SUPERSTREETS

Description

A "superstreet" has intersections in which the minor cross-street traffic is prohibited from going straight through or left at a divided highway intersection. The minor cross street traffic must turn right but can then access a U-turn located in the median to proceed in the desired direction. Doing this reduces the number of traffic signal phases required to move traffic through the intersection thereby allowing for longer green times on the major roadway and thus reducing congestion caused by the signals.

Superstreets are best for an arterial intersection with a low-volume cross-street and a need to maintain large throughputs on the major road.

Alamo RMA

Cost:	●●●●○
Time:	**Moderate**
Impact:	**Corridor**
Who:	**State & Local**
Hurdles:	**Right-of-Way, Public Acceptance**

Target Market

Arterials with Heavy Delays at Intersection

Signalized intersections commonly cause major delays and congestion on corridors due to the time required for each phase. The delays can be reduced if multiple phases run at the same time and the through traffic on the minor street is redirected.

Arterial Intersections with Large Left Turn Volumes

Left turns are a cause of major delay, as they interfere with opposing traffic and can also require their own signal at certain intersections. Congestion can be reduced if the left-turn movements are removed from the main intersection and are made at a location away from that area.

How Will This Help?

- The superstreet concept can increase safety by reducing the number of conflict points at the main intersection. Removing left turns from the main intersection eliminates problem areas from the intersection and reduces the interaction between opposing vehicles.
- Superstreets can reduce delay, improve traffic flow, and simplify signal timing at the main intersection. Eliminating left turns and allowing multiple signal phases can simplify and improve the intersection.
- Superstreets can maintain existing commercial access. The superstreet concept can work well with existing access management plans to allow easy access to commercial areas, limiting the traffic effects on local businesses and industry.

Implementation Examples

San Antonio, TX: The San Antonio area has two sections of superstreets: US 281 North (four intersections) and Loop 1604 West (two intersections). The superstreet provides a transition between the freeway and non-freeway sections of those roads and both are considered short-term improvements while planning is

completed and funding acquired for more substantial upgrades.

A recent before-after study for Loop 1604 between SH 151 and Braun Road found travel time reductions of 14 percent in the northbound morning peak and 35 percent in the southbound evening peak. Alamo Regional Mobility Authority conducted a before-after study on US 281 in San Antonio and found that travel times were shorter and average speed higher, even though traffic volumes increased in the corridor as shown in the table below.

North Carolina: North Carolina employs the superstreet concept in several corridors. A 2010 study evaluated three existing superstreets. Results showed the superstreet intersections outperforming conventional intersections at each location studied, reducing the overall average travel time per vehicle traveling through the intersection.[1]

Application Principles and Techniques

The purpose of implementing a superstreet design is to increase the throughput of the intersection on the major roadway, reduce the number of conflicts in the intersection, and simplify and improve the traffic signaling at the intersection.

The superstreet concept is typically applied to an intersection of a major road with higher volumes and a minor street with lower volumes. The overall right-of-way requirement and design of the superstreet depends on the types of vehicles using the facility. The facility should be able to handle large trucks, but the requirements can be minimized using the following methods:[2]

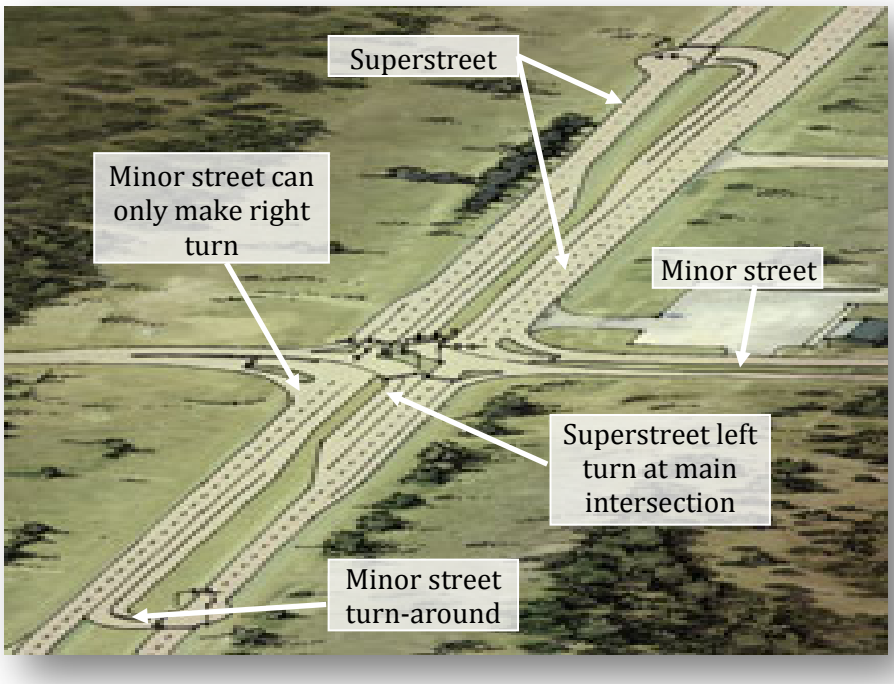
- Construct some openings for only passenger cars, but ensure adequate signage that prohibits trucks from using these.
- Allow larger vehicles to use the shoulder in turning movements by using a stronger pavement.
- Create enlarged turn areas (or loons) that allow for larger turning radii at the intersection.
- Widen the median at the turn areas, but narrow it after the turn position.

Delays and traffic queues may occur if the design is not adequate. This effect should be considered when implementing the superstreet concept. Providing enough space between median-turn points can decrease the likelihood of these events. The larger spacing will also provide more flexibility in dealing with drivers trying to find the lanes needed for their direction.

US 281 (San Antonio) Superstreet Improvements

San Antonio Superstreets	Before	After
Morning Rush Hour (Southbound: Bulverde to Loop 1604)		
Travel Time	23.3 Minutes	18.9 minutes
Average Speed	16 mph	20 mph
Evening Rush Hour (Northbound: Loop 1604 to Bulverde)		
Travel Time	19.2 minutes	12.7 minutes
Average Speed	19 mph	29 mph
Traffic Count (north of Evans)	60,100 vehicles/day	63,552 vehicles/day
Traffic Count (south of Evans)	74,000 vehicles/day	81,526 vehicles/day

Source: http://www.texashighwayman.com/superstreets.shtml



The main intersection of the superstreet typically has traffic signals, but the U-turn may not. Standard warrants for applying traffic signs and signals are used to determine what type of traffic control devices should be used at that location. The design does require large quantities of signage to ensure driver understanding. Signs should be placed in particular areas to provide adequate warning and direction to help sustain the intersection and reduce congestion caused by improper use of the intersection.

The superstreet intersection should be altered to accommodate pedestrians if they are expected to use the intersection regularly. Alterations include eliminating right-turn lanes or any channelizing islands to shorten the crossing distances.

Issues

The unique design of superstreets can cause driver confusion and may result in drivers ignoring the prohibited left turns at the main intersection or rejecting the concept all together. Responsible agencies should be vigilant to educate the public and get them used to the concept when it is being first introduced to the area. The additional right-of-way and paved surfaces required to construct the modified left-turn facilities could have a substantial influence on cost. Adequate signing for road users is important to the operational success. The operation and maintenance of superstreets can be higher than other street designs. Left-turning vehicles can also experience larger delays and distances due to the displaced site.

Who Is Responsible?

The overall responsibility of designing and implementing a superstreet design depends on the project location. This design concept is typically applied to high-volume highways and other arterials and will usually be the responsibility of the local TxDOT office. The TxDOT office should work with the local city officials, as it can affect local businesses and streets. There should be a close relationship between city and state officials to ensure adequate design and implementation.

Project Timeframe

The time required to implement a superstreet design depends on the current intersection design and the available right-of-way in the area. Constructing the facility can take longer if the

additional land is not readily available and must be acquired from other entities. A typical superstreet design can take several months, perhaps years, to implement depending upon available right-of-way.

Cost

The cost of a superstreet design depends on the available right-of-way and the current state of the intersection. The cost will rise if the necessary right-of-way is not available and must be purchased from other owners. The overall cost may be higher than other intersection techniques due to the possible signals and signs required for the left turns. Practitioners should consider comparing the cost of a superstreet design to similar intersection designs (e.g., Median U-Turn intersections) before implementing this technique. The cost to build the superstreet in San Antonio was approximately $5.2 million for US 281 and $5.7 million for Loop 1604.[3]

Data Needs

Data needed to evaluate the use of the superstreet concept include traffic counts for all approaches and left-turn counts at the intersection. The current signal timing plan, the delay caused by the intersection, and speeds traveling through the intersection can all be useful in evaluating the use of the superstreet concept. Other useful information includes crash data, the available right-of-way, and the current roadway geometry (e.g., lane, median, and shoulder widths).

Superstreets Best Practice

- Type of Location: High volume major streets, particularly at intersections with substantial left-turn volumes.
- Agency Practices: Coordination between planning, design, safety, and operations.
- Frequency of Reanalysis: After substantial land use changes or development; as travel increases or trips change in the area; at time of roadway widening or reconstruction.
- Supporting Policies or Actions Needed: Capability to fund improvements, multi-agency agreements and policies where roadways cross jurisdictional boundaries; driver education campaign.
- Complementary Strategies: Intersection improvements – pedestrian treatments; innovative intersection design: Median U-Turn intersection, access management.

For More Information

Alamo RMA. http://www.alamorma.org/index.cfm/projects/us-281-super-street/

References

1. *Alternative Intersections/Interchanges: Informational Report (AIIR).* Report No. FHWA-HRT-09-060. Federal Highway Administration, McLean, VA. 2010.

2. Hummer, J.E., et al. *Superstreet Benefits and Capacities*, Project 2009-06. North Carolina Department of Transportation, Raleigh, North Carolina, December, 2010. Accessed: December 5, 2011. http://ntl.bts.gov/lib/37000/37800/37839/2009-06finalreport.pdf.

3. The Texas Highway Main Page. http://www.texashighwayman.com/superstreets.shtml