter any portion of the structure, including the garage if constructed.

Should the curb be removed (and not the gutter) replacement of the curbing shall include dowels drilled and properly secured be placed every five (5) feet into the gutter to provide structural integrity of the curb and gutter system.