Florida Greenbook

Manual of Uniform Minimum Standards for Design,
Construction and Maintenance for Streets and Highways

Advisory Committee Meeting Agenda

Wednesday, September 18, 2024 **2:00 PM – 3:00 PM**	**Virtual Meeting** Microsoft Teams Virtual Meeting Link

2:00 PM	Welcome	*Jacqui Morris*
2:05 PM	Introductions	*Advisory Committee*
2:15 PM	2023 Florida Greenbook Updates and Concurrence	*Jacqui Morris*
2:30 PM	FDOT Complete Streets & Context Classification Updates for locals • Overview and Discussion	*Kittelson and Associates*
2:45 PM	Chapter 19 Subcommittee Updates • Discussion and Next Steps	*Nikesh Patel*
2:55 PM	Meeting Debrief • General Discussion • Public Comment	*Jacqui Morris*

CHAPTER 1

PLANNING AND LAND DEVELOPMENT

TABLES

FIGURES

CHAPTER 1

PLANNING AND LAND DEVELOPMENT

A CONTEXT-BASED PLANNING AND DESIGN

In 1996, the Federal Highway Administration (FHWA) released guidance encouraging context-based transportation planning and design. Since then, many regional and local transportation agencies in Florida and throughout the U.S. have adopted context-based planning and design policies and practices. Context-based planning and design offers a flexible approach using existing tools in creative ways to address multimodal needs in different contexts. The approach also considers community needs, trade-offs between those needs, and alternatives to achieve multiple objectives.

The Florida Greenbook's Context-Based Design policy captures three core concepts:

- Serve the needs of transportation system users of all ages and abilities, including pedestrians, bicyclists, transit riders, motorists, and freight handlers.
- Design streets and highways based on local and regional land development patterns that reflect existing and future context.
- Promote safety, quality of life, and economic development.

This Context-Based approach builds on flexibility and innovation to ensure that all streets and highways are developed based on their context classification, as determined by the local jurisdiction to the maximum extent feasible. With a Context-Based approach, every non-limited access transportation project, including those on the Strategic Intermodal System (SIS) or part of a residential, commercial, industrial development ,—is uniquely planned and designed to serve the context of that roadway and the safety, comfort, and mobility of all users.

In a high-speed rural context, where higher truck traffic is anticipated, and walking and bicycling are infrequent, wider travel lanes with paved shoulders are appropriate. Shared use paths as part of a regional trail system or for access to schools or parks may also be needed. In urban contexts, where high volumes of pedestrians, bicyclists, and transit users are expected or desired, a roadway should include features such as wide sidewalks, bicycle facilities, transit stops, and frequent, pedestrian crossing opportunities.

Limited-access highways may incorporate elements of context-based design where they connect to the non-limited-access system.

Planning for communities occurs at several levels, including the region, city/town, community, block, and, finally, street and building. Planning should be holistic, looking carefully at the relationship between land use, buildings, and transportation in an integrated fashion. This approach, and the use of form-based codes, can create development patterns and transportation networks that balance walking, bicycling, and transit with motor vehicle transportation.

B CLASSIFICATION

Designs for transportation projects are based on established design controls for the various elements of the project such as width, side slopes, horizontal and vertical alignment, drainage, accessibility, and intersection considerations.

The design criteria presented in this manual are based on:

- Functional Classification
- Context Classification
- Design Speed

A determination of the functional and context- based design and operational requirements, and a clear definition of the classification of each new facility isare determined by the local government with jurisdiction over the street or highway. There should be consultation among local governments in determining the classification. The determination is required prior to the actual design.

B.1 Functional Classification

Functional classification is the grouping of highways by the character of service and connectivity they provide in relation to the total road network. Table 1 – 1 Functional Classification Types summarizes the primary characteristics of each functional classification.

Functional road classifications for Florida are defined in ***Section 334.03 F.S***. The ***AASHTO*** publication ***A Policy on Geometric Design of Highways and Streets (2011)*** presents an excellent discussion on highway functional classifications.

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Table 1 – 1 Functional Classification Types

Functional Classification	Primary Characteristics
Limited Access Facilities	• Limited access • Through traffic movements • Primary freight routes • Guided by FHWA Design Standards for Highways (NHS)
Principal Arterial	• Through traffic movements • Longer distance traffic movements • Primary freight routes • Access to public transit • Pedestrian and bicycle travel
Minor Arterial	• Connections between local areas and network principal arterials • Connections for through traffic between arterial streets or highways • Access to public transit and through movements • Pedestrian and bicycle travel
Collector	• Carry traffic with trips ending in a specific area • Access to commercial and residential centers • Access to public transit • Pedestrian and bicycle travel
Local Roads	• Direct property access—residential and commercial • Pedestrian and bicycle travel

B.2 Context Classification

Following context-based design, projects are ~~uniquely~~ planned and designed to be in harmony with the surrounding land use characteristics and the intended uses of the street or highway. To this end, a context-based classification system comprising eight context classifications has been adopted. Figure 1 – 1 Context Classifications describes the context classifications that will determine key design criteria elements. Criteria for limited access facilities are independent of the adjacent land uses; therefore, context classifications shown in Figure 1 – 1 do not apply to these facilities.

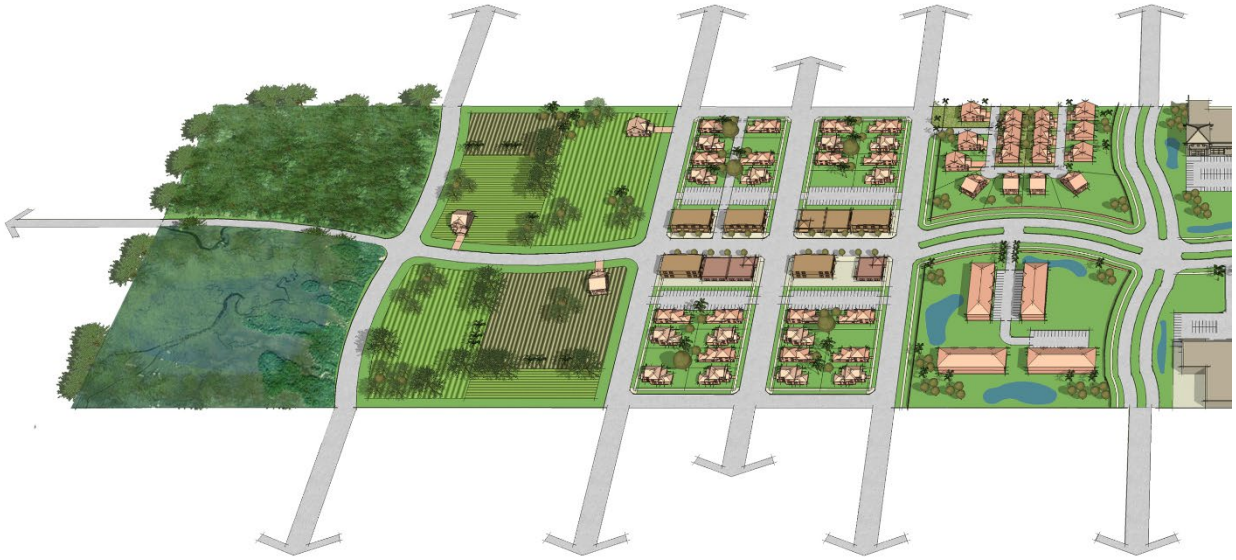
For state and federal facilities and planning activities, urban and rural are based on population density gathered from the most recent census and mapped as urban area boundaries. Urban areas are considered to have *dense* development patterns, while rural areas are considered to have *sparse* development patterns. The ~~Department~~FDOT~~'s~~ 's ***Urban Area 1-Mile Buffer Maps*** identify urban and rural areas based on the census data and regional travel patterns.

Florida cities and counties may use the state and federal urban and rural definitions as guidance. Local comprehensive plans and other studies provide more precise context designations for urban, suburban, and rural areas.

Additional information on context classifications and guidance on the determination of the context classification is provided in the FDOT ***Context Classification Document***. Local governments are encouraged to apply these same definitions to local land areas off the state roadway system. They may also be based upon local context and analysis.

To meet local needs and travel demands, deviations in design criteria may be appropriate for urban streets. ***Chapter 3 – Geometric Design, Chapter 8 – Pedestrian Facilities, Chapter 9 – Bicycle Facilities, Chapter 13 – Transit, Chapter 15 – Traffic Calming, Chapter 16 – Residential Street Design***, and ***Chapter 19 – Traditional Neighborhood Development*** provide additional information for the design of urban streets.

Figure 1 – 1 Context Classifications



C1 – Natural	C2 – Rural	C2T – Rural Town	C3R – Suburban Residential
Lands preserved in a natural or wilderness condition, including lands unsuitable for settlement due to natural conditions.	Sparsely settled lands; may include agricultural land, grassland, woodland, and wetlands.	Small concentrations of developed areas immediately surrounded by rural and natural areas; includes many historic towns.	Mostly residential uses within large blocks and a disconnected or sparse roadway network.

Figure 1 – 1 Context Classifications (continued)

C3C – Suburban Commerical

Mostly non-residential uses with large building footprints and large parking lots. Buildings are within large blocks and a disconnected or sparse roadway network.

C4 – Urban General

Mix of uses set within small blocks with a well-connected roadway network. May extend long distances. The roadway network usually connects to residential neighborhoods immediately along the corridor or behind the uses fronting the roadway.

C5 – Urban Center

Mix of uses set within small blocks with a well-connected roadway network. Typically concentrated around a few blocks and identified as part of the community, town, or city of a civic or economic center.

C6 – Urban Core

Areas with the highest densities and with building heights typically greater than four floors. Many are regional centers and destinations. Buildings have mixed uses, are built up to the roadway, and are within a well-connected transportation network.

B.3 Design Speed

See ***Chapter 3, Section C.1 Design Speed*** for information on establishing appropriate design speeds.

C CONSIDERATIONS FOR DESIGN

The following criteria shall~~should~~ be considered and resolved in the initial planning and design of streets and highways. The criteria are not listed in order of priority, and the weighting of each criterion should be based on the context of a project, the available resources, and the users.

C.1 Safety

Functional and context classification play an important role in setting expectations and measuring outcomes for safety. Since agencies consider the type of street or highway in evaluating the significance of crash rates, classification can be used as part of evaluating relative safety and the implementation of safety improvements and programs.

C.2 Economic Constraints

In determining the benefit/cost ratio for any proposed facility, the economic evaluation should go beyond the actual expenditure of highway funds and the capacity and efficiency of the facility. Overall costs and benefits of various alternatives should include an evaluation of all known environmental, community, and social impacts and the quality and cost of the project.

Allocation of sufficient funds for obtaining the proper corridor and adequate right of way and alignment should receive the initial priority. Future acquisition of additional right of way and major changes in alignment are often economically prohibitive. This can result in substandard streets and highways that don't support the community's vision. Reconstruction or modification under traffic may be expensive, inconvenient, or hazardous to the user. This increase in costs, hazards, and inconvenience can be limited by initial development of quality facilities.

C.3 Access Requirements

Degree and type of access permitted on a given facility is dependent upon its intended function and context and should conform to the guidelines in ***Chapter 3 – Geometric Design***. Reasonable access control must be exercised to allow a street or highway to fulfill its function. The proper layout of the highway network and the utilization of effective land use controls~~(*Chapter 2 – Land Development*)~~ can provide the basis for regulating access.

C.4 Measures of Level of Service

Level of service (LOS) is essentially a measure of the quality of the operating characteristics of a street or highway for each travel mode. Factors involved in determining the level of service include speed and safety, as well as travel time; traffic conflicts and interruptions; freedom to maneuver; convenience and comfort; and operating costs. Level of service is also dependent upon actual traffic volume and composition of traffic (motor vehicles, trucks, transit, bicyclists, and pedestrians).

The ***Highway Capacity Manual, 6th Edition*** provides further information on assessing the traffic and environmental effects of highway projects.

C.5~~4~~ Maintenance Capabilities

Planning and design of streets and highways should include provisions for the performance of required maintenance. The planning of the expected maintenance program should be coordinated with the initial highway design to ensure maintenance activities may be conducted without excessive traffic conflicts or hazards.

C.6~~5~~ Utility and Transit Operations

Utility accommodation within rights of way is generally considered to be in the public's best interest, since rights of way frequently offer the most practical engineering, construction, and maintenance solutions for utility service to businesses and residences. Utility and transit facility locations should be carefully chosen to optimize operations and safety of the transportation facility. Additional information on the design of transit facilities can be found in ***Chapter 13 – Transit***.

C.76 Emergency Response

Development of an effective emergency response program is dependent upon the nature of the highway network and the effectiveness of the operation of the system. Provisions for emergency access and communication should be considered in the initial planning and design of all streets and highways. Local emergency response personnel should be included in primary activities.

C.87 Environmental Impact

Construction and operation of streets and highways frequently produces an adverse effect upon the environment. Early consideration and resolution of environmental issues can avoid costly delays and modifications that may compromise the quality and efficiency of operation. Specific topics often encountered include the following:

- Air Quality
- Coastal Zone Resources
- Farmland
- Floodplains
- Hazardous Waste and Brownfields
- Noise
- Roadside vegetation
- Safe Drinking Water Act
- Water Quality
- Watersheds Management
- Wetlands
- Wild and Scenic Rivers and Wilderness Areas
- Wildlife and Threatened and Endangered Species
- Wildlife, Habitat and Ecosystems

C.98 Community and Social Impact

Quality and value of a community is directly influenced by the layout and design of

streets and highways. Quality of the network determines the freedom and efficiency of movement. Inadequate design of the network and poor land use practices can lead to undesirable community separation and deterioration. Specific design of streets and highways has a large effect upon the overall aesthetic value which is important to the motorist and resident. When using federal funds for transportation projects, the following considerations should be addressed:

- Corridor Preservation
- Historical and Archaeological Preservation
- Scenic Byways
- ***Section 4 (f)*** (parks, refuges, and historic sites)
- ***Section 6 (f)*** properties
- Visual Impacts

D LANE REPURPOSING

A lane repurposing project ~~is a way to reassign~~reallocates ~~roadway space~~travel lane(s) to achieve ~~other purposes such as~~ safety, economic development, and mobility for all users. This section serves as a resource for local transportation agency planners and engineers to analyze potential lane repurposing projects and includes the potential factors to be considered prior to design and implementation.

A typical goal for lane repurposing is better managing motor vehicular traffic ~~in order~~ to make the area more amenable to people who walk/bicycle or at-risk populations, such as children and older adults. A local government may want to create an exclusive lane for transit service. For lane repurposing projects that involve facilities for transit-related services, additional discussion and coordination with their respective transit agencies should take place as early as possible.

All lane repurposing projects must comply with ***Section 334.61 F.S.***

Lane repurposing on the Strategic Intermodal System (SIS) will not be considered.

The FDOT ***Lane Repurposing Guidebook*** provides additional information and tools on how to implement lane repurposing projects on the State Highway System, along with several detailed case studies. This document also provides useful information to locals for additional guidance.

D.1 Data Needs

Evaluating the potential success of a lane repurposing application process may require significant amounts of data, depending on the nature of the project. A lane repurposing project that has future or existing low Annual Average Daily Traffic (AADT) and simply requires restriping to implement will be less data intensive than a project which requires construction of curbs, gutters, and medians. Examples of data needed include:

- Existing and long-range future AADT (the latter based on historical growth and the regional travel demand model).
- Consistency with the local government's comprehensive plan and capital improvements program, MPO's Long-Range Transportation Plan (LRTP), Transportation Improvement Program (TIP), Transit Development Plan (TDP), master plans, visions, and context-based design initiatives.
- Status of the roadway as an Evacuation Route or, freight route, and part of the Strategic Intermodal System (SIS).
- Status of the roadway as a major transit corridor per the LRTP or TDP.
- Proposed use(s) for the right-of-way after lanes are eliminated (e.g., widened sidewalks, bicycle lanes, landscaping, on-street parking, transit lanes).
- Impact on bicycle/pedestrian infrastructure and connectivity.
- Impact on parking.
- Impact on transit routes, stop locations (including appropriateness of turn radii and lane widths), include total number of stops and routes in the area.
- Existing right-of-way width and any proposed changes to the right-of-way width.
- Anticipated changes in jurisdictional responsibility for ownership or maintenance of the roadway.
- Anticipated changes in functional classification, context classification, and/or access management classification.
- Public involvement, agency outreach and endorsement.
- Existing design and posted speeds.
- Existing and future typical section.
- Target speed with anticipated changes in posted speed limits and design speeds.

- Need for design variations or design exceptions.
- Plan for obtaining input and review from businesses, residents, and other stakeholders.
- Plan for receiving endorsement from elected officials.
- Funding source and cost estimates.
- Size of impact area: parallel and cross streets.
- Potential implementation strategy and partner commitments.
- Impact on school crossing locations and midblock crossing.
- Need to add, remove, or modify traffic signals.
- Existing and proposed near and long-range multimodal level of service (LOS) and queuing analysis for intersections and segments in the impact area.
- Mitigation to address the potential significant adverse impact on other local and state roads and regional transportation system.
- Crash data summary and analysis for the segment and intersections in the project limit.
- Case-specific special considerations to be determined (e.g., railroad crossing improvements).

D.1.a Multidisciplinary Review Team

The evaluation of potential lane repurposing projects benefits from a multi-disciplinary review team. The team may include expertise from planning, environmental management, modal development, roadway design, traffic operations, construction, and maintenance.

D.1.b Concept Reports

Lane repurposing projects involve changes to the roadway cross section and restriping of existing travel lanes for either a roadway segment or an entire corridor. The changes may include design modifications such as reduced lane widths, median changes, pedestrian refuge islands, access management modifications, bicycle lanes, new or wider sidewalks, shared-use paths, landscaping, on-street parking, transit-only lanes, or curb zones and loading/transportation network company (TNC) zones.

Traffic operation improvements and design enhancements such as turn lanes and improved turning radii must be evaluated for all lane repurposing projects. Additionally, these projects should consider the incorporation of additional features to improve the mobility or aesthetics of an area, as well as address community needs such as transit accommodations, pedestrian enhancements, on-street parking (including accessible parking), and landscaping. Concept reports should include a project description, proposed modifications, traffic, and safety analysis.

D.1.c Project Description

A project description is critical in ~~informing on~~detailing the current conditions of the roadway and the proposed changes to be made. A project description also includes information as to why a roadway should undergo lane repurposing.

- Project purpose, which clearly state the purpose and goals of the proposed lane repurposing project.
- Project location, including a map series showing the location of the project and nearby roads, land uses and other relevant information to aid reviewers in understanding the context of the proposed project.
- Area of influence and information on how the project may impact surrounding roadways and features during and after its construction.
- Existing conditions, including roadway typical section, functional classification, context classification (if available), evacuation route, ~~SIS designation,~~ posted speed limits and average speeds, traffic data, crash history, signalized intersections, utilities, levels of service (LOS), access management, transit, and parking circulation plans.

D.1.d Proposed Modifications

As part of the concept report, a detailed review of the proposed modifications to the roadway that is being studied should be provided. This conceptual design should include:

- Typical section and intersection designs.
- Proposed changes to the design speed or posted speed limits.
- Consistency with local plans.

- Potential design variations or exceptions.

D.1.e Traffic Analysis

Lane repurposing projects will affect traffic by altering the capacity of the roadway via removal of one or more lanes. This effect may impact the study corridor only or it may ripple to adjacent roadways. The purpose of the project will influence how traffic impacts are prioritized when evaluating performance. Since traffic analysis can require a substantial amount of time and resources, it is important to develop an analysis approach. This section describes attributes of traffic analysis for lane repurposing projects to help streamline the analysis. Components to consider include:

- Existing and future traffic patterns and potential growth of traffic in the study area which allows for a comparison between the Build and No-Build scenarios for existing and future conditions.
- Establishment of a "de minimis" (minimal impacts) level. A level of 3% of existing and projected roadway segment vehicle capacity is suggested.
- Size of the area under study and the level of accuracy needed. These two elements will determine the intensity of the data collection and processing. A minimum radius of 1 mile in all directions per 1-mile segment proposed for lane repurposing is recommended.
- Corridor and intersection Level of Service (LOS) Analysis of Build versus No-Build Alternatives that provide the user experience as a metric for how well a roadway is performing. It should include an analysis for pedestrians and bicyclists, as well as motor vehicles.
- For projects that serve a transit corridor, person throughput should be studied.
- Existing and proposed truck routes, ingress, and egress to port facilities and intermodal centers, and delivery zones and loading areas.
- Effects upon adjacent neighborhoods, communities, and other jurisdictions.

D.1.f Safety Analysis

Lane repurposing projects, in general, have been demonstrated to reduce crashes, including fatalities by all users, while slowing average speeds and reducing traffic exposure. A 5-year crash analysis of the corridor should be conducted. Projects are typically proposed on corridors which demonstrate some of the following characteristics related to safety:

- High crash numbers and rates.
- High crash locations by type.
- Rear-end crashes from left-turning vehicles.
- Left-turning vehicles stopped in the inside travel lane.
- Sideswipe and angle crashes due to lane changes.
- Pedestrian and bicycle crashes.
- Wide crossing distances for pedestrians and bicyclists.
- High differential in speeds in travel lanes.

D.1.g Public Involvement

Support by the local community is crucial to the long-term success of a lane repurposing project. The process to build consensus for the reconfiguration of a roadway in a community can involve some misperceptions. For example, lane repurposing projects can initially be perceived as increasing motor vehicle delay, but at the same time, they can improve safety, ~~and~~ accessibility and mobility for multiple users. Therefore, community engagement requires a commitment to a strong partnership and public involvement process throughout the process. Public involvement tools may include social media, webpages, workshops, and implementation of small demonstration projects, with polling before and after.

For public involvement requirements including meetings and public notice, ~~S~~see ***Section 334.61 F.S.***. ~~for time-frames for public notice requirements.~~

E LAND DEVELOPMENT

Development controls are needed to aid in the establishment of safe streets and highways

that will retain their efficiency and economic worth. There may be legal, social, and economic challenges in land use controls. Proper coordination among the public, various governmental bodies, and public transit and highway agencies can provide solutions to many of these challenges. Implementation of responsible land use and development regulations along with intergovernmental respect for the goals and objectives of each, will promote a high-quality long-term transportation network.

Land development practices should promote high quality street networks that provide interconnectivity and access control. The street network shall be designed for the safety of all road users – pedestrians, bicyclists, transit, and motor vehicle operators and passengers.

The design of the street network and features shall be consistent with the desired context and meet the criteria in this Manual. Context based street design incorporates the following elements:

- Streets are sized and detailed to equitably serve the needs of the intended road users and support target speed.
- Flow patterns are designed to interconnect neighborhoods while discouraging through motorized traffic on local street networks.
- Sufficient right of way is provided, including space allocations for stormwater, utilities, signing and lighting.
- Public transit is supported through a high level of connectivity and attractive facilities (stops, shelters, hubs).
- Energy, infrastructure, and automobile use is reduced through a compact form.
- Provides for aesthetic and environmental compatibility.
- Building size and character spatially define streets and squares.

E.1 Development Types and Guidelines

There are many variables involved in land development. The following principles and guidelines should be utilized in the design of the road network, in the control of access, and in the land-use controls and space allocation that would affect vehicular and pedestrian use.

E.1.a Conventional Suburban Design

This development type was common practice through the 20th century. It is characterized by automobile-dominant design and segregated land uses. The street patterns channel local traffic onto collector and arterial streets to reach most destinations. Although destinations are oftentimes adjacent to one another, this conventional suburban design does not typically connect to them directly. This makes walking an inefficient form of transportation in this development type.

E.1.b Traditional Neighborhood Design (TND)

This refers to the development or redevelopment of a neighborhood or town using traditional town planning principles. Projects should include a range of housing types and commercial establishments, a network of well-connected streets and blocks, civic buildings, and public spaces, and include other uses such as stores, schools, and worship within walking distances of residences. TND communities rely on a strong integration of land use and transportation.

E.1.c Transit–Oriented Design (TOD)

This development type is a compact, mixed use area within one half mile of a transit stop or station that is characterized by streetscapes and an urban form oriented to pedestrians to promote walking trips to stations and varied other uses within station areas. Transit-supportive development enables citizens to use a variety of transportation modes for at least one or more of their daily trips between home, work, shopping, school, or services. These concepts are often called “new urbanism”.

For more information on Conventional Suburban, TND and TOD, refer to the ***21st Century Land Development Code*** and FDOT’s ~~***FDOT’s Traditional Neighborhood Development Handbook (2011)***~~***Traditional Neighborhood Development Handbook (2011).***

E.2 Space Allocation

The provisions for adequate space and proper location of various activities is essential to promote safety and efficiency. The following guidelines should be utilized in land use:

- Adequate corridors and space should be considered for utilities. Utility locations should be carefully chosen to minimize interference with the operation of the streets, highways, and bicycle and pedestrian facilities.
- Adequate space for drainage facilities should be provided. Open drainage facilities should be located well clear of the traveled way.
- Right of way and setback requirements should be adequate to provide ample sight distance at all intersections.
- Space allocation for street lighting (existing or planned) should be incorporated into the initial plan. Supports for this lighting should be located outside of the required clear zone unless they are clearly of a breakaway type, or are guarded by adequate protective devices.
- Sufficient right of way should be provided for future widening, modification, or expansion of the street and highway network.
- Adequate space for desired or required landscaping, shade trees, and greenways should be provided.
- Adequate space for appropriate public transit facilities should be provided.

E.3 Access Control

The utilization of proper control over access is one of the most effective and economical means for maintaining the safety and utility of streets and highways. The following principles should be utilized in the formation of land use controls for managing access:

- The standards presented in ***Chapter 3 – Geometric Design, C.8 Access Control***, should provide the basis for establishing land development criteria for control of access.
- The use of an arterial or major collector as an integral part of the internal circulation pattern on private property should be prohibited.
- Access to sites which generate major traffic (motor vehicular, pedestrian, and bicycle), should be located to provide minimum conflict with other traffic. These generators include schools, shopping centers, business establishments, industrial areas, entertainment facilities, etc.
- Commercial strip development, with the associated proliferation of driveways, should be eliminated. Vehicular and pedestrian interconnections should be encouraged.

- The spacing and location of access points should be predicated upon reducing conflicts between and among motor vehicles, pedestrians, and bicyclists. Crossing and left turn maneuvers may be controlled by continuous median separation.
- Pedestrian access should be provided, with frequent opportunities for crossings.

E.4 Control Techniques

The implementation of a sound highway transportation plan requires certain controls. A logical network design, adequate access controls, and proper land use controls are dependent upon and foster proper land development practices. Techniques that may be utilized to establish these necessary controls include the following:

E.4.a Right of Way Acquisition

The acquisition of sufficient right of way is essential to allow for the construction of streets and highways as specified in this manual. The provision of sufficient space for travel lanes, intersections, bicycle, pedestrian and transit facilities, landscaping, shade trees, buffer zones, drainage facilities, and future expansion is necessary to develop and maintain safe streets and highways.

E.4.b Regulatory Authority

The regulatory authority of local highway agencies (and other related agencies) should be sufficient to implement the necessary land use controls. The following general regulatory requirements and specific areas of control should be considered as minimum:

E.4.b.1 General Regulatory Requirements

The necessary elements for achieving the following transportation goals should be incorporated into all land use and zoning ordinances:

- General highway transportation plans should be created and implemented.

- Determination and acquisition of transportation corridors for future expansions is essential.
- Development plans clearly showing all street and highway layouts, transit facilities, pedestrian and bicycle facilities, and utility corridors should be required. The execution of these plans should be enforceable.
- Development plans, building permits, and zoning should be reviewed by the appropriate agency.

E.4.b.2 Specific Control

Specific areas of control necessary to develop adequate and efficient roadways include the following:

- Land use control and development regulations
- Control of access
- Driveway design
- Street and highway layouts
- Location of vehicular and pedestrian generators
- Location of transit, pedestrian, and bicycle facilities
- Right of way and setback requirements for sight distances and clear zone
- Provisions for drainage

E.5 Contracts and Agreements

Where land purchase or regulatory authority is not available or appropriate, the use of contractual arrangements or agreements with individuals can be beneficial. Negotiations with developers, builders, and private individuals should be used, where appropriate, to aid in the implementation of the necessary controls.

E.6 Education

Education of the public, developers, and governmental bodies can be beneficial in promoting proper land development controls. The need for future planning, access control, and design standards should be clearly and continuously emphasized.

Successful solidification of the cooperation of the public and other governmental bodies depends upon clear presentation of the necessity for reasonable land development controls.

FD OPERATION

The concept of operating the existing street and highway network as a system is essential to promote safety, efficiency, mobility, and economy. This requires comprehensive planning and coordination of all activities on each street and highway. These activities would include maintenance, construction, utility operations, public transit operations, traffic control, and emergency response operations. The behavior of travelers should be considered as an integral part of the operation of streets and highways. Coordination of the planning and supervision of each activity on each facility is necessary to achieve safety and efficient operation of the total system.

FD.1 Policy

Each transportation agency with general responsibility for existing streets and highways should establish and maintain an operations department. Each existing street or highway should be assigned to the jurisdiction of the operations department. The operations department shall be responsible for planning, supervising, and coordinating all activities affecting the operating characteristics of the system under its jurisdiction.

FD.2 Objectives

The primary objective of an operations department shall be to maintain or improve the operating characteristics of the system under its jurisdiction. These characteristics include safety, capacity, and level of service. The preservation of the function of each facility, which would include access control, is necessary to maintain these characteristics and the overall general value of a street or highway.

FD.3 Activities

The achievement of these objectives requires the performance of a variety of coordinated activities by the operations department. The following activities should be considered as minimal for promoting the safe and efficient operation of a system.

~~D~~F.~~.~~3.a Maintenance and Reconstruction

Maintaining or upgrading the quality of existing facilities is an essential factor in preserving desirable operating characteristics. The planning and execution of maintenance and reconstruction activity on existing facilities must be closely coordinated with all other operational activities and, therefore, should be under the general supervision of the operations department.

All maintenance work should be conducted in accordance with the requirements of ***Chapter 10 – Maintenance and Resurfacing***. The priorities and procedures utilized should be directed toward improvement of the existing system. The standards set forth in this Manual should be used as guidelines for establishing maintenance and reconstruction objectives. All maintenance and reconstruction projects should be planned to minimize traffic control conflicts and hazards.

F~~D~~.3.b Work Zone Safety

An important responsibility of the operations department is the promotion of work zone safety on the existing system. The planning and execution of maintenance, construction, and other activities shall include provisions for the safety of motorists, bicyclists, pedestrians, and workers. All work shall be conducted in accordance with the requirements presented in ***Chapter 11 – Work Zone Safety and Mobility***.

F~~D~~.3.c Traffic Control

Traffic engineering is a vital component of highway operations. The planning and design of traffic control devices should be carried out in conjunction with the overall design of the street or highway and highway user. The devices and procedures utilized for traffic control should be predicated upon developing uniformity throughout the system and compatibility with adjacent jurisdictions.

A primary objective to be followed in establishing traffic control procedures is the promotion of safe, orderly traffic flow. The cooperation of police agencies and coordination with local transit providers is essential for the achievement of this objective. Traffic control during maintenance, construction, utility, or emergency response operations should receive special consideration.

FD.3.d Emergency Response

The emergency response activities (i.e., emergency maintenance and traffic control) of the operations department should be closely coordinated with the work of police, fire, ambulance, medical, and other emergency response agencies. The provisions for emergency access and communications should be included in the initial planning for these activities.

FD.3.e Coordination and Supervision

Coordination and supervision of activities on the system should include the following:

- Supervision and/or coordination of all activities of the operations department and other agencies to promote safe and efficient operation
- Coordination of all activities to provide consistency within a given jurisdiction
- Coordination with adjacent jurisdictions to develop compatible highway systems
- Coordination with other transportation modes to promote overall transportation efficiency

FD.3.f Inspection and Evaluation

The actual operation of streets and highways provides valuable experience and information regarding the effectiveness of various activities. Each operations department should maintain a complete inventory of its system and continuously inspect and evaluate the priorities, procedures, and techniques utilized in all activities on the existing system under its jurisdiction. Activities by other agencies, as well as any agency, should be subjected to this supervision.

Promotion of transportation safety should be aided by including a safety office (or officer) as an integral part of the operations department. Functions of this office would include the identification and inventory of hazardous locations and procedures for improving the safety characteristics of highway operations.

Results of this inspection and evaluation program should be utilized to make the modification necessary to promote safe and efficient operation. Feedback for modifying design criteria should be generated by this program. Experience and data obtained from operating the system should be utilized as a basis for recommending regulatory changes. Cooperation of legislative, law enforcement, and regulatory agencies is essential to develop the regulation of vehicles, driver behavior, utility, emergency response activities, and the access land use practices necessary for the safe and efficient operation of the highway system.

GE REFERENCES FOR INFORMATIONAL PURPOSES

- Florida Transportation Plan
  http://floridatransportationplan.com/
- Florida Growth Management and Comprehensive Planning Laws (DEOOE)
  http://www.floridajobs.org/community-planning-and-development
- 1000 Friends of Florida
  http://www.1000fof.org/
- Florida Metropolitan Planning Organization Advisory Council (MPOAC)
  http://www.mpoac.org/
- Understanding Sprawl, A Citizen's Guide
  https://www.osti.gov/etdeweb/biblio/20414909
- Traditional Neighborhood Development Handbook
  http://www.fdot.gov/roadway/FloridaGreenbook/TND-Handbook.pdf

Design criteria are established for transportation projects to ensure that they provide safe, economical, and fully functional multimodal transportation facilities. Various Department FDOT publications contain information on procedures, criteria, and standards for guiding and controlling design and construction activities. There are many local, state, and federal laws and rules that may impact the design of a project. These laws and rules are referenced in the publications when the Department is aware of them.

For situations where specific design standards or criteria cannot be found in the Department FDOT publications, current approved technical publications such as ***AASHTO's Policy on Geometric Design of Highways and Streets (2011)*** should be used as design guidelines. Local agencies must ensure that project designs meet or

~~exceed the referenced design criteria and that the standards developed from acceptable guidelines are appropriate for the proposed facility.~~

~~The following publications provide further information and guidance for Roadway and Bridge/Structure designs:~~

- ~~FDOT Design Plans Preparation Manual, Volume I (Topic No. 625-000-0027) and Volume II (Topic No. 625-000-008)~~
  ~~http://www.fdot.gov/roadway/FDM/~~
- ~~Design Standard Plans for Road and Bridge Constructions (Standard Indexes) (Topic No. 625-010-003)~~
  ~~http://www.fdot.gov/design/standardplans/~~
- ~~FDOT Standard Specifications for Road and Bridge Construction~~

~~Project Development and Environment Manual Part 1 and Part 2 (Topic No. 650-000-001)~~
~~http://www.fdot.gov/environment/pubs/pdeman/pdeman1.shtm~~

- ~~http://www.dot.state.fl.us/rddesign/DesignStandards/Standards.shtm~~
- ~~Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Florida Greenbook) (Topic No. 625-000-015)~~
  ~~http://www.dot.state.fl.us/rddesign/FloridaGreenbook/FGB.shtm~~
- ~~A Policy on Geometric Design of Highways and Streets, 6th Edition (AASHTO Green Book) (AASHTO Bookstore GDHS-6)~~
  ~~https://bookstore.transportation.org/collection_detail.aspx?ID=110~~
- ~~FDOT Standard Specifications for Road and Bridge Construction~~
  ~~http://www.dot.state.fl.us/specificationsoffice/Implemented/SpecBooks/default.shtm~~

- ~~AASHTO LRFD Bridge Design Specifications, Customary U.S. Units, 6th Edition (AASHTO Bookstore LRFDUS-6-M)~~
  ~~https://bookstore.transportation.org/item_details.aspx?id=1924~~
- ~~FDOT Structures Manual (Topic No. 625-020-018)~~
  ~~http://www.dot.state.fl.us/structures/StructuresManual/CurrentRelease/StructuresManual.shtm~~

- ~~FDOT Facilities Design Manual (Topic No. 625-020-016)~~
  ~~http://www.dot.state.fl.us/projectmanagementoffice/Publications/default.shtm~~
- ~~Florida Intersection Design Guide~~
  ~~http://www.dot.state.fl.us/rddesign/FIDG-Manual/FIDG.shtm~~
- ~~NCHRP Report 672 – Roundabouts: An Informational Guide, 2nd Edition~~
  ~~http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_672.pdf~~
- ~~AASHTO Highway Safety Manual, 1st Edition (AASHTO Bookstore HSM-1)~~
  ~~https://bookstore.transportation.org/~~
- ~~https://bookstore.transportation.org/collection_detail.aspx?ID=33~~
- ~~Local Agency Program Manual (Topic No. 525-010-300)~~
  ~~http://www.dot.state.fl.us/projectmanagementoffice/lap/LAP_TOC.shtm~~
- ~~Project Development and Environmental Manual Part 1 and Part 2 (Topic No. 650-000-001)~~
  ~~http://www.dot.state.fl.us/emo/pubs/pdeman/pdeman1.shtm~~
- ~~Rigid Pavement Design Manual (Topic No. 625-010-006)~~
  ~~http://www.dot.state.fl.us/rddesign/PM/Publications.shtm~~
- ~~Flexible Pavement Design Manual (Topic No. 625-010-002)~~
  ~~http://www.dot.state.fl.us/rddesign/PM/publicationS.shtm~~
- ~~FDOT Drainage Manual (Topic No. 625-040-002)~~
  ~~http://www.dot.state.fl.us/rddesign/Hydraulics/ManualsandHandbooks.shtm~~
- ~~Soils and Foundations Handbook~~
  ~~http://www.dot.state.fl.us/structures/DocsandPubs.shtm~~
- ~~Standard Highway Signs (FHWA)~~
  ~~http://mutcd.fhwa.dot.gov/ser-shs_millennium.htm~~
- ~~Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition~~
  ~~http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm~~
- ~~Roadway Lighting Design Guide (AASHTO Bookstore GL-6)~~
  ~~https://bookstore.transportation.org/item_details.aspx?id=320~~
- ~~AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 6th Edition (AASHTO Bookstore LTS-6)~~
  ~~https://bookstore.transportation.org/collection_detail.aspx?ID=126~~
- Highway Functional Classification: Concepts, Criteria and Procedures, 2013 Edition (FHWA)
  http://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functi

onal_classifications/section00.cfm

- ~~Highway Capacity Manual 2010 (Transportation Research Board) (TRB Bookstore HCM10)~~
  ~~http://books.trbbookstore.org/hcm10.aspx~~
- Quality/Level of Service Handbook (FDOT, 2020~~13~~)
  https://www.fdot.gov/planning/systems/documents/sm/default.shtm~~http://www.fdot.gov/planning/systems/programs/sm/los/default.shtm~~
- ~~http://www.dot.state.fl.us/planning/systems/programs/sm/los/default.shtm~~
- Manual on Uniform Traffic Studies (Topic No. 750-020-007)
  https://www.fdot.gov/docs/default-source/traffic/TrafficServices/Studies/MUTS/MUTS-Final-01.2016.pdf~~https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/traffic/trafficservices/studies/muts/new-muts-2021-and-forms/2021-muts-compiled-20220420.pdf?sfvrsn=141a4970_0~~
- ~~Surveying Procedure (Topic No. 550-030-101)~~
  https://pdl.fdot.gov/api/procedures/downloadProcedure/550-030-101
- ~~Right of Way Mapping Procedure (Topic No. 550-030-015)~~
  ~~http://www.dot.state.fl.us/surveyingandmapping/doc_pubs.shtm~~

CHAPTER 13

PUBLIC TRANSIT

FIGURES

CHAPTER 13

PUBLIC TRANSIT

A INTRODUCTION

All modes of transportation (autos, trucks, transit vehicles, rails, aircraft, water craft, bicyclists, and pedestrians) shall~~should~~ be considered when planning, designing, and constructing the surface transportation system. Where there is a demand for highways to serve vehicles, there could also be a demand for public transit or public transportation. Public transit should be considered in all phases of a project, including planning, preliminary design and engineering, design, construction, and maintenance. Coordination with the appropriate public transit provider(s) will help determine the need for transit related infrastructure on a project-by-project basis. The integration of public transit street side facilities along with pedestrian and bicycle facilities furthers the implementation of this goal.

Planning and designing for public transit is important because it is an integral part of the overall surface transportation system. Public transit is defined as passenger transportation service, local or regional in nature, which is available to any person. It operates on established schedules along designated routes or lines with specific stops and is designed to move relatively large numbers of people at one time. Public transit includes bus, light rail, street cars, bus rapid transit and paratransit.

With rising levels of congestion resulting in the use of new strategies to effectively and efficiently manage mobility, there is an increased demand for accessible and user friendly public transit. New strategies include increased emphasis on public transit and new emphasis on Transportation System Management (TSM), as well as Transportation Demand Management (TDM). TSM is the use of low cost capital improvements to increase the efficiency of roadways and transit services such as~~,~~ retiming traffic signals or predestinating traffic flow. TDM focuses on people reducing the number of personal vehicle trips, especially during peak periods. TDM includes the promotion of alternatives to the single occupant vehicle, including public transportation, carpooling, vanpooling, bicycling, walking, and telecommuting, as well as other methods for reducing peak hour travel.

Federal and State legislation provide the stimulus for planning, designing, and constructing a fully integrated transportation system benefiting the traveling public and

the environment. Examples of legislation include ***Fixing America's Surface Transportation Act (FAST Act)***, ***Americans with Disabilities Act of 1990 (ADA)***, and ***Clean Air Act Amendment of 1990 (CAAA)***. In response to this legislation, the surface transportation system should provide for concurrent use by automobiles, public transit and rail, bicycles, and pedestrians.

B OBJECTIVE

There are ~~a number of~~several methods to efficiently develop a coordinated surface transportation system. Coordination among agencies is necessary during the planning and design stages to:

- incorporate transit needs and during the construction phase for re-routing bus (and complementary pedestrian) movements, and
- for actual transit agency specific requirements (e.g., bus stop sign replacement, shelter installations, etc.).

For planning purposes, the state and local Transportation Improvement Program (TIP) should be referenced. Additionally, individual transit authorities have ten-year Transit Development Plans (TDPs) that are updated annually. The TDP can be used as a guide for planned transit needs along existing and new transportation corridors so transit consideration and transit enhancements can be incorporated where appropriate.

C TRANSIT COMPONENTS

C.1 Boarding and Alighting (B&A) Areas

Boarding and Alighting (B&A) areas help to create an accessible bus stop by providing a raised platform that is compatible with a bus that kneels or extends a ramp. A B&A area has a firm, stable and slip-resistant surface with a minimum clear length of 8.0 feet (measured perpendicular to the curb or roadway edge), and a minimum clear width of 5.0 feet (measured parallel to the roadway). Firm, stable, and slip resistant B&A areas are required if amenities such as benches or shelters are added to a bus stop. B&A areas are not required at bus stops on flush shoulder roadways where only a bus stop sign is provided. Coordinate with the appropriate public transit provider(s) to determine compatibility with equipment and transit vehicles.

The slope of the B&A area parallel to the roadway shall to the extent practicable, be the same as the roadway. For water drainage, a maximum slope of ~~1:50 (~~2%~~)~~ perpendicular to the roadway is allowed. Benches and other site amenities shall not be placed on the B&A area. The B&A area can be located either within or outside the shelter, and shall be connected to streets, sidewalks, or pedestrian circulation paths by an accessible route.

On flush shoulder roadways, a B&A area may be constructed at the shoulder point (or edge of shoulder pavement on roadways with a design speed of 45 mph or less) as shown in Figures 13 – 1 and 13 – 2 Boarding and Alighting Area for Flush Shoulder Roadways. A Type “E” curb (5” curb height) should be used.

A sidewalk and/or ramp provided with the B&A area shall be a minimum of 5 feet in width, and the ramp shall not exceed a slope of 1:12. A detectable warning is required where a sidewalk associated with a B&A area connects to the roadway at grade. Except for the area adjacent to the 5” curb, the areas surrounding the B&A area shall be flush with the adjacent shoulder and side slopes and designed to be traversable by errant vehicles. On the upstream side of the platform, a maximum slope of 1:12 should be provided, and may be grass or a hardened surface. The B&A area (and ramp and level landing if needed) should be constructed with 6” thick concrete.

Figure 13 – 1 Boarding and Alighting Area for Flush Shoulder Roadways with Connection to the Roadway

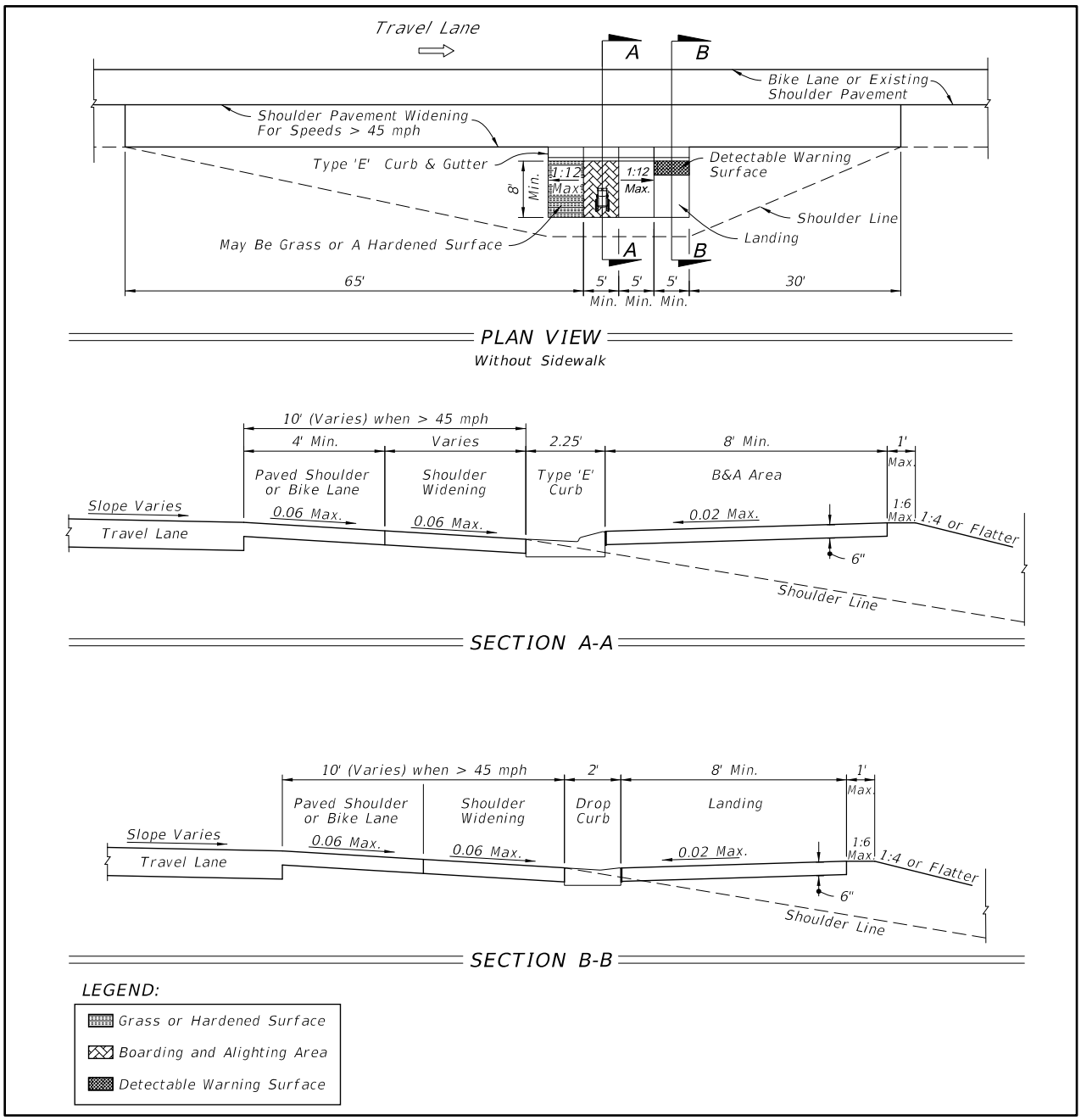
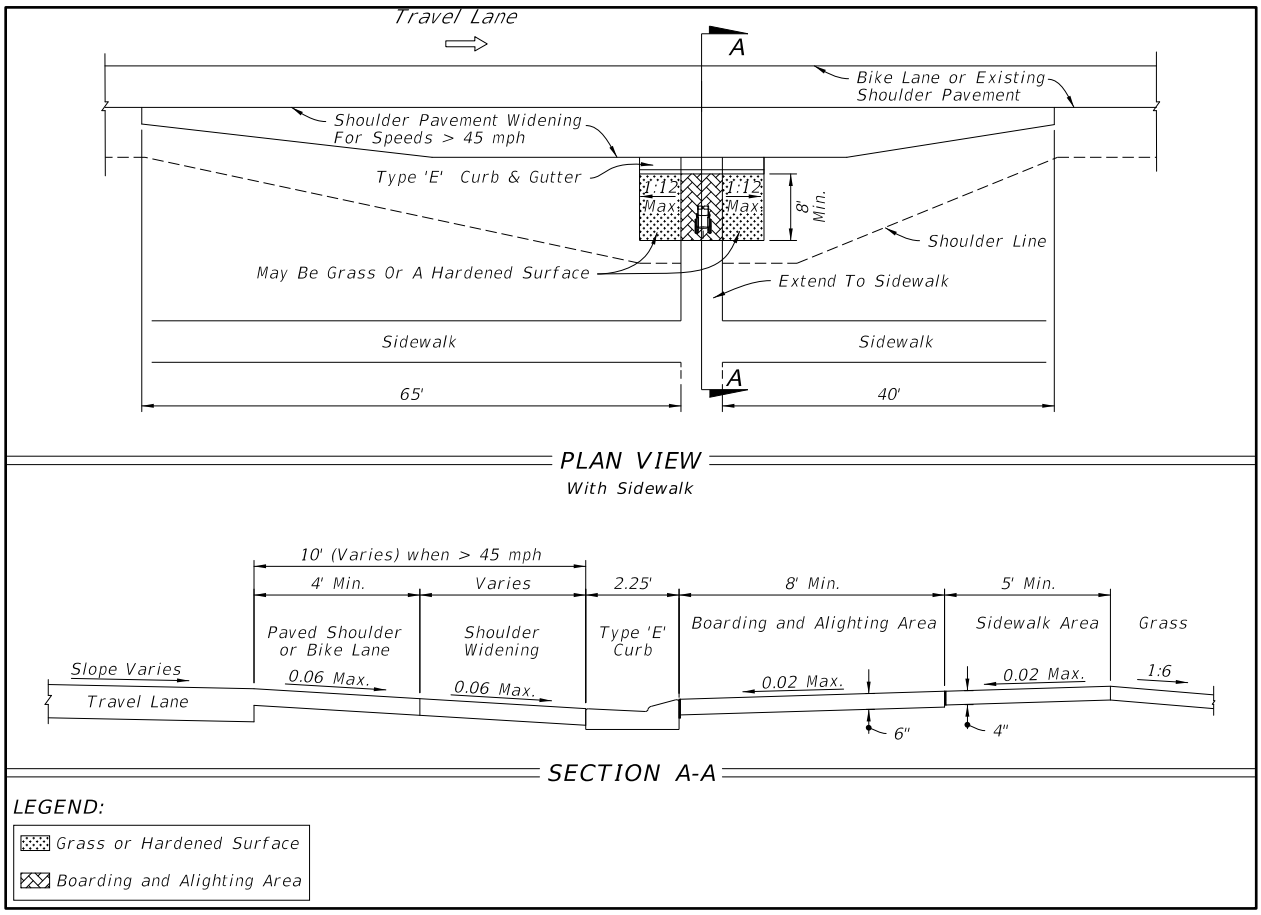


Figure 13 – 2 Boarding and Alighting Area for Flush Shoulder Roadways with Connection to the Sidewalk

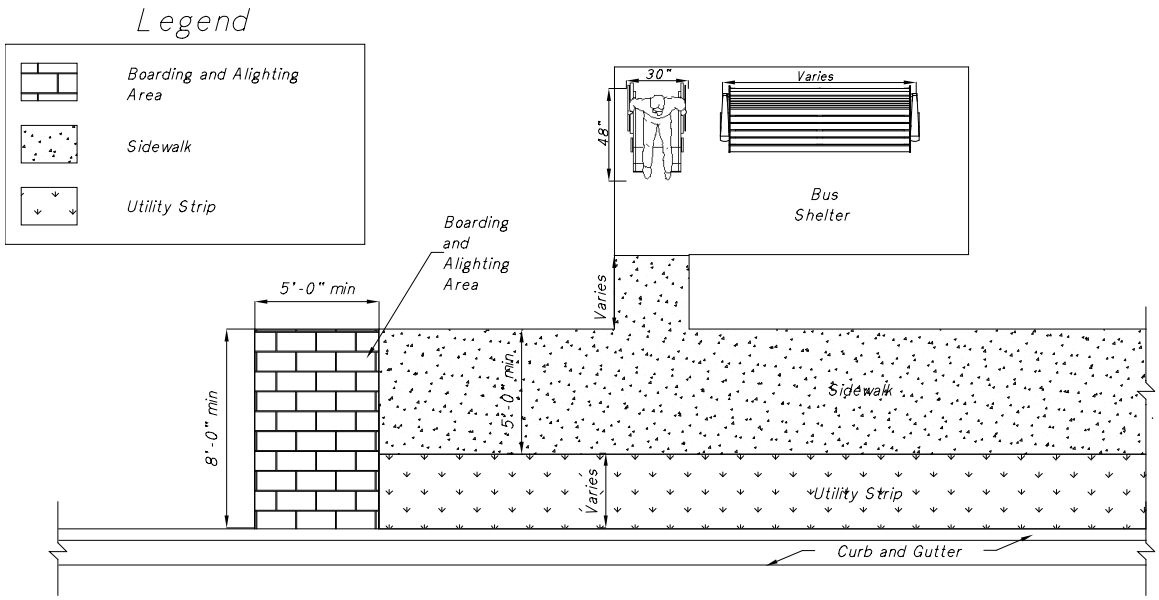


C.2 Shelters

Every public transit system has different needs with regards to shelters and corresponding amenities (e.g., benches, information kiosks, leaning posts, trash receptacles, etc.). Shelter foundation and associated pad size vary from stop to stop based on right of way availability, line of sight, and facility usage. New or replaced bus shelters shall be installed or positioned to provide an accessible route from the public way (sidewalk or roadway) to reach a location that has a minimum clear floor area of 30 inches by 48 inches, entirely within the perimeter of the shelter.

Shelters shall be connected by an accessible route to a B&A area. Coordinate with the appropriate public transit provider(s). Where feasible, shelters should provide a location for a bicycle rack. Shelters should be installed at locations where demand warrants installation and in accordance with clear zone criteria in ***Chapter 3 – Geometric Design, Section C.10.e*** Bus Benches and Transit Shelters and ***Chapter 4 – Roadside Design***, Table 4 – 2~~1~~ Lateral Offset~~Minimum Width of Clear Zone~~ of this Manual.

Figure 13 – 3 Bus Shelter Location



C.3 Benches

If a bench is provided, it should be on an accessible route, out of the path of travel on a sidewalk. Benches shall have an adjacent firm, stable and slip-resistant surface at least 30 inches wide and 48 inches deep to allow a user of a wheelchair to sit next to the bench, permitting the user shoulder-to-shoulder seating with a companion. Connection between the bench, sidewalk and/or bus B&A area shall be provided. Coordinate with the local public transit provider(s).

C.4 Stops and Station Areas

Transit stops should be located so that there is a level and stable surface for boarding vehicles. Locating transit stops at signalized intersections increases the usability for pedestrians with disabilities.

C.5 Bus Bays (Pullout or Turnout Bays)

Bus bays for transit vehicles may be necessary (e.g., extended dwell time, layover needs, safety reasons, high volumes or speed of traffic.). Bus bays can be designed for one or more buses. Coordinate with the local public transit provider(s) to determine the need for bus bays. When possible, bus bays should be located on the far side of a signalized intersection. The traffic signal will create the critical gap needed for bus re-entry into traffic. There are several publications available which provide additional design information for transit system applications. The FDOT ~~Department~~ District Public Transportation Office(s) maintains a library of these publications.

~~C.6 Red-Colored Pavement for Transit Lanes~~

~~FHWA has issued an interim approval for the optional use of red-colored pavement to enhance the conspicuity of station stops, travel lanes, or other locations in the roadway that are reserved for (1) the exclusive use by public transit vehicles or (2) multi-modal facilities where public transit is the primary mode (***MUTCD – Interim 1A-22***). Contact FHWA's Office of Transportation Operations for approval to use red-colored pavement in transit lanes.~~

D PUBLIC TRANSIT FACILITIES

When a project includes a public transit route, curb-side and street-side transit facilities for bus stops should be considered in the roadway design process. Transit facilities shall comply with ***Chapter 14-20, Florida Administrative Code***.

The "Accessing Transit: Design Handbook for Florida Bus Passenger Facilities" provides guidance relating to provisions for curb-side and street-side facilities.

D.1. Curb-Side Facilities

Curb-side facilities are the most common, simple, and convenient form of facilities at a bus stop. These include bus stop signs, shelters, bus stop B&A areas, benches, bike racks, leaning rails, and shelter lighting. "Accessing Transit" provides additional details and guidelines for each type of transit facility. Coordinate with the appropriate public transit provider(s) to determine the appropriate type and placement of amenities.

D.2 Street-Side Facilities

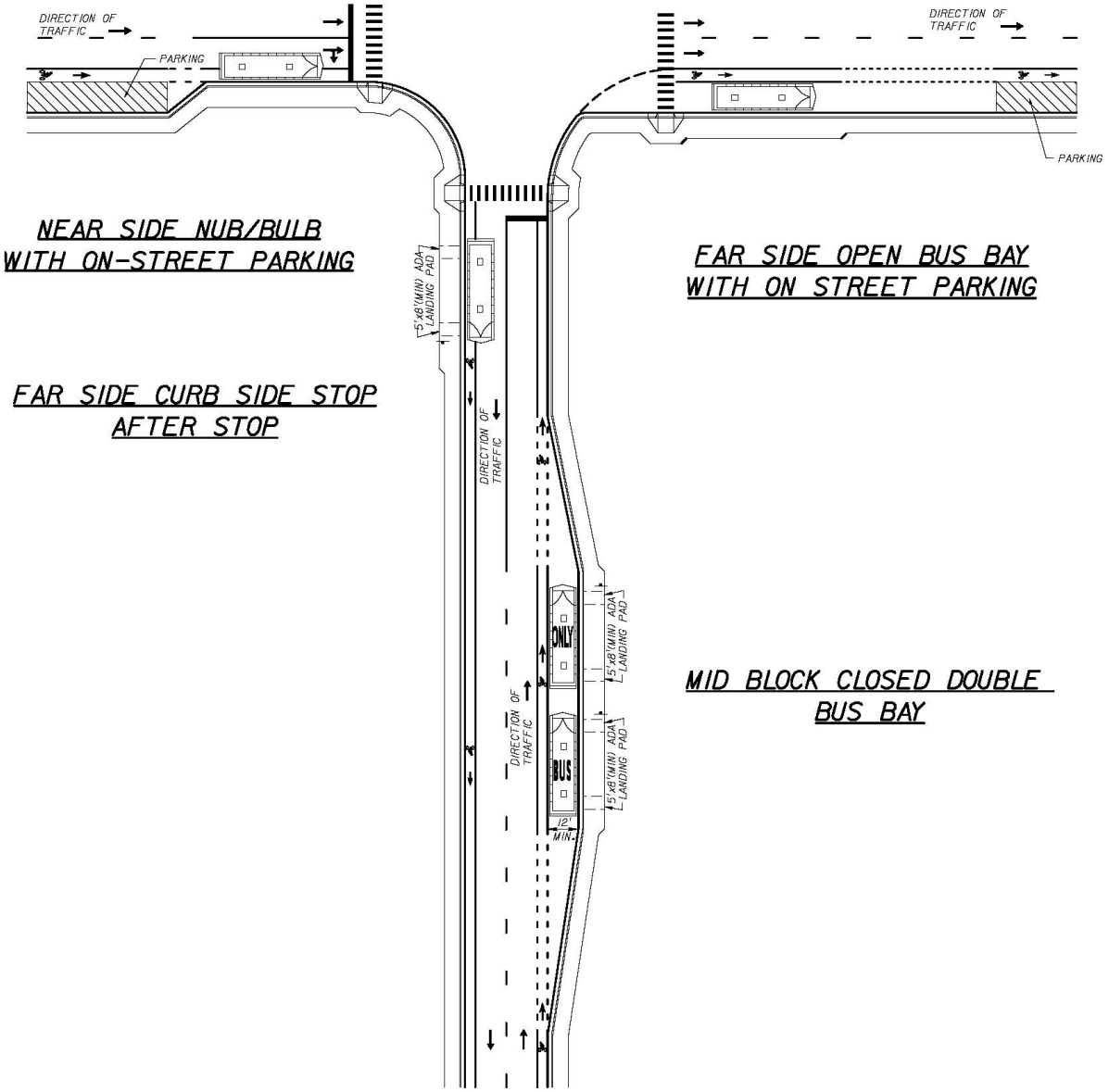
Bus stop locations can be categorized as far side, near side and mid-block stops. Bus stops may be designed with a bus bay or pullout to allow buses to pick up and discharge passengers in an area outside of the travel lane. This design feature allows traffic to flow freely without the obstruction of stopped buses. Far side bus stops and bays are preferred. See ***Accessing Transit, Version 3 (2013)*** and ***Accessing Transit Update (2017)*** for a more detailed discussion of the location of the bus stop or bay.

Bus bays can be closed-ended, open-ended, or nubs/bulbs, and can be positioned near-side, far-side, or mid-block in relation to an intersection, as illustrated in Figure 13~~2~~23 ~~-~~– 3 Bus Shelter Location. The total length of the bus bay should allow room for an entrance taper, a stopping area, and an exit taper as a minimum. However, in some cases it may be appropriate to consider providing acceleration and deceleration lanes depending on the volume and speed of the through traffic. This decision should be based upon site specific conditions. "Accessing Transit" provides detailed bus bay dimensions for consideration with various right of way and access conditions.

D.3 Bus Stop Lighting

Lighting design for bus stops should meet the same criteria for minimum illumination levels, uniformity ratios and max-to-min ratios that are being applied to the adjoining roadway based on ***Chapter 6 – Lighting*** of this Manual. If lighting is not provided for the adjoining roadway, coordinate with the transit agency to determine if lighting should be provided for the bus stop area, particularly when night transit services are provided. A decision to install lighting for the adjoining bus stop area may include illumination of the bus bay pavement area. The use of solar panel lighting for bus stops is another option that should be considered.

Figure 13 – 4 Bus Stop Locations



E REFERENCES FOR INFORMATIONAL PURPOSES

The following is a list of publications that may be referenced for further guidance:

- FDOT's Accessing Transit, Design Handbook for Florida Bus Passenger Facilities, Version III, 2013
  http://www.fdot.gov/transit/

- TCRP Report 155 – Track Design Handbook for Light Rail Transit, Second Edition
  http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_155.pdf

- Central Florida Commuter Rail Transit Project, Design Criteria – Phase 2 South RFP
  https://corporate.sunrail.com/wp-content/uploads/2015/06/P2S-RFP-Design-Criteria-06-15-15.pdf~~http://corporate.sunrail.com/wp-content/uploads/2015/06/P2S-RFP-Design-Criteria-06-15-15.pdf~~

- Transit facilities shall comply with Chapter 14-20, Florida Administrative Code, Private Use of Right of Way
  https://www.flrules.org/gateway/ChapterHome.asp?Chapter=14-20

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