CHAPTER 4
URBAN SRA ROUTES

4.1 INTRODUCTION

Desirable route characteristics for urban SRA routes in the year 2010 have been developed to insure adequate traffic service and geometric design while working within the constraints of limited right-of-way and dense development adjacent to the roadway. Measures to increase capacity will typically be associated with traffic signalization, access, and parking rather than widening or other major new construction.

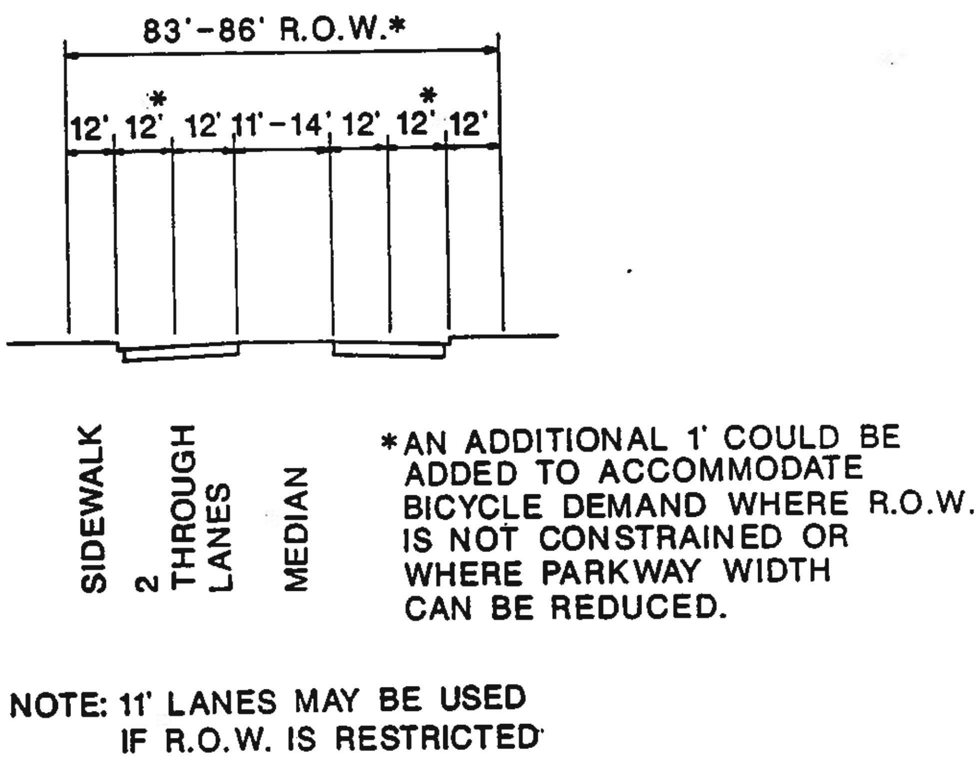
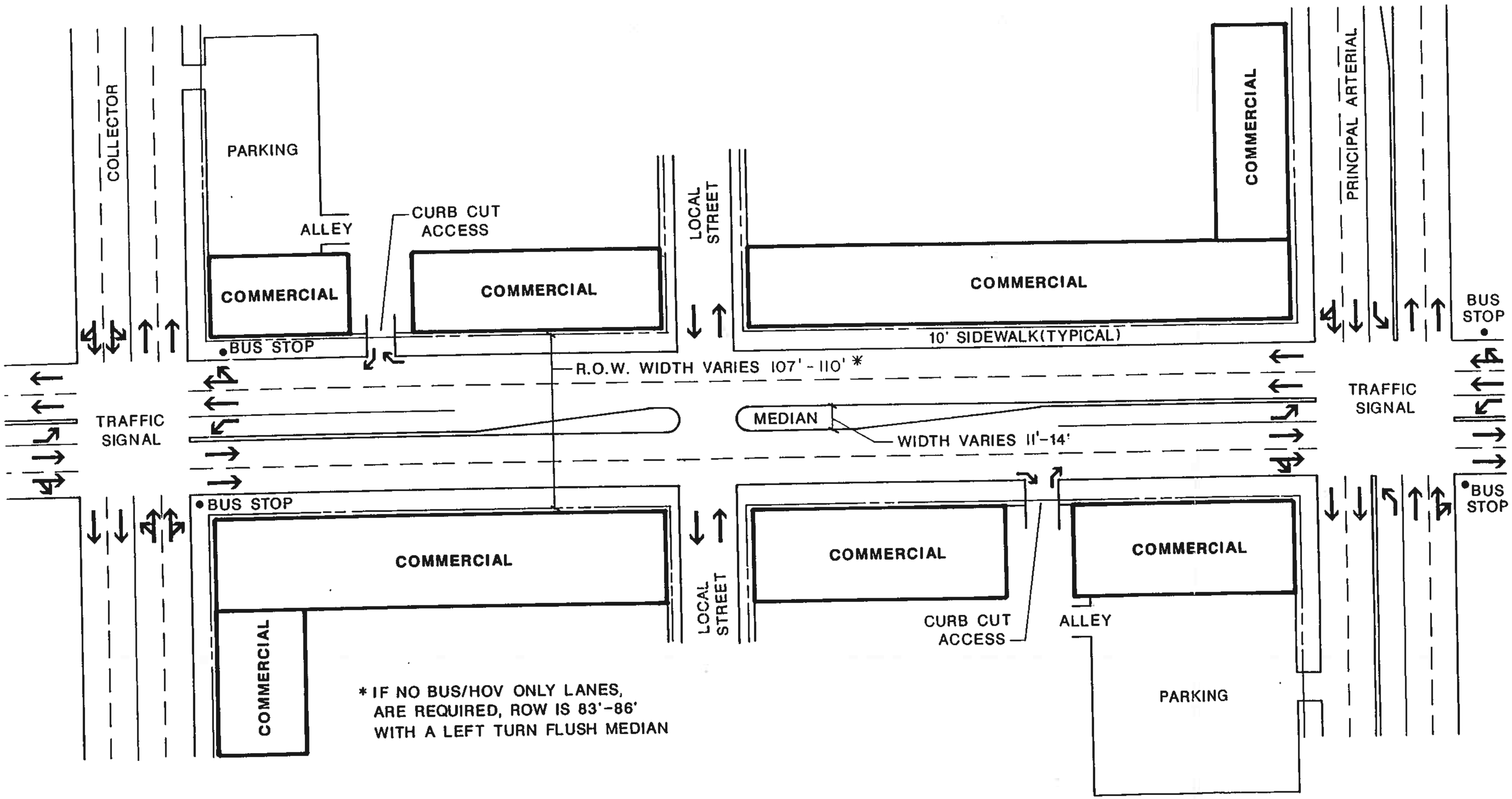


Figure 4.1A Desirable Urban SRA Cross-Section Without HOV Lanes

Table 4.1 lists the desirable characteristics for urban SRA routes in 2010. These characteristics are the basis for the desirable urban cross-sections for two-way streets shown in *Figures 4.1A* and *4.1B* and the typical design configuration in *Figure 4.2*. The remainder of this chapter describes design features along with recommended standards and policies.



URBAN STRATEGIC REGIONAL ARTERIAL
TYPICAL DESIGN CONFIGURATION FOR TWO BLOCK SEGMENT

NOT TO SCALE

Figure 4.2

4.2 RECOMMENDED DESIGNS AND FEATURES

4.2.1 Signals

All signals on urban SRA routes should be interconnected into signal networks or signal systems. Signal networks are beneficial in urban areas where grid patterns of signalized intersections, parallel one-way SRA routes, or intersecting SRA routes exist. The network should establish priority of through movement for the SRA route while providing coordination for the cross-streets. An example of signal networking is shown in *Figure 4.3*.

Where an urban SRA route is not located in a grid pattern of signalized intersections, or where numerous other signals are too close to establish a network, then signals along the SRA should be interconnected into a system to provide for progression of traffic. All new controllers should be compatible with signal pre-emption devices.

All signal networks and signal systems on urban SRA routes should be timed for optimal progression based on a traffic engineering study. The signal timing should be evaluated every three to five years to determine if they are adequate for current traffic patterns.

When timing traffic signals on urban SRA routes, a level-of-service D should be the lowest level-of-service accepted for the SRA through lanes for the peak hour. This may require the turning movements and cross-streets to operate at a lower level-of-service.

In many urban areas pretimed traffic signals are commonly used. If pretimed traffic signals which are not tied into the network are encountered along urban SRA routes, they should be evaluated for possible use as fully-actuated signals. Fully-actuated means that all approaches can detect vehicles and adjust signal timings. Having actuated approaches provides more flexibility in handling varying traffic flows, than the pretimed signals commonly used in urban areas. New technologies allow actuated signals to run as pretimed signals if necessary.

4.2.2 Roadway Design Criteria

The Roadway Design Criteria in *Table 4.2* will help identify substandard roadway features on urban SRA routes. Substandard features that adversely affect safety and/or capacity, such as insufficient vertical clearance or inadequate sight distance, should be corrected.

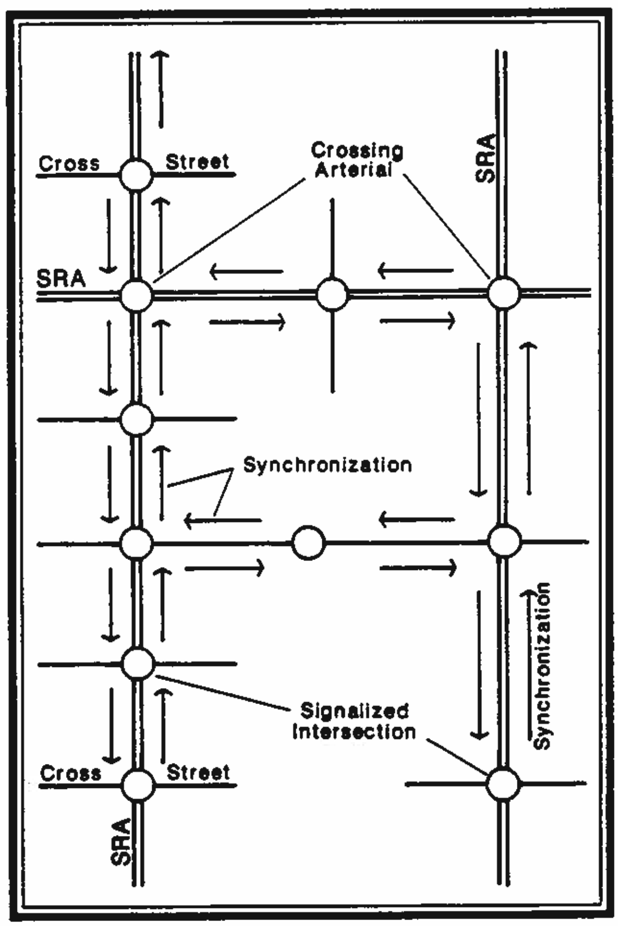


Figure 4.3 Signal Networking

Table 4.2
Urban SRA Roadway Design Criteria

Route Type	Urban
Horizontal Alignment	
Minimum Design Speed	35 mph
Minimum Stopping Sight Distance	225'
Minimum Radius Horizontal Curve	415' w/normal crown 345' w/S.E. = 4%
Maximum Degree of Curvature	14° 30'
Maximum Superelevation	4%
Minimum Length of Superelevation	
- Transition for 4 Lanes w/12'-14' Flush Median	231'
- Transition for 4 Lanes w/12'-14' Flush Median and HOV lanes	309'
Horizontal Clearance	2'
Vertical Alignment	
Maximum Grades	7%
Length Crest Vertical Curve	Compatible with Design Speed
Length Sag Vertical Curve	Compatible with Design Speed
Vertical Clearance (Minimum New Construction)	16'-3"
Vertical Clearance (Minimum Reconstruction)	14'-6"

4.2.3 Intersections

Where right-of-way is available, left turn lanes should be developed at all signalized intersections on urban SRA routes. Right turn lanes should be developed where warranted and right-of-way is adequate. On SRA routes, it is recommended that parking on the approach and far side be prohibited within 100 feet of all major intersections to allow for a right turn bay. Two through lanes should be maintained as a minimum on all urban SRA routes.

Corner radii should be kept to a minimum in order to maintain the shortest possible crossing distances for pedestrians where appropriate. Length of right turn bays should take into consideration parking needs.

When left turn lanes are developed, the turn bay storage should be 1.5 to 2 times the expected arrival rate of vehicles over one traffic signal cycle. Where turn bay storage is inadequate, the existing left turn bays should be reconstructed to increase the storage capacity and remove turning vehicles from the through lanes.

Where high left turn volumes occur at urban SRA intersections, double left turn lanes are recommended to alleviate congestion. However, double left turn lanes will only be feasible where right-of-way is adequate. If used, double left turn lanes must operate under "protected only" phasing. "Protected only" phasing means that a left turn is allowed only on a green arrow and not during the green ball phase for the through movement. All double left turn designs should be separated by a raised median between opposing lanes.

Certain urban SRA routes are diagonal arterials that originate in the central Chicago area. These diagonal arterials frequently intersect with other arterials constructed on the conventional grid pattern which can create intersection triangles. It is recommended that signal timings be optimized to provide progression along the urban SRA routes through the intersection triangle.

Intersection on urban routes with more than four approaches cause operational problems. Excess approaches can be removed by closing the approach, by conversion to one-way operation away from the intersection, or using extremely short signal timings to reduce the desirability of the approach. The most desirable configuration for intersections with more than four approaches would be to relocate the excess approaches away from the intersection. Right-of-way requirements make this concept difficult to implement.

On urban SRA routes with no median, it is recommended where feasible that left turns from the SRA to local streets be discouraged or prohibited or that consideration be given to proposing a one-way arterial pair. Movements between the local roads and the SRA should be restricted to the right-in/right-out type. The nature of urban street layouts, where there can be 8 to 12 streets per mile, make this a desirable technique because the alternative routing of local traffic is readily available. This technique should not be considered, however, if the local streets are organized with one-way operation.

4.2.4 Add Lanes

On urban SRA routes there is often little right-of-way available for physical roadway widening. Existing pavement areas are usually the only places where additional lanes can be obtained. For example, by removing parking from the curb lane it can be converted into a through lane if adequate off-street parking is available and compatible with adjacent land uses. A further discussion of removal of parking criteria and conditions can be found in Section 4.3 of this chapter.

4.2.5 Local Bus Service

On urban SRA routes which accommodate bus routes, a number of transit service enhancements should be reviewed to determine their potential for relieving traffic congestion. One basic technique is to restrict parking in the curb lane, either by removing or prohibiting parking during peak periods, with strict enforcement of parking restrictions, while allowing all vehicles to use the curb lane.

Bus stop turnouts are not considered practical on urban SRA routes. On a route-specific basis, however, both the location and spacing of bus stops, passenger amenities and signal pre-emption should be reviewed. Major objectives would be to eliminate stops if there are more than one in a block, and to eliminate conflicts with right turns. Where the blocks are short, as in the central area, stops could be located at every second block. The Chicago Transit Authority undertook a similar restructuring of bus stops on Michigan Avenue, achieving improved bus travel times as a result.

Another strategy to improve travel times is to establish exclusive lanes for buses and high occupancy vehicles during the morning and evening peak travel periods. This approach would be reserved for SRAs which have at least three traffic lanes in each direction. A companion measure essential to the effectiveness of exclusive lanes is minimizing access points to the roadway by eliminating curb cuts wherever possible. Section 4.4 provides further information about the suitability of HOV lanes in urban areas.

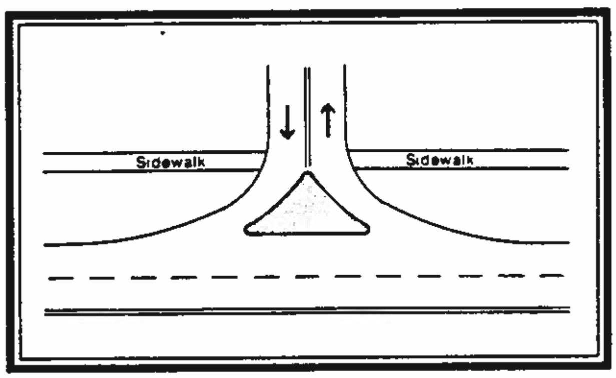


Figure 4.4 Driveway Channelization

4.2.6 Access Management

It is preferable that curb cut access, where permitted along urban SRA routes, should be of right-in, right-out design. This will prevent left turn movements onto the SRA across through traffic lanes. An example of this design is shown in *Figure 4.4*. Another desirable feature would be to minimize the number of access points by elimination or consolidation of curb cuts.

On urban SRA routes, left turn movements from the SRA into curb cut access points should be discouraged. However, where prohibition is not feasible, adequate turn bay storage should be provided. This will remove turning traffic from through lanes. A technique for increasing turn bay storage is shown in *Figure 4.5*.

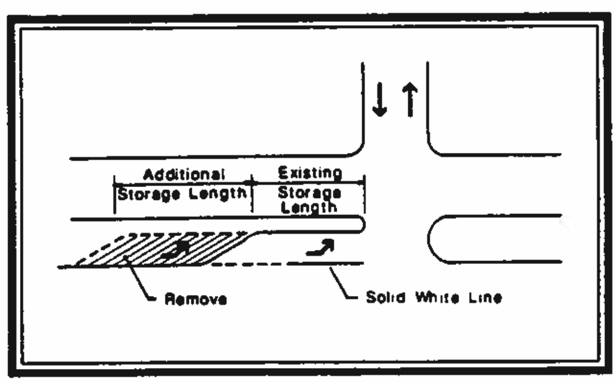


Figure 4.5 Increased Storage Capacity

Cross-access easement to allow vehicular movement between neighboring properties would reduce conflicts and improve safety by eliminating unnecessary turning movements. *Figure 4.6* displays one potential configuration for such easements.

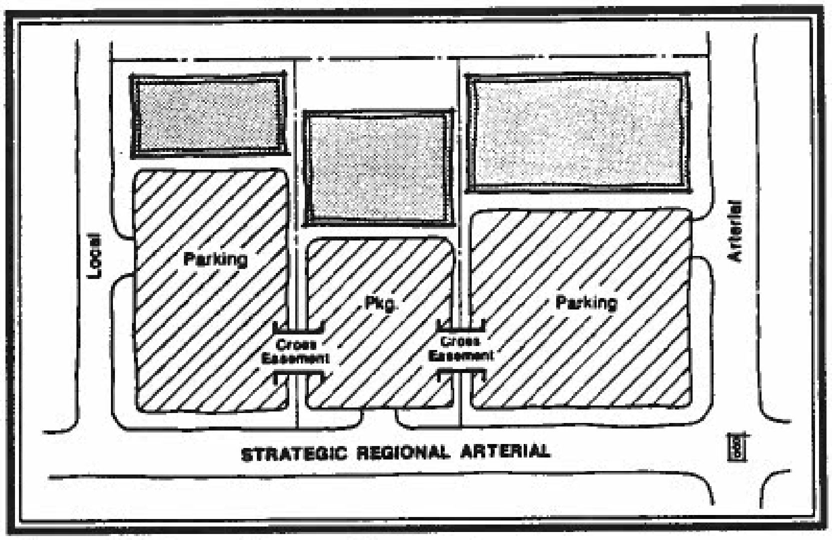


Figure 4.6 Cross-Access Easements

4.2.7 Median Control

The establishment of median control on urban SRA routes will provide protection for left turn vehicles, direct turning movements to desired locations, and reduce centerline conflicts. For urban SRA routes, it is recommended that a raised median be used to establish this control. The desirable dimensions for the urban median are shown on *Figure 4.1*.

A flush or painted median can also offer a measure of median control in areas where limited right-of-way or access requirements render a raised median undesirable.

4.2.8 Structural Clearance Improvements

The clearance criteria for urban SRA routes on *Table 4.2* are directed towards modification of existing facilities. This is mainly due to the general unavailability of necessary right-of-way in urban areas and the high capital costs to construct new facilities.

Horizontal clearances along the urban SRA routes should allow for two 12 foot through lanes in each direction plus two feet from face of curb to face of obstruction. Obstructions within the desirable clearance should be modified or reconstructed if feasible. Bridge railings and abutments are examples of obstructions that should conform to this criteria.

To provide for the unrestricted movement of heavy vehicles on urban SRA routes, vertical clearance may need to be improved. Bridges that do not provide 14 feet - 6 inches of clearance above the roadway are candidates for modification. Where the SRA route is in an underpass, the recommended method to increase vertical clearance is a physical lowering of the urban SRA roadway. Potential drainage and utility problems should be carefully evaluated when this method is proposed. If lowering of the roadway is not feasible, reconstruction of the structure is an alternative.

4.2.9 Stop Sign Removal

Stop sign control for traffic movements on an SRA route is contrary to the concept of an SRA having priority of through movement. Stop sign control on through lanes of any urban SRA route is inappropriate.

A traffic engineering study should be performed to determine traffic control appropriate to the location. The removal of stop signs is recommended for the SRA route only and not the intersecting cross-streets.

4.2.10 Pavement Markings

High-type pavement markings should be used on urban SRA routes. High-type pavement markings include thermoplastic, epoxy and pre-formed plastics. It is recommended that the high-type pavement markings be used because of durability and visibility.

Raised pavement markings should also be used on urban SRA routes. Although street lighting is prevalent in the urban environment, raised pavement markers would introduce an element of safety to the SRA route during inclement weather. The spacing of raised pavement markers should be in accordance with IDOT District One raised reflective pavement marker standards.

4.2.11 Drainage

Drainage problems are intensified in urban areas where high runoff coefficients are often coupled with storm drainage systems of inadequate capacity. Narrow traffic lanes in curbed sections may be unusable for long periods after a storm as standing water makes them hazardous or impassable. These drainage problems should be corrected in conjunction with other roadway reconstruction projects. The IDOT Drainage Manual will guide the design and construction of all drainage improvements.

4.3 CRITERION AND CONDITIONS FOR REMOVAL OF ON-STREET PARKING

On-street parking is typically permitted on portions of SRA routes in urban areas. In areas where parking is allowed, there may be restrictions on parking during peak hours. Impacts on local businesses and other land uses need to be assessed.

The general criterion and conditions for institution of "No Parking" regulations along urban SRA routes are shown below. One or more of the conditions should apply and the criterion should be met before parking is removed.

Conditions

Less than the Minimum Number of Travel Lanes On segments where the urban SRA minimum standard of two lanes in each direction is not provided, on-street parking in peak hours should be prohibited, with the curb lane being converted to a through lane.

Less than the Minimum Level of Service On segments where the projected level of service is below the urban SRA minimum standard of D for peak hour, on-street parking in peak hours should be prohibited, with the curb lane being converted to a through lane.

High Accident Rate Parking should be relocated along segments of urban SRA routes that pose a safety hazard due to high accident rate. If the accident rate is 5 per year per 10,000 average daily traffic (vehicles) or greater, then parking should be relocated.

Criterion

Alternative Off-Street Parking Available If adequate and convenient off-street parking exists in public or private lots and garages, on-street parking may be restricted. If the existing supply is not adequate or sufficiently functional to absorb those vehicles currently parked on the street, adjacent parcels (vacant or non-vacant) of land (in the vicinity) provide an opportunity to develop additional off-street parking. A public agency would be responsible for purchase of the land and development of a parking facility.

Provision of and funding for off-street parking should be carefully planned in order to provide convenient access before any SRA route parking is removed. This must be planned with the objective of reaching a mutually acceptable agreement with local government.

4.4 CRITERIA AND CONDITIONS FOR IMPLEMENTATION OF HOV LANES

High occupancy vehicle (HOV) lanes, designated for buses, carpools and vanpools, may be appropriate in selected areas with high levels of transit ridership and ridesharing activity. There should also be adequate capacity to accommodate traffic in general use lanes. The following criteria and conditions are applicable outside the central area of Chicago using a with-flow HOV lane along the curb or median. The HOV lane would not involve major new construction or right-of-way acquisition, i.e. existing pavement would be used. The facility would be designed primarily for buses, although carpools and vanpools would also be encouraged.

The general criteria and conditions are shown below. One or more of the conditions should apply and all of the criteria should be met before an HOV lane is implemented.

Conditions

High Level of Usage: Curb Lane Route segments should have an existing or projected transit ridership of at least 1200 one-way passengers in the peak hour. A curb HOV lane would be expected to be utilized almost exclusively by buses. Existing or projected bus volumes should be 15 to 40 vehicles in the peak hour one way.

High Level of Usage: Median Lane Route segments should have an existing or projected usage of 2400 one-way passengers or rideshare occupants in the peak hour. A higher demand threshold has been established for a median HOV lane to reflect the potential for higher costs and operational problems associated with implementation.

Criteria

Reduce Total Person Delay There should be a net reduction in the average travel time per person for all users of the route.

Minimal Disruption to Traffic Operations It must be feasible to institute turn restrictions and signalization adjustments necessary for HOV operations with only minimal disruption to traffic flow in the general use lanes.

__No Peak Hour On-Street Parking or Loading__ For implementation of a curb HOV lane, it must be feasible to prohibit parking and loading in the curb lane.

__More Than the Minimum Number of Travel Lanes__ In urban areas, three through lanes should exist in each direction so that with one lane assigned for HOV use, the minimum standard of two through lanes is maintained.

4.5 BICYCLES AND PEDESTRIANS

Safe movement and accessibility are key issues for bicycles and pedestrians. The urban SRA corridors are likely to experience the greatest concentration of pedestrians and cyclists. The density of developments coupled with short trip-making encourage these travel modes. Additionally the urban SRA routes experience heavy traffic volumes. The SRA routes within these corridors are attempting to maintain maximum capacity within right-of-way constraints. In these urban areas close parallel routes are usually present and continuous. These parallel facilities should be identified as bicycle routes so that the SRA routes can focus on their primary responsibility – carrying regional traffic.

However, even with alternate routes, bicyclists can be expected to intermittently enter the SRA system to access destinations along the routes. In order to avoid interruptions of traffic flow caused by vehicles attempting to pass slower-moving cyclists, the outside curb lane could be widened to 13 feet to accommodate bicycle demand. Where right-of-way is constrained, this additional width could be taken from the parkway. This solution provides a minimal width to safely allow experienced cyclists access to destinations along the SRA, while not encouraging continuous bicycle travel on the SRA.

The design of most urban SRA routes already includes sidewalks for pedestrians and should continue to do so under maximum design. Handicapped access ramps for pedestrians will be constructed at intersections and curb cut locations, consistent with appropriate state and local policies and standards.

At major obstacles, such as river crossings, provisions need to be made to ensure that pedestrians and bicyclists have access across these barriers.

4.6 TYPICAL ENVIRONMENTAL CONSIDERATIONS

The environmental analysis component of the SRA planning process is primarily an inventory of existing conditions. The purpose of the inventory is to identify those environmental characteristics which may not be compatible with potential roadway improvements or an increase in traffic volumes. Detailed environmental assessments will be performed when SRA improvements move into preliminary design engineering.

Each route type can be expected to provide slightly different environmental concerns. Environmental considerations important to urban route types are likely to include, at a minimum, land uses that:

- Are sensitive to noise: nursing homes, hospitals, auditoriums, residential areas, and schools;
- Are gathering places for children: schools, parks, and recreation facilities;

- Generate large volumes of traffic: major activity concentrations, areas with inadequate parking;
- Are sensitive to loss of convenient parking; and
- Are sensitive to a change of thoroughfare character as increases in traffic levels are provided for.

Other environmental concerns include but not limited to:

- Public open space, parks, scenic areas and designated natural areas,
- Historic areas, sites and structures,
- Publicly-owned properties,
- Neighborhood boundaries,
- Air Quality,
- Hazardous materials,
- Cemeteries,
- Rivers, streams and wetlands,
- Threatened and endangered species and their habitat,
- Sight screening,
- Effects of roadway lighting on existing light canopy,
- Drainage,
- Water quality,
- Tree preservation,
- Visual/Aesthetic Impact, and
- Character of community and neighborhood commercial districts.

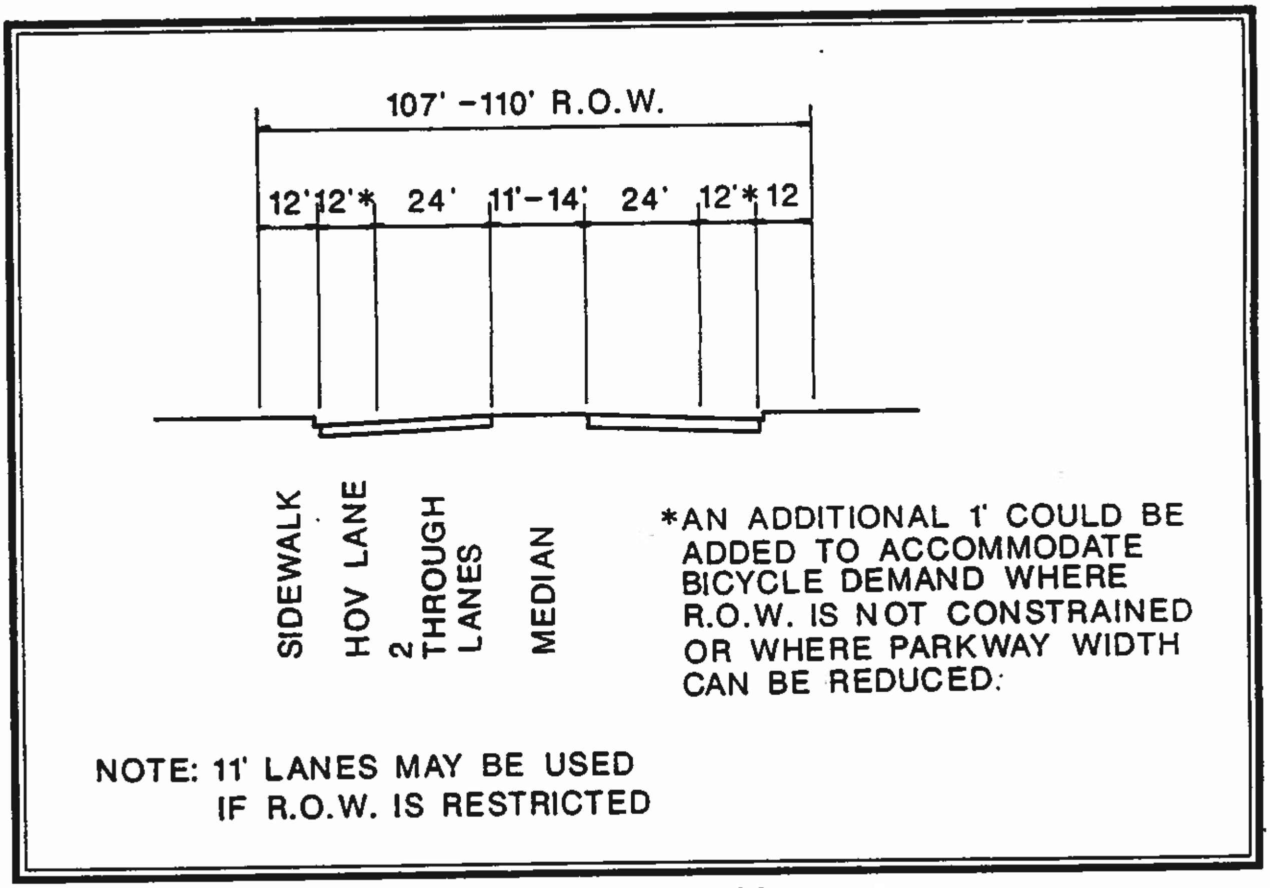


Figure 4.1B Desirable Urban SRA Cross-Section With HOV Lanes

Table 4.1
2010 Desirable Route Characteristics
Urban Strategic Regional Arterials

Right-of-way Width	107' - 110'*
Level of Service (Peak Hour)/Design Speed	D / 35 mph
Number of Through Lanes	2 in each direction: 12' width desirable 11' width minimum
Bicycle Accommodation	13' outside lane desirable
Median Width	14' desirable, 11' minimum
Right Turns	Yes, in curb lane
Left Turns	Permitted along entire length of arterial
Shoulders	Not applicable
Curbs	Yes, with 1' - 2' gutters
Sidewalks	Yes, 10' width when adjacent to curb
Parking	Not recommended, replace with off-street parking**
Cross Street Intersections	Signals with arterials and collectors
Curb Cut Access	Right-in/Right-out preferred
Transit	Bus/HOV lanes in peak hours***; Local bus service with signs, shelters, and signal preemption potential
Number of Traffic Signals Per Mile	4 are desirable
Signalization	Synchronized network with pedestrian actuation where needed
Freight: Vertical Clearance	14'-6"
Loading	Loading zone with peak hour restrictions or alley loading

* 83' - 86' where bus/HOV lanes are not provided
** where criterion and conditions of Section 4.3 are met
*** where criteria and conditions of Section 4.4 are met