WESTHEIMER CORRIDOR MOBILITY STUDY

April 2002

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Contents

Looking east on Westheimer at Beltway 8

Purpose of the Study

The purpose of the study is to identify short-range and long-range transportation improvements along the Westheimer corridor in order to improve traffic flow and to enhance the physical character of the corridor.

Short Range improvements will be made in two phases. Phase One median,intersection and signal improvements can be made immediately within the existing Public Rights of Way to allow through traffic to move more freely. Phase Two improvements along property frontages will require extensive coordination with property and business owners to consolidate driveways, transfer property needed for right turn lanes and construct wide tree lined sidewalks. Long Range improvements require a change in development patterns transforming auto focused strip centers along Westheimer into pedestrian oriented villages. Case by case recommendations will be refined per the economic situation of each property involved.

While continuing to provide convenient access to the destinations along it, short-range improvements to the Westheimer corridor should allow through traffic to move freely without frequent interruptions. They should also provide safe and convenient transportation alternatives in the form of improved transit and pedestrian access. Streetscape improvements to enhance the aesthetic character and vitality of the corridor need to be identified. Building on the transportation improvements along the Westheimer corridor, long-range development strategies would foster a variety of pedestrian-oriented villages. These Westheimer village concepts would be developed to reduce auto dependence and enhance greater foot traffic through higher density mixed-use projects. These projects would promote expanded life-style and work-style choices along with increased economic development opportunities. The study provides a list of recommended improvements and strategies that will help in achieving these goals as well as ways to implement the strategies.

The Study Area

Westheimer Road is a major east-west arterial running through the City of Houston. The limits for this 11-mile study segment are from IH-610 (West Loop) in the east to State Highway 6 in the west (Figure 1.1). The width of the study area is approximately 1,000 feet on each side from the centerline of the roadway.

Within the study area, Westheimer intersects three heavily utilized highways and a large number of north-south arterial roadways such as Chimney Rock, Fountain View, Hillcroft/Voss, Fondren, Gessner, Wilcrest, Dairy Ashford, and Eldridge Parkway. The corridor also passes through the center of two major business districts – the Uptown Houston District and the Westchase District. For most of its length, the corridor serves continuous commercial development with residential and recreational development along cross streets. Often referred to as a "river of commerce," it is an important economic corridor for the city. The Westheimer corridor is a vital link in Houston's street network, serving through traffic as well as providing access to the numerous developments along it. Maintaining its vitality and enhancing its usability are very important to strengthen the physical fabric of Houston.

Through most of the study area, Westheimer is an eight-lane facility within a 120-foot right-of-way. It gets severely congested especially during the morning and the evening rush hours. The corridor is used by regional traffic making long trips as well as local traffic; the current conditions, however, are skewed towards local access. Frequent traffic signals, closely spaced driveways for commercial destinations, and heavy turning movements at the numerous median openings are some factors that tend to slow down the through traffic movement along the corridor.

Scope of the Study

The Westheimer Corridor Mobility Study addresses the issues of transportation and physical enhancement by identifying short-range improvements for immediate implementation and formulation of a long-range vision for the corridor. Short-range improvements are roadway improvement strategies that can reduce traffic congestion allowing for faster through movement on Westheimer. However, to maintain a good mobility level in the future and enhance the quality of life along the corridor, a long-range plan is needed. A long-range vision is based on a good understanding of the land use and urban planning issues in and around the study area. It provides a guideline for a quality urban environment and promotes mobility by reducing car trips, providing transit alternatives, and creating convenient pedestrian access.

Methodology

A significant part of the mobility study involved collecting and analyzing relevant data on the corridor such as traffic volumes, accident rates, and transit usage. Gathering public opinion through public meetings and surveys also was an integral part of the study process. Within the study limits, the Westheimer corridor is represented by three associations: Uptown Houston District, Westchase District, and the West Houston Association. At the same time, there are gaps between these jurisdictions where individual property owners and other stakeholders need a voice in how changes to the transportation system affect them. A steering committee with representatives from the sponsoring agencies and other stakeholders in the study area was formed to guide the study team throughout the process. The final recommendations are based on the analyses done by the study team and the input provided by the public and the steering committee.

Figure1.1
Aerial Image of the Study Area

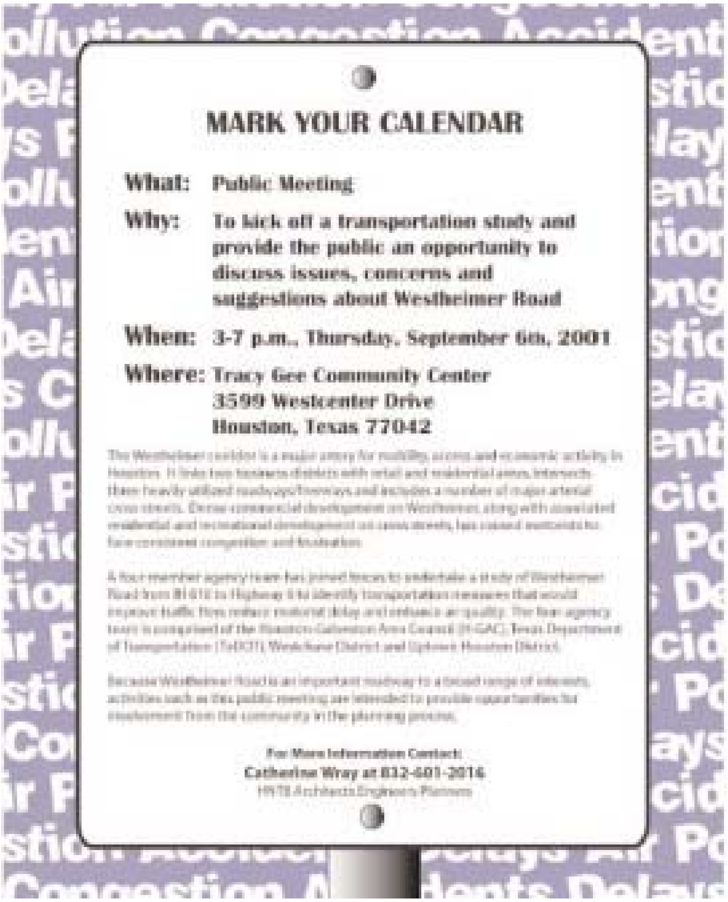


Figure 1.2
Advertisement Flyer for the First Public Meeting

Public Involvement Plan

Consistent with the public involvement goals established at the onset of the project, two public meetings were held during the course of the study. The first public meeting was held at the beginning of the study (September 6, 2001) to inform the general public about the study and to gather their input early in the study process. The second meeting was held on February 19, 2002 to present the study recommendations to the public and gather feedback. Both meetings were held at the Tracy Gee Community Center, located centrally in the study area on Westcenter Drive.

Several approaches were used to ensure that the public meetings were well advertised. Direct mailings to residents and businesses along the corridor, letters to elected officials, media notices including local newspaper, radio and television, and changeable message signs at important roadway intersections were used to reach a wide cross-section of the population.

Public Meeting No. 1

The first public meeting was attended by a total of 134 citizens and 7 public officials. The meeting was held in an open house format. Several exhibits relating to the study area were displayed and the attendees were free to interact with the study team representatives, ask them questions, and voice opinions. The meeting attendees also were asked to complete a two-page questionnaire on the corridor. At the meeting itself, 103 completed questionnaires were turned in, and 95 more were mailed in later. The completed questionnaires helped the study team in understanding the public sentiment regarding important issues and expected improvements along the corridor. A few significant findings are presented here as highlights of the results.

Result Highlights - 1st Public Meeting

Top 3 improvement priorities for Westheimer:

1. Improved traffic flow
2. Intersection improvements
3. Access to / from properties

Top 3 problematic areas/intersections:

1. Beltway 8
2. Gessner
3. The Galleria

Transit:
A significant number of the respondents (44%) said that they would use mass transit along the corridor if options other than buses were present, compared to 20% willing to use buses alone, showing mode bias.

Pedestrian Friendliness:
A majority of the respondents (51%) felt that there is a need for a more people-friendly environment along Westheimer, as opposed to 28% who felt that it was not needed.

Aesthetic improvements:
36% said that they would like to see more landscaping along the corridor.

Public opinion, as gathered through the public meetings and the project web site, helped the study team in identifying the issues of greatest concern along the Westheimer corridor. It also served as a guiding factor in developing recommendations for immediate improvements as well as a long-range vision for the corridor.

Photographs from the Public Meetings

Public Meeting No. 2

The second public meeting was attended by 24 citizens and one elected official representative. The meeting was held in an open house format similar to the first meeting. Several exhibits relating the study recommendations were displayed for review and comment by the public and the study team was present to answer questions. Public comments were collected via a comment form and summarized in a report, which was presented to the technical working group. Information regarding the study recommendations along with the comment form was also placed on the project website (www. westheimercorridor.org) to continue collecting feedback from the public. Eleven completed questionnaires were received after the meeting. The public's comments regarding the proposed recommendations were overall positive.

Result Highlights - 2nd Public Meeting

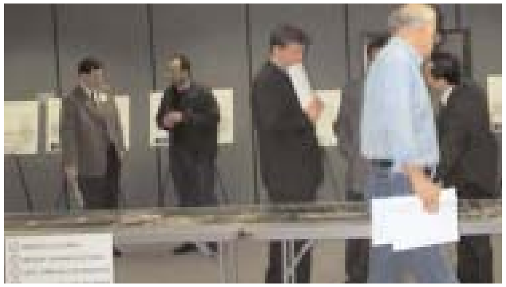
The general public opinion favored both the short range and the long range solutions presented at the meeting. One respondent saw the short range solutions as the best value for money while another respondent wanted to see a greater emphasis on the long range recommendations that would improve quality of life.

A majority of the respondents advocated alternative transportation options. Some of the suggestions were -

· Improve mass transit, especially west of Beltway 8
· Provide better sidewalks and maximize pedestrain linkages between uses
· Provide safe and well connected bike lanes and bike friendly stoplights
· Encourage car-pooling

Some other comments were -

· Replace concrete islands that contain specific cut-thru with turn only lanes. More access to places along Westheimer should result in fewer U-turns at signals
· The T-intersection would require "driver education" before they can be successfully implemented



Photographs from the Public Meetings

Section II

Existing Conditions

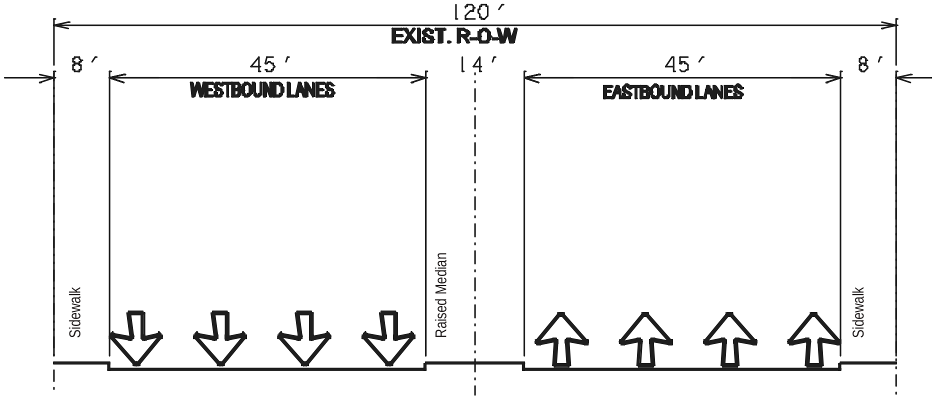
Roadway Conditions

Within the study boundaries, Westheimer Road was constructed as a concrete divided roadway with a raised median, concrete curb, and gutters. An asphalt overlay was installed as a maintenance project by the Texas Department of Transportation (TxDOT). The study section of Westheimer Road includes an eight-lane section with four travel lanes in each direction. However, the eastbound lanes are reduced to three travel lanes between West Alabama Street and IH 610. Dedicated turn lanes are provided at major intersections and median openings with a typical storage capacity of 150 feet. Concrete sidewalks with curb ramps are provided along both sides of the roadway in most locations.

The Westheimer Road study section includes intersections with three major north-south freeway/highway facilities: IH 610, Beltway 8, and SH 6. Spacing of north-south major thoroughfares and traffic signals in the study section ranges from one-half to one mile. In addition, Westheimer intersects with 76 north-south roadways, of which 43 are signalized and 33 are unsignalized. Many of the minor connecting streets do not provide continuation and extension of the local street network. The fragmented local street system with dead-end streets, cul-de-sacs, and gated communities, forces traffic onto major thoroughfare streets, increasing the number and length of vehicle trips and resulting in congested conditions.

Westheimer Road in the study area

Figure 2.1: Typical cross-section of Westheimer Road in the study area



Transit Service

METRO operates two major local bus routes along Westheimer Road, which have the second highest ridership in the system. The two routes are:

53 Westheimer Limited, which provides service from Downtown to the West Oaks Mall and to Westside High School

82 Westheimer, which provides service from Downtown to the West Oaks Mall and to Bellaire and Sharpstown Center.

Intersecting bus routes operating on Post Oak Blvd., Hillcroft, Gessner, Wilcrest, and Dairy Ashford provide transit access to areas north and south of Westheimer via bus transfers. Bus stop locations with significant levels of bus boardings and alightings, resulting in increased pedestrian activity, include Post Oak Boulevard, Hillcroft, and Gessner.

Figures 2.2 and 2.3 show the bus routes and bus stop locations in the study area

Source: METRO, Harris County, Tx

Last Updated: 09/00

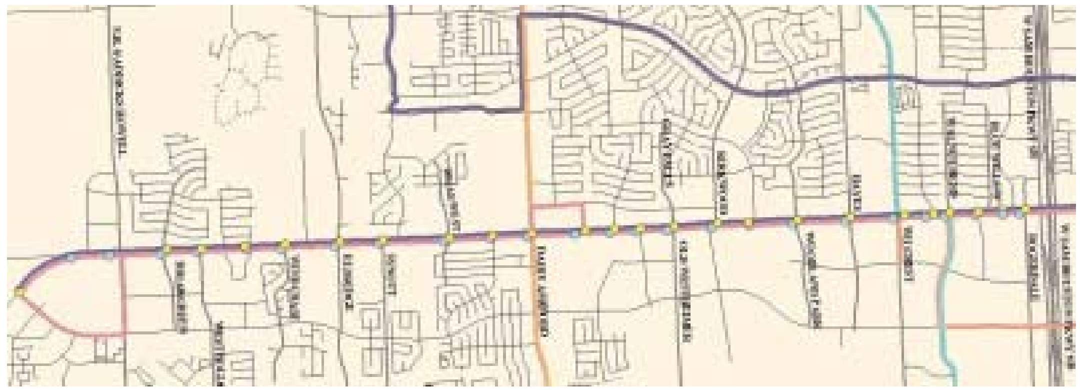
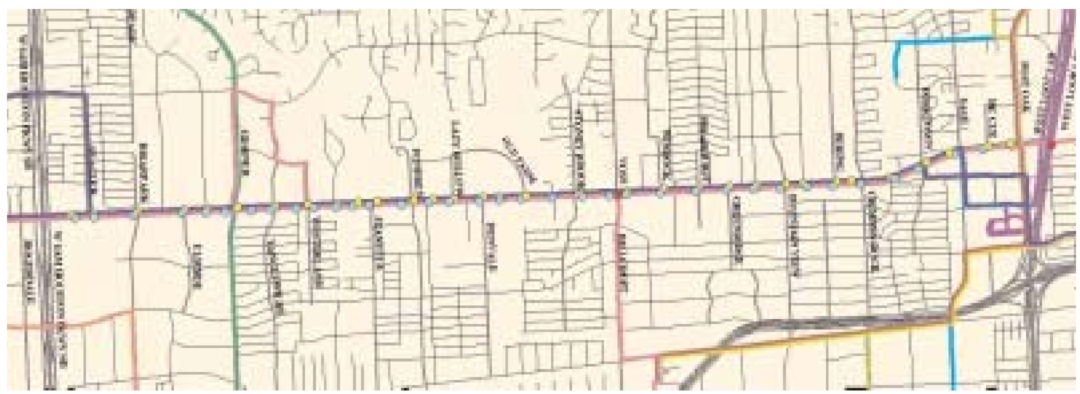


Figure 2.2: Bus Routes between SH 6 and Beltway 8

Figure 2.3: Bus Routes between Beltway 8 and IH 610



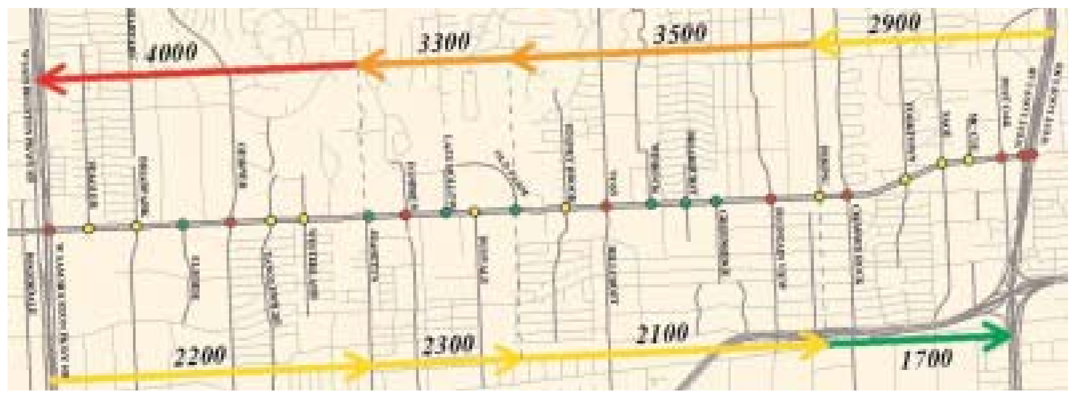
Traffic Flow and Traffic Volumes

The TxDOT year 2000 traffic map indicates an annual average daily traffic of 62,000 vehicles per day near the Westheimer and Beltway 8 intersection and reduces to 36,000 near the SH 6 intersection. The traffic flow along Westheimer Road exhibits a typical urban commute pattern (i.e., the morning peak direction is from the suburbs towards the city center and the afternoon peak direction is the return trip from the city center to the suburbs). The morning peak direction along Westheimer Road is eastbound, and the afternoon peak direction is westbound.

This study focuses on the PM peak period because existing traffic volumes were available and typically this is the period in which higher traffic congestion and delays are observed. Figures 2.4 and 2.5 show the traffic volumes and the intersection Level of Service (LOS) in the study area. Figure 2.6 illustrates traffic conditions associated with the various LOS values. During the PM peak period, the westbound traffic vol-

Figure 2.4: PM Peak Hour Traffic and LOS between SH 6 and Beltway 8

Figure 2.5: PM Peak Hour Traffic and LOS between Beltway 8 and IH 610

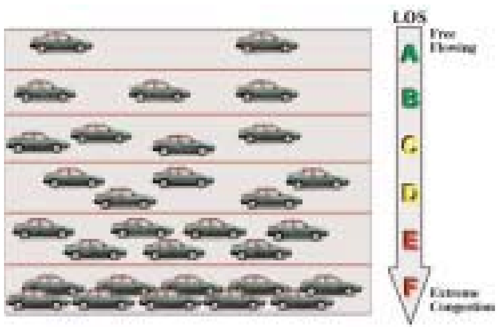


umes range from 2,900 vehicles per hour (vph) in the Galleria area to 4,000 vph near Beltway 8 and the eastbound traffic volumes from 2,300 vph near Fondren Road to 1,600 vph near SH 6.

Congested Intersections

The problem intersections along Westheimer Road are typically the high volume, signalized major thoroughfare intersections. These intersections experience long delays and poor LOS. (That is, the observed delay at these intersections is 55 seconds per vehicle or higher and the LOS is E or F). Typically, the left turn volumes are high and do not clear the intersection every cycle. Left turn vehicles under these conditions queue onto the through lanes of Westheimer Road obstructing traffic (for example, eastbound left turn movement at Westheimer Road and Post Oak Boulevard).

Figure 2.6: Level of Service (LOS) Defintion



Furthermore, the through volumes are considerably high, and at some intersections through vehicles do not clear the intersection every cycle occasioning long queues that can extend to upstream intersections (for example, westbound through movement at Westheimer Road and Wilcrest Drive). The following is a list of intersections where high delays and poor LOS were identified:

- IH 610 Frontage Road
- Post Oak Boulevard
- Sage Road
- Chimney Rock Road
- Fountain View Drive
- South Voss Road / Hillcroft Avenue
- Dunvale Road
- Fondren Road
- South Gessner Road
- Beltway 8 Frontage Road
- Wilcrest Drive
- Kirkwood Drive
- South Dairy Ashford Road
- Eldridge Parkway
- State Highway 6

Westheimer at IH 610, looking west

Westheimer at Beltway 8, looking east

Accident Review

The study area's accident history was obtained from the Texas Department of Transportation (TxDOT) for the three-year period from 1997 to 1999. The TxDOT Traffic Accident Records are an edited version of the Texas Department of Public Safety's Records merged with TxDOT roadway information. The accident records incorporate information on accident location, severity (in terms of fatality, injury, and property damage only accidents), and manner of collision. A total of 2,729 vehicle accidents were recorded within the study area during the three-year time period, as shown in Table 2.1.

Table 2.1
1997-1999 Accident Summary for Westheimer Road

W. Sam Houston Tollway to S. H. 6				
Year	Fatality Accidents	Injury Accidents	Property Damage Only Accidents	Total Accidents
1997	1	252	78	331
1998	1	248	98	347
1999	2	261	108	371
Total	4	761	284	1049
IH 610 to W. Sam Houston Tollway				
Year	Fatality Accidents	Injury Accidents	Property Damage Only Accidents	Total Accidents
1997	1	406	154	561
1998	0	405	137	542
1999	1	423	153	577
Total	2	1234	444	1680

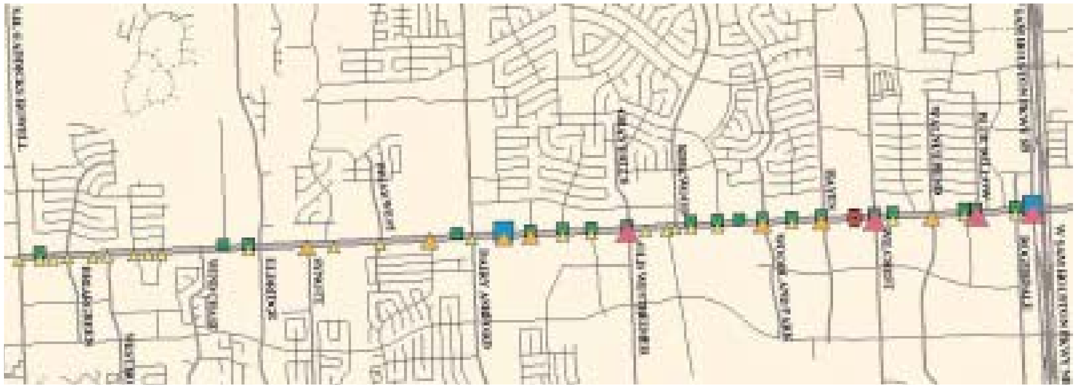


Figure 2.6: Motor Vehicle Accidents in 1998 between SH 6 and Beltway 8

Figure 2.7: Motor Vehicle Accidents in 1998 between Beltway 8 and IH 610

For accident review purposes, Westheimer Road was divided in two sections: State Highway 6 to Beltway 8 (west section) and Beltway 8 to IH 610 (east section). The two sections had average accident rates of 363.0 (west section) and 398.3 (east section) accidents per 100 million vehicle miles traveled (accidents per 100 MVMT) during the three-year period, as shown in Table 2.2. The statewide average accident rate for four-lane divided roadways in urban areas was 141.5 in 1997. It dropped to 135.0 in 1998 and to 132.9 in 1999.

Table 2.2
Accident Rates for Westheimer Road

	Accident Rate (Accidents per 100 MVMT)			
	1997	1998	1999	3-Yr Average
West Section: State Highway 6 to Beltway 8	381.0	333.3	374.7	363.0
East Section: Beltway 8 to IH 610	406.8	385.4	402.6	398.3
Statewide Average *	141.5	135.0	132.9	136.5

* Note: Statewide Traffic Accident Rate for Urban four or more lanes divided roadway

Typically, roadway facilities are considered to have a significant accident problem when the accident rate is double the statewide average. Under this criterion, the two analyzed sections of Westheimer Road qualify as having a significant accident problem. The east section has an accident rate of 292% of the statewide average. The west section has an accident rate of 266% of the statewide average.

Street intersections, median openings, and driveways represent basic vehicle conflict areas. Conflict points provide increased opportunity for accidents. Street intersections with a high number of conflict points have the highest potential for accidents. As noted in Table 2.3, intersection and intersection-related accidents represent more than half the accidents occurring on Westheimer. The roadway segment from IH610 to Beltway 8, with higher levels of traffic and development, experiences a higher percentage of accident in each of the location categories.

Table 2.3
Accident Locations along Westheimer Road

Accident Location Type	Westheimer Segment	Year 1997	Year 1998	Year 1999	Accident Total	Percenta
Intersection/ Related	SH 6 to Beltway 8	162	190	175	527	19.31%
	Beltway 8 to IH 610	260	287	302	849	31.11%
Non-Intersection	SH 6 to Beltway 8	124	105	124	353	12.94%
	Beltway 8 to IH 610	212	177	202	591	21.66%
Driveway	SH 6 to Beltway 8	45	52	72	169	6.19%
	Beltway 8 to IH 610	89	78	73	240	8.79%
	Total	803	811	875	2729	100%

Accident Rates on Westheimer Road are significantly higher than the statewide average:

Between State Highway 6 and Beltway 8 accident rates are 2.5 times higher than the statewide average.

Between Beltway 8 and IH 610 accident rates are 3 times higher than the statewide average.

Driveway Access to Parking

The driveway density, or the number of connecting driveways, varies with the level of commercial development along the study section. Chimney Rock to Gessner, with primarily commercial development, has a driveway density of 56 driveways per mile. The adjoining section from Gessner to Wilcrest with more limited access residential development has a driveway density of 36 driveways per mile. Driveway density is important because accident rates have been determined to increase as driveway density increases. Driveways represent traffic intersections and potential for vehicle conflict points. Adequate spacing of driveways allows drivers to react to one intersection at a time and reduce the potential for conflict.

Driveway access along Westheimer Road also is important to traffic flow and safety because of several factors:

Number of driveways

The number of driveways is a problem because of the high number of conflict points between vehicles entering and exiting driveways. Vehicles entering driveways have to change lanes to reach the destination driveways, sometimes up to four travel lanes in short distances, and vehicles exiting driveways have to merge with the through vehicles traveling on Westheimer Road. These maneuvers cause vehicles to slow down and/or brake suddenly increasing the potential of rear end, sideswipe, and right angle accidents.

Driveway turning radius

Small turning radii require entering or exiting vehicles to slow down or turn wide to complete their maneuver, creating potential blockages and conflicts.

Raised driveways

Raised driveways have steep slopes requiring vehicles entering and exiting a driveway to execute a slower maneuver, causing potential blockages and conflicts.

Driveway corner clearance

Corner clearance provides a minimum distance between an intersection and an adjacent driveway. Inadequate corner clearance results in traffic flow and safety problems, including traffic blocked by vehicles waiting to enter driveways, right or left turns out of driveways being blocked, and collisions caused by inadequate time for drivers to react to vehicles entering or exiting the driveway.

Pedestrian Safety

For pedestrians, driveways represent traffic intersections that are potential conflict points. Numerous and closely spaced driveways create an overlap of the operational area of driveways. Pedestrians and drivers have a difficult time mentally processing more than one conflict point at a time. Reducing the number of driveways reduces the conflict points proportionally. Increasing driveway spacing allows pedestrians and drivers to concentrate on one problem at a time.

Section III

Short-Range Improvements

Access Management Strategies

For the Westheimer Corridor Study, access management concepts were applied to achieve the project goals and objectives. Access management is the coordination between land access and traffic flow. The basic premise of access management is to preserve and enhance the performance and safety of the major street system. It manages congestion on existing transportation facilities and protects the capacity of future transportation systems by controlling access from adjacent development. Properly utilized, it can eliminate the need for street widening or right-of-way acquisition.

Techniques to accomplish access management include limiting and separating vehicle (and pedestrian) conflict points, reducing locations that require vehicle deceleration, removing vehicle turning movements, creating intersection spacing that facilitates signal progression, and providing on-site ingress and egress capacity. In addition, regulation focusing on the spacing and design of driveways, street connections, medians and median openings, auxiliary lanes and transit facilities, on-street parking and parking facilities, on-site storage aisles, traffic signals, turn lanes, freeway interchanges, pedestrian and bicycle facilities, bus stops, and loading zones should be considered

Research indicates that a well-designed and effectively administered access management plan can result in the following tangible benefits:

- Accident and crash rates are reduced.
- Roadway capacity and the useful life of transportation facilities is prolonged.
- Travel time and congestion is decreased.
- Better coordination between access and land uses is accomplished.
- Air quality is improved.
- Economic activity is enhanced by a safe and efficient transportation system.
- Urban design and transportation objectives are reconciled.
- The unique character and livability of the community is preserved through the coordination of land use and transportation.

Failure to manage access negatively impacts the efficiency of transportation networks in the following ways:

- More driveways related to strip commercial development.
- Local streets becoming bypasses for congested streets thereby creating the need to address cut-through traffic in residential neighborhoods.
- More frequent driveway related accidents.
- Vehicle conflicts from closely spaced driveways, which increase congestion, thereby reducing throughput.
- Longer travel times that reduce market areas for business.
- More difficulty in providing safe access for new development, thereby affecting economic growth.
- Lower investment benefits of transportation improvements.
- Greater need for wider streets to compensate for lost capacity.
- More cluttered streets and frequent driveways, which create an undesirable environment for pedestrians and bicyclists.

On the next several pages, the traffic analysis conducted for this study is explained, the improvement types are described, and the recommended implementation projects are listed. All the recommended changes to the roadway are applications of access management strategies.

Beyond the specific projects recommended in this report, more systemic strategies could be applied to the Westheimer corridor, as well as the entire Houston region. The following access management strategies may be used to coordinate the access needs of adjacent land uses with the function of the transportation system:

Intergovernmental Coordination. Access management is most effective as a regional strategy that involves members of the MPO, as well as state and local organizations involved in design and construction of roadways. Through coordinated efforts, access management can even further add to thoroughfare efficiency. The Westheimer Corridor can serve as a pilot project for potential application in other similar corridors in the H-GAC region.

Establish Design Standards. Design standards addressing the spacing of access points, driveway dimensions and radii, sight distance, and the length of turn lanes and tapers are effective mechanisms for managing the balance between the movement of traffic and site access.

Limit Conflict Points. When the number of conflict points between turning vehicles increases, so do the opportunities for traffic accidents. Driveway consolidations and directional median openings can safely provide access management with fewer conflict points.

Separate Conflict Points. Spacing driveways so they are not located within the area of influence of intersections or other driveways is a method to achieve access management objectives.

Remove Turning Vehicles from Through Travel Lanes. Left and right turn speed change lanes provide for the deceleration of vehicles turning into driveways or other major streets and for the acceleration of vehicles exiting driveways and entering roadways.

Encourage Shared Driveways, Unified Site Plans, and Cross Access Easements. Joint use of driveways reduces the proliferation of driveways and preserves the capacity of major transportation corridors. Such driveway arrangements also encourage sharing of parking and internal circulation among businesses that are in close proximity.

Locate and Design Traffic Signals to Enhance Traffic Movement. Interconnecting and spacing traffic signals to enhance the progressive movement of traffic is another strategy for managing mobility needs. A program to maintain signal progression to achieve safety, travel speed, and vehicle capacity can help to achieve mobility objectives.

Broader Access Management Strategies

Intergovernmental Coordination

Establish Design Standards

Limit Conflict Points

Separate Conflict Points

Remove Turning Vehicles from Through Travel Lanes

Encourage Shared Driveways, Unified Site Plans, and Cross Access Easements

Locate and Design Traffic Signals to Enhance Traffic Movement

Traffic Analysis for Short-Range Improvements

This section describes the traffic analysis process and the traffic model calibration methodology. It then summarizes the impacts of proposed traffic improvements and modifications on average corridor travel time, average corridor delay, and average number of stops per vehicle.

Study Area

The study area is located along Westheimer Road between IH 610 and State Highway 6. This segment of Westheimer contains 43 signalized intersections. The study area was further divided into four sections, two of which were analyzed in detail using a traffic simulation model. The two modeled sections are the segment between IH 610 and Chimney Rock Road (Uptown section) and the segment between South Gessner Road and Wilcrest Drive (Westchase section).

Data Collection

Existing intersection turning movement counts, number of median openings, driveway movement counts, travel times, roadway geometric data, and lane utilization data were collected between August and October 2001 for evaluating existing traffic operations. Turning movement counts were collected during the PM peak period between the hours of 4:30 PM and 6:30 PM. Traffic signal timing information was obtained from the City of Houston and was field verified in September 2001. Transit operation data was obtained from METRO. As described earlier, TxDOT provided accident data for the years 1997, 1998, and 1999.

Traffic Simulation Analysis

The analysis process for evaluating short-range improvement alternatives involved the preparation of a traffic simulation model using VISSIM (version 3.5) software. VISSIM is a microscopic, time step, and behavior-based computer model developed to simulate urban and public transit operations. The traffic model provides estimates of travel time (seconds per vehicle), average delay (seconds per vehicle), number of stops (stops per vehicle), and other parameters for use in evaluating traffic conditions along user-defined roadway segments. Data inputs for the model included weekday PM peak hour vehicle turning movement volumes at intersections, median opening and driveway locations, roadway geometric data and lane utilization, transit operations including bus stop locations and bus headways, and traffic signal phasing and timing patterns. Default values were used for more complex model inputs.

Existing Traffic Model Development

Within the Uptown section, Westheimer is a divided roadway with four lanes in the westbound direction. Eastbound has four lanes west of West Alabama Street and three lanes east of West Alabama Street. The primary land use in this section is commercial. The Uptown Section includes seven signalized intersections:

· Westheimer Road at IH 610 East Frontage Road
· Westheimer Road at IH 610 West Frontage Road
· Westheimer Road at Post Oak Boulevard
· Westheimer Road at McCue Road
· Westheimer Road at Sage Road
· Westheimer Road at Yorktown Street
· Westheimer Road at Chimney Rock Road

Within the Westchase section, Westheimer is a divided roadway with four lanes in both the westbound and eastbound directions. The primary land use in this section is commercial, although some residential land use exists in the eastern portion of the study area. The Westchase section has ten signalized intersections:

· Westheimer Road at South Gessner Road
· Westheimer Road at Elmside Drive
· Westheimer Road at Briarpark Drive
· Westheimer Road at Seagler Road
· Westheimer Road at Beltway 8 East Frontage Road
· Westheimer Road at Beltway 8 West Frontage Road
· Westheimer Road at Rogerdale Road
· Westheimer Road at Blue Willow Drive
· Westheimer Road at Walnut Bend Lane
· Westheimer Road at Wilcrest Drive

Calibration of the Model

The traffic simulation model for existing conditions was calibrated to ensure that the resulting output and evaluation properly duplicate actual traffic operating conditions. Refinements were made to the default model input parameters such as driver performance, until the model replicated observed existing conditions, within acceptable limits.

Existing travel time data for the two analysis sections were collected during the month of October 2001 during the afternoon peak period. Average car travel time runs in both directions were performed in the Uptown and Westchase sections during the PM peak period. For calibration purposes, the actual travel times were established by using an average of these travel time runs. The VISSIM model for existing conditions was then run to obtain the simulated travel time.

For **average car travel time runs**, a vehicle is driven along the study section according to the driver's judgment of the average speed of the traffic stream. A stopwatch is used to record the time interval to travel from the beginning to end of the section. Four runs are timed in each direction and then averaged.

The simulation time and average car travel time were compared to determine if they were similar enough to be considered acceptable. This travel time threshold accounts for variations in traffic distribution, such as driver and automobile population, yellow reaction time, gap acceptance factor, courtesy deceleration rate, and several other contributing factors. The survey average car travel time is simply based on the experiences of a single driver on individual trips. In addition, field reviews showed that traffic conditions along Westheimer Road tend to fluctuate from day to day, depending on traffic conditions on other roads that feed Westheimer Road and along alternate routes to Westheimer Road. To account for these factors, a travel time acceptable threshold, or travel time tolerance, of 30 seconds was considered acceptable for calibration purposes. Calibration results are shown in Table 3.1.

Measures of Effectiveness (MOEs)

Operational performance of the proposed alternative improvements can be evaluated in terms of measures of effectiveness (MOEs), which could include travel time, vehicle stops, delays, vehicle hours of travel, vehicle miles of travel, fuel consumption, and several other measures. The MOEs provide a basis for evaluating the performance of the proposed improvements compared to the existing conditions. The MOEs selected to evaluate the proposed short-range improvements along the Westheimer corridor were:

Travel Time: Average travel time for vehicles in seconds per vehicle

Average Delay: Average delay for vehicles in seconds per vehicle

Stops: Average number of stops for vehicles

With the short-range goal of increasing mobility and improving traffic flow, the selected MOEs of travel time, vehicle delay, and stops best serve to illustrate quantitatively the changes that the proposed improvements will have on traffic operations in the study sections. Drivers have an understanding of and can relate to these measures as they are traveling through the corridor. Other measures, such as vehicle emissions or number of person-trips, require more detailed information and coding input when creating the traffic model. In addition, these quantitative measures are less familiar to drivers.

Table 3.1
Existing Model Calibration for PM Peak Period Travel Time

Westheimer Analysis Section	Travel Direction	Distance (Miles)	Floating Car Travel Time (seconds)	Simulation Travel Time (seconds)	Difference (seconds)	Status
Loop 610 to Chimney Rock Road	WB	1.2	259	240	19	Calibrated
	EB		477	459	18	Calibrated
S. Gessner Road to Wilcrest Drive	WB	2.0	554	578	24	Calibrated
	EB		403	426	23	Calibrated

Analyzed Short-Range Improvements

The proposed short-range improvements along the Westheimer corridor were categorized as Phase One Priority and Phase Two Priority. Phase One short-range improvements are geometric and operational improvements that can be implemented within a short time frame of 1-2 years. Phase One improvements are contained within the existing street right-of-way and do not have extensive engineering or construction requirements such as major utility adjustment and right-of-way acquisition. Phase Two short-range improvements require more extensive coordination with property owners, potential acquisition of right-of-way, and more detailed engineering or adjustment of utilities. In most cases Phase One and Phase Two improvements can be constructed independently. On this and the following pages is a summary of the analysis of these short-range improvements.

Phase One Priority Short-Range Improvements

The following strategies were considered and tested as Phase One Priority improvements:

<u>Median Closures</u> - Serve to minimize median and through lane blockage and conflict points at low volume median crossings, especially those without left turn lane bays (Figure 3.1).

<u>Median Channelizations</u> - Serve to reduce median blockage and conflict points at median crossings by allowing left turns only from the median (Left turns from driveways are prohibited.). See Figure 3.2.

<u>Left Turn Bay Extensions</u> - Serve to increase storage capacity and reduce through traffic interference at intersections with high left turn volume. Turning capacity also can be increased by providing dual turn lanes (Figure 3.3).

<u>Signal System Improvements</u> - Maximize and maintain through vehicle progression along the corridor by improvements in signal control hardware to allow use of optimized signal phasing and timing patterns.

Summary of Phase One Improvements

Median Closures

Median Channelizations

Left Turn Bay Extensions

Signal System Improvements

Figure 3.1
Median Closure

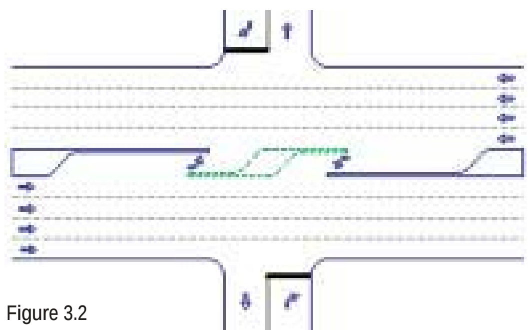


Figure 3.2
Median Channelization

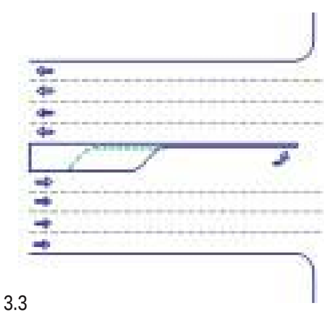


Figure 3.3
Left Turn Bay Extension

Phase Two Priority Short-Range Improvements

The following strategies were considered and tested for Phase Two Priority improvements:

Driveway Consolidations - Consolidate multiple driveways serving a single site and/or driveways located close to intersections to reduce vehicle conflicts, reduce through traffic blockages, and improve pedestrian safety (Figure 3.4).

Right Turn Bays - Provide right turn bays at locations with high right turn volumes to reduce through traffic blockages and potential conflicts (Figure 3.5). Turning traffic reduces the vehicle carrying capacity of traffic lanes. Segregating turning traffic from through traffic is an effective way to accomplish smooth and even traffic flow at busy intersections.

T-Intersection Treatment - Minimize delay at signalized intersections for the through traffic that normally would be required to stop for a signal. Traffic that would have been required to stop can continue unimpeded while still permitting turning movements from side streets onto the main roadway (Figure 3.6).

Summary of Phase Two Improvements

Driveway Consolidations

Right Turn Bays

T-Intersection Treatment

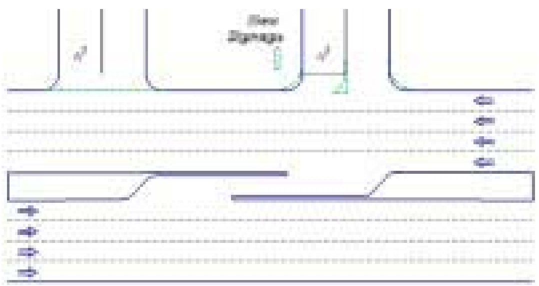


Figure 3.4
Driveway Consolidation

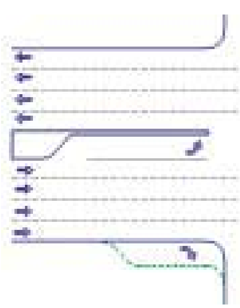


Figure 3.5
Right Turn Bay

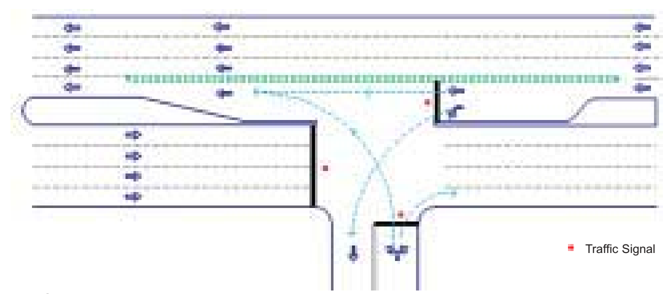


Figure 3.6
T-Intersection Treatment

Improvement Analysis Results

Improvements for the Uptown section and the Westchase section were modeled to evaluate the impacts on traffic flow in each section. For instance, in considering median closures, any existing traffic using a median proposed for closure was rerouted to the adjacent channelized median opening where turn lane storage capacity could be evaluated further. Improvements were grouped and evaluated further based on their implementation priority or type of improvement. The analysis scenarios for the short-range improvement are as follows:

Existing. This scenario provides the baseline condition to assess or quantify the benefits of proposed improvements. It replicates existing field conditions such as signal phasing and intervals, lane configuration and assignment, traffic volumes, and vehicle speeds.

Median Closures, Channelizations, and Left Turn Bays. The median closures, channelizations, and left turn bay extensions represent the Phase One short-range improvements and the initial analysis scenario.

Signal System. This scenario evaluates the short-range improvement with traffic signal timings optimized and synchronized to achieve improved vehicle progression. The signal system scenario assumes that the proposed improvements evaluated in the previous scenario have been implemented. Therefore, the improvements shown by this scenario are cumulative and include improvements from the previous scenario.

Right Turn Bays and Driveway Consolidation. The right turn bays and driveway consolidations represent the Phase Two short-range improvements. As explained in the previous scenario, the improvements obtained by this scenario are cumulative, and include improvements expected in the two previously mentioned scenarios.

"Unconventional" Left Turn or T-Intersection Treatment. This treatment is proposed for existing signalized T-intersections, where a side street begins or ends at Westheimer, but does not continue across on the other side of the intersection. Because of the nature of the treatment and the low number of locations where it could be implemented, this treatment was analyzed separately and is not included with other scenarios. Westheimer Road at Elmside Drive was selected as a case study for this treatment. This intersection currently is signalized, and Elmside Drive forms a T-intersection with Westheimer Road from the south.

IH 610 to Chimney Rock Road

The VISSIM models developed for the IH 610 to Chimney Rock Road (Uptown) section indicate that the Phase One and Phase Two short-range improvements will positively impact traffic conditions along Westheimer Road. The model MOEs are illustrated in Table 3.2. On average, the cumulative Phase One short-range improvement benefits will result in 14 to 32 percent reductions in travel time for the westbound and eastbound traffic, respectively. Phase Two short-range improvements were calculated to further reduce travel times, average delay, and average number of stops. The model represents improvements for the PM peak period, which has higher traffic volumes in the westbound direction.

Table 3.2
IH 610 to Chimney Rock Road - Computed Benefits of Short-Range Improvements

IH 610 to Chimney Rock Road									
Scenario		Direction	Travel Time (sec/veh)	Percent Improvement (Cumulative)	Average Delay (sec/veh)	Percent Improvement (Cumulative)	Stops (stops/veh)	Percent Improvement (Cumulative)
Existing		WB	259		144		6.3	
		EB	477		361		11.5	
Phase One	Median Closures and Left Turn Bays	WB	231	**11%**	117	**19%**	5.4	**15%**
		EB	418	**12%**	306	**15%**	9.3	**19%**
	Signal Timing [1]	WB	224	**14%**	107	**26%**	4.8	**24%**
		EB	324	**32%**	209	**42%**	5.8	**49%**
Phase Two	Right Turn Bays and Driveway Consolidation [2]	WB	218	**16%**	105	**27%**	4.6	**27%**
		EB	310	**35%**	195	**46%**	5.5	**52%**

Notes:

1. Percent Improvement statistics in Signal Timing scenario include the improvements made in Median Closures/Channelization and Left Turn Bays Scenario.

2. Percent Improvement statistics in Right Turn Bays and Driveway Consolidation include the improvements made in Median Closures/Channelization and Left Turn Bays and Signal Timing Scenarios.

South Gessner Road to Wilcrest Drive

As reviewed in the IH 610 to Chimney Rock Road section, the South Gessner Road to Wilcrest Drive (Westchase section) VISSIM model showed that Phase One and Phase Two short-range improvements will positively impact traffic conditions along Westheimer Road. The MOE statistics for this section are illustrated in Table 3.3. On average, the cumulative Phase One short-range improvement benefits will result in 32 to 27 percent reductions in travel time for westbound and eastbound traffic, respectively. Phase Two short-range improvements also were calculated to incrementally reduce travel time, average delay, and average number of stops.

Table 3.3
S. Gessner Road to Wilcrest Drive - Computed Benefits of Short-Range Improvements

S. Gessner Road to Wilcrest Drive							
Scenario	Direction	Travel Time (sec/veh)	Percent Improvement (Cumulative)	Average Delay (sec/veh)	Percent Improvement (Cumulative)	Stops (stops/veh)	Percent Improvement (Cumulative)
Existing	WB	578		398		17.0	
	EB	426		250		9.8	
Median Closures/ Channelization and Left Turn Bays	WB	464	**20%**	284	**29%**	11.8	**30%**
	EB	423	**1%**	247	**1%**	9.6	**2%**
Signal Timing [1]	WB	391	**32%**	209	**48%**	8.9	**48%**
	EB	312	**27%**	133	**47%**	5.5	**44%**
Right Turn Bays and Driveway Consolidation [2]	WB	374	**35%**	188	**53%**	7.7	**54%**
	EB	299	**30%**	119	**52%**	4.9	**50%**

Notes:

1. Percent Improvements in Signal Timing scenario include improvements made in Median Closures/ Channelization and Left Turn Bays Scenario.

2. Percent Improvements in Right Turn Bays and Driveway Consolidation include improvements made in Median Closures/ Channelization and Left Turn Bays and Signal Timing Scenarios.

It should be noted that reductions in travel time, average delay, and average number of stops were determined for the two most congested segments of the corridor, near major interchanges (Westheimer Road at IH 610 in Uptown and Westheimer Road at Beltway 8 in Westchase). While there will be similar results from similar improvements in other sections the benefits for less congested areas might be slightly smaller.

"Unconventional" Left Turn or T-Intersection Treatment

The T-Intersection Treatment is examined for existing signalized T-intersections. Due to the low number of signalized T-intersections and with only one of these intersections located within the detailed analysis section boundaries (Westheimer Road at Elmside Drive), modeling of this treatment was conducted separately. The T-intersection potential benefits were evaluated using three scenarios:

Existing Scenario. This scenario includes existing field conditions, such as signal timing plans, lane configuration and assignment, traffic volumes, and speed limits.

Geometric Modifications Scenario. In this scenario the westbound through movement is considered as the free travel movement, with three travel lanes separated from the westbound left turn movement (occupying what is presently the fourth, inside lane, and the left turn bay). The eastbound and northbound approaches are not operationally affected by this treatment.

As can be seen from Tables 3.2 and 3.3, the Phase One improvement strategies - median closures, median channelizations, and left turn bay extensions - show the greatest amount of mobility benefits.

Geometric Modifications and Signal Optimization Scenario. This scenario includes all geometric modifications included in the previous scenario and adds the benefit of signal optimization.

Results are shown in Table 3.4 and are summarized as follows:

Geometric Modifications Scenario. This scenario does not offer any improvements in travel time, average delay, or stops. This is due to the reduction in number of lanes for free flowing traffic (that is, four through travel lanes before the T-intersection treatment is installed, reduced to only three through travel lanes at the T-intersection). Another effect could be the proximity of adjacent signalized intersections that may interfere with operations at the T-intersection.

Geometric Modifications and Signal Optimization Scenario. This scenario offers improvements in travel time, average delay, and stops for the through movements along Westheimer Road. It should be noted that this improvement is achieved because of the optimized coordination at the nearby intersections after the T-Intersection Treatment is implemented. This treatment is expected to reduce travel time by 9 percent in the free flow direction and 34 percent in the opposite direction during the PM peak period analyzed.

It is noted that while there are reductions in travel time, average delay, and stops resulting from these improvements, there are pedestrian crossing and transit stop issues related to its implementation.

An opportunity for further study could be to determine if the roadway can be reconfigured to maintain four westbound through-lanes. A detailed evaluation of pedestrian and transit impacts could be accomplished at that time. In addition, computer models could be prepared to test the sensitivity to adjacent signal proximity.

Table 3.4
Computed Benefits of T-Intersection Treatment Improvements

T Intersection – Westheimer Road at Elmside Drive							
Scenario	**Direction**	**Travel Time (sec/veh)**	**Improvement**	**Average Delay (sec/veh)**	**Improvement**	**Stops (stops/veh)**	**Improvement**
Existing	**WB ***	125		45		1.61	
	EB	203		124		3.94	
Geometric Modifications only [1]	**WB [2] ***	127	**No Improvement**	48	**No Improvement**	1.74	**No Improvement**
	EB	205	**No Improvement**	126	**No Improvement**	3.97	**No Improvement**
Geometric Modifications and Signal Optimization	**WB [2] ***	113	**9%**	33	**27%**	0.87	**46%**
	EB	135	**34%**	56	**55%**	1.76	**55%**

Notes:

1. Improvement statistics using existing traffic signal coordination (e.g., existing offsets)

2. Free through movement

* Peak Direction

List of Improvement Recommendations

For the purposes of organizing the short-range improvement recommendations, the study corridor was divided into four segments. The segment limits respected the boundaries of the two management districts, so that two segments are wholly contained within the management districts and two segments are outside the management districts. The four segments are:

Segment 1:
From the West Loop to Chimney Rock
(Uptown Houston district)

Segment 2:
From Chimney Rock to Westerland

Segment 3:
From Westerland to Woodland Park
(Westchase District)

Segment 4:
From Woodland Park to State Highway 6

Recommended short-range improvements consisted of seven types:

- Median closures
- Median channelizations
- Left turn bay extensions
- Signal improvements
- Right turn bays
- Driveway consolidation
- T-Intersection signal modifications

Of these, certain improvements could proceed quickly under the direction of TxDOT, the City of Houston, or METRO, because they do not impact right-of-way or right of access. These are median closures, median channelizations, left turn bay extensions, and signal improvements. Because they can be implemented expeditiously, these are called the Phase One Priority improvements.

Right turn bays and driveway consolidations in general require negotiation with adjacent landowners for right-of-way acquisition or changing access points. These are called the Phase Two Priority improvements.

The T-intersection signal modifications require more detailed study on a case-by-case basis to evaluate whether the proximity of adjacent signalized intersections negates the benefits of the modifications. In addition, the feasibility of providing a fourth through-lane at these locations should be considered. They are included among the Phase Two Priority projects.

Table 3.5 on the opposite page shows the number of candidate locations for each type of improvement, divided by segment. Following is a discussion of the specific candidate locations that have been identified. These locations are depicted graphically in the Appendix.

Table 3.5
Matrix of Proposed Short-Range Improvements

		Treatments								
		Improvements to be coordinated with Property Owners and Developers		Improvements to be coordinated through TxDOT						
Segment		*Driveways to be Removed (Phase 2)*	*Driveways to be Rebuilt (Phase 2)*	*Median Closures (Phase1)*	*Median Channelization (Phase 1)*	*Left Turn Bay Extension (Phase 1)*	*Right Turn Bay (New* or Ext.) (Phase 2)*	*Signalized T-Intersection (Phase 2)*	*Signal Hardware Improvements (Phase 1)*	*Signal Timing and Operation (Phase1)*
1	*IH 610 to Chimney Rock*	5	6	4	0	3	1 extended	0	7	
2	*Chimney Rock to Westerland*	60	42	4	17	9	7 new	4	13	
3	*Westerland to Woodland Park*	20	15	6	11	6	4 new	1	13	
4	*Woodland Park to Highway 6*	39	37	21	12	4	4 new	3	11	
Total	*IH 610 to Highway 6*	124	100	35	40	22	15 new, 1 extended	8	44	1 **

Note: * New right turn bays may require right-of-way acquisition.
** Signal Timing and Operation Improvements are required throughout the length of the project

Segment 1: West Loop to Chimney Rock (Uptown Houston section)

Phase One Priority

Proposed Median Closure Locations

· Median west of Post Oak (close westbound left only)
· Median east of McCue (close eastbound left only)
· Median west of Westheimer Way
· Median east of Chimney Rock

Proposed Left Turn Bay Extension Locations

· Eastbound left turn bay at Post Oak
· Westbound left turn bay at McCue
· Westbound left turn bay at Chimney Rock

Proposed Signal System Improvement Projects

· Install new signal controllers for signal system compatibility
· Install signal interconnect and maintain vehicle detectors for system synchronization and operation
· Provide program for signal system timing optimization and operation of signal system
· Signalize northbound right turn at Westheimer and Post Oak, install overhead directional / lane use signage

Phase Two Priority

Proposed Driveway Consolidation Locations

North side of Westheimer

· Eliminate second driveway west of Sage, improve third driveway
· Eliminate fourth driveway west of Sage, improve fifth driveway
· Eliminate driveway east of Chimney Rock, improve second driveway

South side of Westheimer

· Eliminate first driveway to the east of Post Oak, improve second driveway
· Improve second driveway to the west of Post Oak
· Eliminate second driveway to the west of W. Alabama, improve third driveway

Proposed Right Turn Bay Locations

· Extend right turn bay for southbound right turn movement at Post Oak
· New right turn bay for eastbound right turn movement at Chimney Rock

Note:
There are no required median channelizations in the Uptown Houston section. Furthermore, there are no candidate T-intersection signal modifications.

Segment 2: Chimney Rock Road To Westerland

Phase One Priority

Proposed Median Closure Locations

- Median east of Old Farm
- First two medians east of Fondren
- First median west of Jeanetta

Proposed Median Channelization Locations

- Median west of Bering
- Three medians west of Fountainview
- Median west of Greenridge
- Median east of Winrock
- Two medians west of Winrock
- First two medians west of Hillcroft
- Median west of Old Farm
- Median west of Dunvale
- Second median west of Jeanetta
- Two medians east of Westerland

Proposed Left Turn Bay Extension Locations

- Eastbound turn bay at Fountainview
- Create double westbound turn bay at Fountainview
- Eastbound and westbound turn bays at Hillcroft/Voss
- Westbound turn bay at Dunvale
- Add exclusive northbound turn lane on Dunvale
- Westbound turn bay at Fondren

Proposed Signal System Improvement Projects

- Install new signal controller and maintain vehicle detectors for system operation and synchronization
- Provide program for signal system timing optimization and system operation

Phase Two Priority

Driveway Consolidation

North side of Westheimer

- Eliminate first driveway west of Chimney Rock, improve second driveway
- Eliminate first driveway east of Augusta, improve second driveway
- Eliminate first driveway west of Augusta, improve second driveway
- Eliminate first driveway west of Fountainview
- Eliminate first driveway west of Nantucket, improve second driveway
- Eliminate second driveway west of Potomac
- Eliminate second driveway east of Briar Ridge, improve first driveway
- Eliminate first and second driveways west of Briar Ridge
- Eliminate first, third, and sixth driveways west of Briarhurst, improve second driveway, channelize fourth and fifth driveways
- Eliminate second driveway west of Marilee
- Eliminate first driveway east of Voss, improve second driveway
- Eliminate fourth driveway east of Voss, improve third driveway and connect with adjacent gas station
- Eliminate first and seventh driveways west of Voss,

Segment 2: Chimney Rock Road To Westerland Phase Two Priority (continued)

improve second driveway and channelize eighth driveway

- Eliminate first and third driveways west of Stony Brook, improve second driveway
- Eliminate first Driveway east of Stony Brook, improve second driveway
- Eliminate second driveway east of Old Farm, improve third driveway
- Eliminate first driveway west of Locke Lee, improve second driveway
- Eliminate first driveway east of Dunvale
- Eliminate first driveway west of Dunvale
- Eliminate first driveway east of Crossview, improve second driveway
- Eliminate second driveway east of Fondren
- Eliminate third and fourth driveways west of Fondren, improve fifth driveway
- Eliminate first driveway east of Jeanetta, improve second driveway

<u>South side of Westheimer</u>

- Eliminate first driveway west of Bering, improve second driveway
- Eliminate first two driveways east of Augusta, improve third and fourth driveways
- Eliminate first driveway west of Augusta
- Eliminate first driveway west of Fountainiew, improve second driveway
- Eliminate first driveway east of Nantucket, improve first and third driveways
- Eliminate second driveway east of Greenridge, improve third and fifth driveways
- Eliminate fourth driveway east of Potomac, improve first driveway
- Eliminate second and fifth driveways east of Briar Grove, improve third and fourth driveways
- Eliminate first driveway east of Winrock
- Eliminate first driveway west of Winrock
- Eliminate first driveway west of Marilee, improve driveway at Marilee
- Eliminate first two driveways east of Hillcroft (make permanent - temporarily closed now)
- Eliminate first, third, fifth, seventh, and ninth driveways west of Hillcroft, improve second, fourth, and eight driveways
- Eliminate first driveway east of Stony Brook, improve second driveway
- Eliminate first driveway west of Hullsmith
- Eliminate first driveway west of Lazy Hollow
- Eliminate second driveway east of Fondren, improve first driveway
- Eliminate fourth driveway east of Jeanetta, improve second and fifth driveway

Proposed Right Turn Bay Locations

- New right turn bay for westbound at Fountainview
- New right turn bay for eastbound and westbound at Hillcroft/Voss
- New right turn bay for eastbound at Dunvale
- New right turn bay for eastbound and westbound at Fondren

Segment 3: Westerland to Woodland Park (Westchase District section)

Phase One Priority

Proposed Median Closure Locations

· Median west of Gessner (close eastbound left only)
· Median east of Blue Willow (remove as part of underpass design)
· Median east of Walnut Bend
· Median east of Wilcrest (close eastbound left only)
· First median west of Wilcrest
· First median east of Hayes
· First and second medians east of Woodland Park

Proposed Median Channelization Locations

· Median east of Tanglewilde
· Median west of Tanglewilde
· Median east of Gessner
· Median west of Briarpark (upgrade channelization)
· Median east of Seagler
· Median west of Seagler
· Median west of Rogerdale
· Second median east of Walnut Bend
· Third median east of Walnut Bend
· Median west of Walnut Bend
· Second median west of Walnut Bend and add eastbound left turn lane

Proposed Left Turn Bay Extension Locations

· Northbound left turn bay at W. Sam Houston Tollway East Frontage Road
· Southbound left turn bay at W. Sam Houston Tollway West Frontage Road
· Westbound left turn bay at Walnut Bend Lane
· Westbound left turn bay at Wilcrest
· Create double northbound left turn bay at Wilcrest
· Create double southbound left turn bay at Wilcrest

Proposed Signal System Improvement Projects

· Install new signal controllers for system compatibility
· Repair existing signal interconnect and vehicle detectors as needed for system operation and synchronization
· Provide program for signal system timing optimization and system operation

Phase Two Priority

Proposed Driveway Consolidation Locations

<u>North side of Westheimer</u>

· Eliminate first driveway east of Tanglewilde, improve second driveway
· Eliminate first driveway east of Gessner, improve second driveway
· Eliminate third driveway to the west of Seagler, improve fourth driveway
· Eliminate fifth driveway to the west of Seagler, improve sixth driveway
· Eliminate first driveway to the east of Rogerdale, improve second driveway
· Eliminate sixth driveway to the east of Walnut Bend, improve seventh driveway
· Eliminate third driveway to the west of Walnut Bend, improve fourth driveway
· Eliminate first and second driveway to the west of Lake Side Country Club Drive
· Eliminate first driveway to the east of Wilcrest
· Install driveway and add eastbound left turn bay at second median opening east of Wilcrest
· Eliminate third and fourth driveways west of Wilcrest and install new driveway in between
· Eliminate first and third driveways west of Hayes, improve

Segment 3: Westerland to Woodland Park (Westchase District section)

Phase Two Priority (continued)

second and fourth driveways

- Eliminate third driveway east of Woodland Park, improve fourth driveway

South side of Westheimer

- Eliminate first driveway west of Wilcrest, improve second driveway
- Eliminate first driveway west of Westerland, improve second driveway
- Eliminate first driveway east of Rockyridge, improve second driveway
- Eliminate first, third, and fifth driveways east of Tanglewilde, improve second and fourth driveway
- Eliminate first driveway west of Tanglewilde, improve second driveway
- Eliminate fourth, fifth, and seventh driveways east of Gessner, improve sixth driveway
- Eliminate first driveway to the west of Walnut Bend, improve second driveway

Proposed Right Turn Bay Locations

- New right turn bay for westbound right turn movement at Gessner
- New right turn bay for northbound right turn movement at Gessner
- New right turn bay for eastbound right turn movement at Rogerdale
- New right turn bay for westbound right turn movement at Wilcrest

Segment 4: Woodland Park to State Highway 6

Phase One Priority

Proposed Median Closure Locations

- First and second medians west of Woodland Park
- First median west of Kirkwood
- First median west of Westminster Plaza
- First median west of Shadowbriar
- First median west of Shadowview
- First median west of Dairy Ashford
- First median west of Ashford Park
- First three medians west of Ashford Oak/Briarwest
- First median west of Synott
- First three medians west of Eldridge Pkwy
- First median west of Windchase
- First median west of Panagard
- First two medians west of Westhollow

Proposed Median Channelization Locations

- First median east of Old Westheimer
- First two medians west of Old Westheimer
- Median at Westminster Plaza
- Median at Shadowbriar
- Median at Shadowview
- First two medians east of Dairy Ashford
- Median at Ashford Park
- Median at Gentryside
- Median at Panagard
- Second median west of Panagard

Proposed Left Turn Bay Extension Locations

- Eastbound and westbound at Dairy Ashford
- Double eastbound and westbound at Eldridge Pkwy

Proposed Signal System Improvement Projects

- Install new signal controllers for system compatibility
- Repair existing signal interconnect and vehicle detectors as needed for system operation and synchronization
- Provide program for signal system timing optimization and system operation

Phase Two Priority

Driveway Consolidation

<u>North side of Westheimer</u>

- Eliminate first and third driveways west of Crescent Park, improve second driveway
- Eliminate second driveway east of Kirkwood, improve first driveway
- Eliminate first driveway west of Kirkwood, improve second driveway and channelize third and fifth driveways
- Eliminate first driveway west of Gray Falls, improve second driveway
- Eliminate first driveway east and first driveway west of Westminster Plaza, improve driveway at Westheimer Plaza
- Channelize second and third driveways west of Shadowview
- Eliminate first and third driveways east of Dairy Ashford, improve second and fourth driveways
- Eliminate first driveway west of Dairy Ashford, improve second driveway
- Eliminate first driveway east and first and second driveway west of Westhollow, improve third driveway east (Driveway should be realigned to the west so that it allows access for eastbound traffic to enter shopping center safely)
- Eliminate first, third, and fifth driveways east of Briargreen, improve second and fourth driveways
- Eliminate first driveway west of Briargreen, improve seco

Phase Two Priority (continued)

ond driveway

· Eliminate third driveway west of Briargreen, improve fourth driveway

· Eliminate first driveway east of Highway 6, improve second driveway

South side of Westheimer

· Eliminate first driveway west of Shadowbriar, improve second driveway

· Eliminate second and fourth driveways east Shadowview, improve first and third driveways

· Eliminate first driveway west of Shadowview, improve second driveway

· Eliminate first, fourth, sixth, and eighth driveways east of Dairy Ashford, improve second, seventh, and ninth driveways

· Eliminate first driveway west of Dairy Ashford, improve second driveway

· Eliminate first two driveways west of Ashford Park, improve third driveway

· Eliminate second driveway east of Ashford Park, improve third driveway

· Eliminate first driveway east of Ashford Oaks, improve second driveway

· Eliminate first, third, and fifth driveways west of Ashford Oaks, improve second and fourth driveways

· Eliminate fourth driveway west of Synott, improve third driveway

· Eliminate first driveway east of Eldridge, improve second driveway

· Eliminate fourth driveway east of Panagard, improve third driveway

· Channelize first and second east of Briargreen

· Eliminate first driveway east of Highway 6, improve second driveway

Proposed Right Turn Bay Locations

· Install eastbound and westbound at Dairy Ashford

· Install eastbound and westbound at Eldridge Pkwy

Transit Short-Range Improvements

In addition to the roadway improvements described above, a series of short-range and long range transit improvements also were studied. The resulting recommendations are presented on this and the following pages.

Bus Route Efficiency Improvements

To improve local bus service route efficiency, bus stops should be consolidated and route schedules improved. This will improve bus travel times and reduce points where traffic congestion and queuing occurs behind stopped buses.

Locations listed below for bus stop consolidation and removal are recommended based solely on bus boarding and alighting information. Other route efficiency factors, further review, and coordination with METRO are necessary to determine final locations.

· Ashford Park - Inbound and Outbound
· Blue Willow - Inbound and Outbound
· Briargreen - Inbound and Outbound
· Briarwest - Inbound and Outbound
· East Rivercrest - Inbound and Outbound
· Lakeside Estates - Outbound
· Old Farm - Outbound
· Panagard - Outbound
· Shadowbriar - Inbound and Outbound
· Shadowview - Outbound
· West Rivercrest - Inbound and Outbound
· Wal-Mart - Inbound and Outbound
· Wallingford - Inbound and Outbound
· Westminster - Inbound and Outbound
· Windchase - Inbound and Outbound
· Woodland Park - Inbound and Outbound
· 10260 Westheimer - Outbound

Express Bus Service

A pilot express bus services should be developed along the corridor to establish the feasibility of permanent express bus services. This will increase transit options, improve mode share along the corridor, and reduce traveler dependence on automobiles.

Implementation of the projects listed below will require coordination with METRO.

· Beltway Express (New Service) - Develop an express route linking a new Park and Ride lot near Beltway 8 and Westheimer to Downtown Houston. Temporary Park and Ride facilities can be established at locations where available parking is not being utilized fully during the week, such as churches.
· Voss Crosstown - Develop new service linking Westheimer, Hillcroft/Voss bus routes.
· West Oaks Link Limited service - Develop express route with limited stops using a unique transit vehicle to distinguish from local service. Proposed limited stops serving Park & Ride or transit centers near State Highway 6, Beltway 8, Hillcroft/Voss, Galleria and Greenway Plaza.
· Connector between Northwest Transit Center and Westpark Transit Center - providing more connectivity to Westheimer routes from the north and south sides of Uptown.

Bus Service Streamlining

Increasing the frequency of bus service along Westheimer and streamlining service will increase transit options and mode share along the corridor.

Implementation of the projects listed below will require further study and coordination with METRO Route planning staff.

· Streamline local bus service along Westheimer to ensure that users can easily access bus service that runs in a linear pattern between Loop 610 and Highway 6 without diversions.
· Increase service frequency to attract more riders, and to reduce time spent at major stops.
· Improve timed transfers for connecting transit service.

Park & Ride Lots

New Park & Ride lots should be developed in underutilized parking facilities in partnership with local businesses and developers. This will increase transit options and mode share along the corridor.

Implementation of the Park & Ride projects listed below will require coordination with METRO planning staff.

West Beltway Park & Ride Lot - Locate site, potentially in partnership with a private developer, from which to operate park and ride services for travelers bound for Downtown, Uptown, Greenway Plaza, and other major activity centers.

West Oaks Park & Ride Lot - Provide the location for Park & Ride and Park & Pool activities in the West Oaks Mall area, and service connections to major activity centers.

Temporary Park and Ride Lots during Katy Freeway reconstruction - Locate potential sites for temporary Park & Ride facilities to be operated while the Katy Freeway reconstruction is occurring. This could also be utilized as a way to pilot test locations for permanent facilities to be established. Potential sites include underutilized parking areas in shopping facilities and churches.

Circulator Systems

Bus circulator systems should be created in highly developed areas. Systems in Uptown and Westchase should be improved or expanded. This will provide bus service for short trips, increase transit options, and reduce auto vehicle trips, particularly at midday.

Implementation of these projects will require coordination with METRO planning staff as well as representatives of Uptown and Westchase.

· Uptown Area Bus Circulator
· Westchase Bus Circulator

Transit Longer-Range Improvements

Bus Pull-Outs

Bus pullouts should be installed at highly used bus stops and major intersections. This will reduce vehicle congestion and queueing behind stopped buses.

Implementation of bus pullouts at the locations listed below will require further study and coordination with METRO Route planning staff.

Outbound Stops	Inbound Stops
Augusta	Augusta
5030 Westheimer	Bering
Dunvale	Greenridge
5300 Block	Lazy Hollow
Greenridge	Marilee
McCue	McCue
Nantucket	Sage
Sage	Winrock
Winrock	Yorktown
Yorktown	

Summary of Longer-Range Transit Recommendations

Bus Pullouts
High Capacity Transit
Transit Centers

Introduce High Capacity Transit

Infrastructure for high capacity transit operations should be provided. Increasing transit options through high capacity transit has been demonstrated to increase transit mode share along corridors.

Implementation of the projects listed below will require further study and coordination with METRO planning staff.

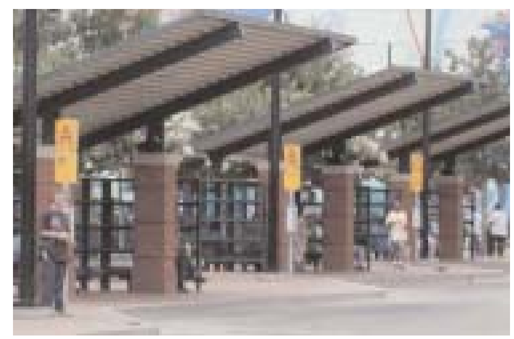
· Rapid Bus or Light Rail Transit - Within the median or along the curb lanes, provide for high capacity transit operations.
· People Mover - Create a people mover along Post Oak Boulevard to provide activity center level circulation to transit riders who would be taking other services to and from the Northwest and Westpark transit centers.

Transit Centers

Additional transit centers should be constructed at key locations evidenced by high ridership and route transfers. The convenience of transit centers increase transit options and mode share along the corridor.

Implementation of the projects listed below will require further study and coordination with METRO Route planning staff.

· Transit Center at Hillcroft/Voss and Westheimer potentially associated with redevelopment of existing commercial sites.
· Transit Center, potentially a linear transit center, located near the intersection of Westheimer and Post Oak.



Conceptual Cost Estimates for Short-Range Improvements

In order to evaluate implementation, conceptual-level cost estimates were prepared for the short-range improvement strategies discussed in detail above. The high and low cost estimates (A) for the seven improvement types were based primarily on Texas Department of Transportation (TxDOT) bid items and average unit prices. Where applicable TxDOT's bid item code, description, and units are used. For those items for which TxDOT codes were not available descriptions, units, and prices have been assumed.

Bonds (B) at 5% of the cost of all items, and Mobilization (C) at 20% of the cost of all items are included in the high and low estimates for each improvement type. Miscellaneous & Contingency (D) at 20% of the sum of A+B+C also is added to arrive at the initial high and low cost estimates for each improvement type. Miscellaneous items include Engineering Design Fee, Survey, and Material Testing.

The high cost estimates take into consideration the quantification of: 1) larger reconstruction area; 2) any above-ground, non-recurring utilities; 3) any below-ground, non-recurring utilities; 4) right-of-way; 5) landscaping; 6) METRO bus shelters; 7) any other items.

The low cost estimates take into consideration: 1) the smallest reconstruction area and, 2) all recurring, common items required to be removed and reconstructed.

Note that the estimates shown in this report are preliminary and subject to change depending on the location and the time of such reconstruction. The final cost estimate for a particular improvement type could even be lower than the low estimate shown in this report or could go over the high estimate.

See the Appendix for further details on the estimates for all improvement types.

How costs are estimated

(A) Materials and Labor (for the various items involved in the construction)

+

(B) Bonds (insurance that the contractor will complete the work)
= 5% of (A)

+

(C) Mobilization (the cost for the contractor to get equipment and workers to the site to begin construction)
= 20% of (A)

+

(D) Miscellaneous and Contingency (to cover engineering, construction management, and unforeseen conditions)
= 20% of (A) + (B) + (C)

Total Estimated Cost = (A) + (B) + (C) + (D)

Section IV

Long-Range Improvements

The Westheimer Villages Concept is not meant to dictate site-specific development. Instead, it provides conceptual ideas for achieving renewed development along different sections of Westheimer resulting in improved traffic movement and generating greater pedestrian and commercial activity.

Westheimer Villages Concept

The existing development pattern along Westheimer Road alienates pedestrians and drivers. Excessive curb cuts and median turn lanes inhibit traffic flow. Side streets often do not connect to development and fences are barriers to walking. Short-term mobility improvements will resolve immediate mobility issues, but to mitigate future traffic congestion the number of auto trips must be reduced.

To reduce the number of auto trips, this report proposes changing development patterns from strip commercial to urban villages. The Westheimer Villages Concept proposes a new pattern for development that will result in a more pedestrian friendly place. Connections between existing commercial developments and residential neighborhoods are proposed. A variety of different building types are added to create a higher density of mixed-use buildings in a pedestrian friendly environment. Visitors park once and walk between multiple destinations. By parking once and walking more, fewer parking spaces are needed and auto trips are kept off Westheimer. Vehicular circulation in parking lots will better connect to side streets and control access to adjacent neighborhoods reducing cut-through traffic and further reducing the number of auto trips on Westheimer.

The Westheimer Corridor lacks a cohesive positive identity. The streetscape varies with lushly landscaped corporate centers mixed with spartan retail centers, large discount outlets, and worn out commercial properties in need of renovation and updating. To help turn different sections of the corridor around and create a distinctive Westheimer character, a four-phase Westheimer Villages Conceptual plan has been developed to help guide new development.

The four phases of the Westheimer Villages Conceptual Plan include the following:

Phase One - Implementation of an Urban Design Program to reduce curb cuts and set in motion streetscape improvements such as street trees, median plantings, crosswalk and intersection enhancements, and spacious sidewalks. These improvements will help to streamline traffic flow, focus access into activity centers, and provide an inviting street environment to help foster pedestrian activity.

Phase Two - The beginning stages of new development patterns, including mixed-use complexes and structured parking garages replacing surface parking lots; modified commercial structures; and bus transit stations.

Bird's eye view of a section of the study area

Phase Three - This phase continues the development patterns taking place in Phase Two; however, these patterns become more complex and start to come together to create a pedestrian-oriented street. In addition, the street grid starts to expand into broad areas of either vacant land or low-use sites, such as surface parking lots.

Phase Four - This final phase is the fruition of the Westheimer Villages Concept in which higher-use development patterns have transformed the area into a pedestrian-oriented place. Lower-use sites are replaced by projects with higher densities to meet new market demands. Connections between different properties provide shade and protection from the hot sun and downpours. Alternatives are provided within the community for living, working, and playing. Traffic flow can work to peak levels; however, the emphasis on the development patterns is oriented to the pedestrian and to getting people out of their cars. Secondary streets in the community are designed to a pedestrian scale.

The five conceptual villages listed below were selected as examples of the types of development patterns found along the corridor. Each proposed village has unique challenges, but each represents development characteristics found in many locations along Westheimer.

West Houston Village
Westchase Village
Briargrove Village
Chimney Rock Village
Uptown Village

Implemented in phases, the Westheimer Villages Concept will sprout in each area changing development patterns along the Westheimer corridor into a string of urban villages.

Mobility Benefits from Urban Villages

Reduction of automobile trips will lead to mobility and air quality benefits
- ability to park at one place rather than having to drive to multiple destinations

Interconnected street grid will provide more route options for both cars and pedestrians reducing congestion on Westheimer

Increased pedestrian activity will:
have air-quality benefits
have personal health benefits
help in creating a greater sense of community
increase economic activity in the area

Alternate lifestyle options available to people
ability to live, work, and play in close proximity

Implementation

Once the Katy Freeway re-construction commences, commuters will seek alternative east - west routes such as Westheimer, bringing more congestion and frustration for motorists and businesses alike. As Phase One of the plan recommends, TxDOT, the City of Houston, and METRO should make short-range mobility improvements immediately to prepare the Westheimer corridor for the anticipated additional traffic. To capitalize on the traffic improvements, West Houston developers, the Westchase District, the Uptown Houston District, and property owners along the corridor, should beautify the streetscape and landscape to improve the image and perception of the area to attract potential customers. Businesses need to prepare to benefit from the additional commuters.

Public entities such as TxDOT and the City of Houston are responsible for public safety and infrastructure in the entire corridor. Westchase and Uptown Districts supplement public agency services and make additional improvements and maintenance within their boundaries to make Houston a better place. However, there are gaps along the way where no organized community group collects taxes or assessments to take care of the area. For these under-represented areas, a new alliance of property owners should be organized to take care of the public rights of ways and medians.

Implementation of the ideas identified in this report will be by many different entities. The report recommends that TxDOT make immediate median and turning lane improvements and that the City of Houston and METRO make signal improvements. Beautification and maintenance improvements between Woodland Park and Westerland should be made by the Westchase District and between Chimney Rock and the West Loop IH 610 by the Uptown Houston District. The areas west of the Westchase District and between Westchase and Uptown will need to be taken care of by others.

In the westernmost reach of the study area, Camden Properties and Royal Oaks are the largest landowners. Others interested in the area between Old Westheimer Road and Woodland Park should join them to coordinate improvements to the public rights of way. A logical organization that could lend technical assistance in westernmost Westheimer would be the West Houston Association and the City of Houston's Planning and Development Department's Super Neighborhood Program.

Property owners between the Westchase and Uptown Houston Districts have not organized as one unified body to plan for the public well being of the area. The City of Houston Super Neighborhood Councils in the area should create an alliance of interested property owners. This report suggests calling the new group "the Westheimer Alliance."

LONG-RANGE IMPROVEMENTS

The Alliance would oversee improvements along the corridor between Westerland and Chimney Rock and coordinate with the adjacent Westchase and Uptown Districts. The Alliance also may be organized to include other areas along the corridor, if there is interest.

For a consistent image throughout the Westheimer Corridor, streetscape and landscape treatments need to be coordinated. Public infrastructure improvements by TxDOT and the City of Houston should be better than current span wire signals, wooden pole street lights, and barren concrete and asphalt. Unsightly overhead utility wires should be relocated or buried to open up views. Landscape improvements such as street trees, parking lot shrubbery, and median plantings should meet a higher standard of quality. Streetscape elements such as signs, signals, streetlights, benches, and pedestrian amenities, should distinguish the Westheimer corridor. Westheimer has the potential to be a symbol of quality for Houston as Ward Parkway is for Kansas City, and Commonwealth Avenue is for Boston. The public infrastructure, overhead utilities, and landscape and streetscape improvements should be coordinated. This report recommends that new Urban Design Guidelines be developed and coordinated with TxDOT's short-range mobility improvements.

An area that is targeted to receive new public or private investment may be a likely candidate for the Westheimer Villages Concept. When identified, a sponsoring organization such as H-GAC or the City of Houston should meet with neighborhood leaders and organizations to explain the urban Westheimer Villages Concept and obtain important feedback regarding residents' and businesses' concerns and expectations. The sponsoring organization should fund a market study of the target area to determine the potential of the concept. Village scenarios may incorporate community facilities such as new police and fire stations, libraries, parks, health facilities, and multi-service centers that could serve as natural gathering places for community activities.

Incentives, such as variances, for development that follows the recommendations of the Westheimer Villages Concept should be offered by the City of Houston Planning & Development Department. Suggestions include reducing set-back requirements and adjusting parking requirements within the village.

Descriptions of five different Westheimer Villages Concepts for Westheimer are illustrated on the following pages.

The Houston-Galveston Area Council (H-GAC), TxDOT, Westchase District and Uptown Houston District are the sponsors of this report and will continue to offer assistance related to the planning and implementation of mobility and quality of life issues in the region and within the corridor.

The five areas selected along Westheimer as examples of the types of existing development patterns found along the corridor are illustrated in Figure 4.1. A long-range vision has been formulated for each of these areas to transform them from their current conditions to urban villages. The five village areas are:

West Houston Village

This area is representative of western Westheimer that has tracts of vacant land surrounding newly built commercial centers and a mix of multi-family and single family residences. Corridor improvements in this type of village would take place as this area develops and expands into the surrounding vacant lands.

Westchase Village

The proposed Westchase village is within close proximity to the Sam Houston Tollway. Corporate office towers, multi-family complexes on the south, and single family residences on the north surround this urban village today. This area contains a number of neighborhood shopping centers with acres of parking spaces fronting along Westheimer. The existing roadway network in this village area would be modified to make better use of surface parking areas to help define the community's character. Improvements in this village are planned and implemented by the Westchase District.

Briargrove Village

This is an older area of low-rise commercial buildings surrounded by aging multi-family complexes. The surface parking lots in this area are comparatively smaller but there are numerous curb cuts. Improvements in this area would focus on streamlining traffic flow and redefining the character of the corridor.

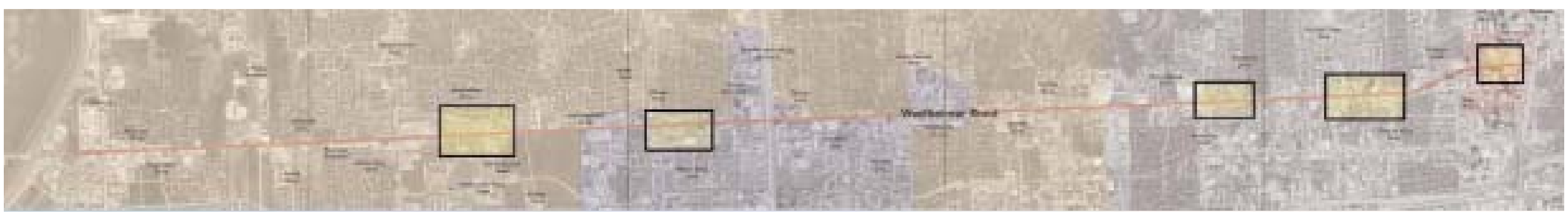
Chimney Rock Village

This area is characterized by a mix of mid- and high-rise office buildings and low-rise commercial structures with supporting surface parking lots adjacent to Briarcroft and Uptown neighborhoods. Corridor improvements for this village type would maintain existing higher-density developments and replace lower-density developments and surface parking lots with higher-density mixed-use structures.

Uptown Village

This area represents an existing urban core with a concentration of high-end office, retail, lodging, entertainment, and multi-family residences. Improvements in this village are planned and implemented by the Uptown Houston District.

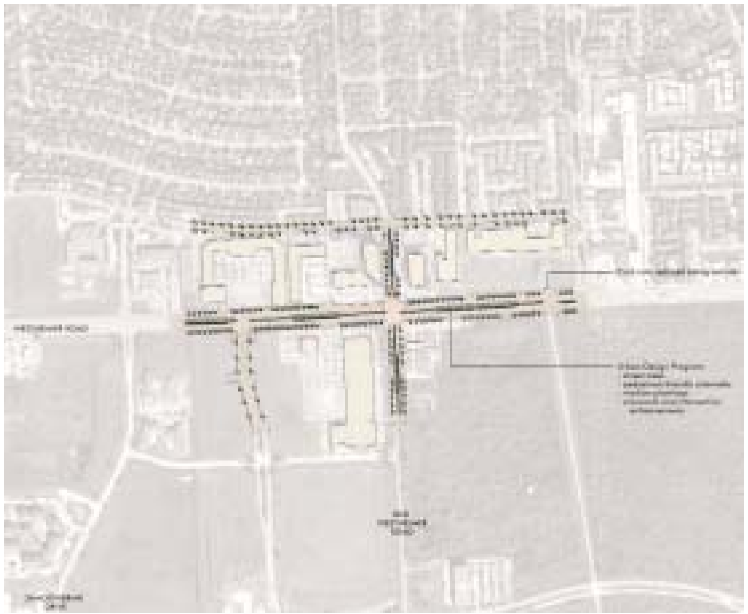
Figure 4.1: Village locations along the study area



LONG-RANGE IMPROVEMENTS

WEST HOUSTON VILLAGE

Phase 1

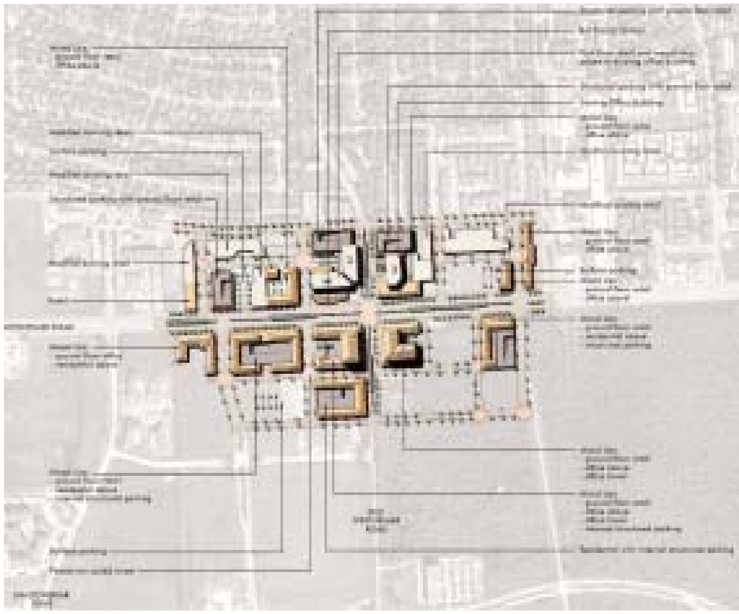


Phase One improvements would start with the Urban Design Program of streetscape improvements along Westheimer, as well as prominent roadways that feed into it. Improvements in this phase would include a consolidation of curb cuts to help streamline traffic movement and direct traffic into existing developments.

Phase 2

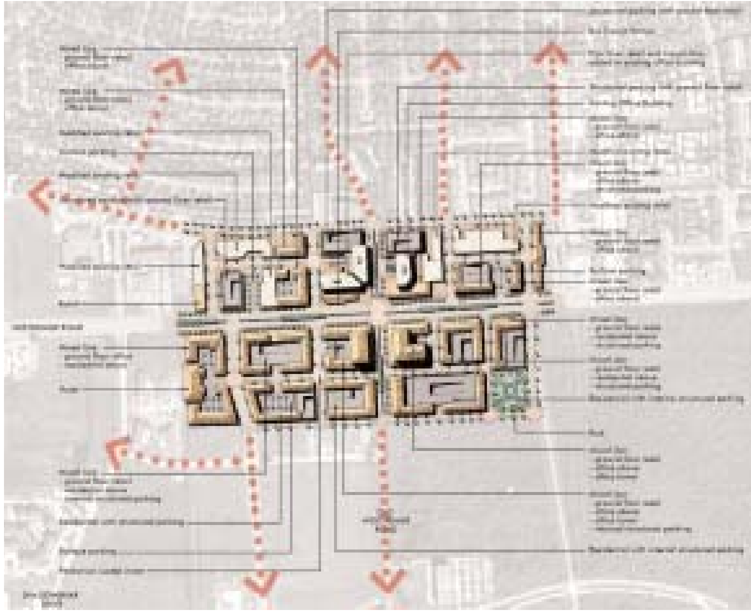
In Phase Two, improvements would start to impact the existing development pattern by attracting new developments and modifying the existing ones at key intersections. The new mixed-use developments would replace some of the existing surface parking lots fronting major roadways and accommodate parking needs in internal parking garages. Transportation improvements would include the addition of a bus transit station adjoining a mixed-use complex. Some existing retail centers would continue to exist as they are until new development patterns catch up.

Phase 3



In Phase Three, the development patterns in the village would become more complex, the complexity serving to bring the developments together into a cohesive pedestrian-oriented community. As more surface parking lots give way to new mixed-use developments and internal parking garages, the street grid, enhanced with streetscape improvements, would start to expand into the nearby vacant land, as well as into the modified retail centers.

Phase 4



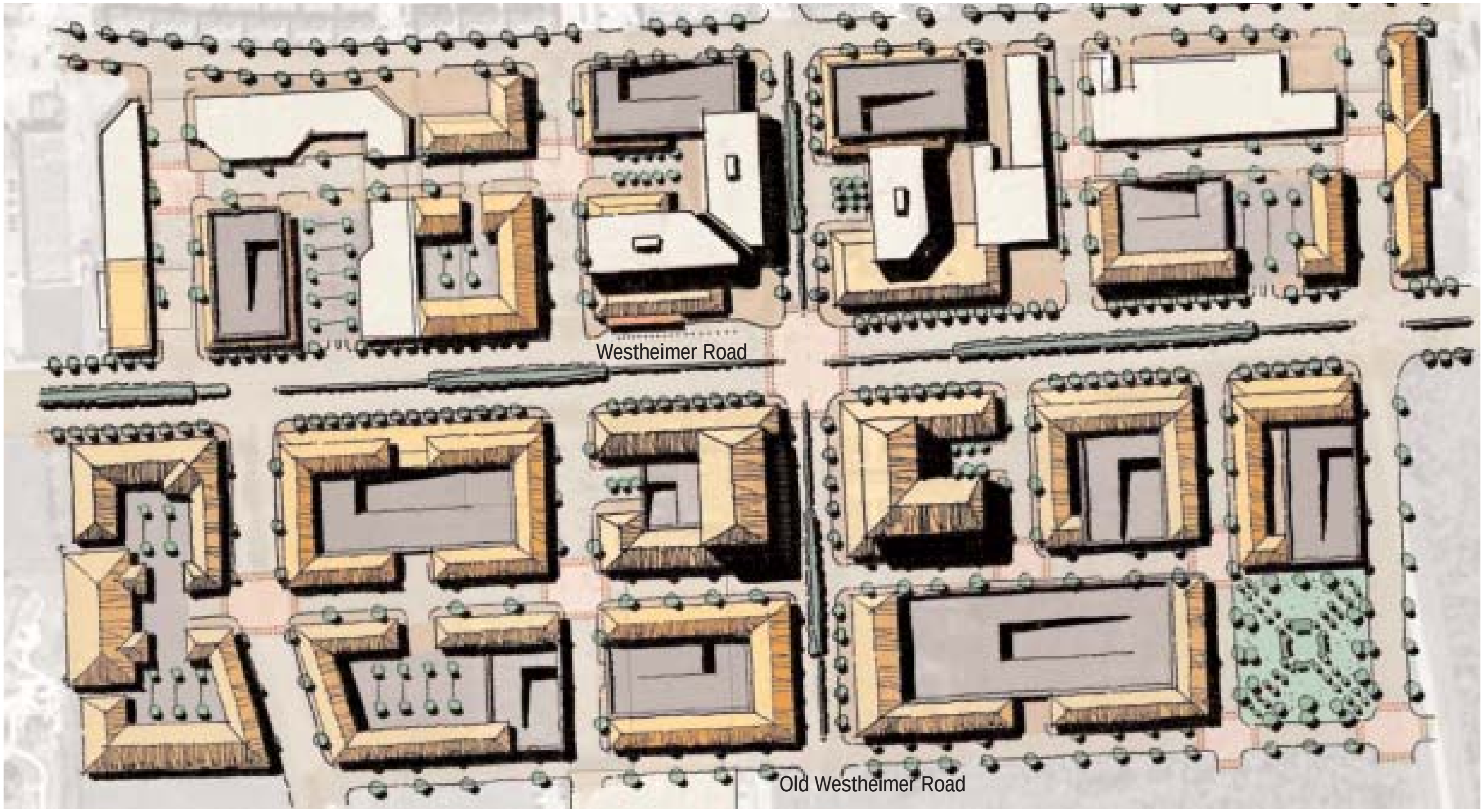
In Phase Four, the remaining surface parking lots would give way to the pressures of development brought on by increased density. The street would become the main center of activity, spurred on by ground floor retail and office and residential uses on the upper floors. The structured parking facilities would be built with ground floor retail or incorporated as internal structures within the mixed-use developments. An open area would be set aside as a community park. Collector streets that connect into the village area will also be developed with streetscape improvements to enhance pedestrian activity.

WEST HOUSTON VILLAGE

West Houston green fields are prime candidates for village development offering the greatest opportunities to implement the Westheimer Villages Concept. The West Houston Village Concept celebrates Westheimer as West Houston's Main Street. The thoroughfare is streamlined, but also complements additional pedestrian activity. This pedestrian activity reduces traffic congestion getting people out of their cars to enjoy foot traffic. Gone are the numerous curb cuts and median cuts along Westheimer. In its place is a tree-lined roadway, with landscaped medians and bricked crosswalks, that define and respect the pedestrian space. Less than a block away, a METRO bus transit stop is tied into an adjoining mixed-use retail and office center.

This urban village offers a range of services and attractions. Retail establishments are a mix of upscale boutiques, specialty shops, neighborhood services, and general mass merchandise stores. Businesses cater to residents living in apartments and lofts above the street-level shops as well as the households from the surrounding neighborhoods. Parking is accessible by using either curbside parking on side streets, off-street surface parking enclosed in a building courtyard, or multi-level parking garages tucked away behind building facades. A park or urban square in the village provides a further anchor where people can come together and enjoy the neighborhood.

The West Houston Association and organized neighborhoods may provide organization and technical assistance for the West Houston Village. The Association promotes improved infrastructure and services in the area and advocates expanding transportation system capacity while enhancing quality growth. As the clearinghouse of information for commercial and residential development in West Houston, the West Houston Association will share information related to Westheimer improvements to those who contact them.


Westheimer Road
Old Westheimer Road

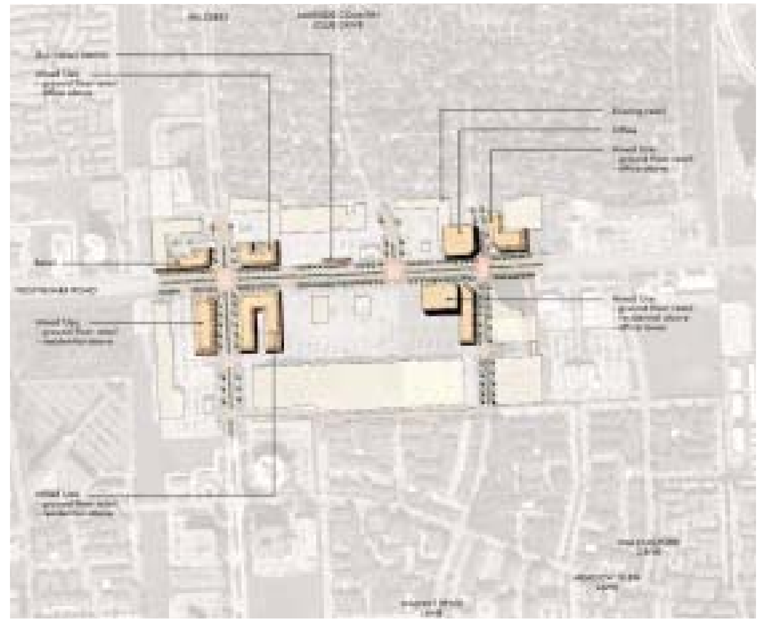
LONG-RANGE IMPROVEMENTS

WESTCHASE VILLAGE

Phase 1

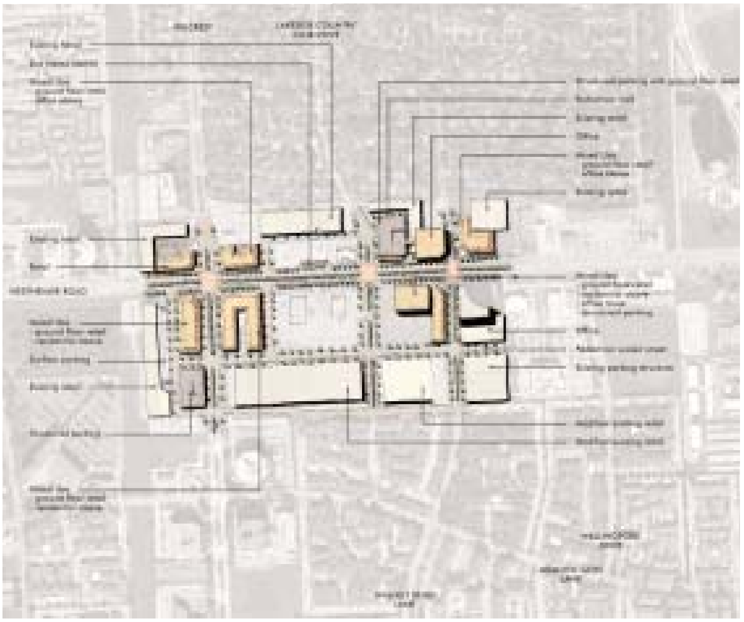
In Phase One, the Urban Design Program would be implemented through streetscape improvements and consolidation of curb cuts. These measures would create a more pedestrian-friendly environment, facilitate traffic movement, and direct access into existing developments.

Phase 2



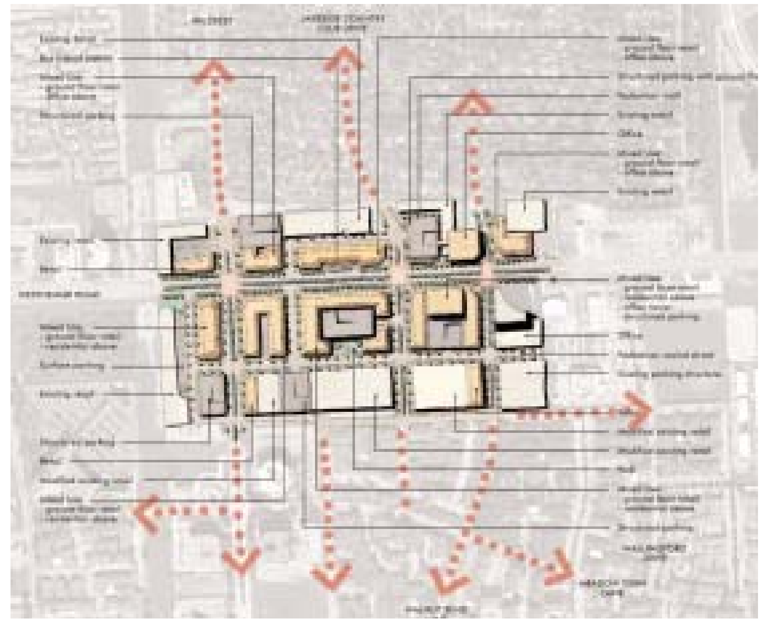
Phase Two improvements would focus on modifying the existing development and encouraging new development along major streets and at key intersections. This would start to create a pedestrian scale environment with retail uses and restaurants at the ground level and office and residential uses on the higher floors. A bus station would be provided in the center of the corridor village, either as a stand-alone structure or connected with a mixed-use complex.

Phase 3



Improvements in Phase Three would expand on developments begun in Phase Two. New mixed-use complexes would be built with internal parking garages or connected to parking garages with ground level retail. The existing street grid would be extended by modifying existing structures and parking lots to allow for through-street connections and the development of secondary streets in front of the modified retail centers. This extended street system would incorporate streetscape improvements introduced in Phase One.

Phase 4



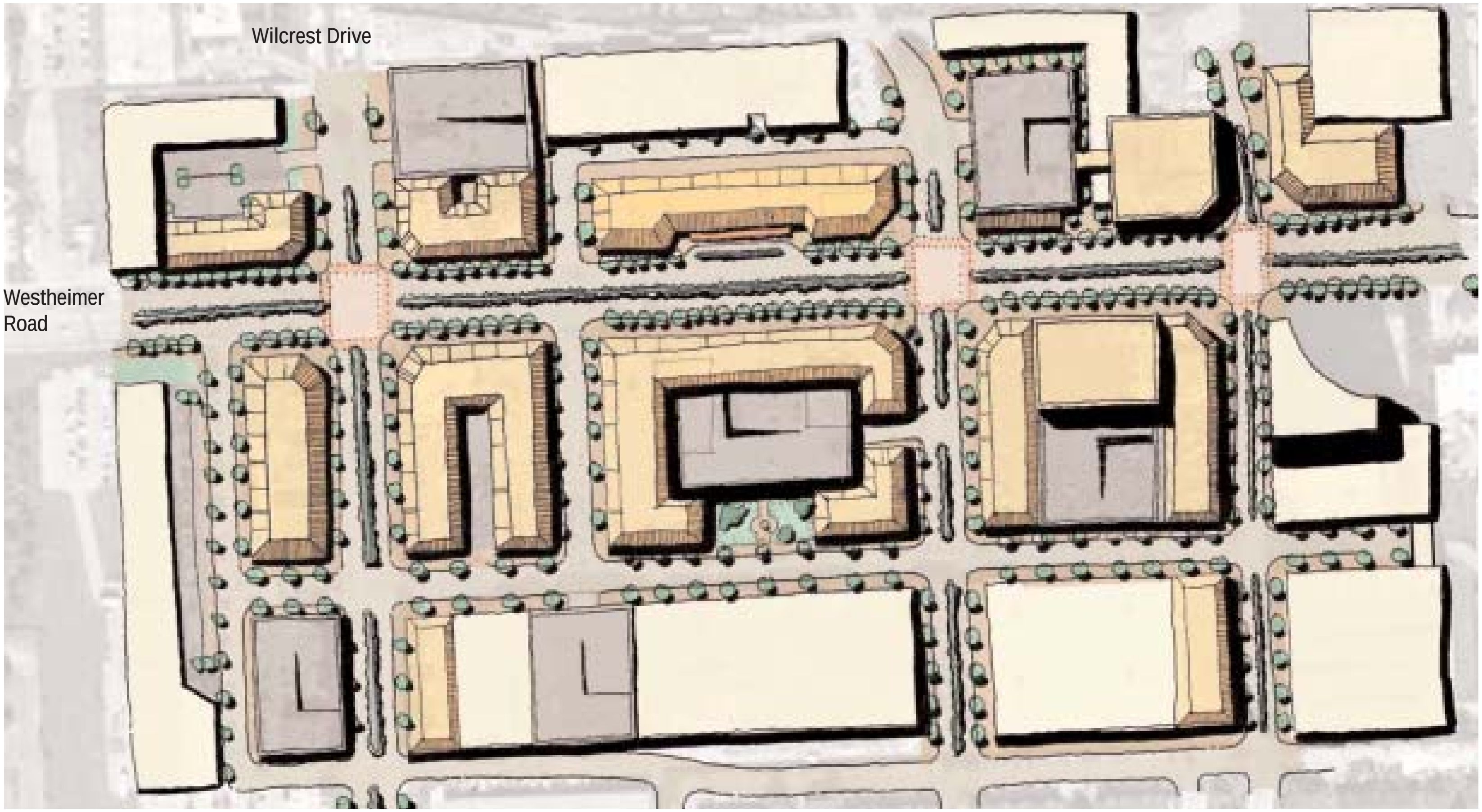
Activity in Phase Four would focus on infill development in the remaining surface parking lots in the village. This would involve modification of existing retail centers and development of new mixed-use structures with internal parking garages. Stand-alone structures, such as bus stations, would be incorporated into new developments to create a vibrant street environment of retail shops and restaurants and pedestrian plazas. The expanded street grid would tie into the surrounding residential neighborhoods.

WESTCHASE VILLAGE

Within walking distance of the office towers, and corporate campuses that line the Sam Houston Tollway, Westchase Village is a relatively high-density, mixed-use enclave of residents, workers and shoppers. Westheimer runs through the middle and is an essential element in unifying this urban village. The street would be redesigned with landscaped medians, tree-lined property frontages, spacious sidewalks, and bricked crosswalks at key intersections. Side streets are tree-lined as well and former acres of strip center parking lots would be broken down into organized street grids with whole blocks of development.

The village would have street-level retail and restaurants. Big box anchors could occupy the eastern end of the urban village near the Tollway while at the western end could be special home accessory and apparel retailers. Intermingled with the shops on the side streets would be restaurants and other services and establishments focusing on special needs. Parking would be handled using multi-level garages, off-street surface lots, or curbside spaces. Above the shops and the street retail activity would be multi-level offices, hotels, and residences. People could live, work, and play within this urban village. The urban design of Westchase Village allows it to blend in and complement adjacent neighborhoods and office parks.

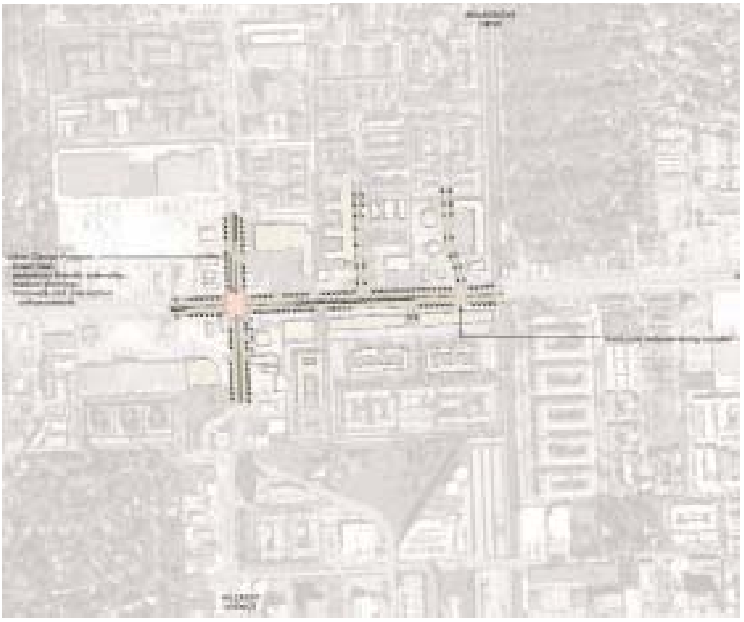
Along Westheimer between Woodland Park and Westerland, the Westchase District is organized to promote and encourage economic development, public safety, area mobility, and area marketing. Westchase will work directly with TxDOT during the design of the short-range Westheimer mobility improvements and will be responsible for the beautification of medians and public rights of way within their boundaries. Landowners and developers interested in Westchase properties along the Westheimer Corridor should contact the Westchase District at (713) 780-9434. Information is available on the Internet at www.westchasedistrict.com.


Wilcrest Drive
Westheimer Road

LONG-RANGE IMPROVEMENTS

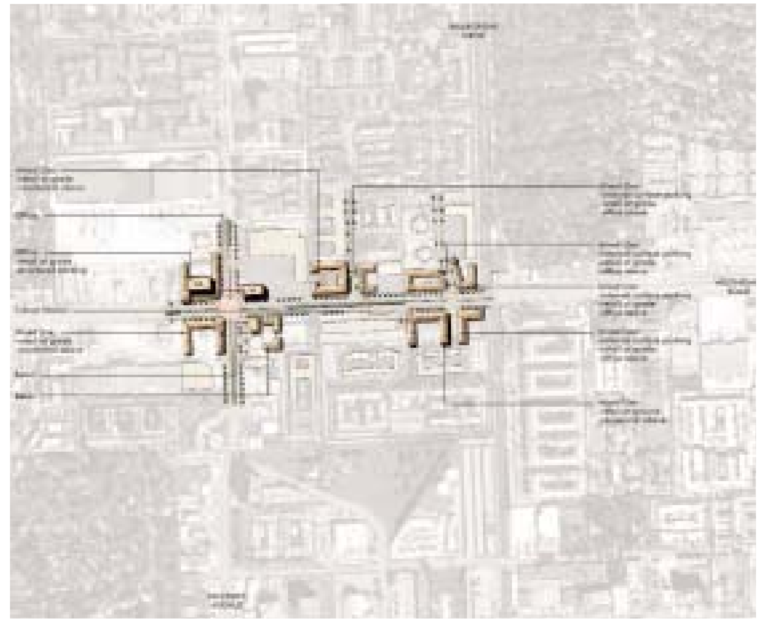
BRIARGROVE VILLAGE

Phase 1



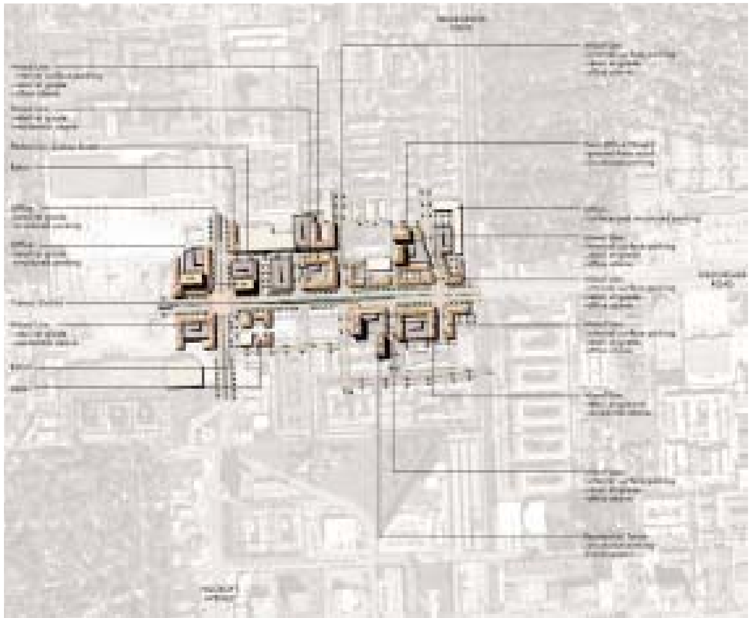
Phase One improvements would put into action the Urban Design Program of streetscape improvements and curb cut consolidation to enhance mobility and improve pedestrian accessibility.

Phase 2



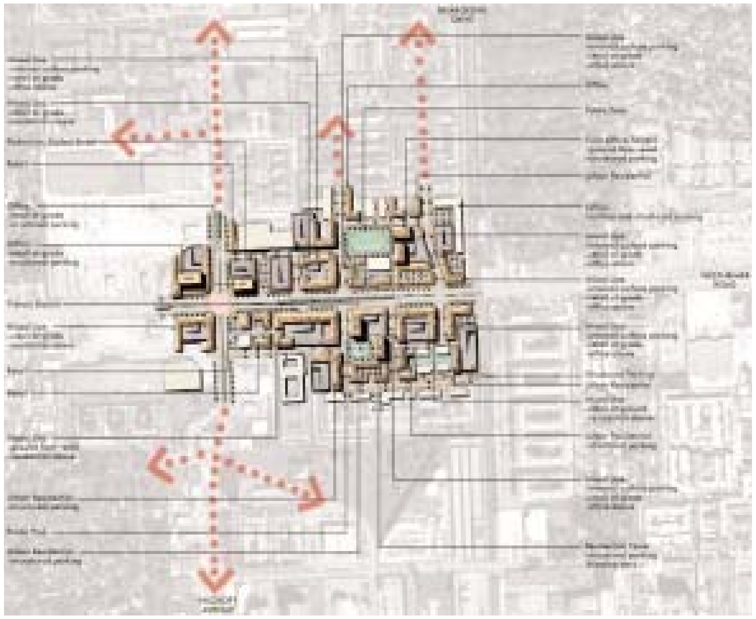
In Phase Two, development patterns would start to take place at notable key intersections in the village, with buildings brought up to the street-side instead of being set far back behind parking lots. New development would start to replace surface parking areas and old, obsolete structures. During this phase, a bus station would be built near the center of the village community such that it is within walking distance from major intersections and high-density residential complexes.

Phase 3



Development patterns would become more complex in Phase Three. More surface parking areas would give way to structured parking and mixed-use developments. Mixed-use developments, some of which would be high-rise office and residential buildings, would become the dominant building type along Westheimer. As density increases, an expanded street grid would evolve, providing easier access to the village from the surrounding areas. Buildings with street level restaurants and retail would promote pedestrian activity on the side-streets.

Phase 4



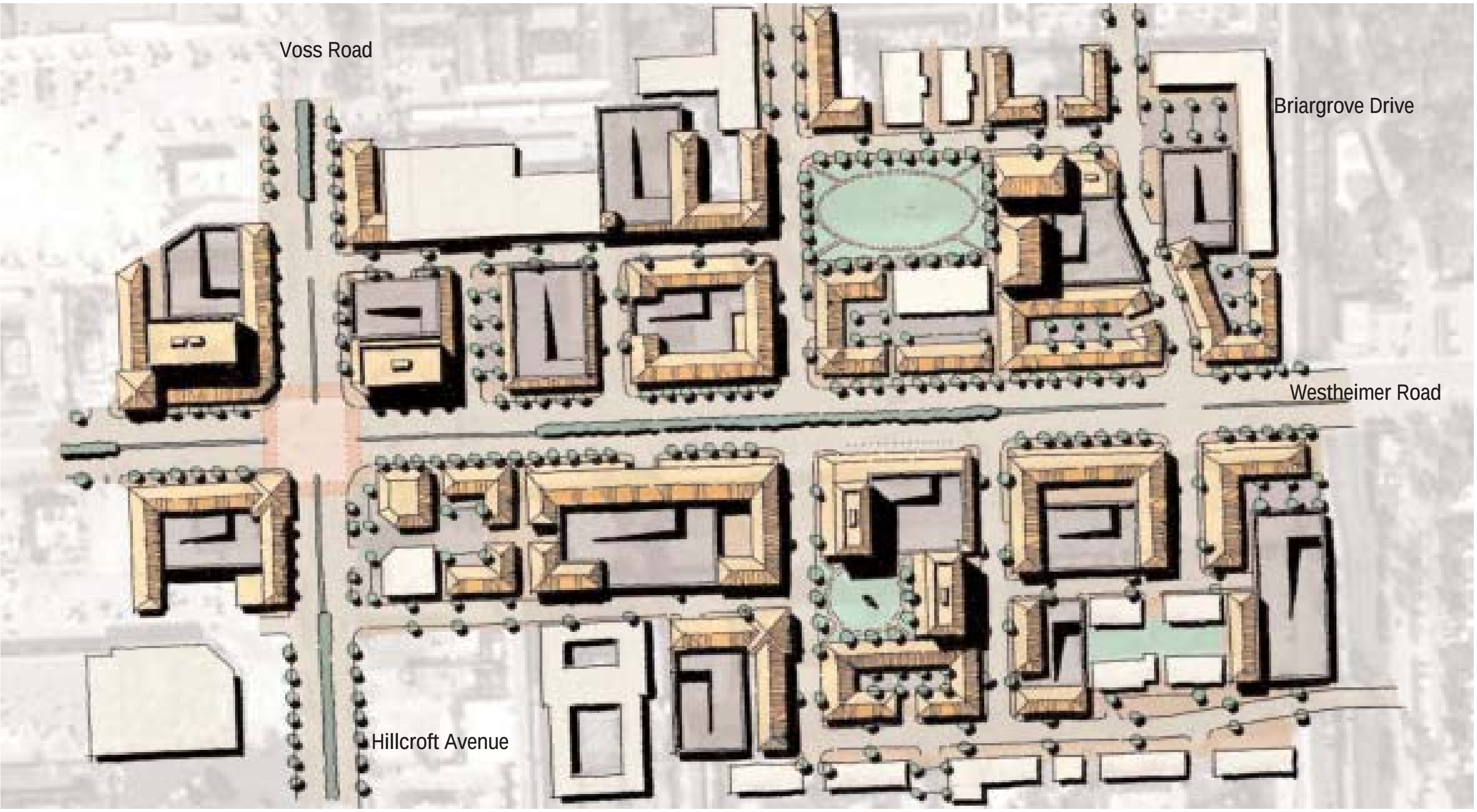
In Phase Four, all surface parking areas would have been replaced with higher-density mixed-use structures built with internal parking garages or built around parks or public squares. Residential structures with structured parking would buffer the village and blend into the surrounding multi-family complexes outside the village. Collector streets and roads that lead from multi-family complexes into the village also would be developed and designed to provide greater connectivity between uses within the village and areas surrounding it.

BRIARGROVE VILLAGE

The urban design plan for Briargrove Village provides a seamless fit with the older multi-family complexes surrounding this area. Streets that feed traffic onto Westheimer from the apartment complexes also would attract foot traffic into the newly created pedestrian-scale urban fabric. The Westheimer streetscape would undergo a change from the present old, low-rise detached structures and numerous curb cuts to a landscaped, tree-lined drive. An improved Westheimer would streamline traffic movement and encourage pedestrian traffic and movement. Parking for the residential and commercial activities within this urban village would be provided as side street curbside parking, off-street surface parking, and in multi-level garages placed behind mid-rise structures and storefronts. Briargrove Village would feature both village squares and smaller pocket parks as places where people can gather to pass the day, enjoy a lunch, or feed the birds. In close proximity to these green spaces would be retail and restaurant establishments that would cater to local residents, as well as to others who choose to enjoy the village atmosphere. Above these shops would be the residences and offices contributing to the eclectic urban village character.

The retail, entertainment, and dining market is excellent for this village. Affluent Memorial Villages residents have direct access on Voss Road; one of the few thoroughfares with bridge access over Buffalo Bayou and northward to I-10. Significant cross streets in the area such as Fondren, Voss, Hillcroft, Briargrove, Fountainview, Bering, and Augusta connect to vital neighborhoods of single family homes, town homes, and apartments. South of the proposed village is the western end of the Richmond Avenue nightclub district.

The proposed Westheimer Alliance would monitor progress implementing the Briargrove Village plan and coordinate recommendations with the City's Capital Improvements Plan.


Voss Road
Briargrove Drive
Westheimer Road
Hillcroft Avenue

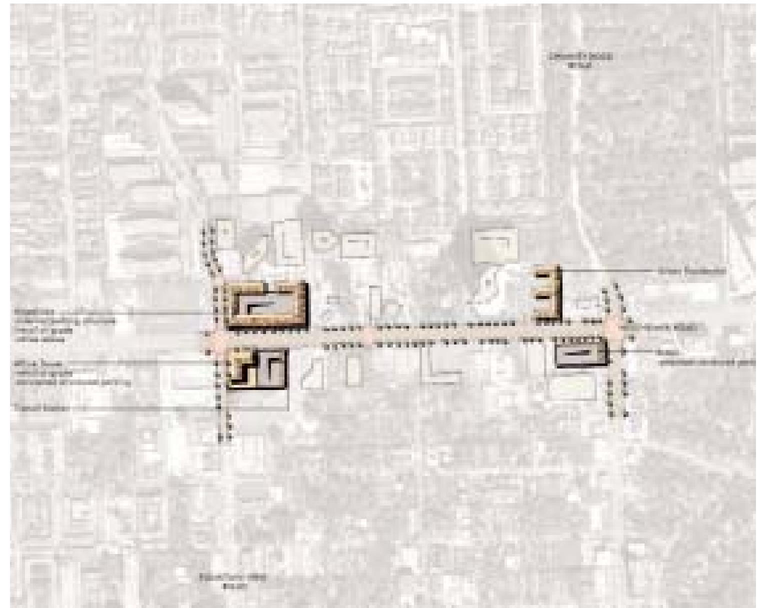
LONG-RANGE IMPROVEMENTS

CHIMNEY ROCK VILLAGE

Phase 1

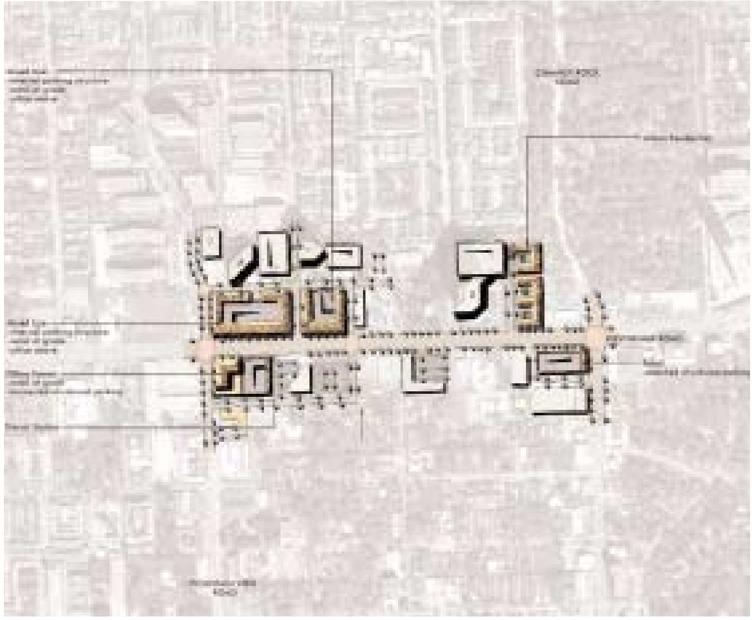
Phase One improvements would start with an Urban Design Program of streetscape improvements and a reduction in curb cuts. Such improvements would streamline traffic movement and help in building a character for the corridor.

Phase 2



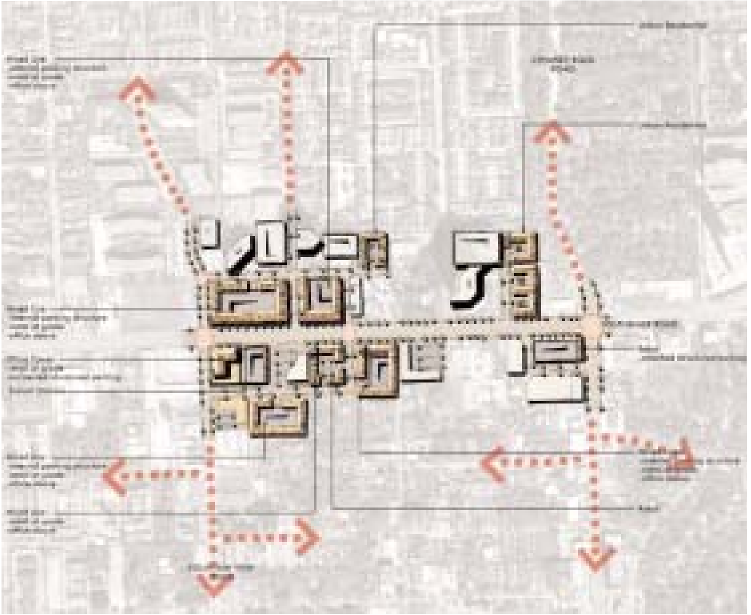
Phase Two would involve the development of office, retail, and mixed-use complexes to replace surface parking lots and obsolete commercial centers at key intersections. These new complexes would have internal parking garages to accommodate parking needs and would provide ground floor retail fronting onto the street with other uses in the floors above. A bus station for the village would be located at the end where extensive development would take place.

Phase 3



The improvements started earlier continue into Phase Three to form a better definition of the village character. A grid of secondary streets would begin to evolve from the major roadways into areas formerly occupied by low-grade commercial strip centers. Mixed-use developments surrounding internal parking garages and retail centers with parking structures would become common elements. Residential complexes would be built along secondary streets to complement the new urban setting and the existing residential neighborhoods.

Phase 4



In Phase Four, the side of the village that had not previously experienced growth would be more extensively developed. Collector streets leading into and from the village would be designed to help tie the village into the surrounding residential neighborhoods.

CHIMNEY ROCK VILLAGE

Chimney Rock Village is less dense than the other three urban villages, to intermingle with existing neighborhoods. Retail and office development would be brought up to the street and a METRO transit center would be in close proximity. The village development plan would combine urban design street improvements such as landscaping in the median, tree-lined property frontages, spacious sidewalks, and bricked crosswalks to help through traffic movement along the corridor and provide a better environment for pedestrians. Parking would be moved away from large lots fronting on Westheimer to curbside parking on side streets, off-street parking in surface level courtyards, and multi-level garages incorporated into building structures.

Several anchor stores and smaller shops would add to the storefront mix. Chocolate bars, coffee shops, and hometown favorite restaurants would allow local residents and shoppers to stop and let their senses be tempted. Mixed in with these shopping and eating locales could be foreign cinemas, galleries, and florist shops, with residences and offices occupying the floors overhead.

The village is adjacent to the Uptown District, the Galleria, and affluent Briarcroft and Tanglewood neighborhoods. There is direct access on Chimney Rock Road to I-10 and US 59. Chimney Rock is the only thoroughfare between Voss Road and the West Loop with a bridge over Buffalo Bayou connecting to I-10. South of the proposed village is the eastern end of the Richmond Avenue nightclub district.

The proposed Westheimer Alliance would monitor progress implementing the Chimney Rock Village plan and would coordinate recommendations with the City's Capital Improvements Plan.


Fountainview Road
Chimney Rock Road
Westheimer Road

East of Chimney Rock, property owners created the Uptown Houston District in the area surrounding the Galleria shopping mall to supplement efforts by public agencies in planning and implementation of public projects. The Uptown Houston District is involved with the implementation of transportation improvements, economic development initiatives, traffic control, street sweeping, beautification, and communications programs. The District has created a Master Plan to address mobility and quality of life issues, and the plan's accomplishments can be experienced in the area. More improvements are planned for the District and some of the key elements from the Uptown Plan are being reiterated here to reinforce their importance in improving mobility and enhancing community character.

Direction / Guide Signage

Reduce travel and delay by providing directional / guide signage that assists motorists to major attractions and parking.

Proposed Projects:

- Develop a directional / guide sign program for primary access points to and from Westheimer Road in coordination with Uptown area requirements.

Pedestrian Network Improvements

- Reduce internal auto trips within Uptown and expand pedestrian activity and safety.
- Improve the pedestrian environment with an enhanced and continuous sidewalk network, improved linkages to transit stops, and better pedestrian crossings at major intersections.
- The overall long range program should consider Westheimer Road needs in coordination with Uptown area requirements.

<u>Proposed Projects:</u>

- Provide enhanced sidewalks and pedestrian amenities consistent with land use and transit service needs.
- Provide appropriate non-intersection (mid-block) pedestrian crossing locations similar to the Dillards/Neiman Marcus pedestrian crossing location.
- Reduce the number of driveway openings that interrupt pedestrian traffic along sidewalks.

Street Network Improvements

Develop a street grid system in the Uptown area to provide alternate routes and internal circulation as relief to congested arterials. Projects should include extension and improvements on existing streets and new streets in coordination with Uptown area requirements.

<u>Proposed Projects:</u>

- Extension of McCue Street to San Felipe.
- Widening of Chimney Rock, Rice, Sage, and McCue from Westheimer to US 59 (Southwest Freeway and Westpark Tollway.

This initial list is based on a limited review of overall mobility needs. Further study and coordination with Uptown is required.

The Uptown Houston District works to obtain and provide a variety of services and improvements for the Uptown area. Uptown economic development information can be obtained from the Uptown Houston District at (713) 621-2011, or on the Internet at www.uptown-houston.com.

Section V

Conclusion

Conclusion

This study examined mobility conditions along the Westheimer Corridor and presented short-range and long-range improvement strategies. The short-range improvement strategies were analyzed with traffic modeling software to demonstrate their ability to make mobility improvements.

The short-range strategies centered around access management to improve traffic flow. Access management techniques are cost effective means to reduce delay for through-movement and to improve roadway safety for motorists and pedestrians. Several improvement projects were recommended for implementation in a prioritized phasing.

Phase One: Construct median closures, median channelizations, left turn bay extensions, and signal optimization.
Phase Two: Construct driveway consolidations, T-intersections (signal elimination), and right turn bays.

In addition, several short- to mid-range transit improvements were recommended, including bus pull-outs, express service, bus stop consolidation, route rationalization, and park-and-ride pilot projects.

The long-range strategies looked at redeveloping properties along Westheimer to improve internal circulation and connections to adjacent neighborhoods in order to take unnecessary auto trips off of Westheimer. Land use and density were linked to transportation demand. Focussing on this link allowed the creation of plans to reduce automobile trips and improve mobility. Five prototypical locations were selected for the development of urban villages, in which employment, housing, shopping, and entertainment are all available. The villages have suitable density to support transit use, and buildings and streets are arranged to maximize pedestrian trips within each village.

Similar to the short-range recommendations, the long-range urban village concept was designed to be implemented in phases.

Phase One: Implement all short-range improvements, make streetscape improvements, and incorporate an urban design program.
Phase Two: Introduce mixed-use buildings at intersections, add some structured parking, begin modifying existing buildings, and build transit centers.
Phase Three: Expand structured parking, construct more mixed-use buildings (housing + office + retail) at the street edge, and complete the street grid.
Phase Four: Increase density, create open space (parks, squares, plaza), and strengthen connections to surrounding neighborhoods.

The Village Equation:

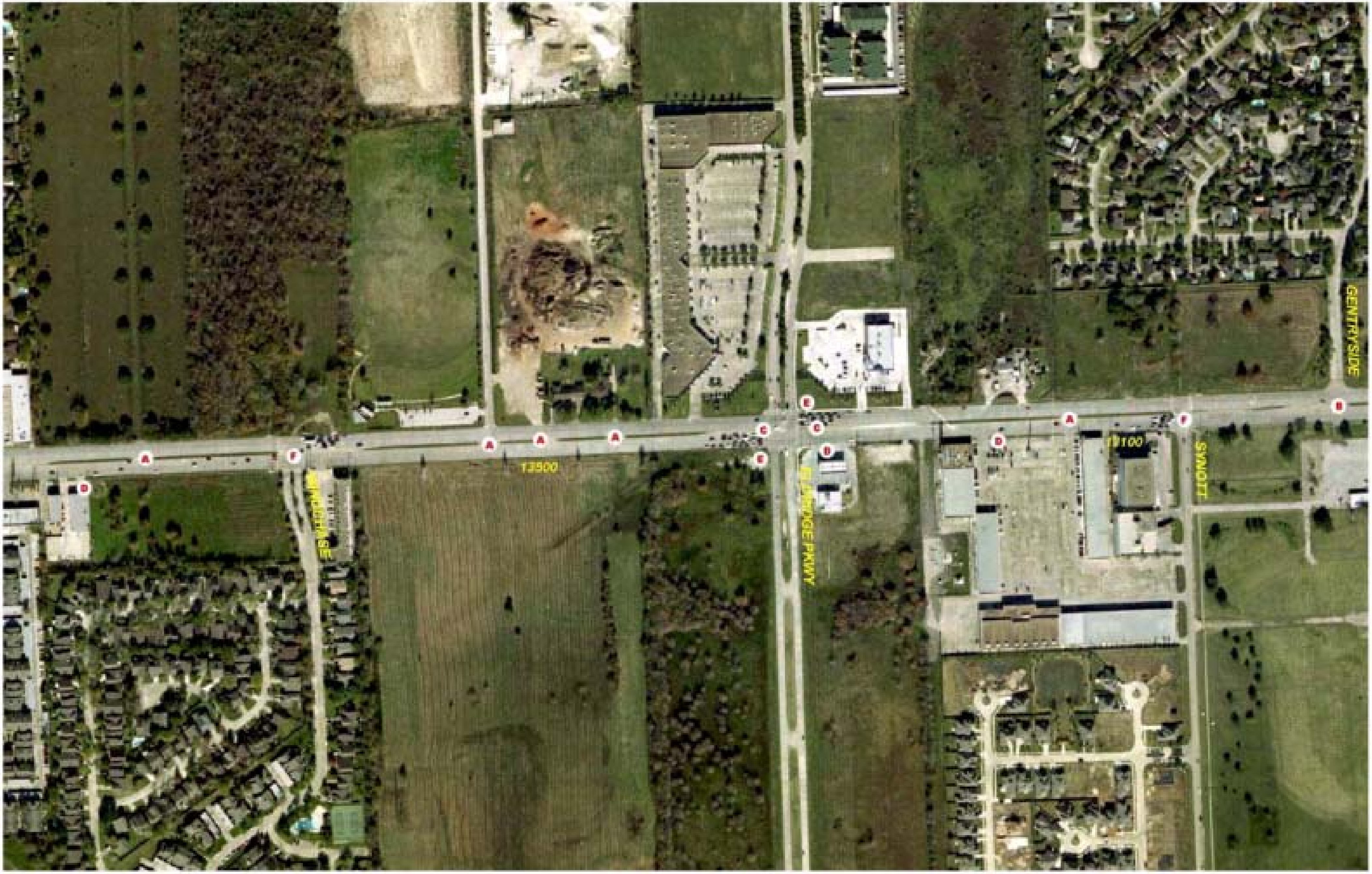
Jobs-Housing Balance
+
Alternative Travel Modes
=
Automobile Trip Reduction

Consideration must be given to the ultimate typical section for Westheimer Road. A wide range of alternative typical sections, from existing conditions to a wide multi-way boulevard, has been provided in the Appendix. Decisions about Westheimer's ultimate typical section will allow for a balance between mobility and access, will provide for alternative travel modes (cars, bikes, transit, and pedestrians), and will create a beautiful environment equal to the greatest streets in the world.

Implementation of the short-range and long-range recommendations will take coordination among many entities. For this reason, this study proposed the formation of a "Westheimer Alliance," made up of public and private stakeholders. The Houston-Galveston Area Council, TxDOT, METRO, the City of Houston, the management districts, property owners, and developers all have roles to play in enhancing the physical environment and improving mobility along the Westheimer Corridor.

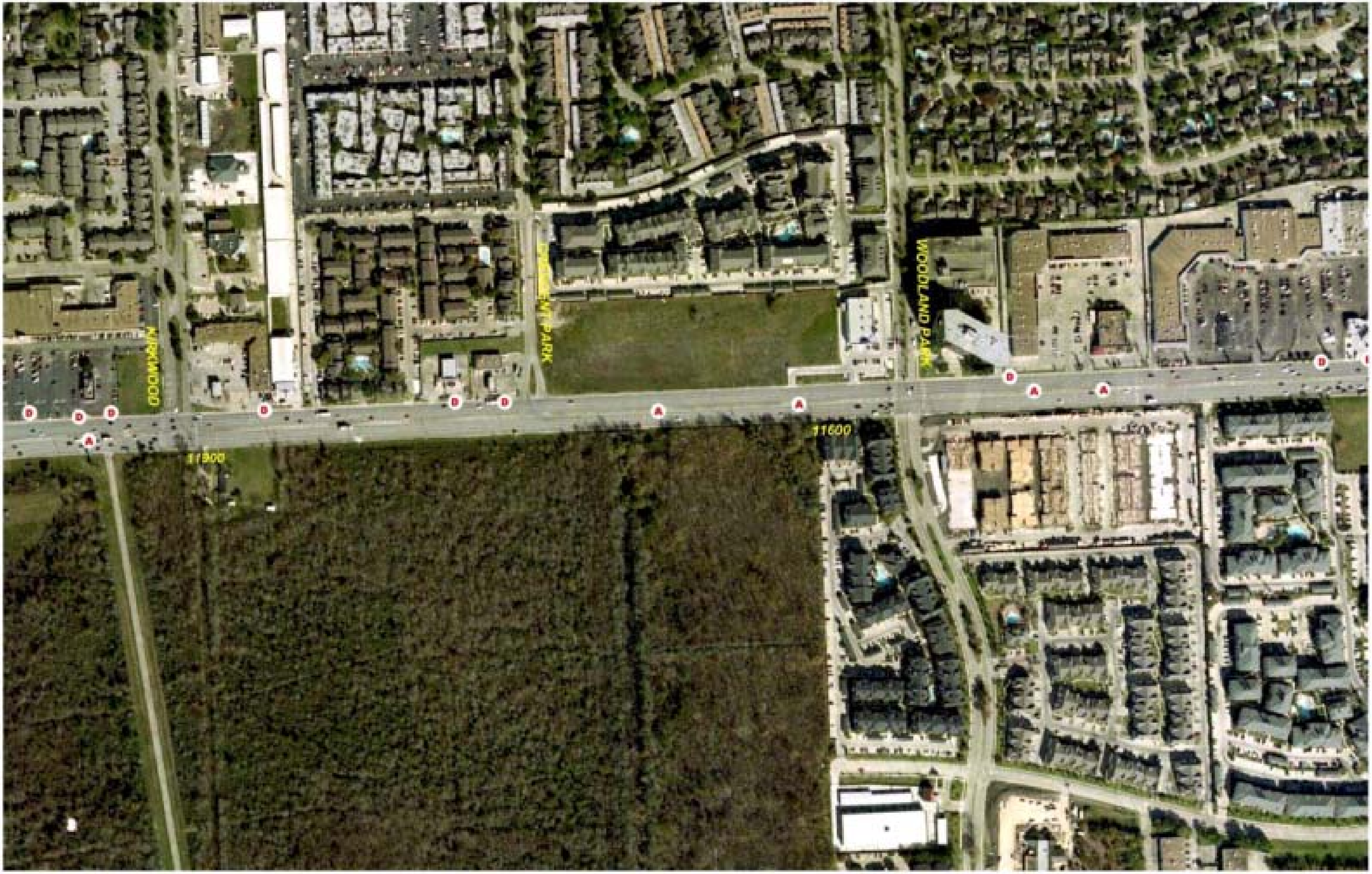
Appendix

Short-Range Improvement Locations


GENTRYSIDE
SYNOTT
ELDRIDGE PKWY
13500
13100

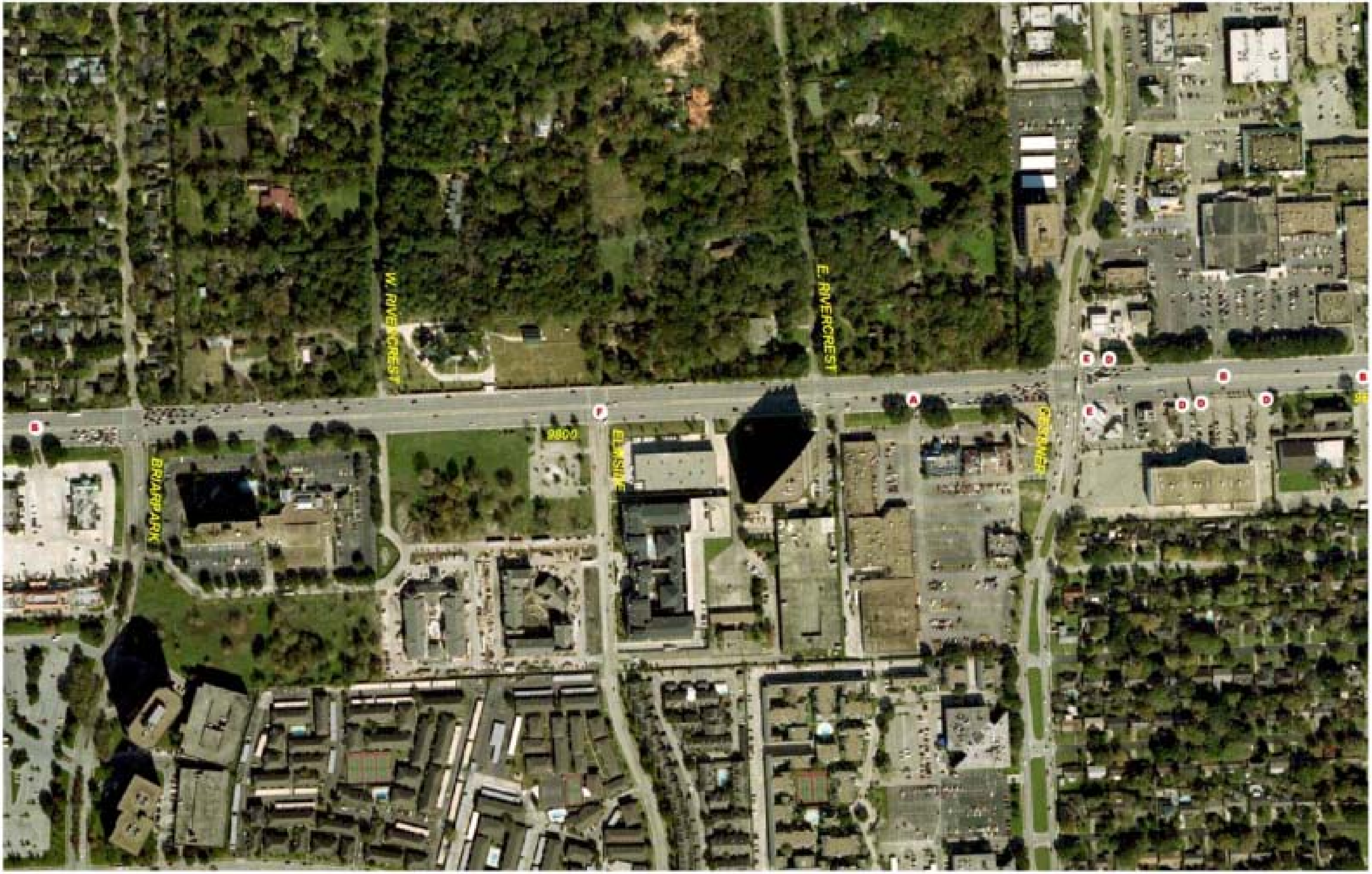

BRIARWEST
DAIRY ASHFORD
12200
12300


SHADOW VIEW
SHADOWBRIAR
OLD WESTHEIMER
12400
12300
12100
12000


WOODLAND PARK
11900
11600

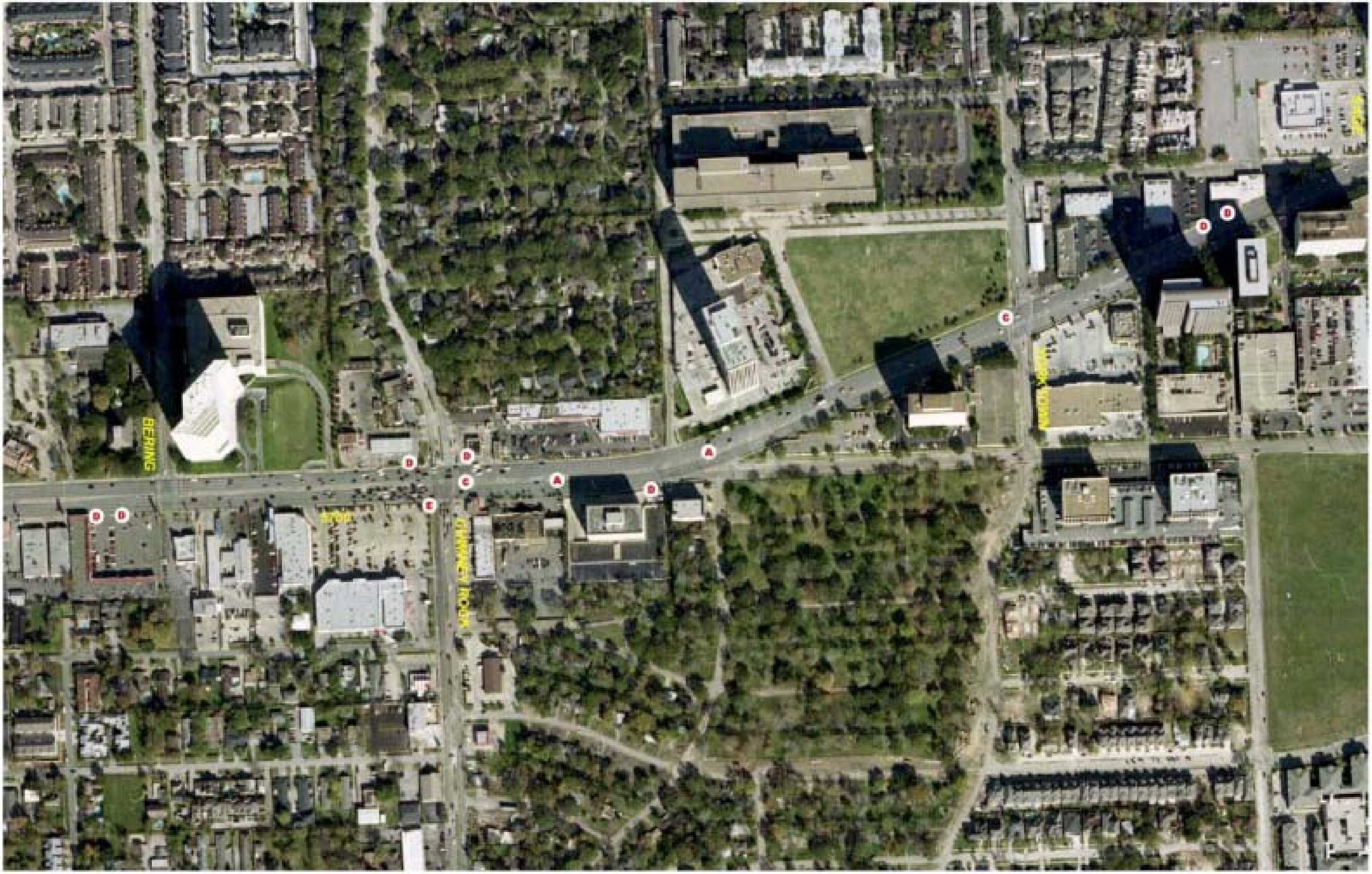

HAYES
11000
WILCREST
10800
WALNUT BEND
WALLINGFORD

BLUE WILLOW
CITYWEST
SAM HOUSTON TOLLWAY
10500
10300

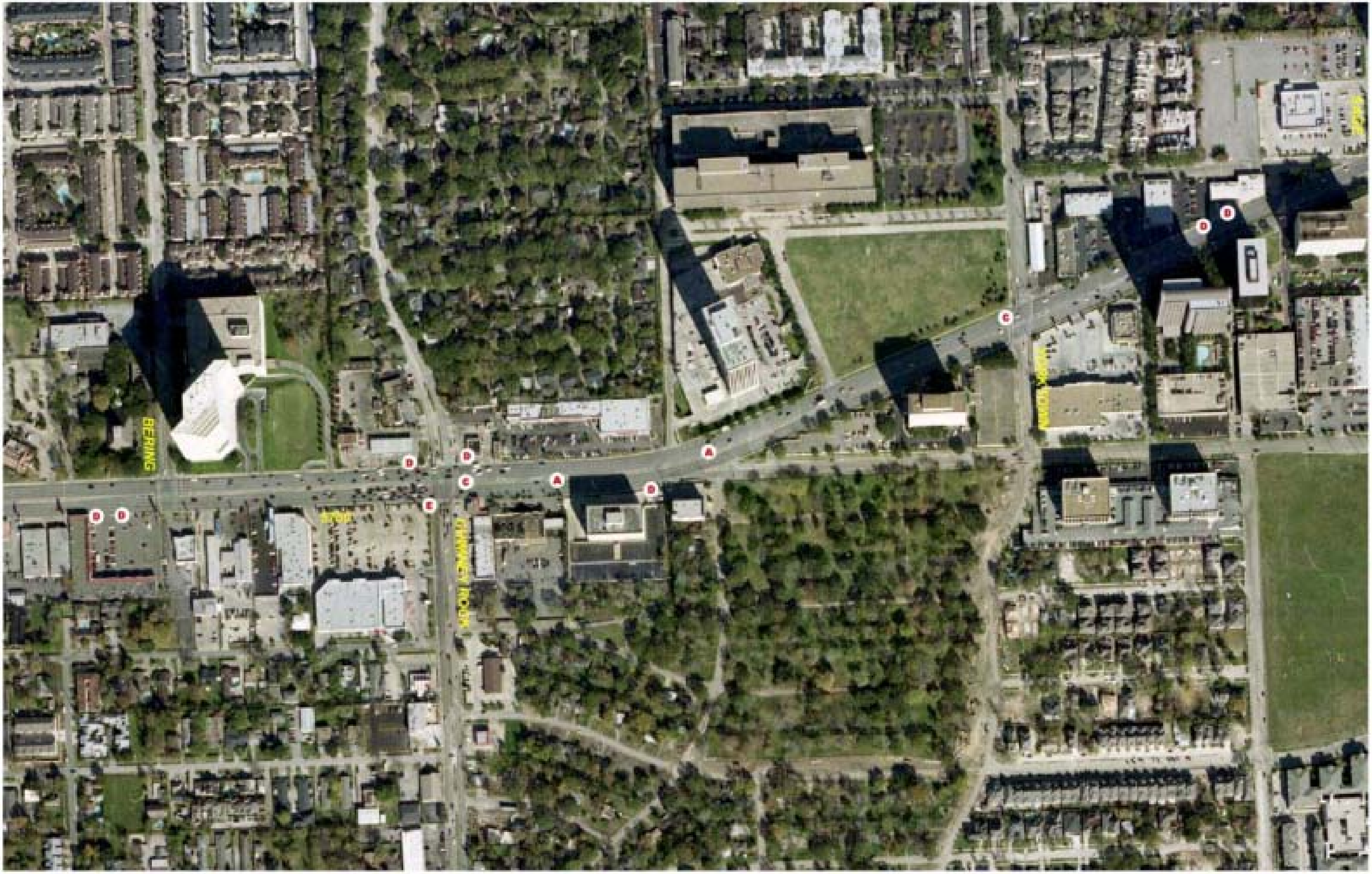

W. RIVERCREST
E. RIVERCREST
BRIARPARK
ELMSIDE
GESSNER

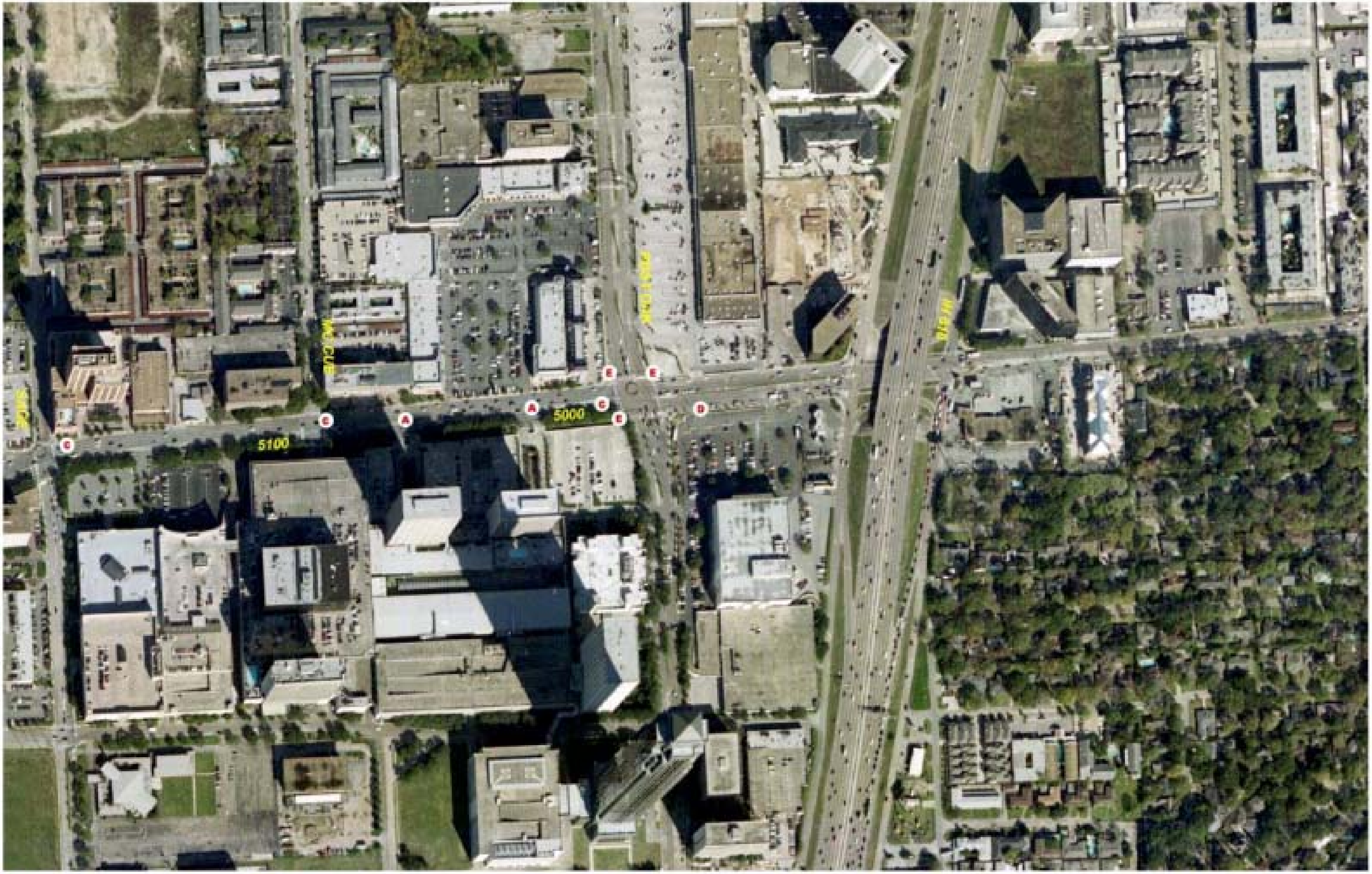
WESTERLAND
SHADY
9400
JEANETTA
ROCKY RIDGE

FONDREN
CROSSVIEW
DUNVALE
OLD FARM


BERING
CHIMNEY ROCK


BRIAR RIDGE
POTOMAC
GREENBRIDGE
100
MOUNTAIN VIEW
5800


BERING
CHIMNEY ROCK
A


5100
5000
A
A

Appendix

Cost Estimates

Westheimer Corridor

Cost Estimate Summary for Short Range Improvements

		Treatments					
		Improvements to be coordinated with Property Owners and Developers					
Segment		Driveways to be Removed (D)			Driveways to be Rebuilt (D)		
		Qty.	Low Est.	High Est.	Qty.	Low Est.	High Est.
1	IH 610 to Post Oak	1	$4,500	$5,000	1	$36,900	$41,300
	Post Oak to McCue				1	$36,900	$41,300
	McCue to Sage						
	Sage to Yorktown	2	$9,000	$10,000	2	$73,800	$82,600
	Yorktown to Chimney Rock	2	$9,000	$10,000	2	$73,800	$82,600
	Totals	**5**	**$22,500**	**$25,000**	**6**	**$221,400**	**$247,800**
2	Chimney Rock to Bering	5	$22,500	$25,000	5	$184,500	$206,500
	Bering to FountainView	2	$9,000	$10,000	1	$36,900	$41,300
	FountainView to Greenridge	7	$31,500	$35,000	7	$258,300	$289,100
	Greenridge to Winrock	10	$45,000	$50,000	6	$221,400	$247,800
	Winrock to Hillcroft/Voss	6	$27,000	$30,000	3	$110,700	$123,900
	Hillcroft/Voss to Dunvale	16	$72,000	$80,000	10	$369,000	$413,000
	Dunvale to Fondren	4	$18,000	$20,000	2	$73,800	$82,600
	Fondren to Westerland	10	$45,000	$50,000	8	$295,200	$330,400
	Totals	**60**	**$270,000**	**$300,000**	**42**	**$1,549,800**	**$1,734,600**
3	Westerland to Gessner	5	$22,500	$25,000	3	$110,700	$123,900
	Gessner to Elmside						
	Elmside to Briarpark						
	Briarpark to Seagler						
	Seagler to Beltway 8	2	$9,000	$10,000	2	$73,800	$82,600
	Beltway 8 to Blue Willow	1	$4,500	$5,000	1	$36,900	$41,300
	Blue Willow to Walnut Bend	1	$4,500	$5,000	1	$36,900	$41,300
	Walnut Bend to Wilcrest	5	$22,500	$25,000	3	$110,700	$123,900
	Wilcrest to Woodland Park	6	$27,000	$30,000	5	$184,500	$206,500
	Totals	**20**	**$90,000**	**$100,000**	**15**	**$553,500**	**$619,500**
4	Woodland Park to Kirkwood	3	$13,500	$15,000	2	$73,800	$82,600
	Kirkwood to Shadow Briar	4	$18,000	$20,000	5	$184,500	$206,500
	Shadow Briar to Dairy Ashford	10	$45,000	$50,000	11	$405,900	$454,300
	Dairy Ashford to Ashford Oak	6	$27,000	$30,000	5	$184,500	$206,500
	Ashford Oak to Eldridge	5	$22,500	$25,000	4	$147,600	$165,200
	Eldridge to Windchase						
	Windchase to Westhollow	2	$9,000	$10,000	2	$73,800	$82,600
	Westhollow to Highway 6	9	$40,500	$45,000	8	$295,200	$330,400
	Totals	**39**	**$175,500**	**$195,000**	**37**	**$1,365,300**	**$1,528,100**
5	IH 610 to Highway 6						
	Grand Totals	**124**	**$558,000**	**$620,000**	**100**	**$3,690,000**	**$4,130,000**
	Averages		$589,000			$3,910,000	

Westheimer Corridor

Cost Estimate Summary for Short Range Improvements (Cpntinued..)

		Improvements to be coordinated through TxDOT																				
	Segment	Median Closures (A)			Median Channelization (B)			Left Turn Bay Extension (C)			Right Turn Bay (New* or Ext.) (E)				Signalized T-Intersection (F)				Signal Hardware Improvements		Signal Timing and Operation	
		Qty.	Low Est.	High Est.	Qty.	Low Est.	High Est.	Qty.	Low Est.	High Est.	Qty.	Comment	Low Est.	High Est.	Qty.	Comment	Low Est.	High Est.	Qty.	High Est.	Qty.	High Est.
1	IH 610 to Post Oak																		1	$15,000		
1	Post Oak to McCue	2	$32,800	$72,600				2	$32,600	$44,000	1	1 Ext.	$88,500	$195,000					2	$30,000		
1	McCue to Sage																		1	$15,000		
1	Sage to Yorktown																		2	$30,000		
1	Yorktown to Chimney Rock	2	$32,800	$72,600				1	$16,300	$22,000									1	$15,000		
	Totals	**4**	**$65,600**	**$145,200**				**3**	**$48,900**	**$66,000**	**1**		**$88,500**	**$195,000**					**7**	**$105,000**		
2	Chimney Rock to Bering				1	$12,800	$14,200				1	New	$88,500	$195,000					1	$10,000		
2	Bering to FountainView							1	$16,300	$22,000	1	New	$88,500	$195,000					1	$10,000		
2	FountainView to Greenridge				3	$38,400	$42,600	1	$16,300	$22,000									1	$10,000		
2	Greenridge to Winrock				2	$25,600	$28,400												2	$20,000		
2	Winrock to Hillcroft/Voss				2	$25,600	$28,400	1	$16,300	$22,000	1	New	$88,500	$195,000	1	Winrock	$47,800	$56,300	1	$10,000		
2	Hillcroft/Voss to Dunvale	1	$16,400	$36,300	5	$64,000	$71,000	3	$48,900	$66,000	1	New	$88,500	$195,000	2	Stoney Brook & Old Farm	$95,600	$112,600	3	$30,000		
2	Dunvale to Fondren	2	$32,800	$72,600	1	$12,800	$14,200	1	$16,300	$22,000	2	New	$177,000	$390,000					2	$20,000		
2	Fondren to Westerland	1	$16,400	$36,300	3	$38,400	$42,600	2	$32,600	$44,000	1	New	$88,500	$195,000	1	Jeannetta	$47,800	$56,300	2	$20,000		
	Totals	**4**	**$65,600**	**$145,200**	**17**	**$217,600**	**$241,400**	**9**	**$146,700**	**$198,000**	**7**		**$619,500**	**$1,365,000**	**4**		**$191,200**	**$225,200**	**13**	**$130,000**		
3	Westerland to Gessner				3	$38,400	$42,600				2	New	$177,000	$390,000					2	$20,000		
3	Gessner to Elmside	1	$16,400	$36,300											1	Elmside	$47,800	$56,300	1	$10,000		
3	Elmside to Briarpark																		1	$10,000		
3	Briarpark to Seagler				2	$25,600	$28,400												1	$10,000		
3	Seagler to Beltway 8				1	$12,800	$14,200	1	$16,300	$22,000									2	$20,000		
3	Beltway 8 to Blue Willow	1	$16,400	$36,300	1	$12,800	$14,200	1	$16,300	$22,000	1	New	$88,500	$195,000					2	$20,000		
3	Blue Willow to Walnut Bend	1	$16,400	$36,300	2	$25,600	$28,400	1	$16,300	$22,000									1	$10,000		
3	Walnut Bend to Wilcrest	1	$16,400	$36,300	2	$25,600	$28,400	2	$32,600	$44,000	1	New	$88,500	$195,000					1	$10,000		
3	Wilcrest to Woodland Park	2	$32,800	$72,600				1	$16,300	$22,000									2	$20,000		
	Totals	**6**	**$98,400**	**$217,800**	**11**	**$140,800**	**$156,200**	**6**	**$97,800**	**$132,000**	**4**		**$354,000**	**$780,000**	**1**		**$47,800**	**$56,300**	**13**	**$130,000**		
4	Woodland Park to Kirkwood	4	$65,600	$145,200															1	$10,000		
4	Kirkwood to Shadow Briar	2	$32,800	$72,600	5	$64,000	$71,000												2	$20,000		
4	Shadow Briar to Dairy Ashford	2	$32,800	$72,600	3	$38,400	$42,600	1	$16,300	$22,000	1	New	$88,500	$195,000					1	$10,000		
4	Dairy Ashford to Ashford Oak	2	$32,800	$72,600				1	$16,300	$22,000	1	New	$88,500	$195,000					1	$10,000		
4	Ashford Oak to Eldridge	4	$65,600	$145,200	2	$25,600	$28,400	1	$16,300	$22,000	1	New	$88,500	$195,000	1	Synott	$47,800	$56,300	2	$20,000		
4	Eldridge to Windchase	3	$49,200	$108,900	2	$25,600	$28,400	1	$16,300	$22,000	1	New	$88,500	$195,000	1	Windchase	$47,800	$56,300	1	$10,000		
4	Windchase to Westhollow	2	$32,800	$72,600											1	Westhollow	$47,800	$56,300	1	$10,000		
4	Westhollow to Highway 6	2	$32,800	$72,600															2	$20,000		
	Totals	**21**	**$344,400**	**$762,300**	**12**	**$153,600**	**$170,400**	**4**	**$65,200**	**$88,000**	**4**		**$354,000**	**$780,000**	**3**		**$143,400**	**$168,900**	**11**	**$110,000**		
5	IH 610 to Highway 6																				1	$120,000
	Grand Totals	**35**	**$574,000**	**$1,270,500**	**40**	**$512,000**	**$568,000**	**22**	**$358,600**	**$484,000**	**16**		**$1,416,000**	**$3,120,000**	**8**		**$382,400**	**$450,400**	**44**	**$475,000**	**1**	**$120,000**
	Averages		**$922,250**			**$540,000**			**$421,300**				**$2,268,000**				**$416,400**			**$475,000**		**$120,000**

Note: Right Turn Bay Improvements will have to be co-ordinated with property owners

PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPE A MEDIAN CLOSURE

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	
						Low	High
104	514	REMOV CONC (CURB)	LF	124	$4.00	$496.00	
104	514	REMOV CONC (CURB)	LF	297	$4.00		$1,188.00
432	547	RIPRAP (CONC)(CL B)	CY	16.3	$250.00	$4,075.00	
432	547	RIPRAP (CONC)(CL B)	CY	55	$250.00		$13,750.00
529	505	CONC CURB (DOWEL)(6 ")	LF	204	$6.00	$1,224.00	
529	505	CONC CURB (DOWEL)(6 ")	LF	394	$6.00		$2,364.00
644	501	SMALL RDSD SGN ASSM (TY A)	EA	2	$500.00	$1,000.00	$1,000.00
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	24	$25.00	$600.00	
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	35	$25.00		$875.00
678	506	PAV SURF PREP FOR MRKS (24")	LF	24	$0.10	$2.40	
678	506	PAV SURF PREP FOR MRKS (24")	LF	35	$0.10		$3.50
xxx	xxx	ADJUST MANHOLE	EA	1	$1,500.00		$1,500.00
502	501	BARRICADES, SIGNS AND TRAF HANDLE	MO	1	$3,500.00	$3,500.00	$3,500.00
		SUBTOTAL 1				$10,897.40	$24,180.50
xxx	xxx	BONDS	LS	5%		$544.87	$1,209.03
500	501	MOBILIZATION	LS	20%		$2,179.48	$4,836.10
		SUBTOTAL 2				$13,621.75	$30,225.63
xxx	xxx	MISCELLANEOUS & CONTINGENCY	LS	20%		$2,724.35	$6,045.13
		GRAND TOTAL:				**$16,346.10**	**$36,270.75**
		CALLED:				**$16,400.00**	**$36,300.00**

NOTES:

1. Some median openings have a left-turn bay in the eastbound or the westbound direction. The high cost estimate reflects the closing of this bay in addition to the median opening.
2. Typical roadway section is based on the plan drawings provided by HNTB Corporation.
3. Miscellaneous items include Engineering Design Fee, Survey and Material Testing.

PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPE B MEDIAN CHANNELIZATION

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT	
						Low	High
104	514	REMOV CONC (CURB)	LF		$4.00		
432	547	RIPRAP (CONC)(CL B)	CY	1	$250.00	$250.00	$250.00
529	505	CONC CURB (DOWEL)(6 ")	LF	116	$6.00	$696.00	$696.00
644	501	SMALL RDSD SGN ASSM (TY A)	EA	2	$500.00	$1,000.00	$1,000.00
666	533	REFL PAV MRK TY I (Y) (ISLAND)	SF	54	$6.00	$324.00	$324.00
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	148	$7.00	$1,036.00	
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	228	$7.00		$1,596.00
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	24	$25.00	$600.00	
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	35	$25.00		$875.00
668	511	PREFAB PAV MRK TY A (W) (ARROW)	EA	2	$200.00	$400.00	$400.00
668	515	PREFAB PAV MRK TY A (W) (WORD)	EA	2	$250.00	$500.00	$500.00
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-	EA	14	$5.00	$70.00	
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-	EA	22	$5.00		$110.00
678	503	PAV SURF PREP FOR MRKS (8")	LF	148	$0.50	$74.00	
678	503	PAV SURF PREP FOR MRKS (8")	LF	228	$0.50		$114.00
678	506	PAV SURF PREP FOR MRKS (24")	LF	24	$0.10	$2.40	
678	506	PAV SURF PREP FOR MRKS (24")	LF	35	$0.10		$3.50
678	507	PAV SURF PREP FOR MRKS (ARROW)	EA	2	$20.00	$40.00	$40.00
678	508	PAV SURF PREP FOR MRKS (WORD)	EA	2	$20.00	$40.00	$40.00
502	501	BARRICADES, SIGNS AND TRAF HANDLE	MO	1	$3,500.00	$3,500.00	$3,500.00
		SUBTOTAL 1				$8,532.40	$9,448.50
xxx	xxx	BONDS	LS	5%		$426.62	$472.43
500	501	MOBILIZATION	LS	20%		$1,706.48	$1,889.70
		SUBTOTAL 2				$10,665.50	$11,810.63
xxx	xxx	MISCELLANEOUS & CONTINGENCY	LS	20%		$2,133.10	$2,362.13
		GRAND TOTAL:				**$12,798.60**	**$14,172.75**
		CALLED:				**$12,800.00**	**$14,200.00**

NOTES:

1. Typical roadway section is based on the plan drawings provided by HNTB Corporation.
2. Miscellaneous items include Engineering Design Fee, Survey and Material Testing.

PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPE C LEFT TURN BAY EXTENSION

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT Low	AMOUNT High
104	503	REMOV CONC (RIPRAP)	SY	55	$7.00	$385.00	
104	503	REMOV CONC (RIPRAP)	SY	119	$7.00		$833.00
104	514	REMOV CONC (CURB)	LF	200	$5.00	$1,000.00	
104	514	REMOV CONC (CURB)	LF	260	$5.00		$1,300.00
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	2.29	$150.00	$343.50	
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	4.96	$150.00		$744.00
340	545	ASPH CONC (TY D)(SURF)	CY	2.29	$200.00	$458.00	
340	545	ASPH CONC (TY D)(SURF)	CY	4.96	$200.00		$992.00
529	505	CONC CURB (DOWEL)(6 ")	LF	200	$5.00	$1,000.00	
529	505	CONC CURB (DOWEL)(6 ")	LF	260	$5.00		$1,300.00
649	504	RELOC SMALL RDSD SGN ASSMS	EA	1	$300.00	$300.00	$300.00
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	120	$7.00	$840.00	
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	160	$7.00		$1,120.00
668	511	PREFAB PAV MRK TY A (W) (ARROW)	EA	2	$200.00	$400.00	$400.00
668	515	PREFAB PAV MRK TY A (W) (WORD)	EA	2	$250.00	$500.00	$500.00
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	12	$5.00	$60.00	
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	16	$5.00		$80.00
677	503	ELIM EXT PAV MRK & MRKR (8")	LF	80	$0.50	$40.00	
677	503	ELIM EXT PAV MRK & MRKR (8")	LF	120	$0.50		$60.00
677	507	ELIM EXT PAV MRK & MRKR (ARROW)	EA	1	$50.00	$50.00	$50.00
677	508	ELIM EXT PAV MRK & MRKR (WORD)	EA	1	$50.00	$50.00	$50.00
678	503	PAV SURF PREP FOR MRKS (8")	LF	120	$0.50	$60.00	
678	503	PAV SURF PREP FOR MRKS (8")	LF	160	$0.50		$80.00
678	507	PAV SURF PREP FOR MRKS (ARROW)	EA	2	$20.00	$40.00	$40.00
678	508	PAV SURF PREP FOR MRKS (WORD)	EA	2	$20.00	$40.00	$40.00
xxx	xxx	ADJUST MANHOLE	EA	1	$1,500.00		$1,500.00
502	501	BARRICADES, SIGNS AND TRAF HANDLE	MO	1.5	$3,500.00	$5,250.00	$5,250.00
		SUBTOTAL 1				$10,816.50	$14,639.00
xxx	xxx	BONDS	LS	5%		$540.83	$731.95
500	501	MOBILIZATION	LS	20%		$2,163.30	$2,927.80
		SUBTOTAL 2				$13,520.63	$18,298.75
xxx	xxx	MISCELLANEOUS & CONTINGENCY	LS	20%		$2,704.13	$3,659.75
		GRAND TOTAL:				**$16,224.75**	**$21,958.50**
		CALLED:				**$16,300.00**	**$22,000.00**

NOTE

1. Typical roadway section is based on the plan drawings provided by HNTB Corporation.
2. Miscellaneous items include Engineering Design Fee, Survey and Material Testing.

PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPE D DRIVEWAY CONSOLIDATION

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT Low	AMOUNT High
104	503	REMOV CONC (RIPRAP)	SY	12.3	$7.00	$86.10	
104	503	REMOV CONC (RIPRAP)	SY	123	$7.00		$861.00
104	509	REMOV CONC (SDWLK)	SY	14.2206	$7.00	$99.54	
104	509	REMOV CONC (SDWLK)	SY	14.2206	$7.00		$99.54
104	511	REMOV CONC (DRVWY)	SY	21.33	$7.00	$149.31	
104	511	REMOV CONC (DRVWY)	SY	31.11	$7.00		$217.77
104	513	REMOV CONC (CURB & GUTTER)	LF	132.66	$5.00	$663.30	$663.30
104	514	REMOV CONC (CURB)	LF	61.37	$5.00	$306.85	
104	514	REMOV CONC (CURB)	LF	61.37	$5.00		$306.85
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY		$150.00		
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY		$150.00		
340	545	ASPH CONC (TY D)(SURF)	CY		$200.00		
340	545	ASPH CONC (TY D)(SURF)	CY		$200.00		
360	501	CONC PAV (CONT REINF)(10 ")	SY	53.28	$100.00	$5,328.00	$5,328.00
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	2.84	$250.00	$710.00	
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	3.93	$250.00		$982.50
432	547	RIPRAP (CONC)(CL B)	CY	6.8	$250.00	$1,700.00	
432	547	RIPRAP (CONC)(CL B)	CY	8.23	$250.00		$2,057.50
529	505	CONC CURB (DOWEL)(6 ")	LF	251.15	$6.00	$1,506.90	
529	505	CONC CURB (DOWEL)(6 ")	LF	284.15	$6.00		$1,704.90
529	511	CONC CURB AND GUTTER (6")	LF	117.8	$10.00	$1,178.00	$1,178.00
531	502	CONCRETE SIDEWALKS	SY	30.13	$25.00	$753.25	
531	502	CONCRETE SIDEWALKS	SY	39.91	$25.00		$997.75
536	510	CONC DIRECT ISLAND (DOWEL)	SY	16.71	$50.00	$835.50	
536	510	CONC DIRECT ISLAND (DOWEL)	SY	16.71	$50.00		$835.50
644	501	SMALL RDSD SGN ASSM (TY A)	EA	2	$500.00	$1,000.00	$1,000.00
666	533	REFL PAV MRK TY I (Y) (ISLAND)	SF	150.39	$6.00	$902.34	$902.34
666	534	REFL PAV MRK TY I (Y) (MED NOSE)	EA	1	$100.00	$100.00	$100.00
666	564	REFL PAV MRK TY II (Y) (ISLAND)	SF	150.39	$6.00	$902.34	$902.34
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	74	$7.00	$518.00	
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	114	$7.00		$798.00
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	25	$25.00	$625.00	
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	25	$25.00		$625.00
668	511	PREFAB PAV MRK TY A (W) (ARROW)	EA	1	$200.00	$200.00	$200.00
668	515	PREFAB PAV MRK TY A (W) (WORD)	EA	1	$250.00	$250.00	$250.00
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	7	$5.00	$35.00	
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	11	$5.00		$55.00
678	503	PAV SURF PREP FOR MRKS (8")	LF	74	$0.50	$37.00	
678	503	PAV SURF PREP FOR MRKS (8")	LF	114	$0.50		$57.00
678	506	PAV SURF PREP FOR MRKS (24")	LF	25	$0.10	$2.50	
678	506	PAV SURF PREP FOR MRKS (24")	LF	25	$0.10		$2.50
678	507	PAV SURF PREP FOR MRKS (ARROW)	EA	1	$20.00	$20.00	$20.00
678	508	PAV SURF PREP FOR MRKS (WORD)	EA	1	$20.00	$20.00	$20.00
xxx	xxx	OBTAIN TEMPRORY CONSTRUCTION EASEMENT	LS	1	$1,500.00	$1,500.00	$1,500.00
xxx	xxx	BEAUTIFYING ROADSIDE	LS	1	$1,500.00	$1,500.00	$1,500.00
502	501	BARRICADES, SIGNS AND TRAF HANDLE	MO	2	$3,500.00	$7,000.00	$7,000.00
		SUBTOTAL 1				$27,928.93	$30,164.79
xxx	xxx	BONDS	LS	5%		$1,396.45	$1,508.24
500	501	MOBILIZATION	LS	20%		$5,585.79	$6,032.96
		SUBTOTAL 2				$34,911.17	$37,705.99
xxx	xxx	MISCELLANEOUS & CONTINGENCY	LS	20%		$6,982.23	$7,541.20
		GRAND TOTAL:				**$41,893.40**	**$45,247.19**
		CALLED:				**$41,900.00**	**$45,300.00**

NOTE

1. Typical roadway section is based on the plan drawings provided by HNTB Corporation.
2. Miscellaneous items include Engineering Design Fee, Survey and Material Testing.

PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPE E RIGHT TURN BAY

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT Low	AMOUNT High
104	503	REMOV CONC (RIPRAP)	SY	107.85	$7.00	$754.95	
104	503	REMOV CONC (RIPRAP)	SY	107.85	$7.00		$754.95
104	509	REMOV CONC (SDWLK)	SY	95.51	$7.00	$668.57	
104	509	REMOV CONC (SDWLK)	SY	95.51	$7.00		$668.57
104	511	REMOV CONC (DRVWY)	SY	0	$7.00	$0.00	
104	511	REMOV CONC (DRVWY)	SY	0	$7.00		$0.00
104	513	REMOV CONC (CURB & GUTTER)	LF	273.9	$5.00	$1,369.50	$1,369.50
104	514	REMOV CONC (CURB)	LF	0	$5.00	$0.00	
104	514	REMOV CONC (CURB)	LF	0	$5.00		$0.00
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	8.79	$150.00	$1,318.50	
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	8.79	$150.00		$1,318.50
340	545	ASPH CONC (TY D)(SURF)	CY	8.79	$200.00	$1,758.00	
340	545	ASPH CONC (TY D)(SURF)	CY	8.79	$200.00		$1,758.00
360	557	CONC PAV (JOINT REINF)(10")	SY	210.99	$100.00	$21,099.00	$21,099.00
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	12.52	$250.00	$3,130.00	
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	12.52	$250.00		$3,130.00
529	511	CONC CURB AND GUTTER (6")	LF	256.96	$10.00	$2,569.60	$2,569.60
529	512	CONC CURB (TY A)(MOUNTABLE)	LF	0	$6.00	$0.00	
529	512	CONC CURB (TY A)(MOUNTABLE)	LF	0	$6.00		$0.00
531	502	CONCRETE SIDEWALKS	SY	103.7023	$25.00	$2,592.56	
531	502	CONCRETE SIDEWALKS	SY	103.7023	$25.00		$2,592.56
536	510	CONC DIRECT ISLAND (DOWEL)	SY	0	$50.00	$0.00	
536	510	CONC DIRECT ISLAND (DOWEL)	SY	0	$50.00		$0.00
644	501	SMALL RDSD SGN ASSM (TY A)	EA	2	$500.00	$1,000.00	$1,000.00
666	502	REFL PAV MRK TY I (W) (4") (BRK)	LF	50	$1.00	$50.00	$50.00
666	524	REFL PAV MRK TY I (Y) (4") (SLD)	LF	400	$1.00	$400.00	$400.00
666	533	REFL PAV MRK TY I (Y) (ISLAND)	SF	0	$6.00	$0.00	$0.00
666	564	REFL PAV MRK TY II (Y) (ISLAND)	SF	0	$6.00	$0.00	$0.00
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	80	$7.00	$560.00	
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	120	$7.00		$840.00
668	507	PREFAB PAV MRK TY A (W) (12") (SLD)	LF	125	$15.00	$1,875.00	$1,875.00
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	36.5	$25.00	$912.50	
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	36.5	$25.00		$912.50
668	511	PREFAB PAV MRK TY A (W) (ARROW)	EA	1	$200.00	$200.00	$200.00
668	515	PREFAB PAV MRK TY A (W) (WORD)	EA	1	$250.00	$250.00	$250.00
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	12	$5.00	$60.00	
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	8	$5.00		$40.00
677	501	ELIM EXT PAV MRK & MRKR (4")	LF	33	$0.25	$8.25	$8.25
677	504	ELIM EXT PAV MRK & MRKR (12")	LF	104	$1.00	$104.00	$104.00
677	506	ELIM EXT PAV MRK & MRKR (24")	LF	24	$1.50	$36.00	$36.00
678	503	PAV SURF PREP FOR MRKS (8")	LF	0	$0.05	$6.25	
678	503	PAV SURF PREP FOR MRKS (8")	LF	0	$0.05		$0.00
678	504	PAV SURF PREP FOR MRKS (12")	LF	100	$0.08	$8.00	$8.00
678	506	PAV SURF PREP FOR MRKS (24")	LF	24	$0.10	$2.40	
678	506	PAV SURF PREP FOR MRKS (24")	LF	24	$0.10		$2.40
678	507	PAV SURF PREP FOR MRKS (ARROW)	EA	0	$20.00	$0.00	$0.00
678	508	PAV SURF PREP FOR MRKS (WORD)	EA	0	$20.00	$0.00	$0.00
xxx	xxx	RELOCATE STORM INLET	EA	0	$200.00	$0.00	
xxx	xxx	RELOCATE STORM INLET	EA	1	$200.00		$200.00
xxx	xxx	RELOCATE STORM TRUNK	LF	0	$100.00	$0.00	
xxx	xxx	RELOCATE STORM TRUNK	LF	300	$100.00		$30,000.00
xxx	xxx	SIGNAL POLE AND FOUNDATION REPLACEMENT	EA	1.00	$0.00	$0.00	
xxx	xxx	SIGNAL POLE AND FOUNDATION REPLACEMENT	EA	1.00	$5,000.00		$5,000.00
xxx	xxx	SIGNAL HEAD ASSEM REPLACEMENT	EA	0.00	$500.00	$0.00	$0.00
7157	503	SPAN WIRE CABLE REPLACEMENT	EA	0.00	$250.00	$0.00	
7157	503	SPAN WIRE CABLE REPLACEMENT	EA	4.00	$250.00		$1,000.00
xxx	xxx	SIGNAL CONTROLLER AND FOUNDATION	LS	1.00	$0.00	$0.00	
xxx	xxx	SIGNAL CONTROLLER AND FOUNDATION	LS	1.00	$8,500.00		$8,500.00
xxx	xxx	ELECTRICAL CABLES	LS	1.00	$0.00	$0.00	
xxx	xxx	ELECTRICAL CABLES	LS	1.00	$2,500.00		$2,500.00
xxx	xxx	UNDERGROUND CONDUITS	LS	1.00	$0.00	$0.00	
xxx	xxx	UNDERGROUND CONDUITS	LS	1.00	$1,500.00		$1,500.00
xxx	xxx	OBTAIN TEMPRORY CONSTRUCTION EASEMENT	LS	1.00	$1,500.00	$1,500.00	$1,500.00
xxx	xxx	BEAUTIFYING ROADSIDE	LS	1.00	$1,500.00	$1,500.00	$1,500.00
xxx	xxx	OBTAIN RIGHT OF WAY*	LS	1.00	$0.00	$0.00	
xxx	xxx	OBTAIN RIGHT OF WAY	LS	1.00	$10,000.00		$10,000.00
xxx	xxx	RELOCATE METRO BUS SHELTER	LS	1.00	$0.00	$0.00	
xxx	xxx	RELOCATE METRO BUS SHELTER	LS	1.00	$2,000.00	$2,000.00	$2,000.00
xxx	xxx	RELOCATE FIRE HYDRANT	EA	1.00	$1,000.00	$1,000.00	
xxx	xxx	RELOCATE FIRE HYDRANT	EA	1.00	$1,500.00		$1,500.00
xxx	xxx	RELOCATE POWER POLE	EA	3.00	$1,000.00	$3,000.00	
xxx	xxx	RELOCATE POWER POLE	EA	5.00	$1,500.00		$7,500.00
xxx	xxx	RELOCATE EXISTING LUMINAIRE	EA	1.00	$3,000.00	$3,000.00	
xxx	xxx	RELOCATE EXISTING LUMINAIRE	EA	2.00	$3,000.00		$6,000.00
xxx	xxx	REMOVE EXISTING TREE	EA	1.00	$1,000.00	$1,000.00	
xxx	xxx	REMOVE EXISTING TREE	EA	5.00	$1,000.00		$5,000.00
502	501	BARRICADES, SIGNS AND TRAF HANDLE	MO	1.5	$3,500.00	$5,250.00	$5,250.00
		SUBTOTAL 1				$58,983.08	$129,936.83
xxx	xxx	BONDS	LS	5%		$2,949.15	$6,496.84
500	501	MOBILIZATION	LS	20%		$11,796.62	$25,987.37
		SUBTOTAL 2				$73,728.85	$162,421.03
xxx	xxx	MISCELLANEOUS	LS	20%		$14,745.77	$32,484.21
		GRAND TOTAL:				**$88,474.62**	**$194,905.24**
		CALLED:				**$88,500.00**	**$195,000.00**

NOTES:

1. Typical roadway section is based on the plan drawings provided by HNTB Corporation.
2. Miscellaneous items include Engineering Design Fee, Survey and Material Testing.
3. Metro items paid by Metro or by agreement.
*** Right of Way donated.**

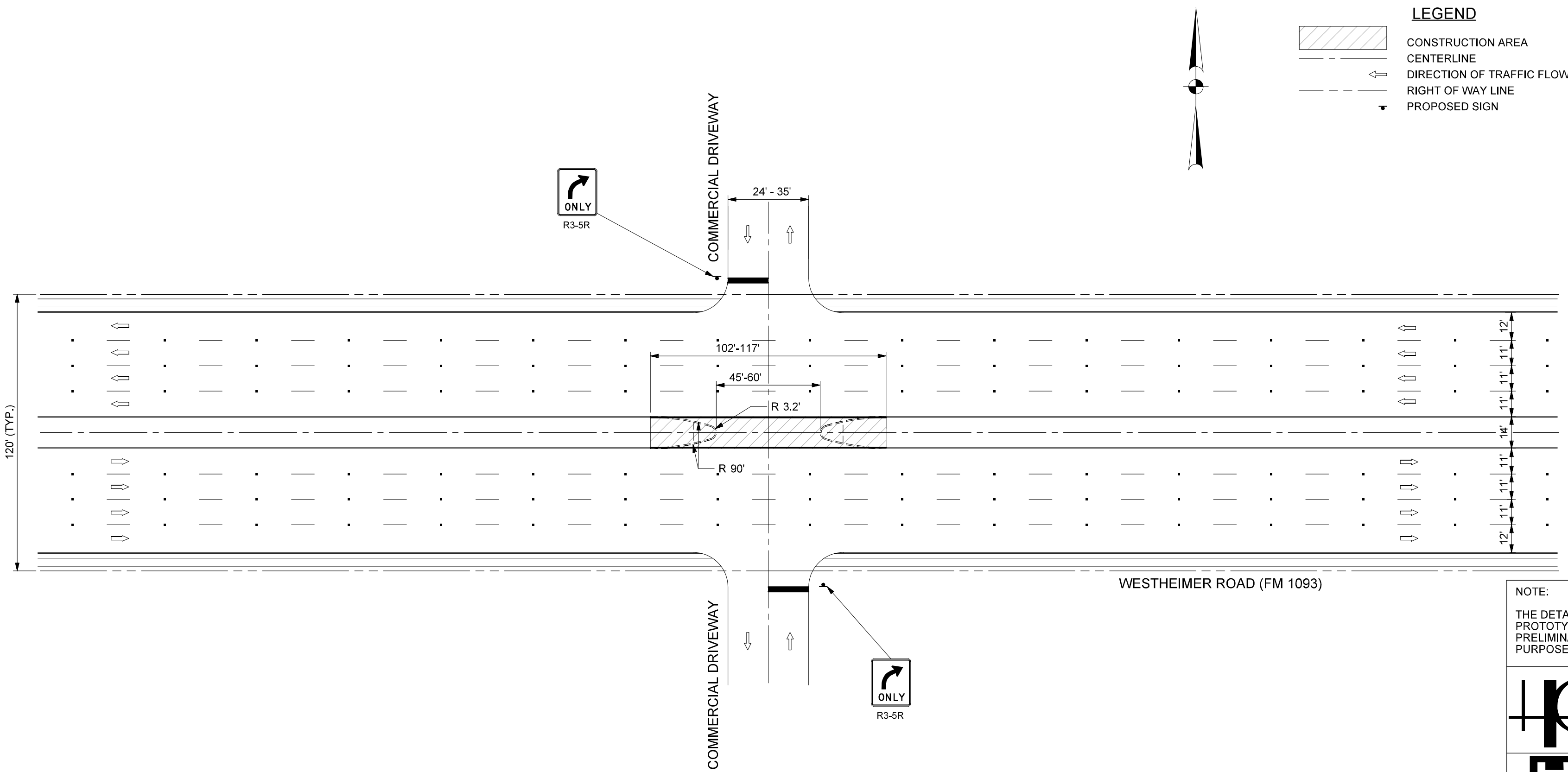
PRELIMINARY CONSTRUCTION COST ESTIMATE
TYPE F T-INTERSECTION TREATMENT

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT Low	AMOUNT High
104	503	REMOV CONC (RIPRAP)	SY	135.38	$7.00	$947.66	
104	503	REMOV CONC (RIPRAP)	SY	135.38	$7.00		$947.66
104	514	REMOV CONC (CURB)	LF	212.66	$7.00	$1,488.62	
104	514	REMOV CONC (CURB)	LF	212.66	$7.00		$1,488.62
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	4.17	$150.00	$625.50	
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	4.17	$150.00		$625.50
340	545	ASPH CONC (TY D)(SURF)	CY	4.17	$200.00	$834.00	
340	545	ASPH CONC (TY D)(SURF)	CY	4.17	$200.00		$834.00
360	557	CONC PAV (JOINT REINF)(10")	SY	0	$100.00	$0.00	
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	0	$250.00	$0.00	
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	0	$250.00		$0.00
432	547	RIPRAP (CONC)(CL B)	CY	1.52	$250.00	$380.00	
432	547	RIPRAP (CONC)(CL B)	CY	1.52	$250.00		$380.00
529	505	CONC CURB (DOWEL)(6 ")	LF	214.37	$6.00	$1,286.22	
529	505	CONC CURB (DOWEL)(6 ")	LF	214.37	$6.00		$1,286.22
529	511	CONC CURB AND GUTTER (6")	LF	0	$10.00	$0.00	$0.00
529	512	CONC CURB (TY A)(MOUNTABLE)	LF	512	$6.00	$3,072.00	
529	512	CONC CURB (TY A)(MOUNTABLE)	LF	524	$6.00		$3,144.00
644	501	SMALL RDSD SGN ASSM (TY A)	EA	7	$500.00	$3,500.00	$3,500.00
658	505	DEL ASM TY A (D-DW)	EA	26	$50.00	$1,300.00	$1,300.00
666	502	REFL PAV MRK TY I (W) (4") (BRK)	LF	0	$1.00	$0.00	$0.00
666	503	REFL PAV MRK TY I (W) (4") (DOT)	LF	32.45	$2.00	$64.90	$64.90
666	514	REFL PAV MRK TY I (W) (DBL ARROW)	EA	1	$150.00	$150.00	$150.00
666	524	REFL PAV MRK TY I (Y) (4") (SLD)	LF	0	$1.00	$0.00	$0.00
666	533	REFL PAV MRK TY I (Y) (ISLAND)	SF	0	$6.00	$0.00	$0.00
666	537	REFL PAV MRK TY II (W) (4") (DOT)	LF	32.45	$1.00	$32.45	$32.45
666	546	REFL PAV MRK TY II (W) (DBL ARROW)	EA	1	$50.00	$50.00	$50.00
666	564	REFL PAV MRK TY II (Y) (ISLAND)	SF	0	$6.00	$0.00	$0.00
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	160	$7.00	$1,120.00	
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	160	$7.00		$1,120.00
668	507	PREFAB PAV MRK TY A (W) (12") (SLD)	LF	0	$15.00	$0.00	$0.00
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	21	$25.00	$525.00	
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	21	$25.00		$525.00
668	511	PREFAB PAV MRK TY A (W) (ARROW)	EA	12	$200.00	$2,400.00	$2,400.00
668	515	PREFAB PAV MRK TY A (W) (WORD)	EA	4	$250.00	$1,000.00	$1,000.00
672	508	RAIS PVA MRKR CL B (REFL) TY I-R	EA	8	$7.00	$56.00	$56.00
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	8	$5.00	$40.00	
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	8	$5.00		$40.00
677	501	ELIM EXT PAV MRK & MRKR (4")	LF	0	$0.25	$0.00	$0.00
677	503	ELIM EXT PAV MRK & MRKR (8")	LF	160	$0.50	$80.00	$80.00
677	504	ELIM EXT PAV MRK & MRKR (12")	LF	0	$1.00	$0.00	$0.00
677	506	ELIM EXT PAV MRK & MRKR (24")	LF	6	$1.50	$9.00	$9.00
678	503	PAV SURF PREP FOR MRKS (8")	LF	160	$0.05	$8.00	
678	503	PAV SURF PREP FOR MRKS (8")	LF	160	$0.05		$8.00
678	504	PAV SURF PREP FOR MRKS (12")	LF	0	$0.08	$0.00	$0.00
678	506	PAV SURF PREP FOR MRKS (24")	LF	21	$0.10	$2.10	
678	506	PAV SURF PREP FOR MRKS (24")	LF	21	$0.10		$2.10
678	507	PAV SURF PREP FOR MRKS (ARROW)	EA	13	$20.00	$260.00	$260.00
678	508	PAV SURF PREP FOR MRKS (WORD)	EA	4	$20.00	$80.00	$80.00
xxx	xxx	SIGNAL POLE AND FOUNDATION REPLACEMENT	EA	0.00	$0.00	$0.00	
xxx	xxx	SIGNAL HEAD ASSEM REPLACEMENT	EA	6.00	$500.00	$3,000.00	$3,000.00
xxx	xxx	REMOVE MAJOR STREET PEDESTRIAN SIGNALS	EA	0.00	$150.00	$0.00	
xxx	xxx	REMOVE MAJOR STREET PEDESTRIAN SIGNALS	EA	4.00	$150.00		$600.00
xxx	xxx	ELECTRICAL CABLES	LS	1.00	$1,000.00	$1,000.00	
xxx	xxx	ELECTRICAL CABLES	LS	1.00	$2,000.00		$2,000.00
xxx	xxx	UNDERGROUND CONDUITS	LS	1.00	$0.00	$0.00	
xxx	xxx	UNDERGROUND CONDUITS	LS	1.00	$1,500.00		$1,500.00
xxx	xxx	OBTAIN TEMPRORY CONSTRUCTION EASEMENT	LS	0.00	$1,500.00	$0.00	$0.00
xxx	xxx	BEAUTIFYING ROADSIDE	LS	1.00	$1,500.00	$1,500.00	$1,500.00
xxx	xxx	OBTAIN RIGHT OF WAY	LS	0.00	$10,000.00	$0.00	$0.00
xxx	xxx	RELOCATE METRO BUS SHELTER	LS	0.00	$2,000.00	$0.00	
xxx	xxx	RELOCATE METRO BUS SHELTER	LS	1.00	$2,000.00		$2,000.00
xxx	xxx	RELOCATE METRO BUS STOP	LS	0.00	$500.00	$0.00	
xxx	xxx	RELOCATE METRO BUS STOP	LS	1.00	$500.00		$500.00
502	501	BARRICADES, SIGNS AND TRAF HANDLE	MO	2	$3,500.00	$7,000.00	$7,000.00
		SUBTOTAL 1				$31,811.45	$37,483.45
xxx	xxx	BONDS	LS	5%		$1,590.57	$1,874.17
500	501	MOBILIZATION	LS	20%		$6,362.29	$7,496.69
		SUBTOTAL 2				$39,764.31	$46,854.31
xxx	xxx	MISCELLANEOUS & CONTINGENCY	LS	20%		$7,952.86	$9,370.86
		GRAND TOTAL:				**$47,717.18**	**$56,225.18**
		CALLED:				**$47,800.00**	**$56,300.00**

Note: 1. Typical roadway section is based on the plan drawings provided by HNTB Corporation.
2. Miscellaneous items include Engineering Design Fee, Survey and Material Testing.

Appendix

Short-Range Improvement Layouts



NOTE:

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WESTHEIMER CORRIDOR SHORT-RANGE IMPROVEMENT TYPES

TYPE A
MEDIAN CLOSURE

THIS EXHIBIT IS FOR REVIEW AND CONSIDERATION ONLY AND NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES.

01/09/02
DATE

SCALE: 1" = 50'		SHEET 2 OF 14	
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093

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01/09/2002

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	514	REMOV CONC (CURB)	LF	124
432	547	RIPRAP (CONC)(CL B)	CY	15
432	547	RIPRAP (CONC)(CL B)	CY	18.8
529	505	CONC CURB (DOWEL)(6 ")	LF	204
529	505	CONC CURB (DOWEL)(6 ")	LF	234
644	501	SMALL RDSD SGN ASSM (TY A)	EA	2
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	24
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	35
678	506	PAV SURF PREP FOR MRKS (24")	LF	24
678	506	PAV SURF PREP FOR MRKS (24")	LF	35

NOTE: SOME ITEMS ARE CALLED OUT TWICE TO SHOW THE LOW END AND THE HIGH END OF THE QUANTITY RANGE. PLEASE SEE ASSOCIATED EXCEL SPREADSHEET (INCLUDED SEPARATELY) FOR FURTHER DETAILS.

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WESTHEIMER CORRIDOR
SHORT-RANGE
IMPROVEMENT TYPES

ESTIMATED QUANTITIES
FOR TYPE A
IMPROVEMENT

SCALE: NOT TO SCALE SHEET 3 OF 14

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093

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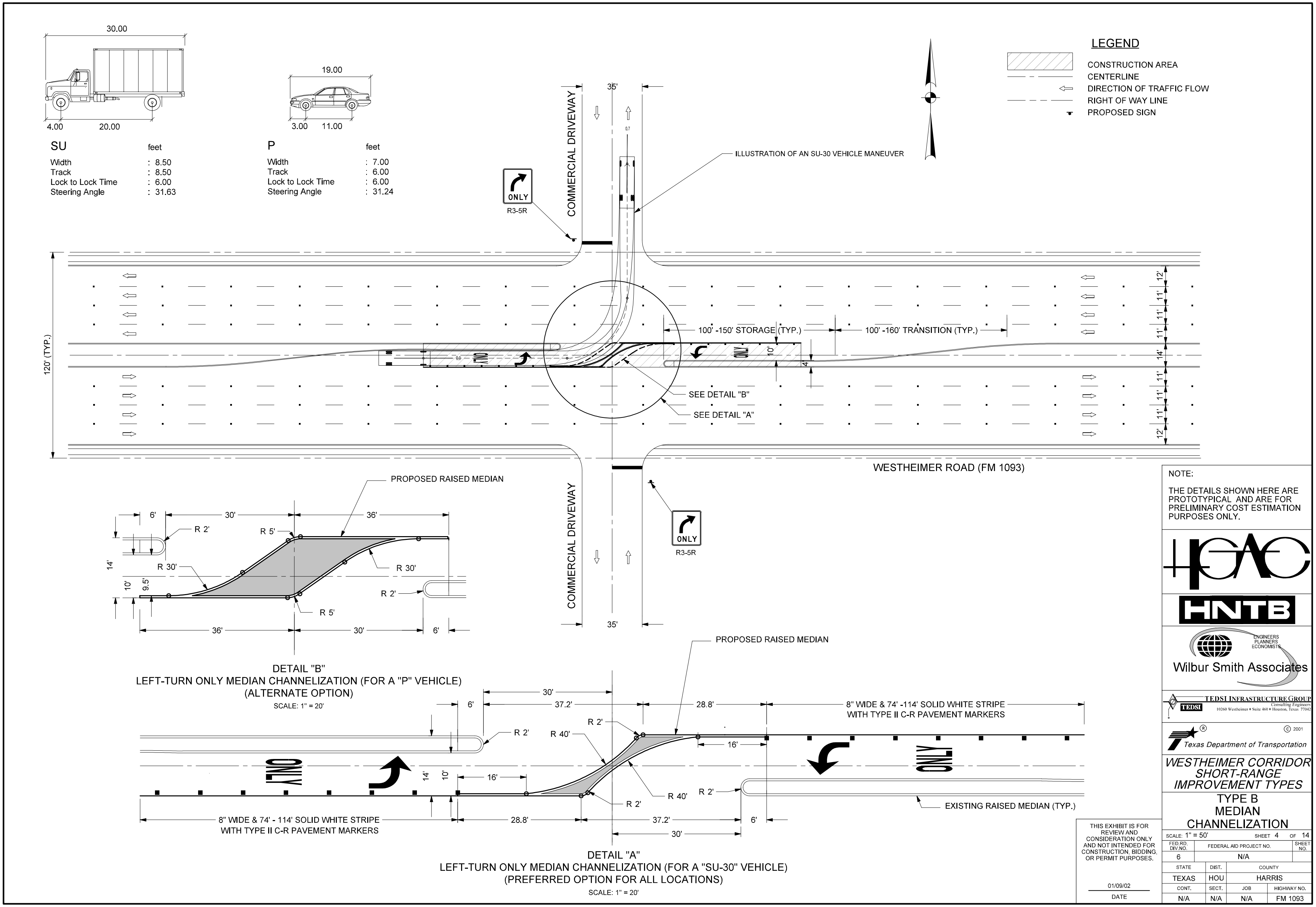
01/10/2002



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01/09/2002

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	514	REMOV CONC (CURB)	LF	0
432	547	RIPRAP (CONC)(CL B)	CY	1
529	505	CONC CURB (DOWEL)(6 ")	LF	116
644	501	SMALL RDSD SGN ASSM (TY A)	EA	2
666	533	REFL PAV MRK TY I (Y) (ISLAND)	SF	54
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	148
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	228
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	24
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	35
668	511	PREFAB PAV MRK TY A (W) (ARROW)	EA	2
668	515	PREFAB PAV MRK TY A (W) (WORD)	EA	2
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	14
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	22
678	503	PAV SURF PREP FOR MRKS (8")	LF	148
678	503	PAV SURF PREP FOR MRKS (8")	LF	228
678	506	PAV SURF PREP FOR MRKS (24")	LF	24
678	506	PAV SURF PREP FOR MRKS (24")	LF	35
678	507	PAV SURF PREP FOR MRKS (ARROW)	EA	2
678	508	PAV SURF PREP FOR MRKS (WORD)	EA	2

NOTE: SOME ITEMS ARE CALLED OUT TWICE TO SHOW THE LOW END AND THE HIGH END OF THE QUANTITY RANGE. PLEASE SEE ASSOCIATED EXCEL SPREADSHEET (INCLUDED SEPARATELY) FOR FURTHER DETAILS.

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WESTHEIMER CORRIDOR SHORT-RANGE IMPROVEMENT TYPES

ESTIMATED QUANTITIES FOR TYPE B IMPROVEMENT

SCALE: NOT TO SCALE SHEET 5 OF 14

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093

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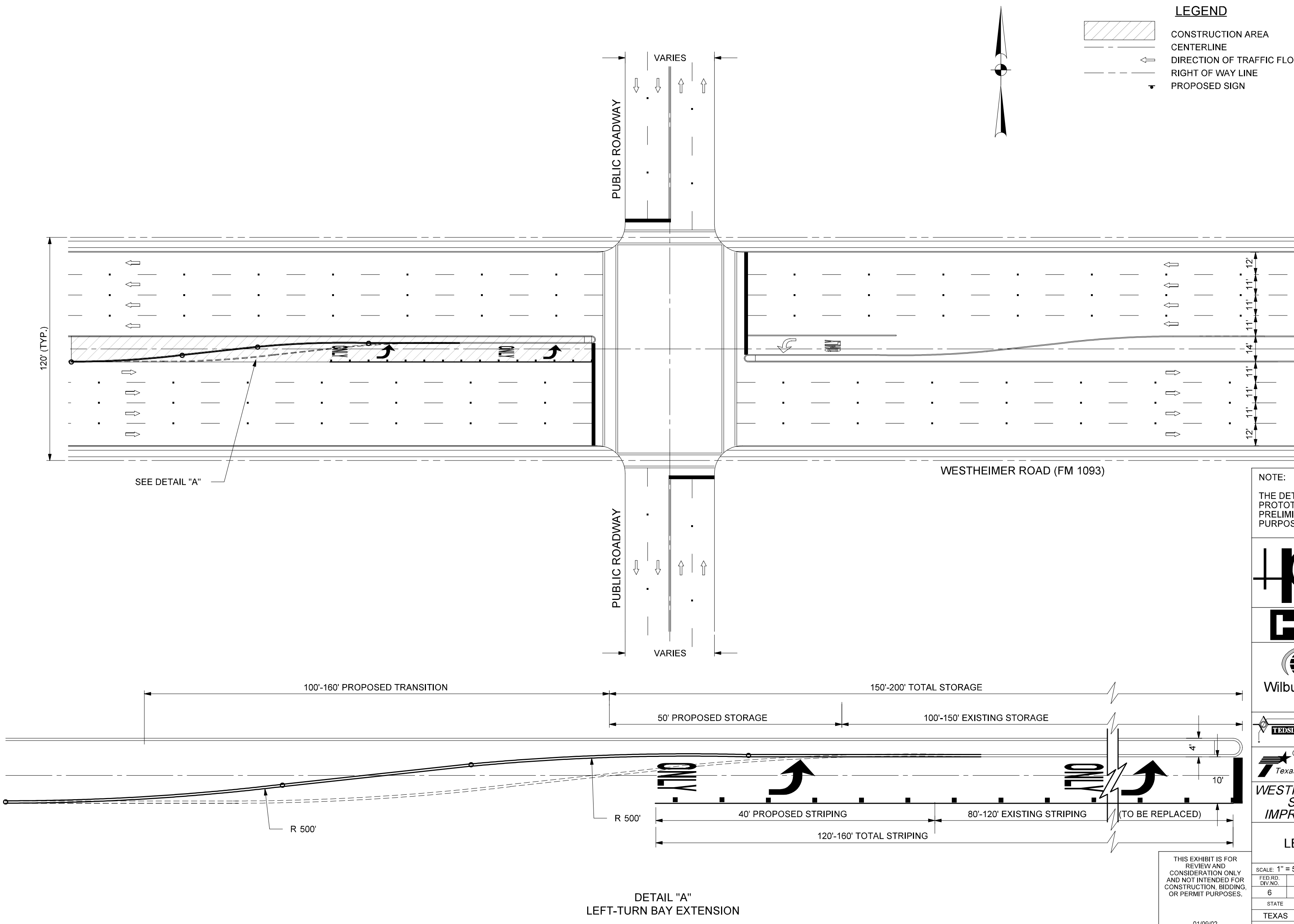
01/10/2002



NOTE:

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WESTHEIMER CORRIDOR SHORT-RANGE IMPROVEMENT TYPES

TYPE C
LEFT-TURN BAY EXTENSION

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01/09/02
DATE

SCALE: 1" = 50' SHEET 6 OF 14

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093

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01/09/2002

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	503	REMOV CONC (RIPRAP)	SY	55
104	503	REMOV CONC (RIPRAP)	SY	119
104	514	REMOV CONC (CURB)	LF	200
104	514	REMOV CONC (CURB)	LF	260
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	2.29
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	4.96
340	545	ASPH CONC (TY D)(SURF)	CY	2.29
340	545	ASPH CONC (TY D)(SURF)	CY	4.96
529	505	CONC CURB (DOWEL)(6 ")	LF	200
529	505	CONC CURB (DOWEL)(6 ")	LF	260
649	504	RELOC SMALL RDSD SGN ASSMS	EA	1
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	120
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	160
668	511	PREFAB PAV MRK TY A (W) (ARROW)	EA	2
668	515	PREFAB PAV MRK TY A (W) (WORD)	EA	2
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	12
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	16
677	503	ELIM EXT PAV MRK & MRKR (8")	LF	80
677	503	ELIM EXT PAV MRK & MRKR (8")	LF	120
677	507	ELIM EXT PAV MRK & MRKR (ARROW)	EA	1
677	508	ELIM EXT PAV MRK & MRKR (WORD)	EA	1
678	503	PAV SURF PREP FOR MRKS (8")	LF	120
678	503	PAV SURF PREP FOR MRKS (8")	LF	160
678	507	PAV SURF PREP FOR MRKS (ARROW)	EA	2
678	508	PAV SURF PREP FOR MRKS (WORD)	EA	2

NOTE: SOME ITEMS ARE CALLED OUT TWICE TO SHOW THE LOW END AND THE HIGH END OF THE QUANTITY RANGE. PLEASE SEE ASSOCIATED EXCEL SPREADSHEET (INCLUDED SEPARATELY) FOR FURTHER DETAILS.

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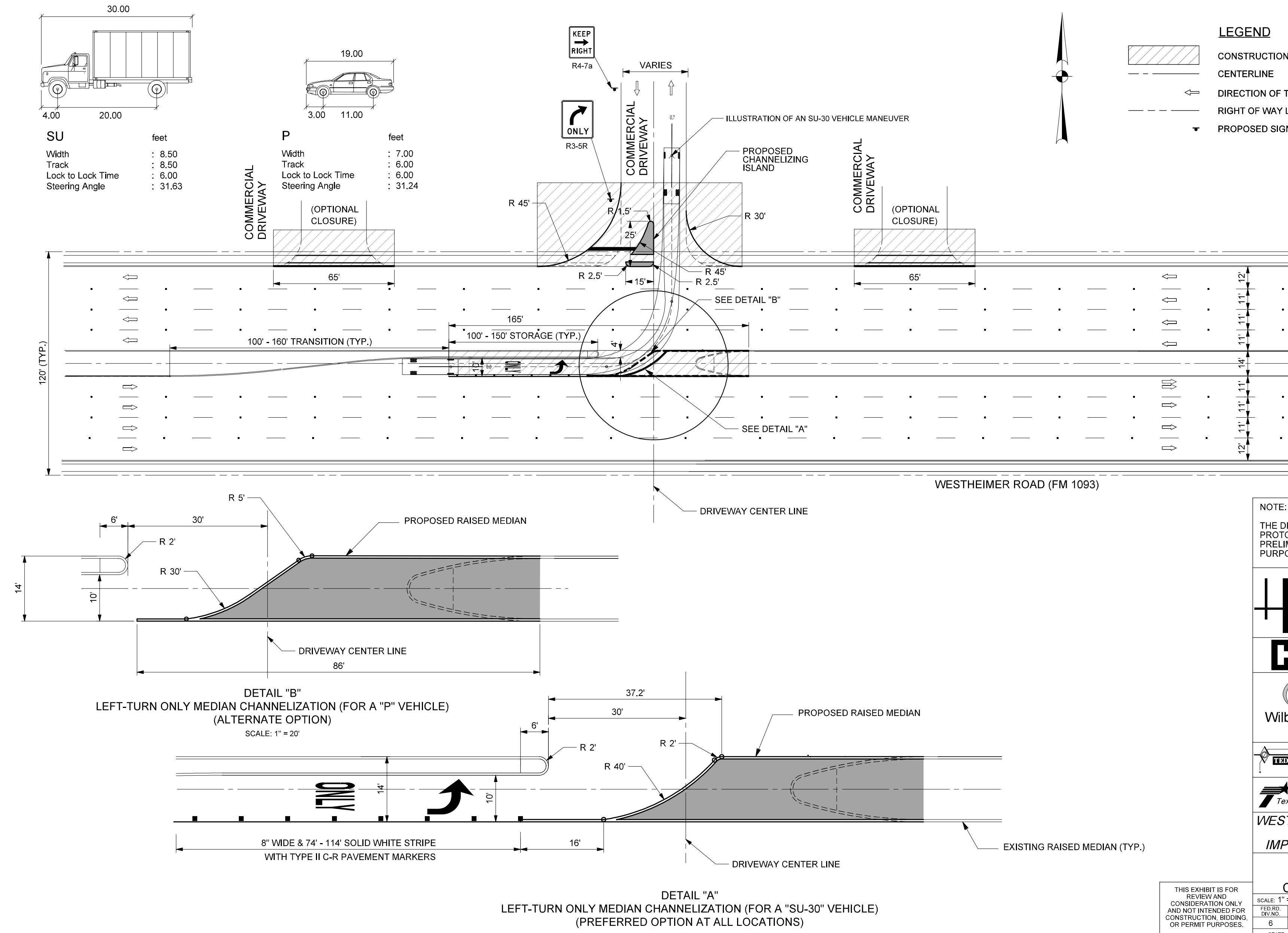
WESTHEIMER CORRIDOR SHORT-RANGE IMPROVEMENT TYPES

ESTIMATED QUANTITIES FOR TYPE C IMPROVEMENT

SCALE: NOT TO SCALE		SHEET 7	OF 14
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093



DETAIL "B"
LEFT-TURN ONLY MEDIAN CHANNELIZATION (FOR A "P" VEHICLE)
(ALTERNATE OPTION)
SCALE: 1" = 20'

DETAIL "A"
LEFT-TURN ONLY MEDIAN CHANNELIZATION (FOR A "SU-30" VEHICLE)
(PREFERRED OPTION AT ALL LOCATIONS)
SCALE: 1" = 20'

NOTE:
THE DETAILS SHOWN HERE ARE PROTOTYPICAL AND ARE FOR PRELIMINARY COST ESTIMATION PURPOSES ONLY.

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WESTHEIMER CORRIDOR SHORT-RANGE IMPROVEMENT TYPES

TYPE D
DRIVEWAY CONSOLIDATION

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01/09/02
DATE

SCALE: 1" = 50'		SHEET 8 OF 14	
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093

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01/09/2002

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	503	REMOV CONC (RIPRAP)	SY	12.3
104	503	REMOV CONC (RIPRAP)	SY	123
104	509	REMOV CONC (SDWLK)	SY	14.2206
104	509	REMOV CONC (SDWLK)	SY	14.2206
104	511	REMOV CONC (DRVWY)	SY	21.33
104	511	REMOV CONC (DRVWY)	SY	31.11
104	513	REMOV CONC (CURB & GUTTER)	LF	132.66
104	514	REMOV CONC (CURB)	LF	61.37
104	514	REMOV CONC (CURB)	LF	61.37
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	0
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	0
340	545	ASPH CONC (TY D)(SURF)	CY	0
340	545	ASPH CONC (TY D)(SURF)	CY	0
360	501	CONC PAV (CONT REINF)(10 ")	SY	53.28
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	2.84
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	3.93
432	547	RIPRAP (CONC)(CL B)	CY	6.8
432	547	RIPRAP (CONC)(CL B)	CY	8.23
529	505	CONC CURB (DOWEL)(6 ")	LF	251.15
529	505	CONC CURB (DOWEL)(6 ")	LF	284.15
529	511	CONC CURB AND GUTTER (6")	LF	117.8
531	502	CONCRETE SIDEWALKS	SY	30.13
531	502	CONCRETE SIDEWALKS	SY	39.91
536	510	CONC DIRECT ISLAND (DOWEL)	SY	16.71
536	510	CONC DIRECT ISLAND (DOWEL)	SY	16.71
644	501	SMALL RDSD SGN ASSM (TY A)	EA	2
666	533	REFL PAV MRK TY I (Y) (ISLAND)	SF	150.39
666	534	REFL PAV MRK TY I (Y) (MED NOSE)	EA	1
666	564	REFL PAV MRK TY II (Y) (ISLAND)	SF	150.39
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	74
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	114
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	25
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	25
668	511	PREFAB PAV MRK TY A (W) (ARROW)	EA	1
668	515	PREFAB PAV MRK TY A (W) (WORD)	EA	1
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	7
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	11
678	503	PAV SURF PREP FOR MRKS (8")	LF	74
678	503	PAV SURF PREP FOR MRKS (8")	LF	114
678	506	PAV SURF PREP FOR MRKS (24")	LF	25
678	506	PAV SURF PREP FOR MRKS (24")	LF	25
678	507	PAV SURF PREP FOR MRKS (ARROW)	EA	1
678	508	PAV SURF PREP FOR MRKS (WORD)	EA	1

NOTE: SOME ITEMS ARE CALLED OUT TWICE TO SHOW THE LOW END AND THE HIGH END OF THE QUANTITY RANGE. PLEASE SEE ASSOCIATED EXCEL SPREADSHEET (INCLUDED SEPARATELY) FOR FURTHER DETAILS.

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WESTHEIMER CORRIDOR
SHORT-RANGE
IMPROVEMENT TYPES

ESTIMATED QUANTITIES
FOR TYPE D
IMPROVEMENT

SCALE: NOT TO SCALE SHEET 9 OF 14

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093

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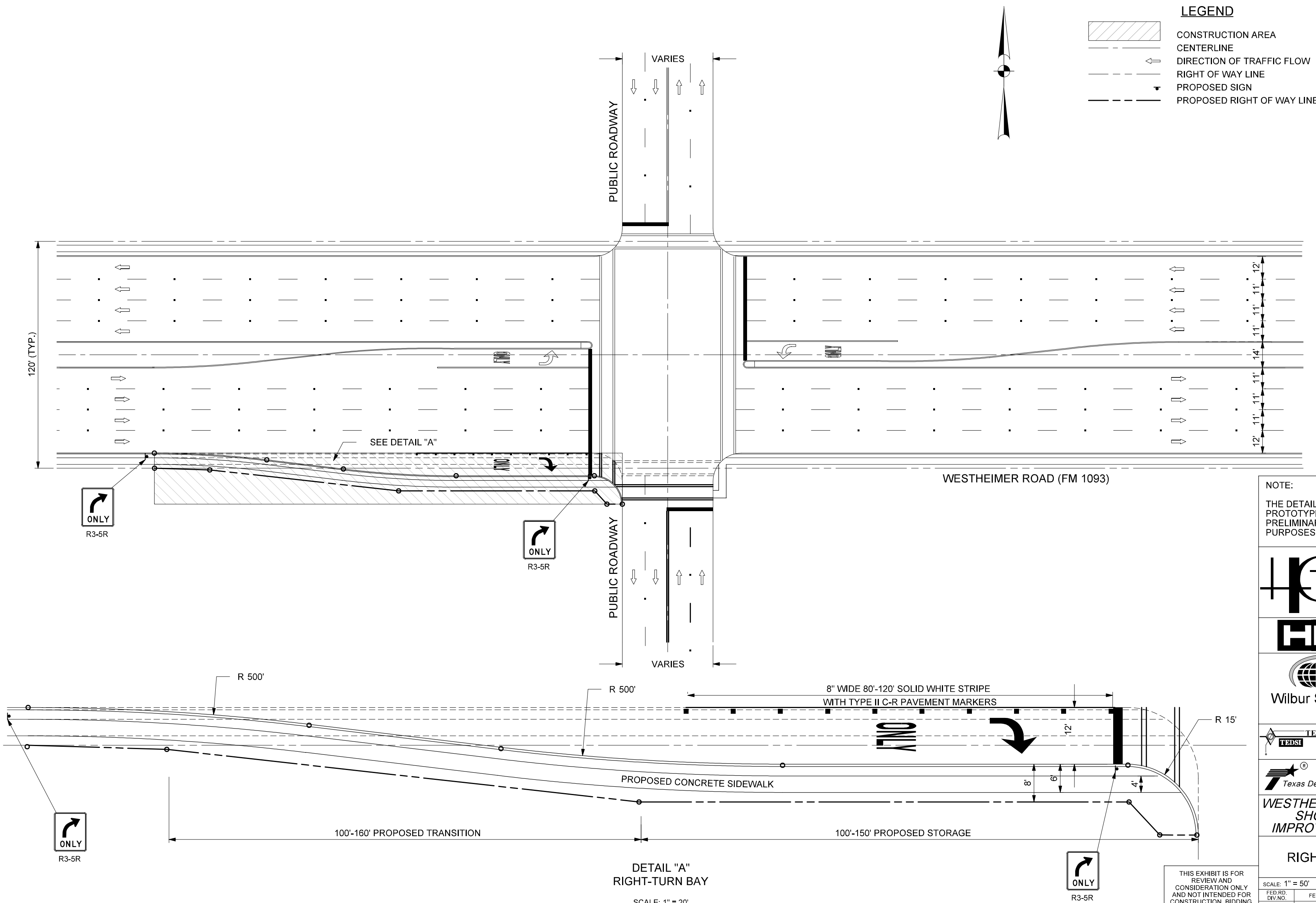
01/10/2002



DETAIL "A"
RIGHT-TURN BAY

SCALE: 1" = 20'

NOTE:

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WESTHEIMER CORRIDOR SHORT-RANGE IMPROVEMENT TYPES

TYPE E RIGHT-TURN BAY

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01/09/02
DATE

SCALE: 1" = 50'		SHEET 10 OF 14	
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093

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01/09/2002

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	503	REMOV CONC (RIPRAP)	SY	107.85
104	503	REMOV CONC (RIPRAP)	SY	107.85
104	509	REMOV CONC (SDWLK)	SY	95.51
104	509	REMOV CONC (SDWLK)	SY	95.51
104	511	REMOV CONC (DRVWY)	SY	0
104	511	REMOV CONC (DRVWY)	SY	0
104	513	REMOV CONC (CURB & GUTTER)	LF	273.9
104	514	REMOV CONC (CURB)	LF	0
104	514	REMOV CONC (CURB)	LF	0
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	8.79
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	8.79
340	545	ASPH CONC (TY D)(SURF)	CY	8.79
340	545	ASPH CONC (TY D)(SURF)	CY	8.79
360	557	CONC PAV (JOINT REINF)(13")	SY	210.99
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	12.52
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	12.52
529	511	CONC CURB AND GUTTER (6")	LF	256.96
529	512	CONC CURB (TY A)(MOUNTABLE)	LF	0
529	512	CONC CURB (TY A)(MOUNTABLE)	LF	0
531	502	CONCRETE SIDEWALKS	SY	103.7023
531	502	CONCRETE SIDEWALKS	SY	103.7023
536	510	CONC DIRECT ISLAND (DOWEL)	SY	0
536	510	CONC DIRECT ISLAND (DOWEL)	SY	0
644	501	SMALL RDSD SGN ASSM (TY A)	EA	2
666	502	REFL PAV MRK TY I (W) (4") (BRK)	LF	50
666	524	REFL PAV MRK TY I (Y) (4") (SLD)	LF	400
666	533	REFL PAV MRK TY I (Y) (ISLAND)	SF	0
666	564	REFL PAV MRK TY II (Y) (ISLAND)	SF	0
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	80
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	120
668	507	PREFAB PAV MRK TY A (W) (12") (SLD)	LF	125
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	36.5
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	36.5
668	511	PREFAB PAV MRK TY A (W) (ARROW)	EA	1
668	515	PREFAB PAV MRK TY A (W) (WORD)	EA	1
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	12
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	8
677	501	ELIM EXT PAV MRK & MRKR (4")	LF	33
677	504	ELIM EXT PAV MRK & MRKR (12")	LF	104
677	506	ELIM EXT PAV MRK & MRKR (24")	LF	24
678	503	PAV SURF PREP FOR MRKS (8")	LF	0
678	503	PAV SURF PREP FOR MRKS (8")	LF	0
678	504	PAV SURF PREP FOR MRKS (12")	LF	100
678	506	PAV SURF PREP FOR MRKS (24")	LF	24
678	506	PAV SURF PREP FOR MRKS (24")	LF	24
678	507	PAV SURF PREP FOR MRKS (ARROW)	EA	0
678	508	PAV SURF PREP FOR MRKS (WORD)	EA	0
7157	501	SIGNAL POLE REPLACEMENT	EA	1
7157	502	SIGNAL HEAD ASSEM REPLACE	EA	0
7157	503	SPAN WIRE CABLE REPLACEMENT	EA	4
7157	506	SIGNAL CONTROLLER CABINET REPLACE	EA	1

NOTE: SOME ITEMS ARE CALLED OUT TWICE TO SHOW THE LOW END AND THE HIGH END OF THE QUANTITY RANGE. PLEASE SEE ASSOCIATED EXCEL SPREADSHEET (INCLUDED SEPARATELY) FOR FURTHER DETAILS.

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WESTHEIMER CORRIDOR SHORT-RANGE IMPROVEMENT TYPES

ESTIMATED QUANTITIES FOR TYPE E IMPROVEMENT

SCALE: NOT TO SCALE		SHEET 11 OF 14	
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093

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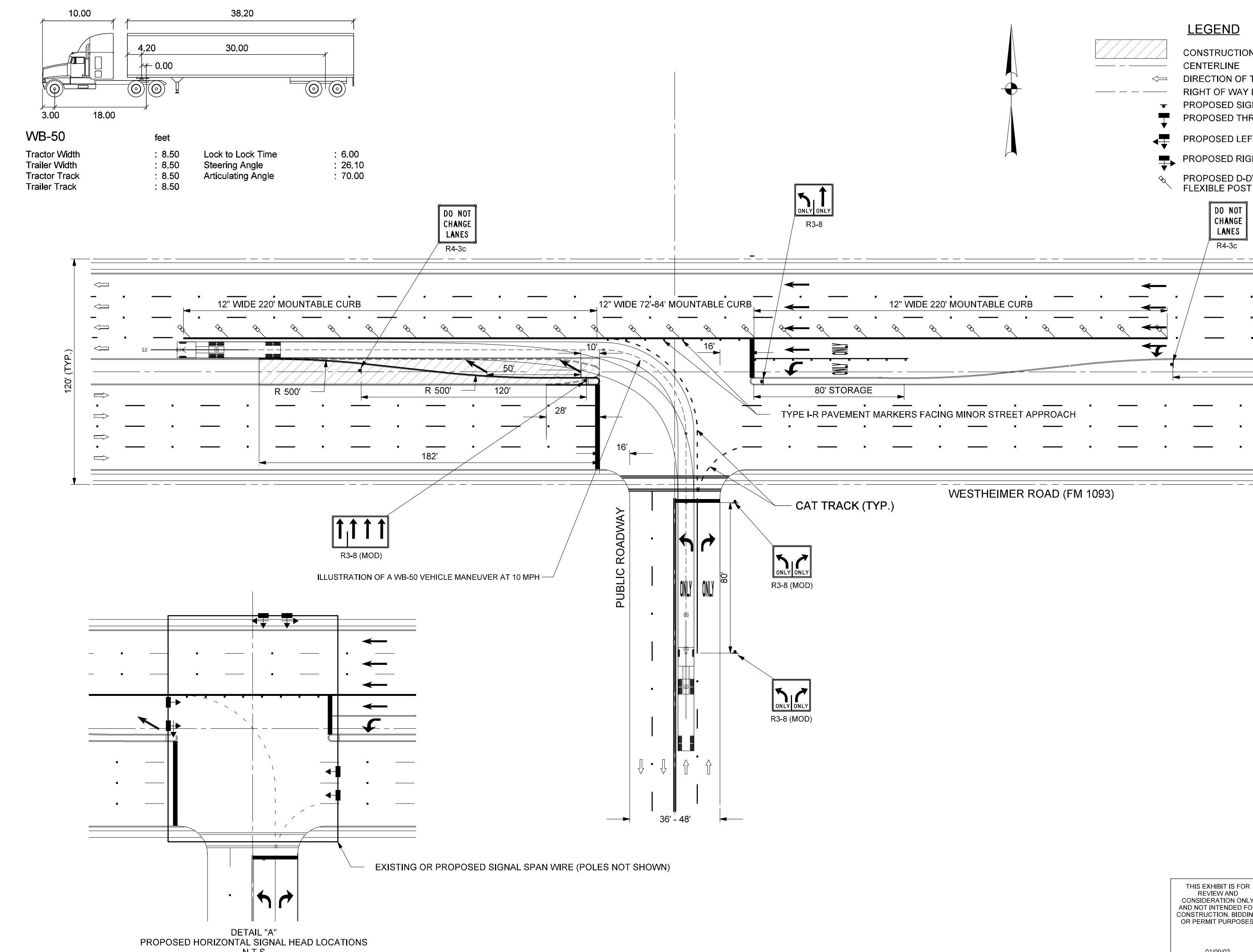

DETAIL "A"
PROPOSED HORIZONTAL SIGNAL HEAD LOCATIONS
N.T.S

NOTE:

THE DETAILS SHOWN HERE ARE PROTOTYPICAL AND ARE FOR PRELIMINARY COST ESTIMATION PURPOSES ONLY.

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WESTHEIMER CORRIDOR SHORT-RANGE IMPROVEMENT TYPES

TYPE F
SIGNALIZED "T"
INTERSECTION LANE USE

THIS EXHIBIT IS FOR REVIEW AND CONSIDERATION ONLY AND NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES.

01/09/02
DATE

SCALE: 1" = 50'		SHEET 12 OF 14	
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093

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01/09/2002

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	503	REMOV CONC (RIPRAP)	SY	135.38
104	503	REMOV CONC (RIPRAP)	SY	135.38
104	514	REMOV CONC (CURB)	LF	212.66
104	514	REMOV CONC (CURB)	LF	212.66
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	4.17
340	526	ASPH CONC (TY D)(LEVEL-UP)	CY	4.17
340	545	ASPH CONC (TY D)(SURF)	CY	4.17
340	545	ASPH CONC (TY D)(SURF)	CY	4.17
360	557	CONC PAV (JOINT REINF)(13")	SY	0
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	0
432	524	RIPRAP (CONC)(CL B)(4 IN)	CY	0
432	547	RIPRAP (CONC)(CL B)	CY	1.52
432	547	RIPRAP (CONC)(CL B)	CY	1.52
529	505	CONC CURB (DOWEL)(6 ")	LF	214.37
529	505	CONC CURB (DOWEL)(6 ")	LF	214.37
529	511	CONC CURB AND GUTTER (6")	LF	0
529	512	CONC CURB (TY A)(MOUNTABLE)	LF	512
529	512	CONC CURB (TY A)(MOUNTABLE)	LF	524
644	501	SMALL RDSD SGN ASSM (TY A)	EA	7
658	505	DEL ASM TY A (D-DW)	EA	26
666	502	REFL PAV MRK TY I (W) (4") (BRK)	LF	0
666	503	REFL PAV MRK TY I (W) (4") (DOT)	LF	32.45
666	514	REFL PAV MRK TY I (W) (DBL ARROW)	EA	1
666	524	REFL PAV MRK TY I (Y) (4") (SLD)	LF	0
666	533	REFL PAV MRK TY I (Y) (ISLAND)	SF	0
666	537	REFL PAV MRK TY II (W) (4") (DOT)	LF	32.45
666	546	REFL PAV MRK TY II (W) (DBL ARROW)	EA	1
666	564	REFL PAV MRK TY II (Y) (ISLAND)	SF	0
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	160
668	505	PREFAB PAV MRK TY A (W) (8") (SLD)	LF	160
668	507	PREFAB PAV MRK TY A (W) (12") (SLD)	LF	0
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	21
668	510	PREFAB PAV MRK TY A (W) (24") (SLD)	LF	21
668	511	PREFAB PAV MRK TY A (W) (ARROW)	EA	12
668	515	PREFAB PAV MRK TY A (W) (WORD)	EA	4
672	508	RAIS PVA MRKR CL B (REFL) TY I-R	EA	8
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	8
672	539	RAIS PVA MRKR CL B (REFL) TY II-C-R(HV)	EA	8
677	501	ELIM EXT PAV MRK & MRKR (4")	LF	0
677	503	ELIM EXT PAV MRK & MRKR (8")	LF	160
677	504	ELIM EXT PAV MRK & MRKR (12")	LF	0
677	506	ELIM EXT PAV MRK & MRKR (24")	LF	6
678	503	PAV SURF PREP FOR MRKS (8")	LF	160
678	503	PAV SURF PREP FOR MRKS (8")	LF	160
678	504	PAV SURF PREP FOR MRKS (12")	LF	0
678	506	PAV SURF PREP FOR MRKS (24")	LF	21
678	506	PAV SURF PREP FOR MRKS (24")	LF	21
678	507	PAV SURF PREP FOR MRKS (ARROW)	EA	13
678	508	PAV SURF PREP FOR MRKS (WORD)	EA	4
7157	502	SIGNAL HEAD ASSEM REPLACE	EA	6
7157	503	SPAN WIRE CABLE REPLACEMENT	EA	6
7157	506	SIGNAL CONTROLLER CABINET REPLACE	EA	1

NOTE: SOME ITEMS ARE CALLED OUT TWICE TO SHOW THE LOW END AND THE HIGH END OF THE QUANTITY RANGE. PLEASE SEE ASSOCIATED EXCEL SPREADSHEET (INCLUDED SEPARATELY) FOR FURTHER DETAILS.

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WESTHEIMER CORRIDOR SHORT-RANGE IMPROVEMENT TYPES

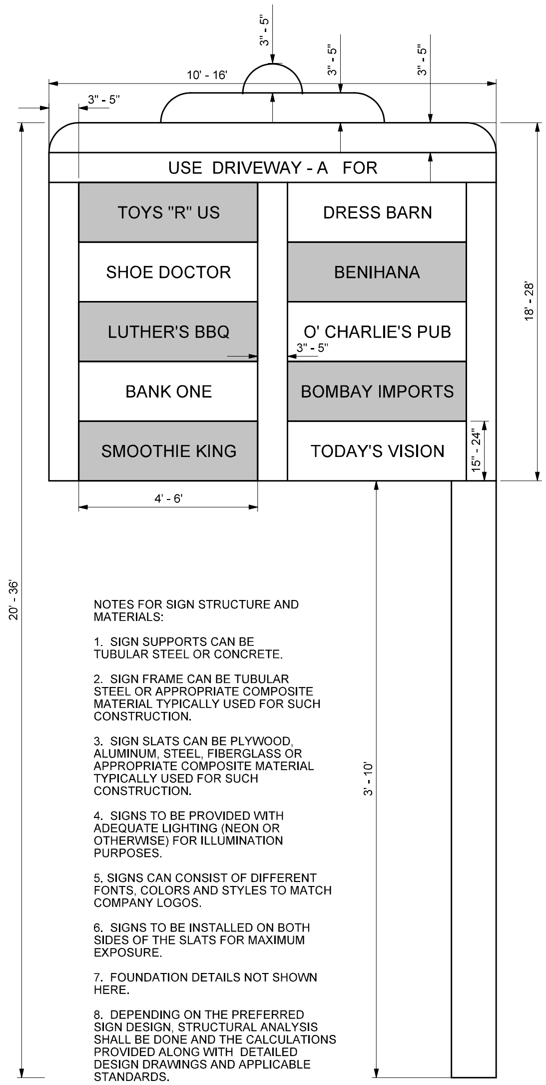
ESTIMATED QUANTITIES FOR TYPE F IMPROVEMENT

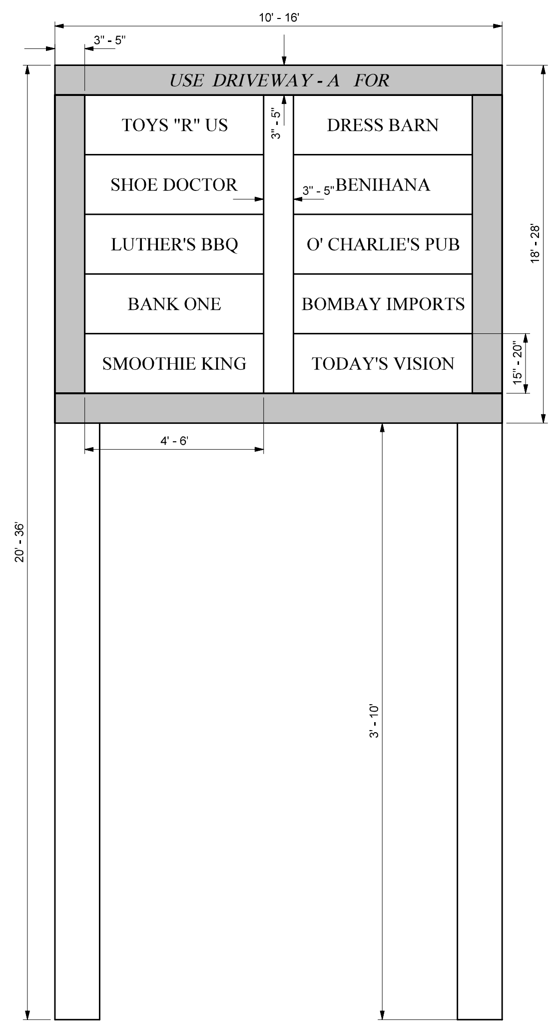
SCALE: NOT TO SCALE — SHEET 13 OF 14

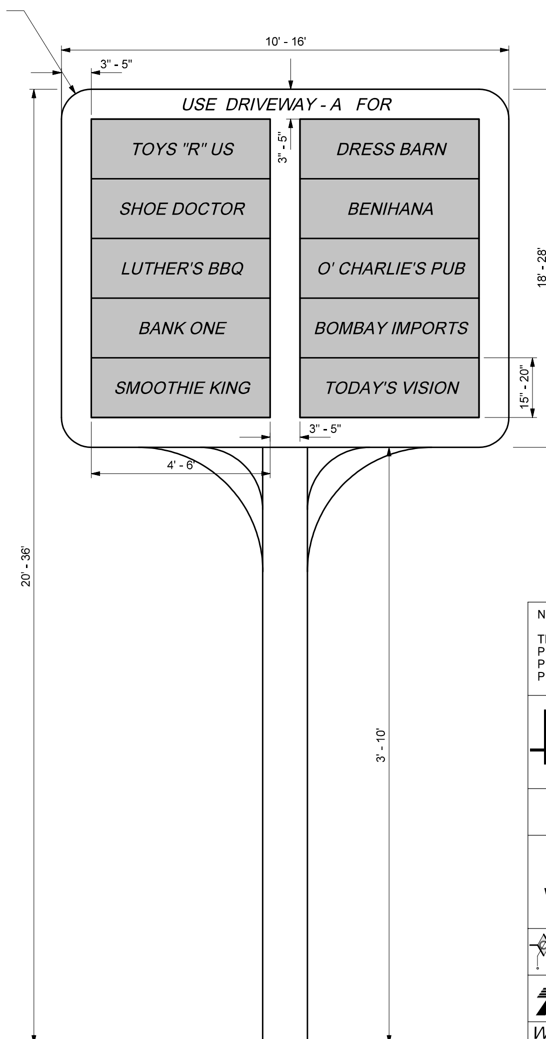
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	N/A	

STATE	DIST.	COUNTY
TEXAS	HOU	HARRIS

CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093







NOTES FOR SIGN STRUCTURE AND MATERIALS:

1. SIGN SUPPORTS CAN BE TUBULAR STEEL OR CONCRETE.

2. SIGN FRAME CAN BE TUBULAR STEEL OR APPROPRIATE COMPOSITE MATERIAL TYPICALLY USED FOR SUCH CONSTRUCTION.

3. SIGN SLATS CAN BE PLYWOOD, ALUMINUM, STEEL, FIBERGLASS OR APPROPRIATE COMPOSITE MATERIAL TYPICALLY USED FOR SUCH CONSTRUCTION.

4. SIGNS TO BE PROVIDED WITH ADEQUATE LIGHTING (NEON OR OTHERWISE) FOR ILLUMINATION PURPOSES.

5. SIGNS CAN CONSIST OF DIFFERENT FONTS, COLORS AND STYLES TO MATCH COMPANY LOGOS.

6. SIGNS TO BE INSTALLED ON BOTH SIDES OF THE SLATS FOR MAXIMUM EXPOSURE.

7. FOUNDATION DETAILS NOT SHOWN HERE.

8. DEPENDING ON THE PREFERRED SIGN DESIGN, STRUCTURAL ANALYSIS SHALL BE DONE AND THE CALCULATIONS PROVIDED ALONG WITH DETAILED DESIGN DRAWINGS AND APPLICABLE STANDARDS.

9. THESE SIGN LAYOUTS ARE TO BE INSTALLED ALONG WITH "TYPE D - DRIVEWAY CONSOLIDATION" IMPROVEMENT.

NOTE:

THE DETAILS SHOWN HERE ARE PROTOTYPICAL AND ARE FOR PRELIMINARY COST ESTIMATION PURPOSES ONLY.

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WESTHEIMER CORRIDOR SHORT-RANGE IMPROVEMENT TYPES

COMMERCIAL SIGN STRUCTURE LAYOUTS

SCALE: NOT TO SCALE SHEET 14 OF 14

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	N/A		
STATE	DIST.	COUNTY	
TEXAS	HOU	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
N/A	N/A	N/A	FM 1093

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Appendix

Alternative Sections

Alternative Sections

The roadway sections shown in this Appendix were developed to launch a discussion into alternative visions for the roadway element of the corridor. The sections serve several important functions in considering the future of the Westheimer corridor.

They demonstrate the variety of roadway types available that may serve transportation in the corridor. They show how the local access and through movement functions of Westheimer can be segregated but accommodated within a single right-of-way. They show how wide streets with lots of traffic can be made more pedestrian friendly. They show how higher capacity transit could be incorporated into the corridor.

A broad range of alternatives have been presented, from the existing condition to multiway boulevards with different transit modes.

The implementation of any of these alternative roadway sections must be preceded by extensive public involvement. For some of these sections it could be appropriate to test them in pilot projects. Some could be built as part of an urban village development.

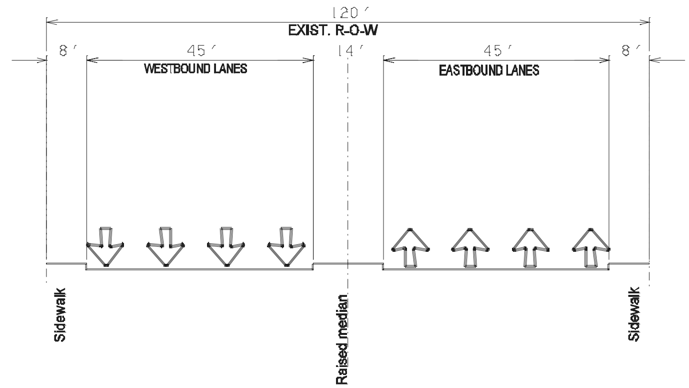
The way Westheimer looks and functions now is not the only option. The sections shown on the following pages are a starting point for discussions on the future of the corridor.

ALTERNATIVE SECTIONS

Existing Configuration
(No-Build)

ADVANTAGEOUS FEATURES:
- Low cost
- No R-O-W acquisition

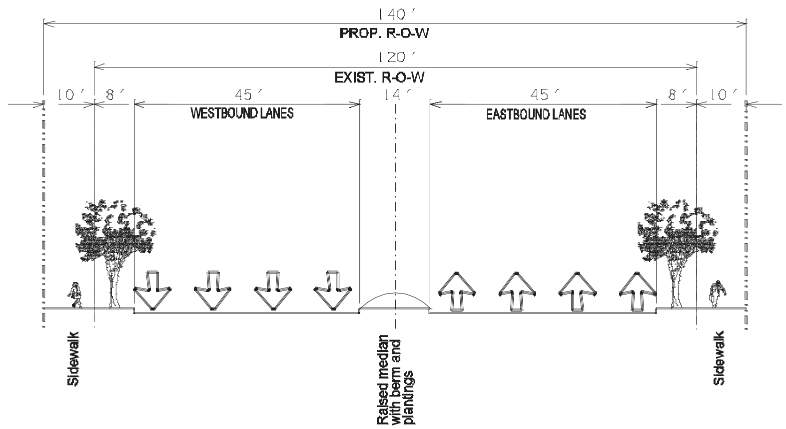
ISSUES TO BE ADDRESSED:
- Frequent curb cuts
- Frequent bus stops
- Edge of the roadway is undefined
- Aerial utilities
- Narrow sidewalks (when present)

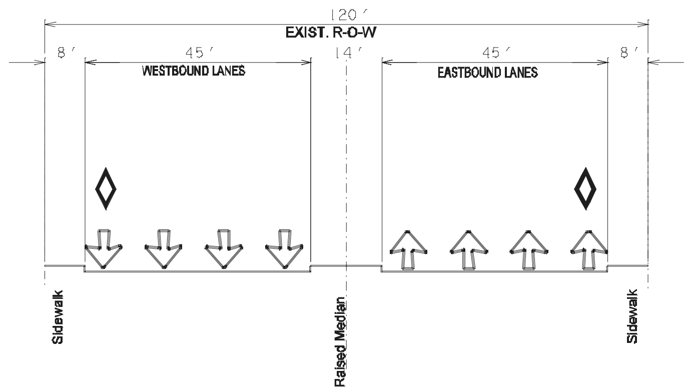


Existing Configuration
with Enhanced Streetscape
(Long-Range Phase One)

ADVANTAGEOUS FEATURES:
- Consolidated driveways
- Edge of the roadway is defined by trees
- Aerial utilities are buried
- More ample sidewalk width

ISSUES TO BE ADDRESSED:
- Negotiations with property owners for driveway consolidation and R-O-W
- Frequent bus stops

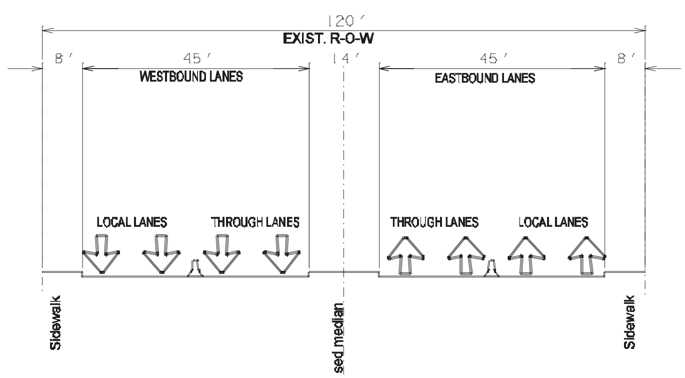




Existing Configuration with Diamond Lane

ADVANTAGEOUS FEATURES:
- Increased distance between bus stops
- Right lane for right turns and buses only
- Low cost
- No R-O-W acquisition

ISSUES TO BE ADDRESSED:
- Frequent curb cuts
- Edge of roadway is undefined
- Aerial utilities
- Narrow sidewalks (when present)
- Through-traffic limited to three lanes



Existing Configuration with Traffic Barrier

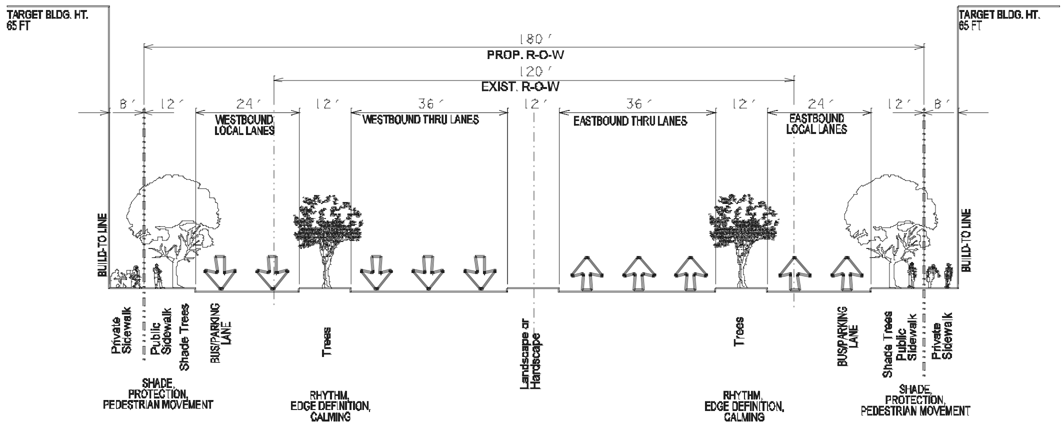
ADVANTAGEOUS FEATURES:
- Right turns and buses separated from through traffic
- Easily implemented through pilot project
- Low cost
- No R-O-W required

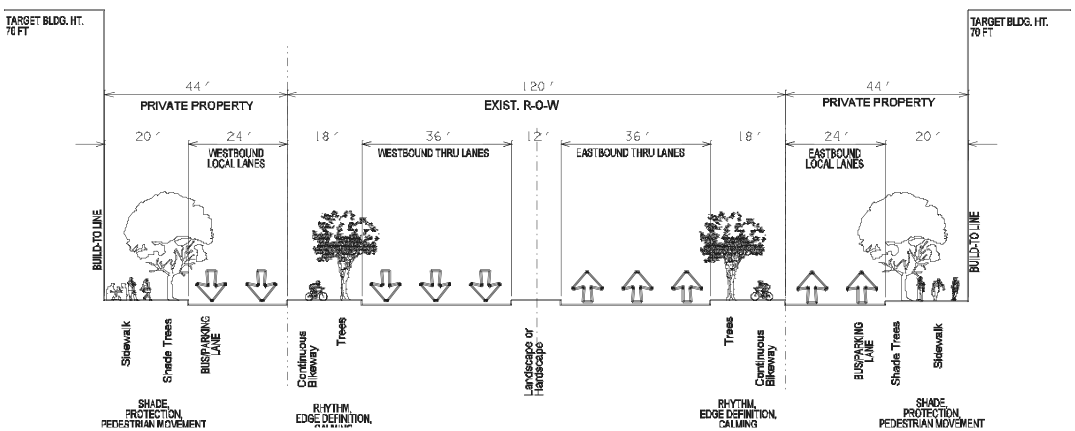
ISSUES TO BE ADDRESSED:
- Safety considerations when changing between through-lanes and local lanes
- Edge of the roadway is undefined
- Aerial utilities
- Narrow sidewalks (when present)

Multiway Boulevard
Alternative #1

ADVANTAGEOUS FEATURES:
- Through-traffic separated from local traffic and buses
- Distance between signalized intersections increased to as much as 1 mile for through-lanes
- Edge of the roadway is defined by trees
- Existing aerial utilities are buried
- On-street parking is provided
- Encourages building development closer to the street
- Increased pedestrian amenities

ISSUES TO BE ADDRESSED:
- Cost
- Construction phasing
- 30' R-O-W required on each side
- Circuitous route for those entering facility on local lanes
- Left and U-turns from local lanes require special handling
- Negotiations with property owners on access and R-O-W





Multiway Boulevard
Alternative #2

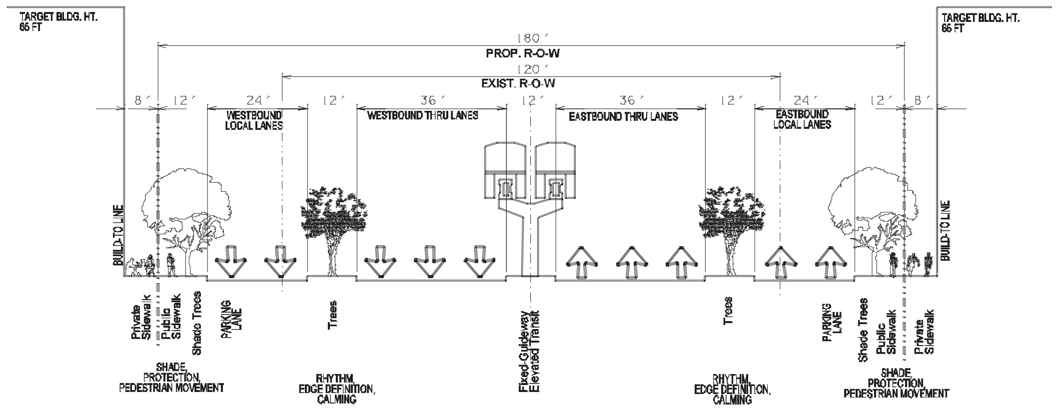
ADVANTAGEOUS FEATURES:
- Through traffic separated from local traffic and buses
- Distance between signalized intersections increased to as much as 1 mile for through lanes
- Edge of the roadway is defined by trees
- Existing aerial utilities are buried
- On-street parking is provided
- Encourages building development closer to the street
- Provides continuous bike lane
- Increased pedestrian amenities
- No R-O-W acquisition, use private property

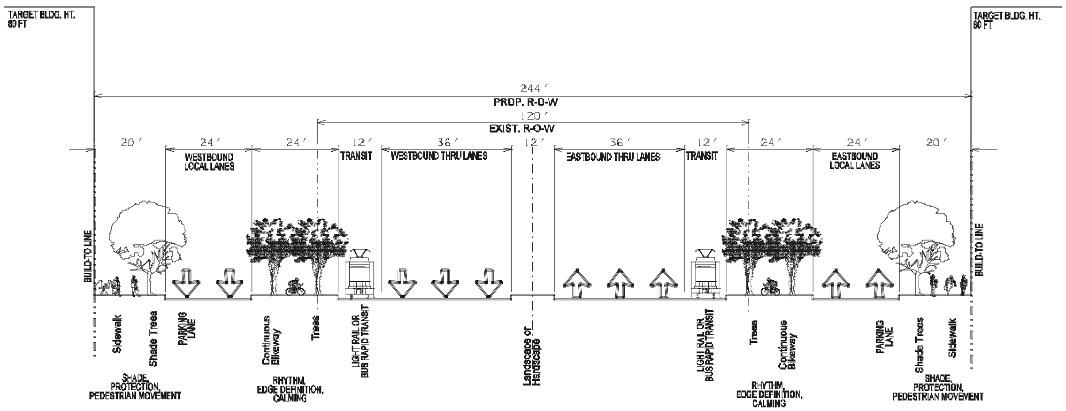
ISSUES TO BE ADDRESSED:
- Cost
- Construction phasing
- Circuitous route for those entering facility on local lanes
- Left and U-turns from local lanes require special handling
- Negotiations with property owners on access and use of private property

Multiway Boulevard
Alternative #3

ADVANTAGEOUS FEATURES:
- Through traffic separated from local traffic
- Distance between signalized intersections increased to as much as 1 mile for through lanes
- Buses are replaced by much faster and more attractive transit mode
- Edge of the roadway is defined by trees
- Existing aerial utilities are buried
- On-street parking is provided
- Encourages building development closer to street
- Improved pedestrian amenities

ISSUES TO BE ADDRESSED:
- 40' R-O-W required on each side
- Cost of roadway plus rapid transit
- Construction phasing
- Circuitous route for those entering facility on local lanes
- Left and U-turns from local lanes require special handling
- Negotiations with property owners on access and R-O-W





Multiway Boulevard
Alternative #4

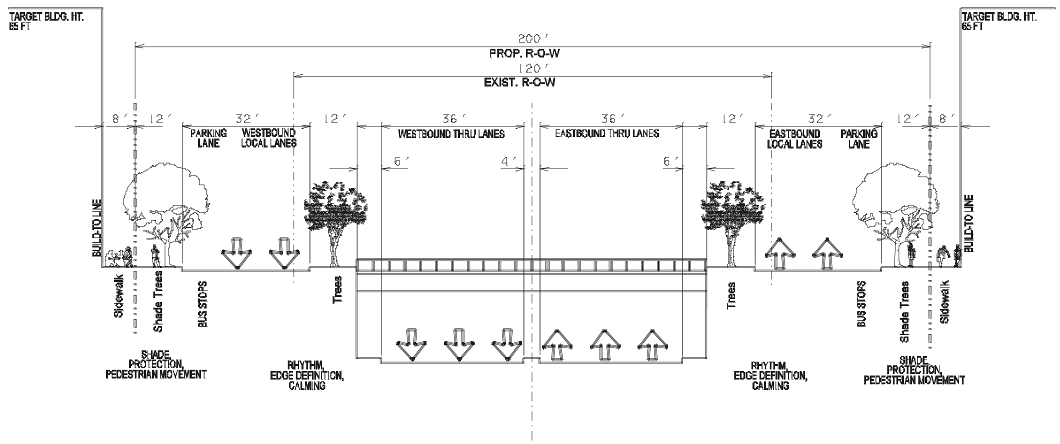
ADVANTAGEOUS FEATURES:
- Through traffic separated from local traffic
- Distance between signalized intersections increased to as much as 1 mile for through lanes
- Buses are replaced by much faster and more attractive transit mode (BRT or LRT)
- Edge of the roadway is defined by trees
- Existing aerial utilities are buried
- On-street parking is provided
- Encourages building development closer to street
- Improved pedestrian amenities

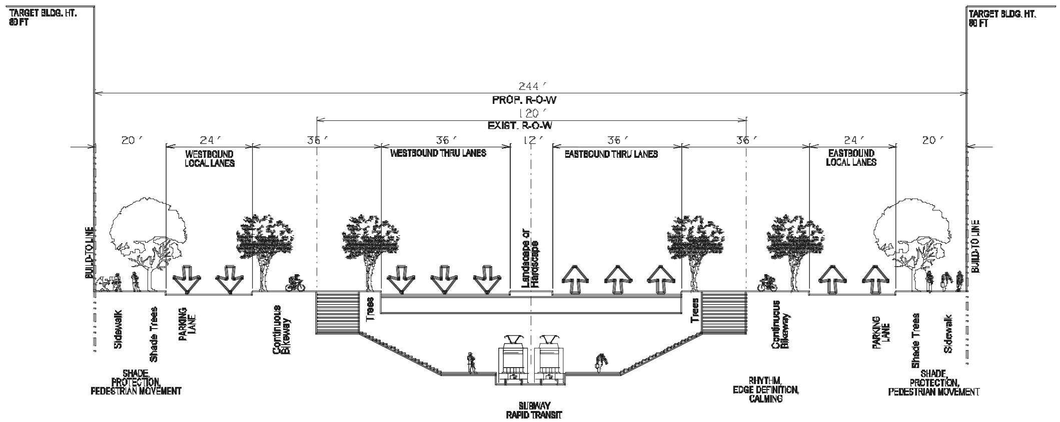
ISSUES TO BE ADDRESSED:
- 62' R-O-W required on each side
- Cost of roadway plus rapid transit
- Construction phasing
- Circuitous route for those entering facility on local lanes
- Left and U-turns from local lanes require special handling
- Negotiations with property owners on access and R-O-W

Multiway Boulevard
Alternative #5

ADVANTAGEOUS FEATURES:
- Through traffic separated from local traffic
- Grade-separated major intersections
- Edge of the roadway is defined by trees
- Existing aerial utilities are buried
- On-street parking is provided
- Encourages building development closer to street
- Improved pedestrian amenities

ISSUES TO BE ADDRESSED:
- 40' R-O-W required on each side
- Cost
- Construction phasing
- Circuitous route for those entering facility on local lanes
- Left and U-turns from local lanes require special handling
- Moving between through and local lanes requires special handling
- Negotiations with property owners on access and R-O-W





Multiway Boulevard
Alternative #6

ADVANTAGEOUS FEATURES:
- Through traffic separated from local traffic
- Grade-separated rapid transit
- Edge of the roadway is defined by trees
- Existing aerial utilities are buried
- On-street parking is provided
- Encourages building development closer to street
- Improved pedestrian amenities

ISSUES TO BE ADDRESSED:
- 72' R-O-W required on each side
- Cost of roadway and transit
- Construction phasing
- Circuitous route for those entering facility on local lanes
- Left and U-turns from local lanes require special handling
- Moving between through and local lanes requires special handling
- Negotiations with property owners on access and R-O-W