FARM 1960 ROAD

FARM 1093 ROAD

FARM 518 ROAD

Evaluation of Access Management Summary Report

Safety

Mobility

Economy

Houston-Galveston Area Council

Texas A&M Transportation Institute

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Access Management Summary

Access Management is a set of techniques used to proactively manage vehicular access points to land parcels adjacent to roadways. These access management techniques are a tool used to, promotes safe and efficient use of the transportation network, and potentially influence land development access. Access management can improve safety and mobility by reducing conflict points and removing turning vehicles from the through lanes.

Several access management studies have been conducted in the Houston region and some of the resulting recommendations have been implemented in several corridors. An evaluation was conducted to determine which recommendations were implemented and the benefits realized in three corridors: FM 1093, FM 1960 and FM 518. An example of a before and after access management implementation is shown in Figure 1 and Figure 2.

Figure 1. FM 1960, Looking East, West of Nanes Drive (Before Access Management, 2007)

Figure 2. FM 1960, Looking East, West of Nanes Drive (After Access Management, 2013)

Objective

The objective of this evaluation was to assess and compare the three access management study corridors listed in Table 1 to determine the following:

- Determine which corridor study recommendations have been implemented and which improvements are still being planned or were deferred;
- Examine the effects of the recommended improvements before, during and after project implementation in the following areas:
  - Operations – traffic flow, intersection delay, and corridor delay;
  - Safety – crash frequency, crash rates, and compare those to the state averages; and
  - Economic – compare taxable sales receipts and control for other economic factors occurring during those times.

Table 1. Corridor Studies and Publication Dates

Corridor	From*	To*	Study Publication Date
FM 1093	IH 610	SH 6	April 2002
FM 1960	Gatewick Road	Mills Road	October 2004
FM 518	SH 288	SH 146	August 2004

*See Study Reports for exact limits.

Through this evaluation, the Houston-Galveston Area Council (H–GAC) assessed the effectiveness and feasibility of recommendations made in previous access management studies. This effort sought to determine whether or not the estimated benefits from recommended and implemented improvements (as documented in the access management studies) were realized. This assessment will help to determine the utility of access management studies in the region and quantify the benefits of access management projects for policy makers and local government personnel. Moreover, this assessment will ultimately help the H–GAC develop better guidance for conducting future access management studies.

Previous Access Management Studies

Each of the corridor study reports recommended access management strategies to improve traffic flow, motorized (and non–motorized) user safety, air quality, and the general aesthetics of each corridor. The Texas Department of Transportation (TxDOT) has since implemented some of the recommended improvements along each corridor. This evaluation document provides an assessment of the application of access management along the three corridors with respect to traffic operations, safety, and impacts on economic activity.

Each of the three corridor study reports differed from each other relative to scope, scale, and approach. The FM 1093 (Westheimer Road) corridor was the first study corridor and the study approach was more conceptual in nature than the FM 1960 and FM 518 studies. The scopes of the FM 1960 and FM 518 studies were enhanced to deliver an implementation plan as opposed to only potential alternatives.

Corridor Description

The three studied roadway corridors are located in the greater Houston area. FM 1093 and FM 1960 are similar, serving sections of dense retail and major shopping malls, as well as sections of strip retail development and multifamily housing. FM 518 has a mix of retail development, single family and multifamily housing, but is less densely developed than the other two corridors. Each corridor is illustrated in Figures 3, 4, & 5 and in Tables 1 and 2.

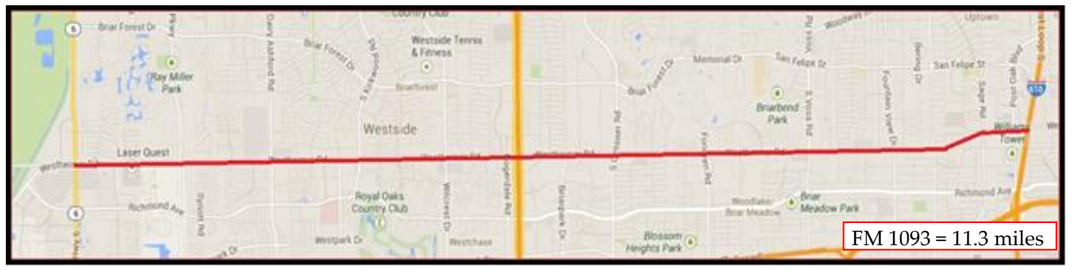

Figure 3. FM 1093 Access Management Study Corridor (Source Google Maps®)

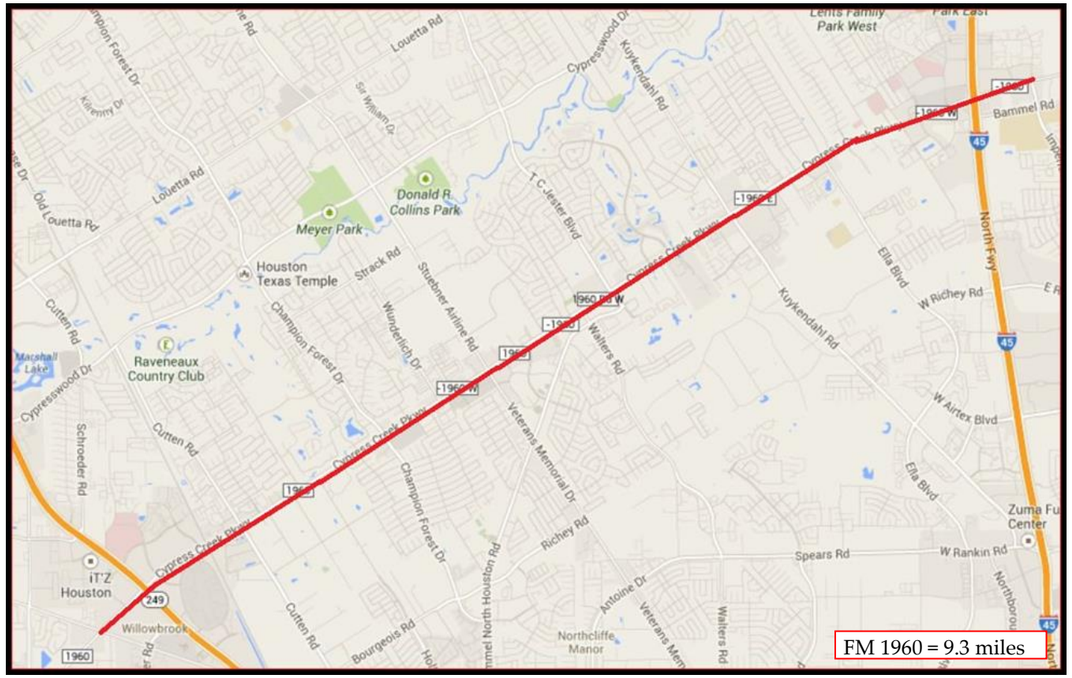

Figure 4. FM 1960 Access Management Study Corridor (Source Google Maps®)

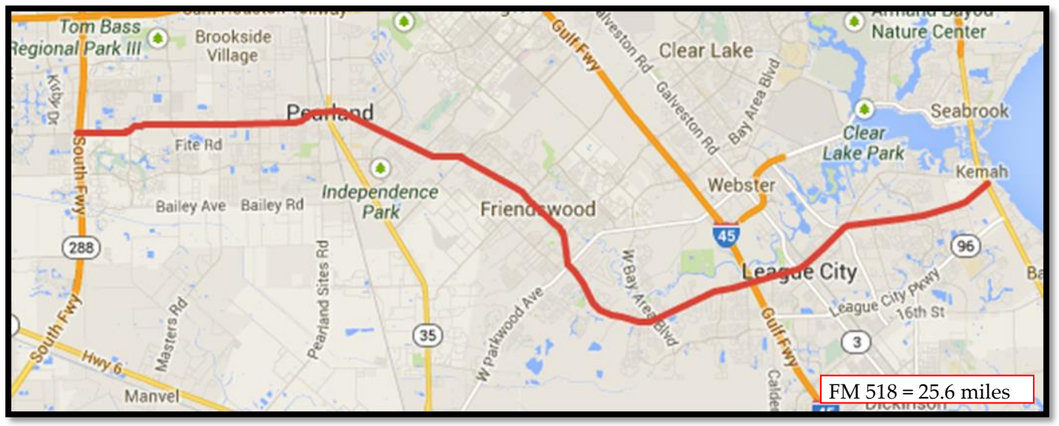

Figure 5. FM 518 Access Management Study Corridor (Source Google Maps®)

Figure 6. Example of Median Treatments on FM 1093 West of Gesner Left Turn Bay and Planter

Table 2. Access Management Roadways and Description

Roadway	Functional Classification	Number of Lanes	Number of Signalized Intersections	Roadway Length	Roadway Direction	Major Highway Intersections	Traffic Volume Per Day	Level of Service Range
FM 1093	Principal Arterial	8	43	11.3 miles	East-West	3	44,000 to 71,000	D/E
FM 1960	Principal Arterial	6	36	9.3 miles	East-West	2	60,000 to 70,000	C/E
FM 518	Principal Arterial	4	74	25.6 miles	East West	3	13,000 to 56,000	C/D

Recommended Improvements and Corridor Inventory

Most of the study recommendations for improvements occur within the right-of-way on the three corridors, but some of the improvements are on private property or recommended increased use of alternative nearby parallel facilities. Likewise, some improvements were recommended not only to the main corridor but also to cross streets to contribute to improved safety and mobility along the corridors.

An inventory of each corridor and the recommended improvements was made using the original study recommendations, Google Earth® aerial images, and Google Earth® historical aerial images. Inventory items were placed on the aerial maps and summarized into tables to make comparisons with the recommended improvements for this evaluation.

Corridor Improvements

Access management is intended to address mobility and safety issues along a roadway facility. Each of the studies recommended improvements that focused on the access management concepts of conflict reduction, mobility and operations, and provision for alternative modes of travel.

Access Management Summary

Conflict Reduction

A fundamental concept of access management is minimizing vehicular and vehicular/pedestrian conflicts. Reducing conflicts can take the form of the following:

- Channelizing medians (one way and two way);
- Creating right and left turn bays; or adding additional lanes;
- Extending existing turn bays;
- Consolidating driveways; and
- Creating one way driveways or diverters to better channelize traffic.

Separating vehicles from the rest of the traffic stream and reducing the number of conflict points is a proven method to both increase safety and improve mobility by reducing the potential sources of crashes.

Mobility and Operations

Other access management concepts include operational improvements including: 1) improving traffic signal hardware and software to provide additional functionality; 2) interconnecting signals to enable progression; and 3) optimizing signal timing and phasing for progression and/or minimum delay. These improvements assist in the efficiency of moving vehicles longer distances at higher average speeds through the corridor.

Alternative Modes

Another access management concept is to create opportunities to reduce motorized vehicle travel through the use of multimodal alternatives. These alternative modes may include walking, biking, and increased accessibility and use of transit. Improved sidewalks and bike facilities may encourage the use of those modes of travel over motorized travel. Adding amenities, including bus shelters, benches, sidewalks, and landscaping can increase transit accessibility.

Operations Evaluation

In order to evaluate the operational impacts of access management implementation along the three study corridors, a traffic operations and level of service analysis was performed. The traffic analysis included comparison of operational measures of effectiveness for three conditions including:

- No-Build Conditions with 2013 Traffic Volumes;
- Current Conditions with 2013 Traffic Volumes; and
- Build-Out (Full Study Recommendations) with 2013 Traffic Volumes.

Operations Summary

Detailed traffic analysis during the evaluation revealed several notable findings. Most operational benefits appear to be the result of capacity improvements, including the addition of turn bays, changes in traffic signal phasing (e.g., removal of split-phasing), and strategic roadway widening. The list below summarizes the benefits obtained by the various access management components.

- Reduced travel times and reduced overall network delay were realized for full implementation of the recommendations as compared with the before conditions (No Build). These benefits are correlated to the type of recommendations implemented. Capacity improvements such as turn bay additions, a short thru lane at congested intersections, and grade separation of a congested intersection improve traffic operations yielded the greatest saving. Using only raised medians can result in somewhat higher delay as compared to No Build Condition with two-way left turn lanes as an increase in turning traffic at the median openings and signalized intersections is realized.
- Level of Service categories at signalized intersections typically only improved if there were significant capacity improvements at the intersection. Raised medians appear to have relatively minor operational benefits, but contribute to positive safety benefits.
- In this evaluation, an increase/decrease in vehicle delay at an intersection was typically due to side street delay (typically at low to moderate volume on side streets). Improvements to the side street approaches such as turn bays reduce green time needed to serve the side street and thus reduce intersection delay.

A comparison of network delays for the roadway sections modeled are shown in Table-3 Figure 8. The larger decreases in network delay were largely attributed to the addition of through, lanes turn bays, or in the case of Kuykendahl an underpass. Total network delay ranged from 76 to 837vehicle –hours.

Table-3 Operational Comparison Based on Network Delay

Corridor/ Peak Hour	Segment	Total Delay (Veh- hrs) Before	Total Delay (Veh- hrs) After	Percent Change
FM 1093/PM	Wilcrest Dr to Gessner Rd	895	837	-6.9%
FM 1960/PM	Mills Road to Cutten Road	527	533	1.1%
FM 1960/PM	Walters Rd to Kuykendahl Rd	520	211	-146.4%
FM 518/AM	SH 288 to Sunrise Lakes Blvd	86	76	-13.2%
FM 518/PM	SH 288 to Sunrise Lakes Blvd	507	237	-113.9%
FM 518/AM	IH 45 to SH 3	91	94	3.2%
FM 518/PM	IH 45 to SH 3	210	212	0.9%

Figure 7. FM 518 East of SH 288

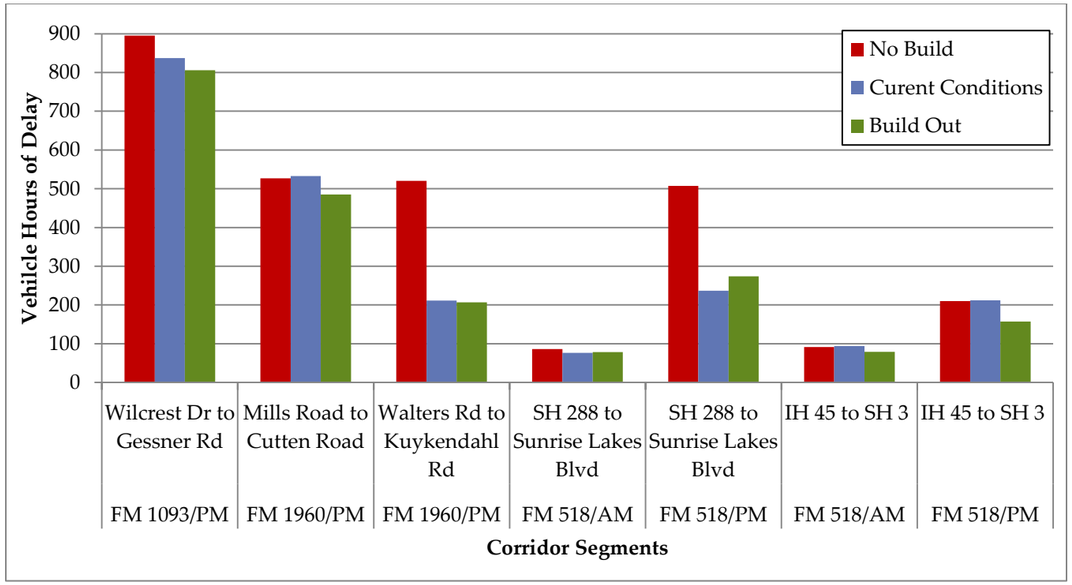

Figure 8. Vehicle Hours of Delay Comparison

Safety Evaluation

The safety evaluation analyzed the three access management projects to determine the impacts of access management on the number and severity of crashes before and after access management implementation. The following questions were posed:

- Were the facilities safer with or without access management?
  - Did crash frequency change?
  - Did crash severity change?
  - What types of crashes were reduced and what, if any, were increased?
  - What other crash characteristics are related to access management?
- Were there relative differences between sections of roadway based on the area type and land use?
- What criteria should be used to evaluate corridor safety in future studies?

Access Management Summary

Safety Summary

Average crash frequency and average crash rates are reduced in each of the three study corridors for each consecutive time period (before, during, and after improvements). Figure 10 shows the crash rate compared with the state average

- Crash Frequency (number of crashes) were reduced
- Crash Rates (number of crashes/traffic volume) were reduced 20 to 68 percent

The FM 1093 (higher volume roadways) are still about the state average for crash rate of this facility type. There were some evaluation sections that crash rate increased, however most of those segments were four times below the statewide average for urban four lane undivided arterials. The larger reductions were realized in the most congested sections. Reduction in crash types were as expected:

- Driveway related crashes decreased by 40 to 70 percent.
- Entering/exiting vehicles crash were reduced significantly
- Rear end and intersection crashes were also reduced.
- The types and severity of crashes remained relatively unchanged
- Almost 90 percent of the crashes are non-injury crashes.
- Crash frequency, crash severity and highway safety manual methodology should be considered for future corridor studies

Figure 9. FM 1960 Intersection Turn Bay

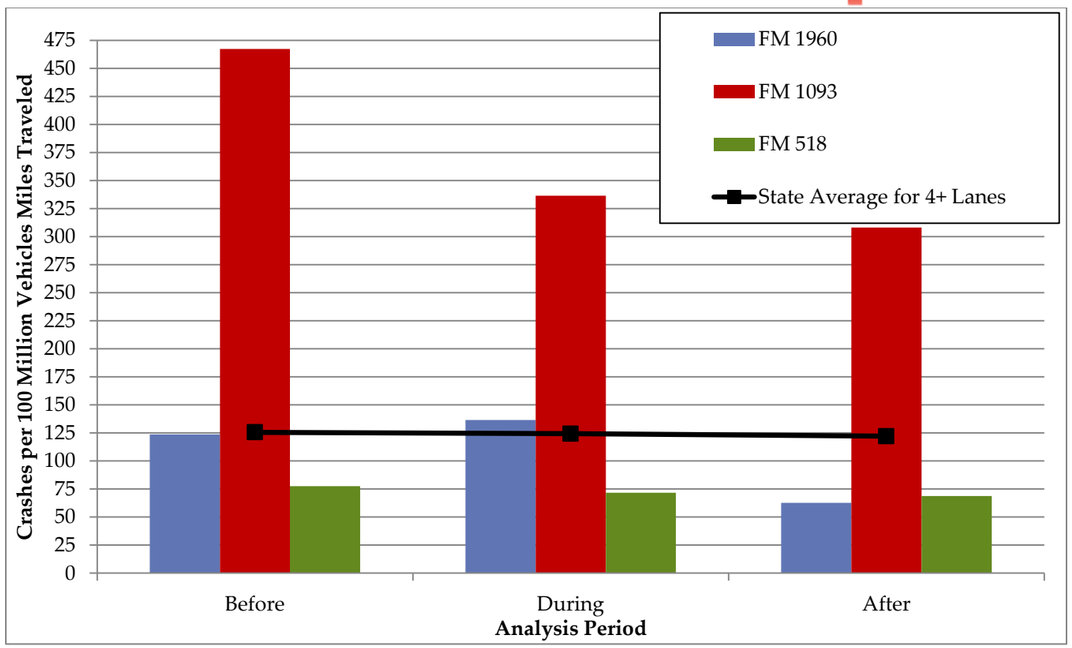

Figure 10. Corridor Crash Rate Compared with Statewide Average for Four Lane Divided Arterials

Economic Impact

The impact of access management projects on business and overall economic activities are not well documented and there has been no conclusions as to the magnitude of access management projects in the Houston region. Both factual and anecdotal examples exist regarding how access management improvements can positively or negatively affect business activity. However, few recent studies have been conducted on the economic effects of access management improvements in the Greater Houston region. The focus of this portion of our evaluation was to investigate the potential economic effects arising from access management improvements along the three corridors. This evaluation methodology focused on collection and analysis of taxable sales data to examine the possible changes in business activity before, during, and after any implemented improvements for various classes of businesses in the corridor study areas.

Economics Summary

The purpose of the review of economic data was to gain understanding of the potential impacts access management improvements on taxable business sales and economic growth along the corridor. Generally, the trends from the three corridors studied suggest that business sales increased at a greater rate along these corridors than in the adjacent zip code analysis zone as shown in Figure 11.

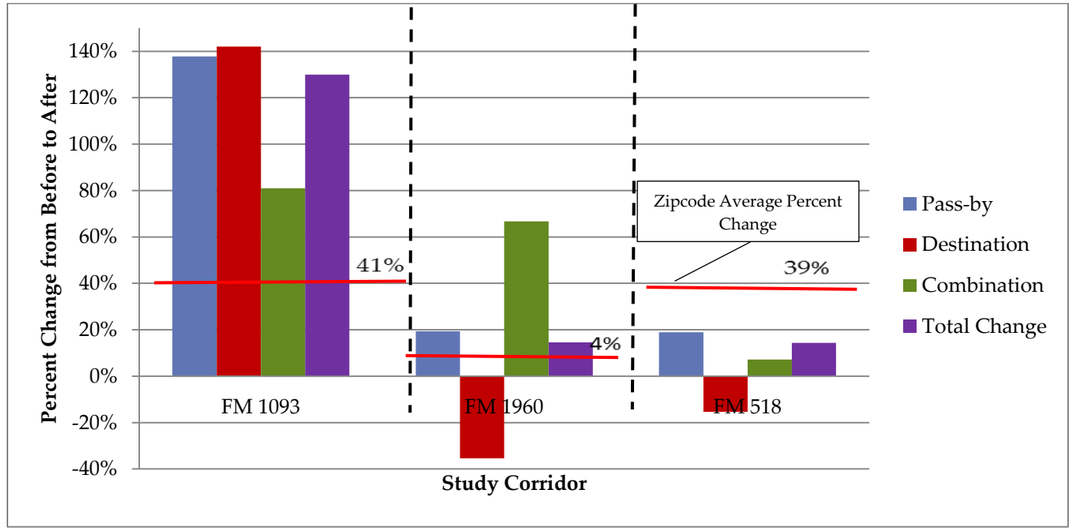

Figure 11. Percent Change (Before to After) of Taxable Sales Compared with Control Zone Zip Code Taxable Sales.

The FM 1093 corridor far out performed the control zip code (41 percent) which ranged from 81 to 142 percent. The FM 1960 corridor had mixed results ranging from 67 percent to -35 percent compared with the average control zip code 3.5 percent. FM 518 showed mixed results with a control zip code percent change from before to after of 39 percent while the sections ranged from -15 to 19 percent. The smaller sample sizes and changes in the corridor characteristics in FM 518 corridor contributed to the high variability. Confounding factors may have affected the results in unknown ways; however it does not appear that businesses along the access management corridors were generally and on aggregate unduly burdened by such improvements. Findings may be summarized with the statement that the data shows that most roadway sections and the average business levels (with sales tax revenue as a proxy) were not unduly burdened by access management activities and modifications.

Conclusions - What We Learned

The application of access management has significant benefits with respect to increased corridor safety. The evaluation found that crash frequencies and crash rates were reduced between -11% to -50% in the three studied corridors after access management was implemented.

Access management may moderately benefit traffic operations, with higher advantages associated with intersections where minor capacity improvements are made. The evaluation found that on these three corridors, average vehicle delay experienced between a modest reduction (-13%) to a slight increase (+4%) before to after implementation. Added capacity, extension of turn bay storage length, and optimal positioning of left turn movements along the corridor can influence operations in a positive way.

It does not appear that overall economic activity in the three studied corridors was negatively impacted by the implementation of access management. While there are certainly confounding factors in play when examining economic impacts during these types of projects, the results of this evaluation indicate that corridor economic activity typically remains steady, and in many cases, increases after access management projects are implemented.