

## Development and Evaluation of Options

Access management is an excellent planning and design tool when starting with a new roadway corridor or one that has little or no development along the corridor. However, it is much more difficult to implement access management on existing conditions or “retro-fits”, particularly along a heavily developed mature corridor. Often the access management principles must be compromised somewhat to try to balance improved access management with maintaining the viability of the community, achieving the best possible solution given the circumstances. It is also important to note that not every access management concept is appropriate or feasible in all circumstances or locations. Access management in retrofit applications is extremely site specific and site sensitive.

### Access Management Options

For example, a raised median is a typical and effective access management technique. It is intended to control traffic turning movements and is most beneficial near signalized intersection approaches with heavy traffic volumes. Driveway access may be restricted on one side by a raised median, making internal circulation necessary to assist directional mobility. Without fully directional mobility (even if somewhat circuitous), a raised median may not be a practical access management technique.

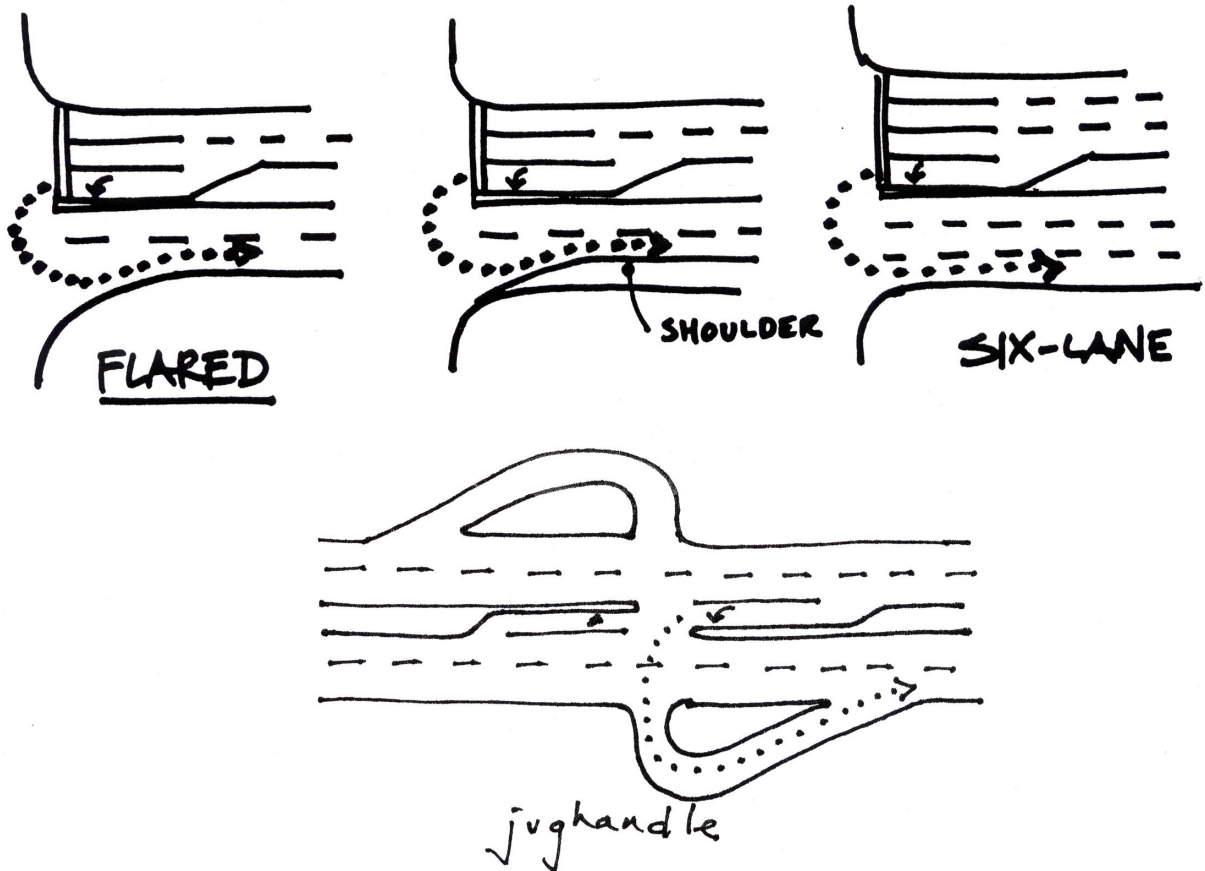
The use of a raised median can be applied in two basic configurations: a continuous median, or only within the functional area of a signalized intersection. For a continuous median to work effectively, certain conditions are necessary. First is that a means be available to access adjacent properties. This could be:

- side street access with or without an internal cross access road,
- a parallel road providing access (such as a frontage or backage road),
- or the ability to change direction (in other words, turning around).

The majority of the corridor does not have parallel access roads and many properties do not have side street access. It may be necessary to improve cross access between properties to improve internal circulation or to consider the potential of U-turning at signalized intersections. This situation may apply under both the continuous median and the intersection median approach.

In order for u-turns to be provided with a continuous median, a wide enough area must be provided to accommodate a U-turn. This can be accomplished via a flared intersection, a wide shoulder, or a minimum three-lane section in each direction. Another option could be a jughandle as provided in several locations along US 24 (State Avenue) between I-435 and US 40 in Kansas City, Kansas.

**Figure 6  
Median Treatments**



### **Corridor Segments**

The Corridor was divided into four segments associated with land use types, traffic volumes and other physical and operational characteristics such as posted speeds. The four segments are:

- Segment 1 – Iowa to Louisiana
- Segment 2 – Louisiana to Barker
- Segment 3 – Barker to Harper
- Segment 4 – Harper to Noria

A brief description of each segment and its potential options follows. Enhancements also have been conceptualized along the entire corridor and are discussed later on.

### **Segment 1 – Iowa to Louisiana**

This segment covers approximately one mile and contains numerous traffic signals and the greatest density of commercial driveways along the corridor. The roadway contains a five-lane section with a center-turn lane. Medians are

provided at the Iowa Street intersection and the east leg of the Louisiana intersection.

Continuous medians were investigated for applicability, but because of highly developed properties and narrow right-of-way, a continuous median may be of questionable value here. Medians at intersection approaches were reviewed to determine if adjacent properties had fully directional mobility. Because of site-specific property configurations, all movements cannot be provided for many of the properties where an intersection median was conceptualized. However, intersection approach medians will improve intersection operations and provide a safety benefit.

Other concepts to consolidate driveways and develop a frontage road system within existing right-of-way would trade one design issue for another. While the total number of driveways could be reduced, the frontage road concept would create a very short “throat” with inadequate room for storage which is an unacceptable design because it can block turning movements and cause vehicles to stack out on the roadway.

The density and proximity of commercial development define this segment. While access management policies may eventually affect and hopefully reduce the number and placement of driveways, the ability to effectively reduce access points is limited because of the small size of properties. Medians to protect the functional area of the intersection somewhat restrict fully directional mobility from some properties.

If one desires a more pro-active approach to achieve the result of reducing the number of driveways, redevelopment or active acquisition of access is necessary. Any redevelopment should encourage relocation within the redeveloped area and financial incentives could be provided as encouragement for landowners. It is also recommended that enhancements be implemented, such as continuous sidewalks.

## EVALUATION

- Continuous raised median on a 5-lane section requires either roadway or intersection widening. Major roadway or intersection widening is impractical with its impacts.
- Raised medians at intersections are somewhat constrained by physical restrictions to adjacent properties.

### **Segment 2 – Louisiana to Barker**

This segment covers approximately a half-mile and contains the majority of residential properties abutting the corridor. The roadway transitions from a four-lane undivided section to five lanes with exclusive turn lanes.

This segment has been reviewed primarily in relationship to an enhanced environment that may include sidewalks, ornamental lighting and other treatments. No specific roadway concepts were developed due to potential impacts on adjacent residential areas due to very narrow right of way and because the Massachusetts intersection was recently improved. Access to residential properties would remain unchanged.

This segment's character is essentially controlled by the residential land use. Consequently, no roadway improvements are recommended, although a series of enhancements are strongly suggested and include construction of continuous sidewalks. It should be noted that some right-of-way will be required to install continuous sidewalks on the north side of the corridor.

## EVALUATION

- Residential segment – driveway treatments not under review
- Narrow right-of-way
- Different segment from the rest of the corridor
- Enhance and unify character of the corridor
- Transitions are important

### **Segment 3 – Barker to Harper**

This segment covers approximately one mile and is primarily a developed commercial corridor. The roadway is a five-lane section with a center-turn lane. The posted speed is 45-mph. There are three signalized intersections in this segment.

With a wide right-of-way able to accommodate U-turns, continuous medians were reviewed. To provide capacity for this heavily trafficked segment and to allow for U-turns, the roadway would be widened to three lanes in each direction. While the majority of driveways would be restricted to right-in and right-out turns, all abutting properties could be afforded fully directional mobility through U-turns at signalized intersections and at selected median breaks.

Various concepts were developed to replace the bridge over the former railroad tracks (between Barker and Haskell), with an interchange.

The offset alignment of Silicon and Ponderosa Avenue intersections were investigated to determine the possibility of realigning to reduce the number of conflict points.

This segment affords tremendous improvement opportunities and it is recommended that major reconstruction occur to widen the roadway to a six-lane section. Because of ample right-of-way, the principles of access management

can be applied through the concept of a continuous median while addressing driveway consolidation in a comprehensive manner.

#### EVALUATION

- Wide right-of-way (120 foot minimum) throughout segment affords opportunities to widen roadway with minimal impacts.
- Currently there are few sidewalks along this portion of the corridor.
- Transitions are important

#### **Segment 4 – Harper to Noria**

This segment covers approximately two miles and contains the highest posted speeds along the corridor. The roadway is a divided highway with a wide grassed median. The two directions of travel have independent profiles that require the wide (90 feet) median. Several median breaks at public roads and private drives are provided. One of the more active median breaks is at East Hills Business Park. This segment serves as the transition zone from a 45-mph commercial corridor to a 70-mph freeway east of Noria Road.

Along this segment, a review of the spacing of the median breaks was conducted. Approximately every other median break was reviewed for removal, thereby reducing the number of conflict points. As part of a long-range set of improvements, interchange concepts were reviewed for Noria Road coupled with the closure of the median break at East Hills Business Park or alternately at East Hills Rd with a grade separation at Noria road. Right-in and right-out turning movements would remain. Movements restricted by the median break closure would be accommodated at the interchange or at the median break at County Road 1650.

With the extension of a continuous median east of Harper, access to and from Anderson would need to be enhanced through local extensions and access to Harper.

This segment affords tremendous improvement opportunities and it is recommended that major reconstruction occur to revise roadway profiles and construct a phased interchange-concept linking Noria Road with East Hills Business Park. Roadway widening is also recommended to a six-lane section.

#### EVALUATION

- Wide median section (90 feet), typical is 60 feet. Needed to accommodate different profiles for eastbound and westbound roadways
- Median breaks at 1/8 mile spacing
- Nearly continuous curb cuts along frontage roads
- Narrow throat depth at frontage road and side road junction
- Transitions are important

## **Economic Impacts**

Changes of any sort to an existing roadway impact adjacent properties to varying degrees in terms of gaining or losing access, changes in local travel patterns due to new capacity, signalization, or medians, different speed on the roadway, and many other factors. This section attempts to estimate the potential economic impacts of access management techniques in general as well as the potential economic effects along specific sections of the corridor where the installation of a raised median is considered.

Two recent research papers have been reviewed from the 4<sup>th</sup> National Access Management Conference entitled:

- *Developing a Methodology to Determine the Economic Impacts of Raised Medians on Adjacent Businesses, and*
- *The Economic Impacts of Medians: An Empirical Approach.*

The first paper presents some case studies and a formula to estimate maximum business loss due to the restriction of left turns. The second paper presents a more general analysis based upon surveys with businesses along corridors that have undergone access management improvements.

*Developing a Methodology to Determine the Economic Impacts of Raised Medians on Adjacent Businesses* - The research focused upon estimating the economic impacts of raised medians on sales and property values for adjacent businesses and undeveloped landowners. The research has found that installation of a raised median does not equate to economic losses by adjacent businesses. In fact, only two types of businesses (auto repair and gas stations) were found to generally experience losses of gross revenues.

Business owners were asked to rank “accessibility to store” with other factors including distance to travel, hours of operation, customer service, product quality and product price in order of importance that customers use when selecting a business of their type. In all cases, accessibility ranked third or lower. Customers were also asked the same question. Customers ranked accessibility with lower or equal value to the business owners. The most important elements used by customers to determine what businesses they will endorse are factors that may be controlled by the business owners themselves to some extent.

Customers generally indicated they would be less likely to visit the businesses during the construction phase of the project. On another note, business owners prior to a median installation expected a 2.3 percent decline in property values, however after the median installation the perception was that property values actually *increased* 6.7 percent.

The construction phase did seem to impact customers per day and gross sales. Perceptions of expected loss in gross sales during construction were higher (18.6

%) compared to those businesses (11.6%) that were present before, during and after. The construction phase of the project appears to have a negative affect on many of the business types. Business types such as durables retail, specialty retail, fast-food restaurants and sit-down restaurants indicated increasing customers per day, gross sales, and property values. Gas stations, auto repair, and other service businesses indicated somewhat of a decrease in customers per day and gross sales after the raised median was installed. Suggestions to alleviate construction impacts include 1) ensuring adequate and highly visible access, 2) reducing construction time, and 3) performing the construction in smaller roadway segments (phases) to the extent possible.

*The Economic Impacts of Medians: An Empirical Approach* - Estimating the economic impacts becomes important in helping to decide when and where to install a physical median. It presents a simplified procedure for quantifying the estimated impacts of installing a raised median. The estimates derived represent the maximum likely impacts, since normal traffic growth and overall economic growth are likely to offset some of the potential loss.

Property acquires value because of its location, and the keys to location are accessibility and exposure. Accessibility is measured by the ease that people and vehicles can reach, arrive at and depart from a site; exposure is measured in terms of the number of people and vehicles that pass a site.

In summarizing some previous studies, it is noted that “traffic serving” businesses that were not located at median openings reported a 44% decline in sales volumes after median construction, while non-traffic-serving business reported no change. Comparisons suggest that the raised median did not result in any overall negative impact, although some individual mid-block businesses (i.e. businesses located between median openings) may have suffered some loss of sales. The businesses that were reported to suffer ended up on the “wrong” side of the median, such as a liquor store located on the “going to work” side and a breakfast restaurant located on the “coming home” side. In many cases the changes in business activity reflected the overall economic climate.

In Fort Lauderdale, public opinion surveys found that 63% felt inconvenienced by U-turns, and some 44% reported that U-turns affect the choice of businesses visited. 70% of the merchants reported no adverse effect on truck deliveries. In Orange County, 43% indicated they were unduly inconvenienced by U-turns. U-turns affected driver choice of destination – the range was from 16% for offices to 43% for gas stations. 36% of the businesses indicated that the median changes adversely affected truck deliveries.

NCHRP 25-4 found that perceptions and attitudes were mixed. Some business owners felt that the left turn restrictions limited access to their stores and resulted in lost business, while others reported that the turn restrictions reduced

congestion an improved traffic flow to the point where their market areas actually expanded.

Businesses located at mid-block locations (i.e. away from intersections) perceived the left turn restrictions as more detrimental than businesses located at places where left turns were permitted. In some cases, left turn restrictions appeared to cause some sales to shift from the restricted to the unrestricted business locations. Some businesses reported losses because of left turn restrictions were ready to go out of business before the restrictions were implemented or were planning to go out of business for other reasons.

Perceptions of impacts also varied depending upon the purpose of the project. There was some evidence to suggest that where safety had been publicly perceived to be a serious problem, the left turn restrictions actually enhanced the number of customers coming into the area. However, where projects were intended to improve traffic speeds and flow, perceptions were mixed. Some businesses wanted customers to travel at slower speeds in front of their establishments. While other businesses reported that increased speeds allowed their market areas to be expanded.

In terms of sales impacts, gas stations, food stores and personal service businesses appeared to be the most adversely affected. These businesses showed the largest sales decline and the highest rates of business failure.

Where direct left turns are prohibited, some motorists will change their driving or shopping patterns to continue patronizing specific establishments. Some repetitive pass-by traffic will use well-designed or conveniently located U-turn facilities. Retail sales may increase as overall mobility improves, or as economic conditions change, and as traffic volumes increase. It is also reasonable to expect that destination-oriented trips will find alternate routes to their destinations.

The maximum economic impact will depend on the following factors:

- Size and type of each abutting land use
- Reliance upon pass-by traffic
- Number of vehicles turning left
- Average purchase per vehicle (or person).

The maximum loss would be the number of left turns times the percent pass-by times the dollar per purchase summed for the locations of businesses. Typical proportions of pass-by trips are provided, including 55% for a service station-convenience market and 45% for a fast-food restaurant with a drive-thru. An estimate of left turns as a percentage of total traffic shows a declining proportion of left turn entrants as daily traffic increases. Information is also needed on the purchases per vehicle to estimate maximum daily and annual economic loss.

It should be reiterated that impacts would be less where alternate left-turn access into a property remains open. Over a section of highway, sales at other establishments might increase because of improved accessibility. Finally there may be no overall impact on a community since business would divert to other establishments.

*Maximum Economic Impact Along 23<sup>rd</sup> Street associated with Raised Median*

The information from the above research appears inconclusive in many ways, although some generalities may be determined such as:

- One can expect business owner concerns about left-turns restricted by raised medians
- The degree of economic loss, increase or no change due to a raised median is difficult to attribute
- Economic impacts during construction can be expected for many of the business types.

The formula does offer one method of estimating maximum impact that can be applied to the 23<sup>rd</sup> Street Corridor, in particular between Barker and Anderson. The retail establishments were reviewed by land use type and assigned a probable degree of sensitivity to pass-by traffic. Of the 45 businesses along this stretch, approximately 18 percent could be categorized as high or highest degree of sensitivity. Taking only these eight businesses, consisting of gas stations, convenience stores and restaurants an estimate of maximum economic loss is calculated.

The total traffic for these establishments was reviewed from the ITE Trip Generation Manual. For simplicity purposes each establishment is estimated to generate approximately 2,000 vehicles per day. Using the table for estimated left turns based upon ADT, a value of 22.5% was assumed (being between 20% and 25%). The pass-by percentage varied according to land use. The dollars per purchase was estimated at \$20.00. For the eight businesses under review, the maximum estimated annual loss (based upon 300 days per year) is slightly over \$11.2 million. If adjustments were made to account for those businesses with side street accessibility, the maximum estimated annual loss could reduce to \$9.3 million. It should be noted that these values could be significantly higher or lower depending upon the average value of a purchase. Table 2-1 reflects the above information for each of the eight establishments.

**Maximum Annual Estimated Economic Loss**

<u>Business</u>	<u>Max. Loss per Year</u>	<u>Adj. Max Loss per Year</u>
Retail/Conoco	\$1,485,0000	\$1,113,750
Food Mart	\$1,485,0000	\$1,113,750
Sonic	\$1,215,0000	\$1,215,000

AmPride (currently vacant)	\$1,485,0000	\$1,113,750
Phillips 66	\$1,485,0000	\$1,485,000
Conoco	\$1,485,0000	\$1,113,750
Texaco	\$1,485,0000	\$1,113,750
Don's Steak House	<u>\$1,080,0000</u>	<u>\$1,080,000</u>
<b>TOTAL</b>	<b>\$11,205,0000</b>	<b>\$9,348,750</b>

### **Enhancement Goals and Objectives**

The goals and objectives for developing enhancements for the corridor were:

- to focus enhancement applications on Gateway and Primary Intersections throughout the corridor,
- to select a segment of the corridor to illustrate opportunities for enhancements,
- to provide site amenities that will visually enhance the corridor, and
- to provide a continuous pedestrian network.

Site amenities are one way to enhance the quality of a corridor. Site amenities that were considered for the 23<sup>rd</sup> Street Corridor include:

- Landscaping – Plant material consisting of shade and ornamental trees, shrubs, groundcovers, and native grasses.
- Hardscape – Brick/concrete pavers.
- Ornamental street lighting with banners.
- Gateway monuments.
- Vertical elements – Water or sculpture features.

Other factors that can contribute to the visual quality of the 23<sup>rd</sup> Street Corridor are:

- Removing existing overhead power lines and placing utilities underground.
- Consistent sign design (uniform height and type).
- Continuous sidewalk system.

### *Enhancement Examples*

Examples of these types of applications are illustrated in two separate corridors. One site is located along the Highway 69 Corridor in Ankeny, Iowa, and the second is located along the 87<sup>th</sup> Street Corridor in Lenexa, Kansas. Refer to the following examples of potential enhancements.



**Photo 11**  
**Intersection of 5<sup>th</sup> Street & Highway, Ankeny, Iowa**

The combination of landscaping and appropriate site elevations can effectively screen less desirable views (i.e., automobile headlight glare, parking lot surface, utility boxes, etc.).



**Photo 12**  
**Center median along Highway 69, Ankeny, Iowa**

Landscape treatment within center medians soften provide contrast with the roadway. Also, the landscape beds provide a common theme that is consistent throughout the corridor. It should be noted that utilities have been placed underground versus overhead. The continuous sidewalk also defines the edge of the street right-of-way.



**Photo 13**  
**Commercial Center along Highway 69, Ankeny, Iowa**

This site has effective building setback distance combined with a diverse landscaped buffer. This concept serves two functions. First, the landscaping

adequately screens parking from view of the corridor, and second, the landscaping visually enhances this portion of the site within the corridor and accents the business' entrances.



**Photo 14**  
**Rosehill Road Intersection, Lenexa, Kansas**

The combination of earth berms and landscaping effectively screen out parking areas and drives. The variety of plant materials enhances the visual quality of the corridor.



**Photo 15**  
**Sidewalk and Landscaping, Lenexa, Kansas**

Signage type is restricted to ground monument signage. The height of the sign shown is 6 feet. This restriction decreases the amount of visual interference that can occur along a corridor when restrictions and standards are not applied.



**Photo 16**  
**Center Median, Lenexa, Kansas**

The center median is enhanced by selection of materials that are in contrast to the roadway. The combination of cobblestone pavers, concrete curb, and landscape beds with concrete edging provide a unified theme throughout the corridor.