Circulation Guidelines and Standards

This section gives direction to the detailed planning of circulation networks within individual developments and will ensure an interconnected system of arterial, collector, connector and local streets; bicycle lanes; multi-use trails; transit; traffic calming; and parking standards.

Street Sections - provides cross sections for typical roadways detailing lane width, parking, bicycle lanes and required right-of-way.

Bicycle Lanes - presents the recommended standards for both on-street and off-street bicycle facilities.

Multi-Use Trails - summarizes the standards and recommended location for paths / trails designed to accommodate pedestrians, cyclists roller skaters and joggers.

Transit - presents recommended bus routes and transit shelter design.

Accessibility Index - summarizes the percent of households, employees and mixed-use centers served by pedestrian / bicycle facilities and transit.

Traffic Calming - summarizes a catalog of traffic calming techniques and discusses appropriate locations and benefits.

Parking Standards - presents a discussion of shared parking, parking ratios, and on- and off-street parking.

Street Sections

Typical cross sections have been developed for each type of street within Southeast Orlando. These cross-sections shall only be used where Traditional Design land use and building standards are utilized. Each cross section details lane width, medians, bicycle lanes, parking, sidewalks, landscape areas, drainage (rural roadways), and required right-of-way. Not all contingencies have been covered because the list would be far too large. However, cross sections can be modified to accommodate special circumstances. For example, it may not be desirable to have a sidewalk on the side of a roadway fronting a wetland; the appropriate cross section can be developed by deleting the sidewalk from the cross section designed for the particular type of roadway. Such modifications shall be reviewed by all pertinent City departments (Planning, Fire, Police, Solid Waste, Public Works) and must be approved by the City Planning Official and City Engineer.

Cross sections have been developed for arterials (urban and rural), mixed-use center streets (arterial and local), residential neighborhood streets, residential and connector streets, and airport support district streets. Arterials are defined as major high-volume roadways such as Narcoossee Road and Alafaya Trail. Town and Village Center streets will be composed of arterial and local streets. Neighborhood Center streets should be local in nature. Residential Neighborhoods shall be comprised of connector and local streets. Residential and commercial connector streets shall provide vehicular connections between residential neighborhoods and commercial centers. Airport Support District streets are typically local in nature, but with a lane width and intersection radius sufficient to handle large trucks.

Residential neighborhood local streets reflect the options available for three levels of on-street parking. Whether there is no on-street parking, limited on-street parking or unlimited on-street parking will be determined by presence or absence of one- or two-car garages and the resulting driveway width. The specific roadway cross-section shall be determined at the time of site plan review based on the proposed unit types fronting the roadway.

As stated in GMP Future Land Use Policy 4.2.6, bicycle lanes should be designed for all connector and arterial streets. Bicycle lanes are typically 4 feet in width, and 5 feet in width when adjacent to on-street parking. Consult the State of Florida Department of Transportation's Bicycle Facilities Planning and Design Manual and the City of Orlando Bicycle Plan when designing bicycle lanes.

The core cross sections referenced above are summarized in the following table and individually presented on the following pages. An additional multi-use trail section has also been included.

Typical Roadway Cross Sections

Roadway Type	Cross Section	Parking	Bicycle Lanes	Sidewalks	ROW (feet)	Lane Widths (feet)
Major Urban Arterial						
Four-Lane Divided						
Narcoossee Road	A	No	Yes	Yes	138	11
Alafaya Trail	B	No	Yes	Yes	104	11
Town Center						
One-Way Arterial	C	Yes	Yes	Yes	69	11
Two-Way Arterial	D	Yes	Yes	Yes	67	10
Local	E	Yes	No	Yes	57	10
Village Center						
One-Way Arterial	C	Yes	Yes	Yes	69	11
Two-Way Arterial	D	Yes	Yes	Yes	67	10
Local	E	Yes	No	Yes	57	10
Neighborhood and Residential Centers						
Local	E	Yes	No	Yes	57	10
Residential Neighborhood						
Connector	F	No	Yes	Yes	74	11
Connector	G	No	Yes	Yes	64	11
Local	H	Limited	No	Yes	53	12
Local	I	Yes	No	Yes	58	8
Local	J	No	No	Yes	47	9
Estate Residential						
Connector	F	Yes	Yes	Yes	74	11
Connector	G	No	Yes	Yes	64	11
Local	H	Limited	No	Yes	53	12
Local	I	Yes	No	Yes	58	8
Local	J	No	No	Yes	47	9
Airport Support District						
Local	K	No	Yes	Yes	66	12

Source: Glatting Jackson Kercher Anglin Lopez Rinehart, Inc.

Bicycle Accommodation

Bicycle lanes are a portion of the roadway which has been designated for the preferential or exclusive use of the bicycle. Sidewalks are not encouraged as substitutes for bicycle lanes. As stated previously, bicycle lanes should be designed for all connector and arterial streets. The following map shows the conceptual Bicycle Master Plan for the Southeast Orlando Sector Plan area. As with the conceptual roadway network, the final alignments and connections will be established based on individual master plan proposals and environmental constraints.

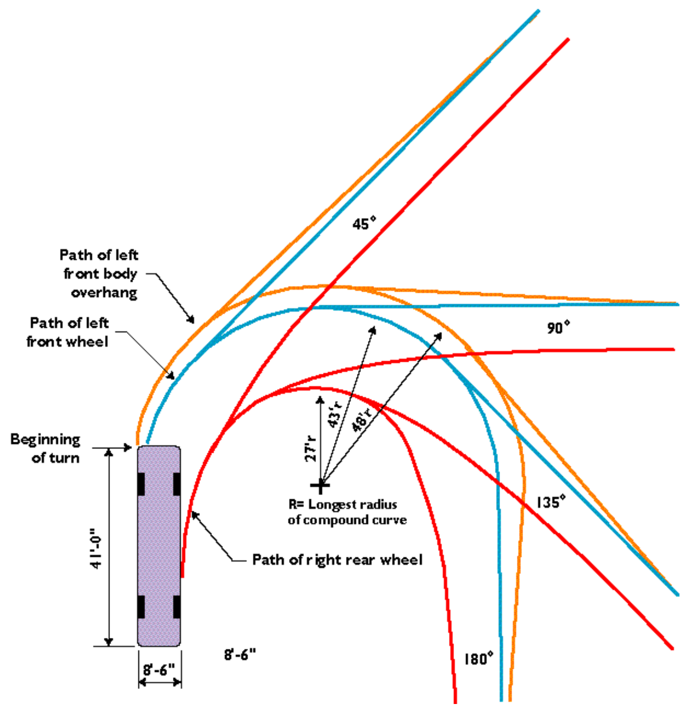
Bicycle Master Plan

Transit Accommdation

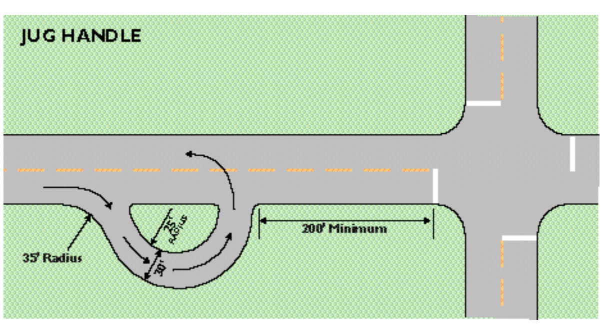
Creating an environment conducive to the development of a balanced transportation system requires the circulation system to be engineered to functionally accommodate all modes. Designing for the functional requirements of LYNX (local transit provider) vehicles means creating suitable facilities in which LYNX vehicles can operate properly and passengers can wait in comfort. In general, the City advocates utilizing smaller lane widths than recommended by LYNX in order to create a more urban environment.

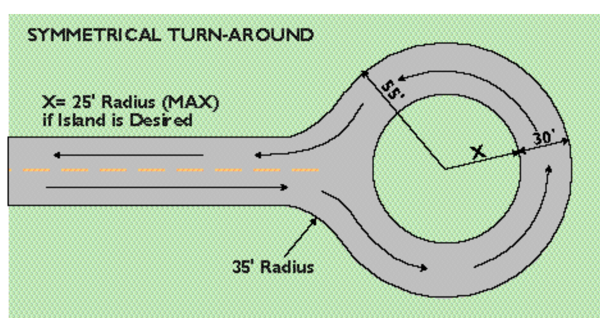
Bus Turning Template

Understanding the turning radius of LYNX vehicles will allow designers to easily accommodate bus movement.



Turnaround Possibilities

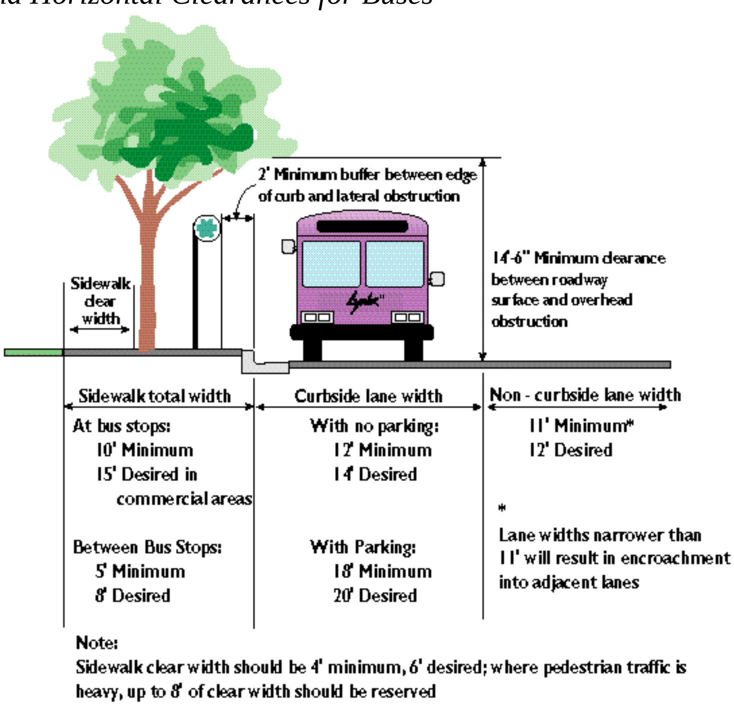




Bus Vehicle Dimensions

Vehicle dimensions are used to establish minimum functional standards. Dimensions illustrated below represent the largest vehicles within each bus classification.

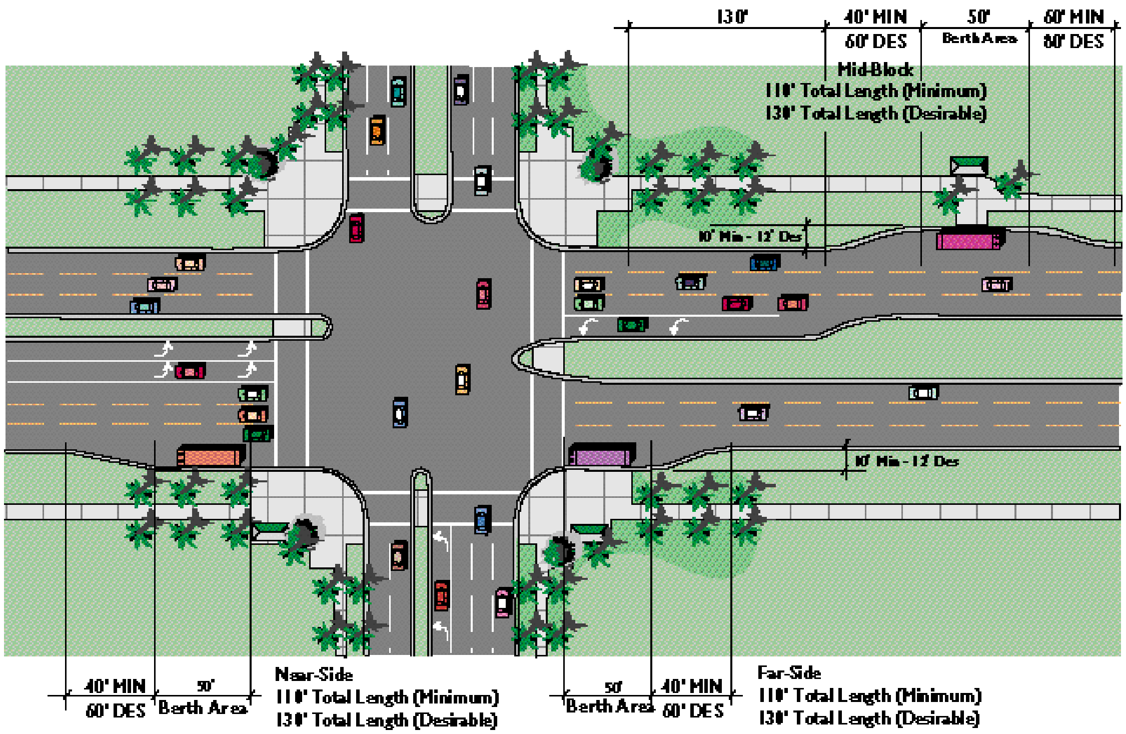
Vertical and Horizontal Clearances for Buses

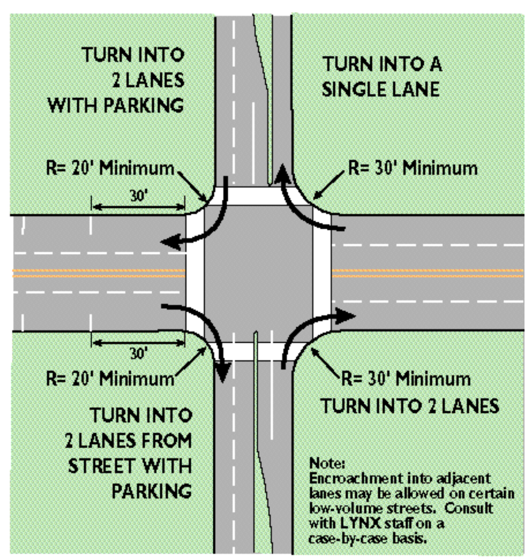


In general, the City advocates utilizing smaller lane widths than recommended by LYNX in order to create a more urban environment.

Bus Turnouts:

Bus turnouts are used to facilitate traffic flow when LYNX buses need extended layover time for transfers and scheduling. Add 50 feet for each additional bus expected to use the stop at the same time. While turnouts are advantageous to traffic circulation, turn-outs make it difficult for LYNX buses to reenter traffic. Contact LYNX Planning Department on an individual project basis.





Intersection Design for Bus Turns

Transit Plan

Accessibility

The intent of the Southeast Orlando Sector Plan's Transportation Design Standards are to assist in creating a sustainable community with a livable, more balanced transportation system. These standards integrate the mobility of each mode of travel into Southeast Orlando's community design process. This section covers four topics: pedestrian mobility, bicycle mobility, transit mobility, roadways, and vehicle mobility.

Incorporating sound transportation design standards into the Southeast Orlando Sector Plan will facilitate the creation of a sustainable community with a more balanced transportation system. This Accessibility Index analysis documents potential success of the proposed transportation design standards.

Pedestrian Mobility

Southeast Orlando planners focused on walking as an essential mode of transportation. Pedestrians travel is the basic building block in developing a balanced transportation system. Pedestrian mobility is decided as "distances individuals are willing to walk." The average pedestrian travels at 3 mph. At that speed a pedestrian can cover distances from a quarter mile to a half mile in a five to ten minute walk.

Southeast Orlando's pedestrian design standards improve pedestrian mobility through the provision of facilities which shorten walking distances, increase pedestrian accessibility to various land uses, provide improved internal pedestrian circulation in village and town designs, and encourage the creation of a "park once" environment, where individuals can comfortably walk and not consider using the auto for trips other than for their arrival and departure.

Many design elements for pedestrians are incorporated into design standards to improve the quality of the pedestrian environment. These include: standards which influence the location of buildings or block standards (shortening walking distance); landscape standards and building (which make a walk more enjoyable); and, roadway standards (slowing traffic and encouraging pedestrian activity).

Site design elements also include multiple points of pedestrian access to the street network, encouraging pedestrian activity. Mixing of retail, office, and residential uses in a dense, compact space also encourages a pedestrian-based transportation system. Mixed used environments of this type, in combination with attractive streetscapes and pedestrian friendly design, help create higher percentage of trips which are pedestrian based.

Transit Mobility

Southeast Orlando's community design allows transit convenient access to community centers, provides direct routes, and locates stops where they have high pedestrian access. Direct transit routing will reduce the operational cost of providing service. Circuitous routes increase the number of miles and hours of operation, increasing costs. Indirect routing discourages transit ridership through time delays and limitations to pedestrian access.

Traditionally, transit services have located along main arterials because the arterials provide direct convenient access to many community destinations. A transit routing system was developed which strikes a blend between directness-of-service and transit accessibility objectives throughout the mixed use centers. Although the developed plan is not based on an arterial roadway system, the connectivity of neighborhood, village, and town centers enables direct, central routing.

Indirect transit routing is often the only available means of serving automobile-induced urban sprawl. The Southeast Orlando Sector Plan overcomes the limitations of automobile-oriented design through dense, mixed-use nodal development and good street connectivity, thereby avoiding the need for inefficient, indirect routing. The Southeast Orlando Sector Plan provides street connections in all major directions to and from centers. The proposed well-connected street system offers the opportunity to route transit directly through a series of communities, or town centers, serving more residents and providing more convenient service. Complete street systems bring all travel origins and destinations closer together. Therefore, trips to or from a transit stop are shorter and more convenient.

Bicycle Mobility

Bicycles provide an alternative form of travel which effectively quadruples the speed and provides sixteen times the coverage area of pedestrian travel. The Southeast Orlando Sector Plan promotes the bicycle as a viable transportation mode in a balanced transportation system. Consideration of the needs of bicycles will be an important component in the review of individual project master plans.

A network of bike routes, lane(s), and multi-use trails are included in the Southeast Orlando design. The objectives considered in the placement of network links were 1) connectivity between residential areas and activity centers, 2) local resident accessibility to the network, and 3) ecological constraints, primarily infringement on wetland areas. A geographic information systems analysis was utilized in an attempt to quantify the first two points.

Multiple bicycle routes were provided, allowing higher percentages of the population access to safe, alternative modes of transportation. Bicycle routes were designed to provide the most direct and convenient service possible.

Interconnection of bicycle facilities within the transit system was considered in bike network design. Improving bicycle linkages and promoting “bike and ride” are among the most cost-effective approaches to increasing transit ridership. Bicycles provide a strong feeder mode for premium transit, and the potential bicycle travelshed fills gaps provided by a feeder bus service.

Vehicular Mobility

The Southeast Orlando Sector Plan is designed to integrate the needs of the automobile with the needs of transit, walking, and biking into their vehicular circulation system. This integration will provide a well-connected street system and detailed street designs that make them usable for all types of travel.

Street connections in all major directions from neighborhood, town, and village centers are components of a complete street system which brings all travel origins and destinations closer together. Inevitably, driving time will be reduced. Quite possibly, good street connectivity will induce mode shifts to alternative forms of transportation, such as transit, bicycle, and pedestrian modes. Trips to and from transit stops are shorter and more convenient due to a completed, cohesive street system.

Overall, the street network design reflects the objective of creating streets which serve vehicular traffic as well as pedestrians, bicyclist, and transit riders.

Having a wide variety of street design features can be implemented as a way to make streets usable for all travel. Measures termed “Neighborhood Traffic Control”, or “Livable Streets” are based on ability to slow vehicle speeds, provide drivers with awareness of other users, and buffer pedestrians from traffic flow. The ultimate objective of the Southeast Orlando Sector Mobility Plan is to enable residents to achieve many destinations through alternative modes of transportation, not through moving faster, or further, in a single mode.

Study Results

A geographic information system was used in order to quantify the transit and bicycle mobility characteristics of the proposed development. Design elements taken from the Southeast Orlando development program (i.e. number of dwelling units, population, employment) were converted to person trip ends, and coded into a geographic database. The proposed bicycle and transit networks were digitized, and overlayed by the proposed development zones. "Buffers", or one-quarter mile boundaries, were formed around both networks; these boundaries were then spatially "intersected" with the geographic database.

The Geographic Information System analysis output demonstrates that approximately three quarters of all population and employment are accessible via a specifically designated bicycle facility. Of course, bicyclists have the same rights as automobiles to the entire street network effectively making 100% of the development area accessible by bicycle. Significantly less employment and population are served by transit; this figure, however, reflects a tradeoff between accessibility and directness, and may increase significantly with slightly less direct routing.

Access to Jobs and Housing via Bike and Transit

	Employees Served	*Households Served*	*Town Center Served*	*Village Center Served*	*Neighborhood Center Served*
Bicycle	75%	76%	100%	100%	78%
Transit	58%	56%	100%	100%	63%

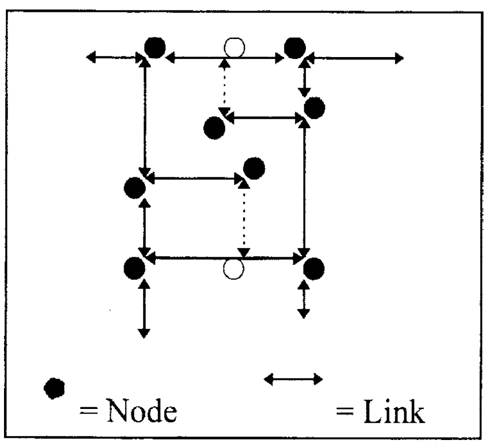
Connectivity Index

Accessibility and connectivity are complementary concepts. In accordance with GMP Future Land Use Policy 4.2.5, and consistent with the GMP Transportation Element, the City shall combine the mobility of the traditional interconnected street pattern with the safety, security, and topographic sensitivity of the conventional or contemporary network. Such a hybrid network features short, curved stretches that follow the lay of the land or contribute to good urban design, as well as short loops and cul-de-sacs, so long as the higher-order street network is left intact.

"Higher-order" means arterials, collectors, and sub-collectors that carry through traffic. An acceptable individual project master plan may feature interrupted grids of short street ending at T or Y intersections, traffic circles or squares / parks. By design, local streets may carry some through-traffic, but the truncated nature of local streets means that traffic moves more slowly and the heaviest volumes are diverted to higher-order streets.

A simple measure of connectivity is the number of street links divided by the number of nodes or link ends (including cul-de-sac heads). The more links relative to nodes, the more connectivity. A connectivity index of 1.4 to 1.8 represents an acceptable street network in the Southeast Plan area. The optimal connectivity index for a perfect grid network is 2.5. This is the procedure for calculating the connectivity index:

1. Count the number of nodes. Nodes are any point of intersection of two or more roads or any cul-de-sac ends. There are 8 nodes in the example (counting only the black nodes).
2. Count the number of links. Links are the segments of road connecting nodes. To properly calculate the connectivity index, you must include the first link beyone the last nodes. There are 12 links in the example (ignoring the dashed lines).
3. Use the following formula to calculate the connectivity index: *links/ nodes = connectivity index*. The connectivity index of the example is 12 / 8 = 1.5.



This connectivity index can be improved by removing the cul-de-sacs and connecting the street-ends to other streets (follow the dashed lines). There are still 8 nodes (counting the clear circles and ignoring the black cul-de-sac circles), but there are now 14 links. The index is now 1.8. Simple changes in design can bring about significant changes in connectivity index scoring. The City shall utilize the connectivity index mechanism, in addition to other qualitative measures, to determine whether transportation impact fees can be reduced within the Southeast Plan area.

Traffic Calming

Traffic calming devices have potential use in both the design of new road segments in Southeast Orlando, as well as the modification of existing roads, or the future modification of roads initially built without traffic calming features. Five groups of traffic calming devices are appropriate for use in Southeast Orlando:

1. Street narrowing;
2. Vehicle deflection (traffic diversion);
3. Pavement sharing;
4. Rerouting; and,
5. Pavement surface treatments.

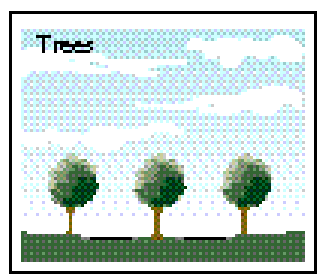
Street Narrowing

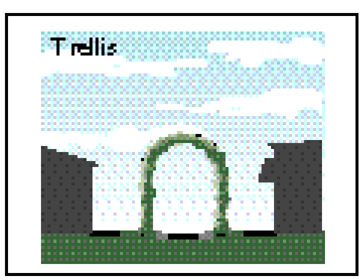
A low cost method of street narrowing is to stripe roadway lanes to a maximum width of nine to eleven feet. Where roads are wider then 24 feet, this has the added benefit of providing space for bicycle lanes on each side of the roadway.

Another low cost way to narrow the street is to allow parking on one or both sides of the roadway. On-street parking reduces speed noticeably, by effectively "narrowing" the street. The parking can be staggered to create a weaving path on the roadway, further informing drivers that caution should be used in this neighborhood.

"Bulbouts" -- Short sections of narrowed street appear to narrow the entire street, yet permit a normal amount of on-street parking. Bulbouts can be placed at intersections or at mid-block locations.

Gateways appear to narrow the street, and also serve as highly visible entryways into neighborhoods. Gateway features can also double as transit waiting areas.





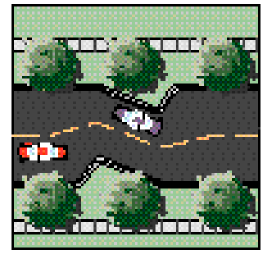
Vehicle Deflection

Angled slow points, sometimes called chicanes, are curbed or other physical barriers to a straight path on a roadway. Trees can be planted in the slow point to restrict the driver's vision down the street, creating the feeling of a "closed" street.

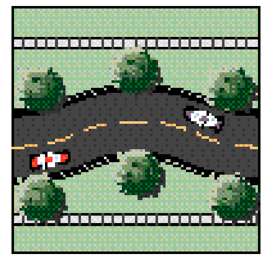
Knockdowns or bulbouts at intersections limit the pavement width at an intersection sufficiently to require motorists to alter their path. Pedestrian crossings are shorter, and therefore easier and safer. Vehicles are diverted or knocked-down from their previous traveled lane width.

The roundabout and its less sophisticated variation, the traffic circle, deflect cars out of their straight-line path as they travel through an intersection. With landscaping included, a roundabout also breaks up the uninterrupted sight lines and thereby reduces design speed.

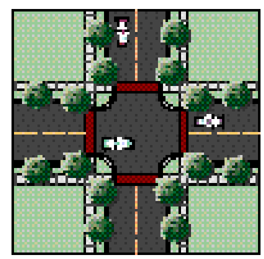
Roundabouts are a high-performance traffic control device, having a higher traffic capacity than do stop signs or signals. The roundabout also reduces crashes in number and in severity, compared to stop signs or signals.



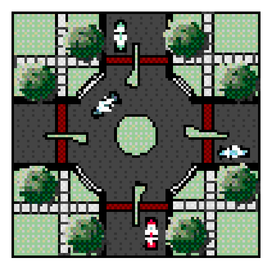
Angled Slow Point



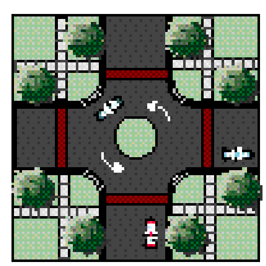
Chicane



Knockdown



Roundabout



Traffic Circle

Pavement Sharing

The mid-block single-lane yield point reduces the street width to a single lane for a short section at some point between intersections. A variety of designs are possible for the remaining single lane of traffic: it can be centered in the existing street, offset to one side or the other of the street, or aligned in a curve from one side of the street to the other.

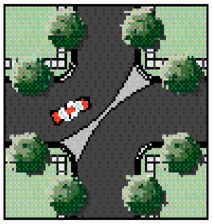
Landscaping at mid-block yield points can screen the view along the street, not only for drivers but also for pedestrians and residents of the street. This blocking of the view reduces vehicle speeds for several hundred feet to either side of the yield point. Further, the blocking of the view can screen out unappealing views, such as nearby cross streets and buildings along them.

At the intersection yield point, the street is narrowed through an intersection or some of its approaches. The intersection yield point allows only a single vehicle at a time to negotiate the intersection. Approaching drivers interact with each other, and reach an understanding on taking or yielding the right-of -way through the intersection.

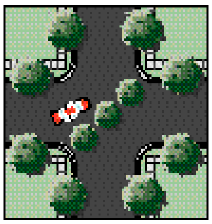
On many streets, allowing on-street parking will crate a series of single-lane yield points wherever parked cars are present. This “informal” single-lane yield point occurs when the street width is narrow enough to prevent simultaneous passing of two moving vehicles past a parked vehicle. For streets of up to about 26 feet in width, a parked vehicle on one side will create, for most drivers, a single-lane yield point. For streets up to about 30 feet in width, parked vehicles on both sides will create a single-lane yield point in the remaining unused street width.

Rerouting

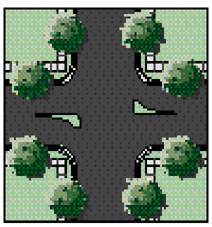
Diagonal Road Closure with Strip



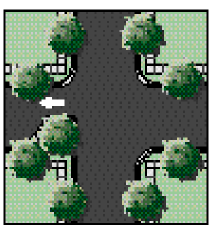
Diagonal Road Closure with Bollards



Forced Turn Barrier



Partial Road Closure



A diagonal road closure forces turns to be made at certain points, eliminating some (or even all) direct routes through a neighborhood. This can be effective with cut-through traffic. Access to homes is still maintained from more than one direction, allowing the local roadway network to continue to carry local traffic. A diagonal road closure can be a continuous strip connecting corners with landscape maintained by the city or by adjacent property owners.. It can also consist of several barriers (bollards, circular planters) that allow pedestrian, bicycle and moped access through the barrier. This provides an incentive to use bicycle for travel as it does not have the same constraints to movement through the network as do the automobiles.

Forced turn barriers can also be used to change the route through a neighborhood. These allow vehicular traffic on a through street to remain unchanged, and at the same time force traffic from the side street to the through street. Partial road closures physically block one direction of a two-way street. For instance, one could drive through an intersection away from a community, but could not return by that same route.

Pavement Surface Treatments

Textured pavement such as brick streets are also an effective traffic calming device. The advantages of a brick street are that it is aesthetically pleasing and it calms traffic better as it ages, as tree roots “push-up” bricks and as the surface wears out. However, textured pavement can be loud and costs significantly more than asphalt roadways.

Raised intersections slow cars down throughout an entire intersection. This provides an extra level of safety for pedestrians crossing at an intersection. This improvement may be most appropriate in commercial areas where the traffic volumes are high. Textured pavement can also be a part of this improvement.

Parking Standards and Design

The following standards shall apply in Town, Village, Neighborhood and Residential Centers and may be used as design guidelines in other districts.

Joint Access

Cross access easements or similar mechanisms shall be used to provide joint access between the parking areas of adjacent properties. This will preclude drivers from having to use the street network to access a neighboring parcel.

Shared Parking

Shared parking may be provided for multiple uses where it can be demonstrated that due to different use time frames the minimum amount of required parking will be available for each use. For example, land uses such as movie theaters and restaurants can share office parking space during the evening hours.

Off-Site Parking

Off-site parking, including on-street parking may be utilized to meet minimum parking requirements as long as reasonable pedestrian access is provided from the parking space to the use.

Parking Access

Parking areas shall be accessed from side and back streets and from adjacent properties. Access from the front street shall be avoided unless no other reasonable access is available. Block standards for Town, Village, Neighborhood, and Residential Centers require a minimum of 65% street frontage therefore, forcing parking to the sides and rear of buildings.

Pedestrian Access

A direct pedestrian access shall be provided from the public sidewalk network to the primary building entrance without having to cross a vehicular travelway.

Landscaping/Screening

Parking areas shall be landscaped consistent with Chapter 60 of the Land Development Code. Connecting walkways should be landscaped with either shade trees or climbing vines on trellises.

On-Street Parking

On-street parking shall be utilized in mixed-use centers whenever and wherever possible. On-street parking areas shall be differentiated from road travel lanes through the use of texture paving or textured paving strips.