

Fulton Bike Lane Relocation Analysis

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Executive Summary

METRO's planned extension of the light rail network through the North Corridor has created a conflict with existing federally funded bike lanes along Fulton Street. METRO has asked the City of Houston to move the bike lanes to an alternative route to mitigate safety concerns and avoid having to purchase additional Right of Way along Fulton.

In order to determine the best alternative route that is equivalent to the existing bike lanes on Fulton Street; the City of Houston has completed a study on all possible alternatives in the northern corridor. Field studies and spatial analysis, using GIS software, were performed on all suitable corridors with the intention of determining the best replacement route. All routes were evaluated based on: service area, cost, safety, aesthetics, access to mass transit and light rail, and ridership potential.

As a result of this study, we recommend Irvington Boulevard as the preferred alternative route for the replacement of the Fulton bike lanes. The configuration of the replacement bikeway along Irvington consist of (2) 5-foot bike lanes from Crosstimbers to Fulton Street and (2) 10-foot shared-use paths along Fulton from Irvington to Boundary. This route ranks highest in service area, access to mass transit and light rail, cost, and potential ridership and second highest in safety and aesthetics. In addition, bike lanes on Irvington would maintain a north-south bikeway through the Near Northside, connecting Crosstimbers to downtown, and serve the same major destinations as Fulton currently does.

We also recommend that the Irvington Boulevard bike lanes be constructed prior to the removal of the bike facilities on Fulton Street. The shared-use path on Fulton, can be bypassed during construction of the light rail line, by creating a temporary detour as a signed bike route on adjacent neighborhood streets. The preferred detour route would begin at Irvington, travel east along Collingsworth to Cochran, south on Cochran to Genova, then continuing west on Reynolds/Morris to connect to the existing bike lane on Fulton at Genova.

Introduction

METRO plans to construct a 5.2 mile long Light Rail Transit (LRT) line that will run along Fulton from the Northline Transit Center, at Deerfield St, down to North Main at Girard St, to connect with the existing METRO Main Street Line adjacent to the University of Houston Downtown. This proposed segment of rail will run on a 26 ft wide guideway that will be located down the middle of the roadway. Due to the limits of the existing right of way (ROW), the City of Houston was asked to consider the relocation of the existing bike lanes on Fulton. To avoid purchasing additional ROW along the Fulton corridor, METRO request moving the existing bike lane to an adjacent alignment that will serve the needs of the both bicyclist and the local community.

In addition, METRO proposes to construct an Intermodal Terminal (IT) at the southern portion of the Near Northside, where North Main intersects the Southern Pacific Rail Road, in the area formerly knows as the Rail Shops. The Intermodal Terminal will act as a hub that will connect METRO's Light Rail Transit (LRT), regional commuter rail, and local and regional bus service. The proposed IT will feature a Light Rail Platform, parking garage, a 6.1 acre Metro Bus Transit Center, 8.9 acre Metro Bus Storage area, and a 4.3 acre Transit Oriented Development. A proposed elevated North Main Street. bypass will be built around the terminal area, connecting Providence/Rothwell Street. to the south, to Harrington Street, and is proposed to include 5-foot bike lanes.

Existing Conditions

Fulton

The Fulton bike lane was established through the Near Northside area in 2001; in the 3 years prior to its establishment, there were 29 reported bicycle-automobile crashes in this area. Over the past seven years, this federally-funded bike lane has helped enhance both the safety and convenience of bicycle transportation throughout the area.

The history of the Near Northside (also known as the Northside Village) and the Fulton corridor dates back to 1861 when the first land plots in the area were developed. In the 1880's, the Southern Pacific Rail Road opened a large repair and maintenance facility, knows as the Rail Shops, along the southern boundary of the Near Northside.

The location of the Rail Shops and the original Port of Houston at Allen Landing (at Buffalo Bayou and Main st) were a major employment center that lead the rapid urbanization of the Near Northside area during the late 1890's and early 1900's. The Near Northside grew steadily until the 1950's when the opening of Interstate 45 effectively bypassed that area; this combined with the decline of the railroads and migration of working class residents to the suburbs stagnated residential and commercial development in the region. Over the last few decades much of the area has fallen into decline, but with recent revitalization efforts in the region and a new migration back to the inner city, the Near Northside has begun to gentrify.

Today the Near Northside still filled with many historically significant buildings, neighborhoods and attractions that date back to the turn century. Moody Park is located at the intersection of Fulton and Irvington, once the site of 1978 race riots; it is now a mecca of community and recreational activities for the region. The once blight-stricken Irvington Court Public Housing Projects has been revamped into the award winning Irvington Village Apartment Complex, operated by the Houston Housing Authority. Many older buildings such as, Lee Elementary school and the Southern Pacific Hospital have both been revitalized into a community centers and HIV/AIDS treatment facility. In June of 2007, a large portion of the Near Northside was recommended to the National Register of Historic Places as an historical district.

Currently, Fulton Street is a north-south arterial roadway that has a mixture of different cross sections throughout the length of the corridor. The speed limit for the entire corridor is 35 mph and the pavement lane markings are in fair condition. In some areas there is rough pavement where the road has been patched and in a few areas the lane markings have worn off and need to be repainted.

Fulton Roadway Configuration

Segment	Number of Travel Lanes	Lane Widths	Bike Lane Width	Median
Quitman to Irvington	North - 1 South - 1	Northbound - 17 ft Southbound - 16 ft	Northbound - 5 ft Southbound - 6 ft	Curbed grass median with left turn lanes
Irvington to Cavalcade	North - 1 South - 1	Northbound - 12 ft Southbound - 12 ft	Northbound - 6 ft Southbound - 6ft	Undivided
Cavalcade to 610	North - 1 South - 1	Northbound - 16 ft Southbound - 16 ft	Northbound - 5 ft Southbound - 5 ft	13 ft two-way left turn lane
Fulton Underpass at 610	North - 3 South - 3	Northbound - 10 ft Southbound: inner: 10 ft outer: 15 ft	Northbound - 5 ft Southbound - Shared outer lane	Divided by median and freeway columns
610 to Crosstimbers	North - 2 South - 2	Northbound: Inner: 10 ft Outer: 9.5 ft South Bound: Inner: 10 ft Outer: 9.5 ft	Northbound : 4 -4.5 ft Southbound : 4 - 4.5 ft	13 to 14 ft curbed, grass median with left turn lanes.

Major trip attractors for this corridor include 12 local schools with approximately 8800 students. The two largest schools are Davis High School with 1689 students and Marshall Middle School with 1120 students. Other trip attractors include Moody Park, Carnegie Library, Leonel J. Castillo community center (formerly Lee Elementary school), six civic art attractions, two college campuses, two Fiesta grocery stores, Northline Transit Center, Northline Commons (previously Northline Mall) and numerous commercial destinations and restaurants that flank the roadway. Although there are many recreational and work trips that take place along the Fulton corridor, a majority of the observed bike trips appeared to be short distance and utilitarian in nature. This is supported by fact that 20.8% of the households within the area do not own automobiles and must rely on bicycling and walking for there main form of transportation.



Bicycle parking outside the Fiesta located on Fulton at Patton Street.

The Fulton corridor offers excellent access to mass transit. There are currently 6 bus routes that intersect or operate along Fulton Street: the 15, 23, 26, 78, 37, and 52. The Fulton bike lane offers direct access to the Northline Transit Center at Crosstimbers and Fulton. The 23, 26, and 27 bus routes provide access to the Kashmere, Greater Heights, and 5th Ward/Denver Harbor Transit Center, located to the east and west of the Fulton corridor.

The land use juxtaposed to the Fulton corridor is very diversified with: 56.26% being residential (53.96 single family and 2.3% multi family), 11.4% commercial, 9.17% industrial, 7.22% public and institutional, 1.83% parks and open space, 0.7% office, and 12.48% undeveloped. This mix of land use has been shown to encourage higher levels of bike and pedestrian activity due to the fact that short automobile trips from home to commercial areas, places of employment, and recreational activities can easily be replaced by bicycling or walking. Observed traffic on Fulton was relatively light, with some thru truck traffic caused by a mix of logistical and industrial land uses throughout the Near Northside and a Pilot Truck Stop located at Patton Street. The lack of an eastbound exit from 610 helps to limit traffic entering the area via Fulton thus reducing traffic load along the roadway.

There are approximately 28,137 residents living within ½ mile of the Fulton bike lane with 22.16% or 6,237 of them being between the age of 5-17 and 9.25% or 2604 of them being over the age of 65. Along with this, 48% of the households in this area are classified as low income. The high density of this area, 11.35 people per acre, combined

with the number of low income households and large population of children and elderly people are good indicators of a high potential for bike usage.



Bicyclist riding by a school on Fulton Street

Physical Layout and 1/2 mile Catchment of Potential Adjacent North – South Routes

In the scope of this study four potential corridors were identified for evaluation as possible relocation alternatives for the Fulton bike lane. The routes examined were Irvington Boulevard, Little White Oak Bayou, Airline Drive - North Main Street, and Hardy Street – Elysian Street – Maury Street.

Irvington

Irvington Blvd. is a north – south arterial street, located to the east of Fulton, whose configuration consists of:

Segment	Irvington Roadway Configuration		
	Number of Travel Lanes	Lane Widths	Median
Crosstimbers to Fulton	North – 2 South – 2	Northbound – 12 ft Southbound – 12 ft	28 ft curbed grass median with left turn lanes
Irvington underpass at 610	North – 3 South – 3	Northbound – 12 ft Southbound – 12 ft	Divided by median and freeway columns

Although the speed limit along Irvington Blvd is posted at 35 mph; the straight wide design of the road combined with the lack of stoplights promotes increased traffic

speeds. Compared to Fulton Street, Irvington had a relatively higher traffic volume as it is the central arterial road for the Near Northside area as a whole. Traffic volumes are increased due to there being no exit for Fulton when heading east bound on 610. Because of the lack of an exit, a majority of the traffic entering the area from the west is funneled onto Irvington blvd. There is also a higher percentage of trucking traffic, which is caused by a mixture of warehouses, industrial land uses, and the large freight terminal centrally located at Irvington and Patton Street. For the most part, the road surface and pavement markings on Irvington are in fair condition.



Wide grass median on Irvington Boulevard

The land use along the Irvington corridor is 68.47% residential (67.12% single family, 1.35% multi family), 5.93% commercial, 5.75% industrial, 5.5% public and institutional, 1.75% parks and open space, .53% offices, and 11.39% undeveloped. There are approximately 31,781 residents living within ½ mile of Irvington Blvd with 22.69% or 7,210 of them being between the age of 5-17 and 9.45% or 3,004 of them being over the age of 65. Furthermore, 48.7% of the households are classified as low income, 20.8% of the households do not own an automobile, and 13.87% of people in the area rely on non automotive transportation to commute to work.

Little White Oak Bayou

Little White Oak Bayou is located west of Fulton and I-45 and runs from north of Crosstimbers down to White Oak Bayou to the south. The segment of the bayou from Crosstimbers to the intersection with the HB&T Rail Road/Stokes Road is channelized; past this area the bayou has a natural earthen bank with some areas of erosion. The section of bayou from Crosstimbers to Moody Park crosses six surface streets and two freeways. The bayou crosses 610 and I-45 within a large underground box culverts that are approximately 1,410 ft and 955 ft in length respectively. The bayou has a limited ROW in many areas especially on the east side of I-45.



Little White Oak Bayou at Moody Park

Currently there is a .63 mile length bikeway that is under construction along Little White Oak Bayou; 610 to Cavalcade Street. This planned bikeway will consist of a 10 ft concrete multi-use path from Cavalcade Street to Edin Street., from there the trail will continue along Edin Street as a dedicated 5 ft bike lane from the bayou to the I-45 frontage rd. This bikeway is slated to be completed by spring 2010.

The land use adjacent to the Little White Oak Bayou corridor consists of: 54% residential (51.6% single family, 2.4% multi family), 11.43% industrial, 10.88% commercial, 6% public and institutional, 1.11% office, 2.76% parks and open space, and 14.2% undeveloped. Approximately 26,943 people live within a ½ mile of the Little White Oak Bayou; of these 21.79% or 5,872 people were age 5-17 and 8.96% or 2,415 people where over the age of 65, 49.24% of households are classified as low income. 19.38% of households do not own an automobile and 13.68% of people used non automobile transit to get to work.

Airline – North Main

Airline drive is a north – south arterial street located to the west of Fulton and 1-45; the street configuration for airline consists of:

Airline Roadway Configuration			
Segment	Number of Travel Lanes	Lane Widths	Median
Crosstimbers to 610	North – 2 South – 2	Northbound – 12 ft Southbound – 12 ft	Divided by a 12 ft curbed grass median with left turn lanes
610 to Cavalcade	North – 2 South – 2	Northbound : Inner: 9 ft Outer: 8 ft + gutter pan Southbound: Inner: 9 ft Outer: 8 ft + gutter pan	Divided by an 8 ft two-way left turn lane
Cavalcade to North Main	North – 2 South – 2	Northbound : Inner: 11 ft Outer: 10 ft + gutter pan Southbound: Inner: 11 ft Outer: 9 ft + gutter pan	Undivided

North Main is an arterial street that runs northwest – southeast connecting downtown Houston, the Northside Village Super Neighborhood, and the Greater Heights Super Neighborhood. The configuration of North Main within the study area is:

North Main Roadway Configuration			
Segment	Number of Travel Lanes	Lane Widths	Median
Airline to Boundary	North – 2 South – 2	Northbound : Inner: 9 ft Outer: 11 ft + gutter pan Southbound: Inner: 9.5 ft Outer: 10.5 ft + gutter pan	Undivided

The northern segment of Airline from Crosstimbers to 610 has good pavement and lane markings. However, excessive traffic volumes in the section of Airline south of 610 and North and North Main have led to poor pavement conditions with many areas that are uneven and patched.

*Airline Drive north of 610*

The observed traffic volume on Airline and North main are substantially higher than Fulton, with high amounts of thru truck traffic on the northern part of Airline. This heavy truck traffic on Airline is created by warehousing and industrial land uses north of 610 and centered around Cavalcade. While the posted speed on Airline is 35 mph, the straight wide straight roadway lends itself to higher traffic speeds. Airline to the south of 610 experiences slower overall traffic speeds due to the narrower roadway and heavier traffic volumes. North Main from Airline to Boundary has a posted speed of 30 mph; much like Airline, the speed on North Main is regulated by the narrow lanes, high traffic volume and presence of on street businesses.

Land use along the Airline – North Main corridor composed of: 61.11% residential (58.85% single family, 2.26% multi family), 9.25% commercial, 8.9% industrial, 4.96% public and institutional, 2.23% parks and open space, and 12.13% undeveloped. Approximately 30,583 people live within a ½ catchment of this corridor, with 18.61% or 5,693 people being 5-17 years of age, 9.31% or 2,850 people being over the age of 65, 41.13% of households are classified as low income, 17.3% if households did not own an automobile, and 12.8% rely on non automobile transit to commute to work.

*Airline Drive north of Cavalcade*

Hardy – Elysian

East of Fulton and Irvington, on the edge of the Near Northside, lays the Hardy, Elysian, and Maury street corridor. The current Configuration of Hardy – Elysian – Maury is as follows:

Hardy – Elysian -Maury Roadway Configuration

Segment	Number of Travel Lanes	Lane Widths	Median
Hardy St: Cavalcade to Lorraine	Southbound only: 4	11 ft	Undivided
Elysian St.: Cavalcade to Lorraine	Northbound only: 4	11 ft	Undivided
Maury St.: Lorraine to Lyons	No lane markings: two way roadway	No measurable lanes: Roadway ranged from approximately 20-30 ft depending on area	Undivided

The general land use within the ½ mile catchment of the Hardy – Elysian –Maury corridor is primarily residential at 62.51% (61.36% single-family and 1.15% multi-family), followed by 7.90% industrial, 5.17% commercial, 5.05% public and institutional, .34% office, .11% parks and open space, and 17.42% undeveloped. The ½ mile catchment contains 27,926 residents, with 22.57% or 6,303 people being between the age of 5 and 17 and 9.99% or 2,789 people being over the age of 65.

During our review process, Hardy and Elysian Streets were not considered as viable alternatives for the Fulton bike lane relocation due to safety and routing issues. Hardy and Fulton are one way traffic streets, this combined with the long, straight, wide, multi-lane layout of the road leads to high traffic speeds that are not compatible with bicycle use. These high traffic speeds are exacerbated by the fact that a majority of the traffic on Hardy and Elysian is thru traffic between the Hardy Toll Road and the Elysian Viaduct. In addition, land uses along Hardy and Elysian are primarily single family residential with many of the residential driveways entering directly into the street. The multiple conflicts point cause by the high frequency of driveways and limited visibility poses an immense safety concern for bicyclist. Also, this route has poor connectivity to

the new METRO Light Rail Line with two of the seven light rail stations would fall within a ½ mile distance of the bike lane.

Hardy Street cuts across a block diagonally, at Lorraine Street, to combine with Elysian at Harrington Street, to become the Elysian Viaduct at Brooks Street. This segment poses a problem when connecting this corridor to the existing bike network because the bike lane would have to continue down Maury st, to the east, in order to intersect the Lyons Street bike lane to the south. Maury Street, along this segment, is in poor condition and has a limited street width with the street ranging from 24 to 30 ft wide. Bike lanes along Maury Street would require additional ROW and roadway resurfacing.

TXDOT and the Harris County Toll Road Authority (HCTRA) plan to rebuild the Elysian Viaduct (TXDOT) and extend the Hardy Toll Road (HCTRA) through the eastern edge of the Near Northside. HCTRA is planning to extend the Hardy Toll Road from 610 and connect to US-59 near downtown. Much of the toll road will build upon Maury Street and the railroad ROW as an at grade roadway. This project will include an interchange at Cavalcade that would add traffic volume to the adjacent Hardy and Elysian roadways. As part of the Hardy Toll Road Extension, HCTRA will develop detention basins adjacent to the new roadway that could be used as pocket parks. Although no plans have been finalized, recommendations have been made to connect these detention basins and the open space with hike and bike trails that would run along the parallel to the Hardy – Elysian corridor. Furthermore TXDOT is planning on rebuilding the Elysian Viaduct from Downtown to Brooks Street, which will include (2) 12-foot travel lanes and (1) 10-foot shoulder in each direction. With the redesign of both roadways, thru traffic volumes between the Elysian Viaduct to the entry/exit ramp at Cavalcade will increase thus creating an environment that is inconducive to bicycle use.

Land Use for all Corridor

	Fulton	Irvington	Little White Oak Bayou	Airline – North Main
Total Residential	56.26%	68.47%	53.10%	61.11%
Single-Family Residential	53.96%	67.12%	51.06%	58.85%
Multi-Family Residential	2.3%	1.35%	2.04%	2.26%
Commercial	11.4%	5.93%	10.88%	9.25%
Office	.7%	.53%	1.11%	.74%
Industrial	9.17%	5.74%	11.43%	8.90%
Public and Institutional	7.22%	5.50%	6.00%	4.96%
Parks and Open Space	1.83%	1.75%	2.76%	2.23%
Undeveloped	12.48%	11.39%	14.2%	12.13%
Other or Undefined	.94%	.69%	.52%	.68%

Demographic and Economic Factors for all Corridors

	Fulton	Irvington	Little White Oak Bayou	Airline – North Main
Total Population	28,137	31,781	26,943	30,583
Population Age 5-17	6,237 (22.16%)	7,210 (22.69%)	5,872 (21.79%)	5,693 (18.61%)
Population Age 65+	2,604 (9.25%)	3,004 (9.45%)	2,415 (8.96%)	2,850 (9.31%)
Population Density	11.35 people per acre	11.68 people per acre	10.75 people per acre	10.51 people per acre
Percentage of Households Classified as Low-Income	48%	48%	49.24%	41.13%
Percentage of Households with out an Automobile	20.8%	20.8%	19.38%	17.3%
Percentage of People who use Non-Automotive Transportation to Commute to Work	13.86%	13.86%	13.68%	12.8%

Alternative Routes for the Fulton Bike Lane

Irvington

Moving the Fulton bike lanes to Irvington Blvd would consist of a 2.6 mile, dedicated bike lanes, with a minimum width of 5 ft, which would run north-south from Crosstimbers to Fulton. The bike lanes would continue along Fulton Street, between Irvington and Boundary as a striped 10-foot shared-use path on the east and west sides of the roadway. The 10-foot shared-use path would be striped so that bicyclist would stay in the 5-foot section to closest to the roadway and pedestrians to the right by the edge of the ROW. This will increase bicyclist visibility, and remove them from the path of any utility polls, benches, junction boxes and any other obstructions places on the outer ROW. In compliance to American Association of State Highway and Transportations Officials (AASHTO) guidelines this section of sidewalk would require a 42 inch railing to the place along its extent to protect cyclist. This bikeway accommodation would be possible with the existing ROW by combining the bike lane, currently in METRO's North Corridor Plans, with the existing 5-foot sidewalk along the street.

To guide bicyclists through this section of bikeway, signalized bicycle crossings would be needed at the intersection of Irvington at Fulton and Boundary at Fulton. A signalized intersection at Irvington would allow southbound bicyclist to cross the light rail tracks on Fulton at a perpendicular angle and continue onto the shared sidewalk down to Boundary. At Boundary Street, we recommend the addition of a bicycle crosswalk that would traverse the light rail tracks at a 90 degree angle and connect to the existing bike lanes on Fulton. As part of this recommendation, access management would be needed at the shopping center on Fulton, between Hays Street and Halpern Street. Two of the four entry/exit driveways from the shopping center onto Fulton would need to be removed to help reduce conflict points between motorist and cyclist.

On Irvington Boulevard, north of Fulton, narrowing of the 28-foot median would allow for (1) 5-foot bike lane and (2) 12-foot travel lanes in each direction. Where Irvington crosses under 610, the roadway could be re-striped, similar to the Fulton underpass, with (3) 10-foot travel lanes and (1) 5-foot bike lane in each direction.

Little White Oak

Moving the Fulton bike lane to the Little White Oak Bayou corridor would create a 3.9 mile long bikeway that would stretch from Crosstimbers down to Fulton Street at Quitman. From Crosstimbers to 610, the bikeway would consist of a 10-foot wide concrete multi use path along the bayou ROW. At 610, the bikeway would have to pass under the freeway as a tunnel or over it as a pedestrian/bicycle bridge and would connect to the .63 mile long bikeway that is currently under construction. After Cavalcade, this alternative would continue down Little White Oak Bayou to I-45 where it would have to cross the freeway as either a tunnel or pedestrian/bicycle bridge. After I-45, the trail would continue down Little White Oak Bayou till it gets to Moody Park, connecting to Fulton and continuing, as a 10-foot shared sidewalk to the intersection of Boundary.

Airline – North Main

Another consideration to replace the Fulton bikeway would be a bike lane on Airline from Crosstimbers to North Main, and continue along North Main to Quitman then turning east to intersect with Fulton Street. A bike lane could be placed down Airline between Crosstimbers and 610 by removing a section of the 12-foot median; allowing for (1) 5-foot bike lane and (2) 12-foot travel lanes in each direction. Significant modifications would be needed on the segment of Airline where the roadway crosses the HB&T Rail Road via a large bridge which creates a safety issue for bicyclist due to limited sight distance and steep grades. The roadway width, upon the bridges, is very limited travel lanes widths would need to be reduced, and the concert median removed, in order to accommodate bike lanes with a minimum width of 5-foot and a recommended width of 6-foot. Airline Drive, from 610 to North Main, would require significant changes to accommodate bike lanes, through either widening the roadway or lane reduction. These modifications would also be necessary on North Main as, the thoroughfare would either have to be widened or a travel lane would have to be removed to accommodate 5-foot bike lanes. On North Main from Boundary to Quitman, the bike lane would run parallel to the light rail line; this would require reducing travel lane widths to accommodate the bike lane. On the eastside of North Main, at the Quitman Station, additional ROW will be required as the current plan only allots 10-feet for the

northbound travel lane. From the Quitman Station, the bike lane would travel down Quitman Street to connect to existing bicycle facilities at Fulton. This Quitman segment has sufficient width to provide (1) 12-foot travel lane and (1) 5-foot bike lane in each direction.

Analysis

Irvington, Little White Oak Bayou, and Airline – North Main were all studied to evaluate their effectiveness as a potential bike facility to replace bike lanes on Fulton Street. Elements considered were: catchment area, cost, safety, aesthetics, access to mass transit, and ridership potential.

First, we compared the catchment area for each of the alternative routes to that of Fulton to see which one retained the highest level of service to the original area. Of all the routes, Irvington ranked the highest in maintaining the original service area of the Fulton bike lane with roughly 66% of the ½ mile catchment falling within that of Fulton's catchment. Little White Oak Bayou followed closely with 50% and Airline/North Main at 28%. In addition, the Irvington corridor will preserve the only north-south bike lane throughout the Near Northside area and provides service to nearly all the same bicycle destinations in the area accessible via the Fulton bike lane.

Access to mass transit and the planned Metro Light Rail Line on Fulton was a key factor in the relocation analysis, due to the possibility of multi-modal transit. All the probable relocation corridors provide access to bus routes and transit centers in the area. Of the three, the Irvington corridor has the greatest access to the future North Corridor Light Rail Line, with five of the eight planned stations falling within a ½ mile of the bike lane and all eight within a mile. The access to Metro rail access for Little White Oak Bayou and Airline/North Main was limited to due to I-45 creating a barrier to mobility for bicyclist. The Little White Oak Bayou trail would have access to four of the eight rail stations and two of the eight for Airline/North Main.

Project cost was another factor considered. Of the three alternatives, Irvington would be the most cost effective followed by Airline/North Main and Little White Oak Bayou. The cost associated with the relocation of the bike lane to Irvington come from reducing the width of the median and roadway redesign to accommodate (4) 12-foot

travel lanes and (2) 6-foot bike lanes along the 2.60 miles portion of Irvington from Crosstimbers to Fulton. The bikeway would continue along Fulton thru the construction of a shared-use path on Fulton from Irvington to Boundary. While an off-street trail along the Little White Oak Bayou route is desirable, it is very impractical due to the high cost of construction of a bridge or tunnel to span the intersection with 610 and I-45. Additional cost would also come from bank improvements to the bayou to prevent erosion, acquisition of proper ROW, construction of the 10-foot shared-use path and lighting improvements along the trail. For the Airline – North Main alternative, there would be a large cost due to the narrowing of the median and roadway redesign on approximately one mile of the corridor from Crosstimber to 610. In addition, for the segment of Airline south of 610 and along North Main, the roadway would need to be widening and ROW acquired. Quitman would need to be re-stripped along the ¼ mile from North Main to Fulton.

Bicyclist safety is always a top concern when planning a bikeway. Of the three feasible routes, the Little White Oak Bayou corridor offers the safest alternative for cyclist due to the fact that the majority of the route is located off street. Safety concerns along the Little White Bayou corridor focus on where the trail crosses intersecting streets and the unprotected grade crossing at the HB&T Railroad by Stokes Road. These safety concerns could be mitigated by proper signalized bike crossing at these conflict points. The Airline/North Main corridor has most limitations when employing safe roadway design, due to its limited street width and narrow bridge crossing of the HB&T Railroad. Due to high volumes of traffic and trucking, Airline and North Main would have to be widened to offer (2) 5-foot bike lanes and (4) 12-foot travel lanes along its extent. Another safety concern on the Airline - North Main corridor is that North Main cuts across the grid pattern of streets creating non perpendicular intersections. The reduced visibility at these intersections can lead to unseen bicyclist being stuck by motorist entering North Main from cross streets. While both Irvington and Airline/North Main have higher observed traffic and truck traffic volumes than Fulton, Irvington ranks better in potential safety. Irvington has less on street commercial and industrial land use, thus reducing the number and frequency of conflict points created by vehicles and trucking traffic entering and exiting the roadway. The existing large median along Irvington, from

Crosstimbers to Fulton, can be reduced to provide (2) 6-foot bike lanes and (4) 12-foot travel lanes that would decrease unnecessary interaction between bicyclist and motorist.

Aesthetics is often overlooked as a factor that contributes to the success of a bikeway. The meandering nature of the Fulton corridor not only slows traffic speeds, it also produces terminating vistas that make the roadway more visually appealing to travelers, as when compared to long straight streets which can increase speeding. Tree lined areas and grass medians make Fulton one of the more pleasant corridors to ride a bicycle. Little White Oak Bayou presents the best options for a pleasurable visual environment, a hike and bike trail along the bayou would provide urban residents with a much needed natural open space that can be used for recreational activities. Irvington offers the next highest potential for an appealing visual environment. Much of the area located along the Irvington Boulevard is currently tree lined with many segments of the median containing small trees could be landscaped to create a very pleasing ambiance for bicyclist. Irvington has the potential to be a bikeway that is comparable to the Heights Blvd bike lane, which is noted to be one of the finest bike facilities in Houston. Airline/North Main ranked last in potential aesthetics due to the lack of medians and insufficient ROW along a majority of the roadway. Airline has 12-foot medians from Crosstimbers to 610, but the surrounding land uses are industrial areas and warehouses which are both visually unattractive and inconducive to bicyclist mobility and safety. South of 610, Airline and North Main have limited ROW that will hinder the extend of streetscaping along the roadways.

Ridership potential was assessed in this study. Several factors have been shown to indicate bicycle usage, including: total population, children age 5-17, elderly age 65+, low-income households, households without vehicles, non vehicle work trips, and trip attractors. Out of the three corridors studied, Irvington ranked the highest in total population (31,781 people), population density (11.68 people per acre), children age 5-17 (7,210 people), elderly age 65+ (3,004 people), percentage of households with out a vehicle (20.8%), and percentage of non vehicle work trips (13.86%). Of the other corridors Little White Oak Bayou scored the highest in percentage of low income households (49.24%) and Airline/North Main scored the highest with number of trip

attractors due to the high number of businesses in the area (827). Based on these statistics, the Irvington Blvd alternative shows the highest indicators of potential bicycle usage. (For complete statistic see appendix A: Ridership Potential)

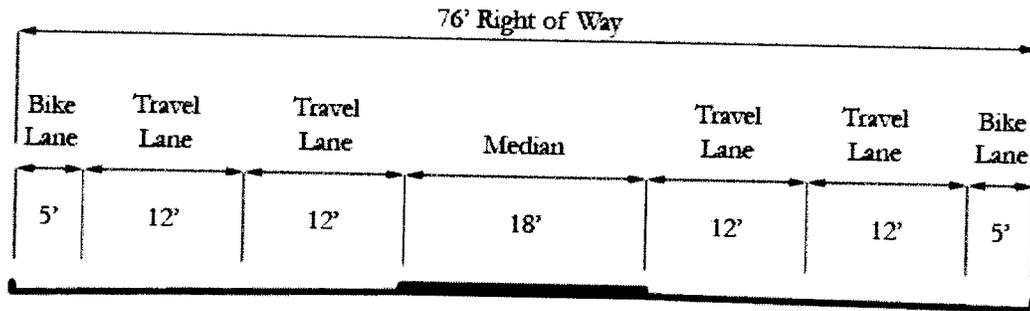
Conclusion

The Irvington Corridor is the best alternative for reallocating the bike lanes along Fulton Street. Irvington ranked first in maintaining mobility within the service area, access to mass transit and light rail, cost, ridership potential, and second in safety and aesthetics. The combination of all of these factors analyzed makes Irvington the obvious choice for the new bike lane.

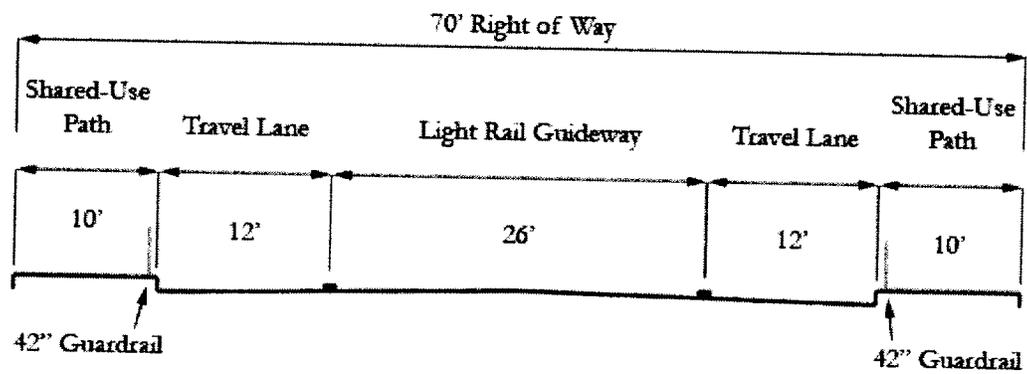
The recommendation move the Fulton bike lane to Irvington also coincides with the findings of the TEDSI Infrastructure Group's study, which was prepared for Metro Solutions in August of 2007. TEDSI recommended having the bike lane, 5-foot or 4-foot with a 1-foot gutter pan where applicable, go down Irvington Blvd from Crosstimbers to Fulton, along Fulton from Irvington to Hays as a 5-foot shared sidewalk on the westside and a bike lane on the east side and continuing as a bike lane on Fulton from Hays Street to Boundary. The only recommended changes to the TEDSI alignment would be a 5-foot minimum bike lane along the full extent of Irvington and on the Fulton segment, from Irvington to Boundary, moving the bike lane off the street to a 10-foot shared use sidewalk as described earlier.

Other comments

The City of Houston Bikeway Program realizes that it will not be possible to have the bike lane on the Fulton segment during the construction of the light rail line. As such, a temporary detour of the bike lane, as a signed bike route, on adjacent neighborhood streets would be acceptable. A possible detour route would go from Irvington down Collingsworth to Cochran, on Cochran to Genova, then continuing on Reynolds/Morris to connect to the existing bike lane on Fulton at Genova.

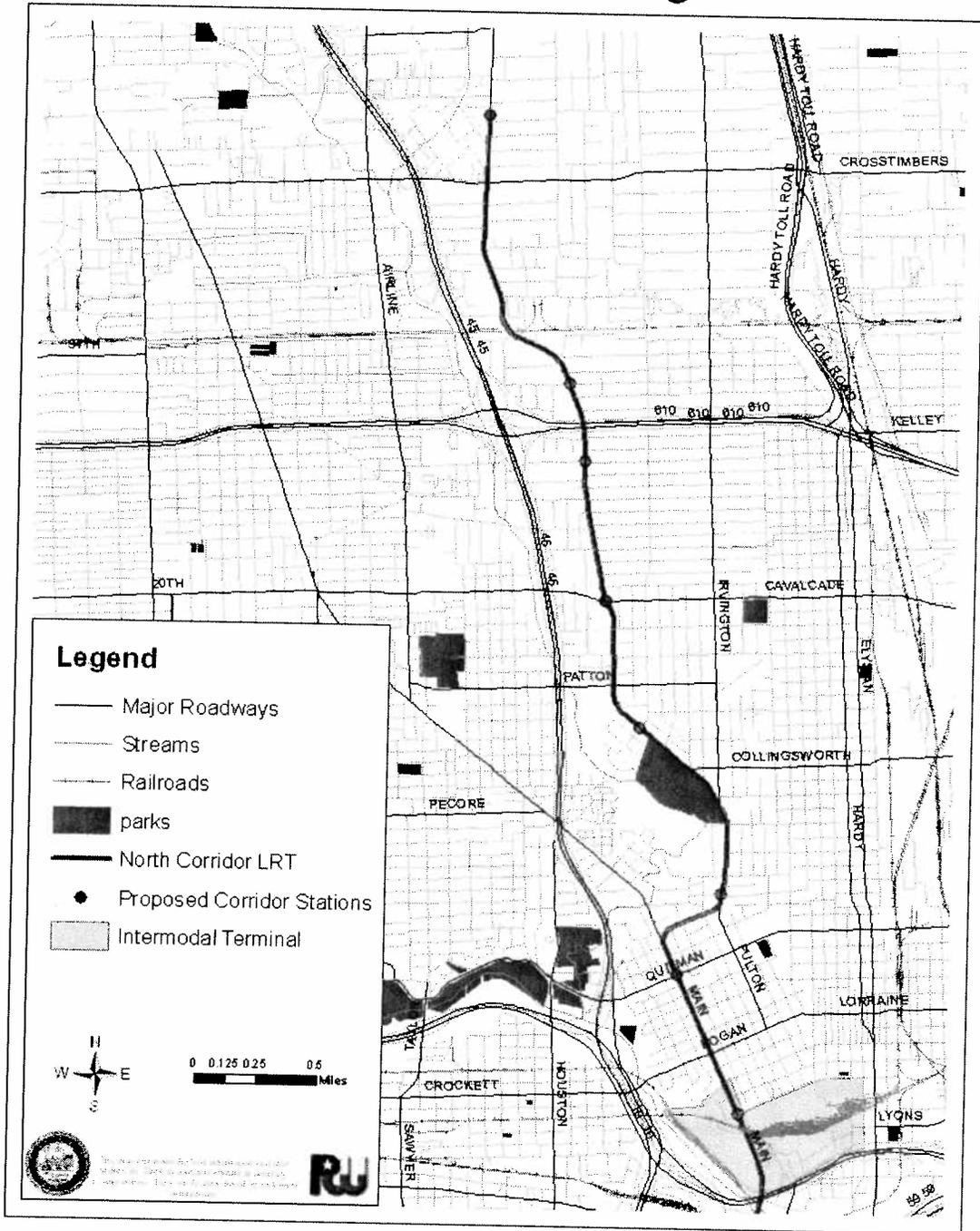


Recommended typical section of Irvington between Crosstimbers and Fulton

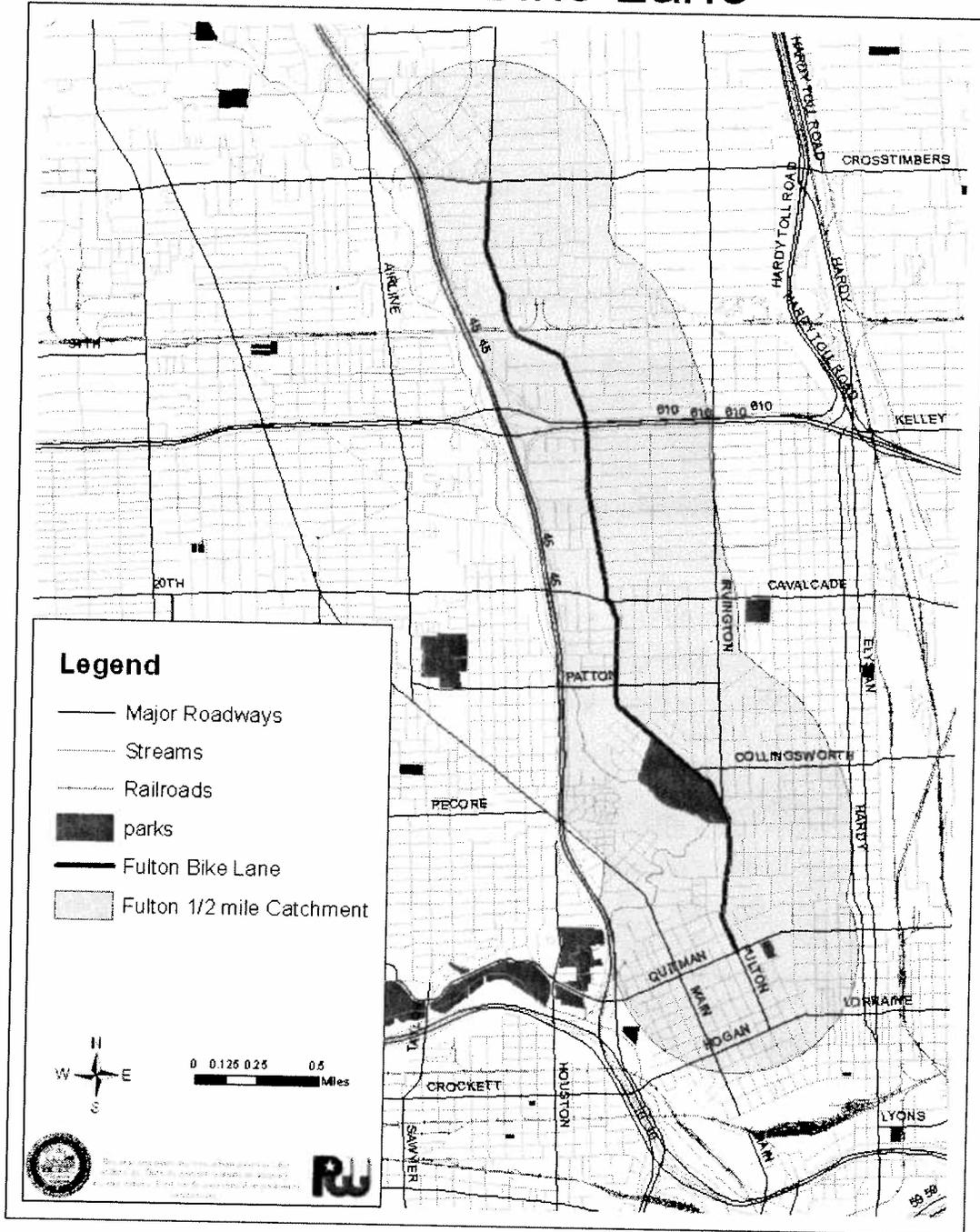


Recommended typical section of Fulton between Irvington and Boundary

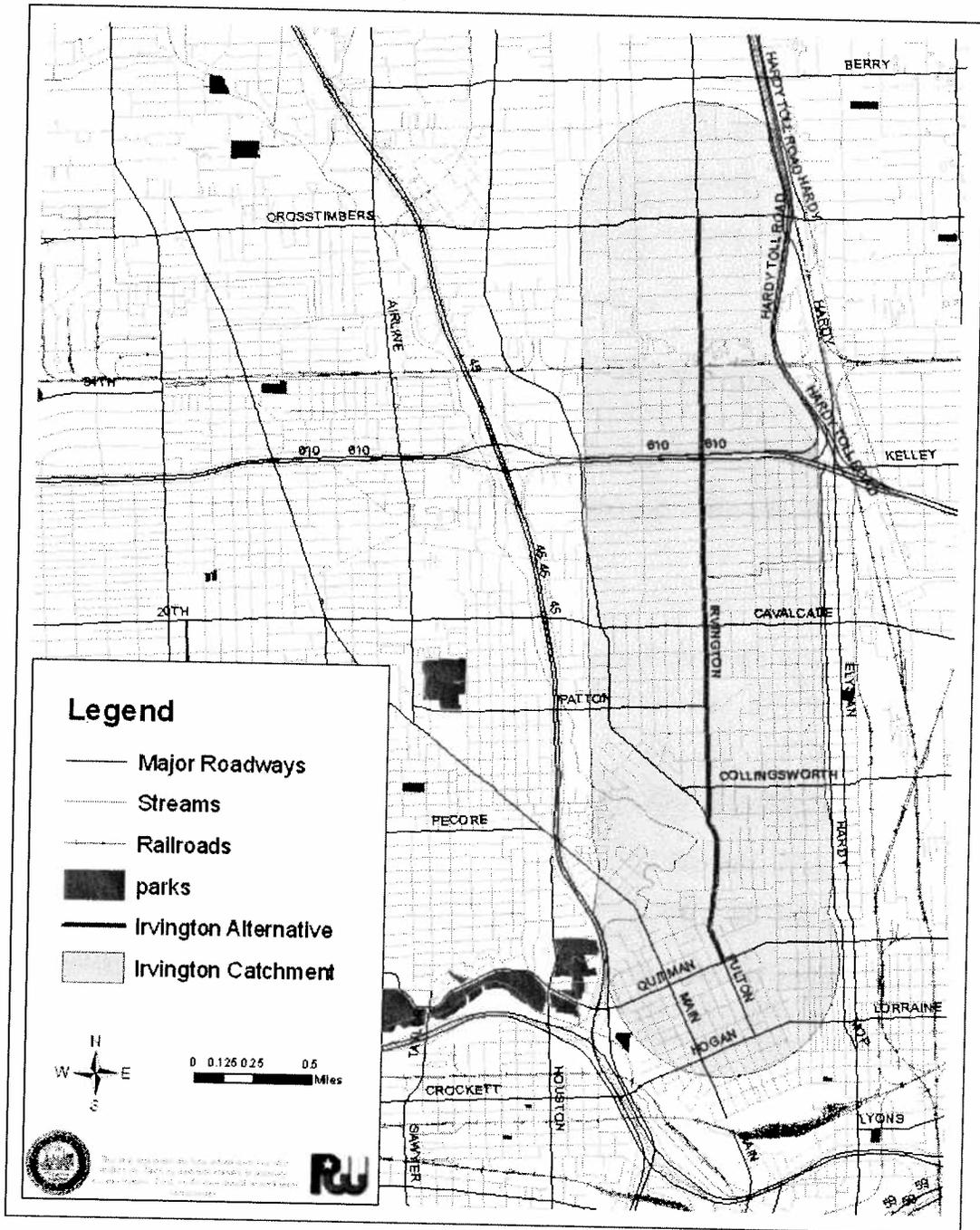
METRO North Corridor Light Rail Line



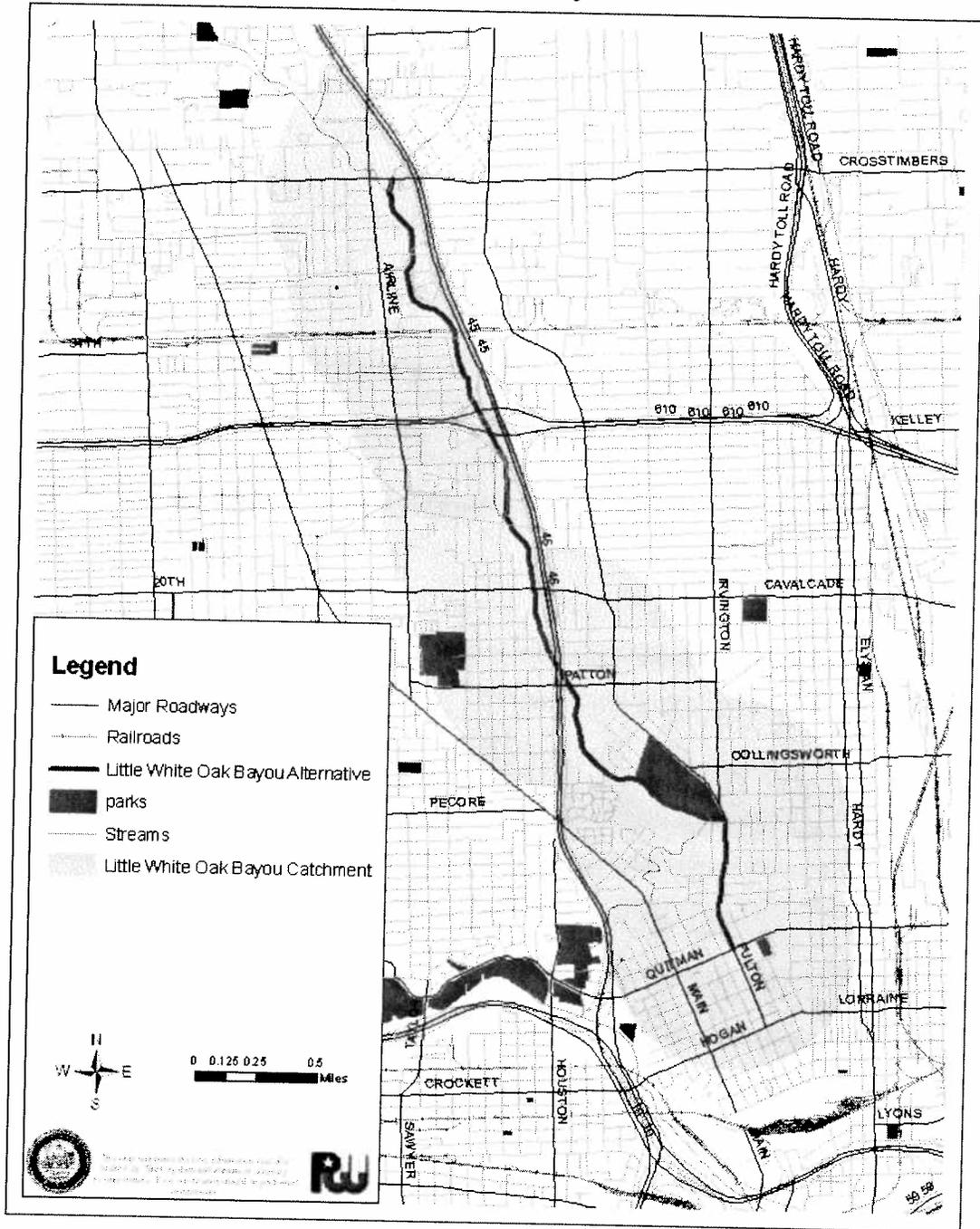
Fulton Bike Lane



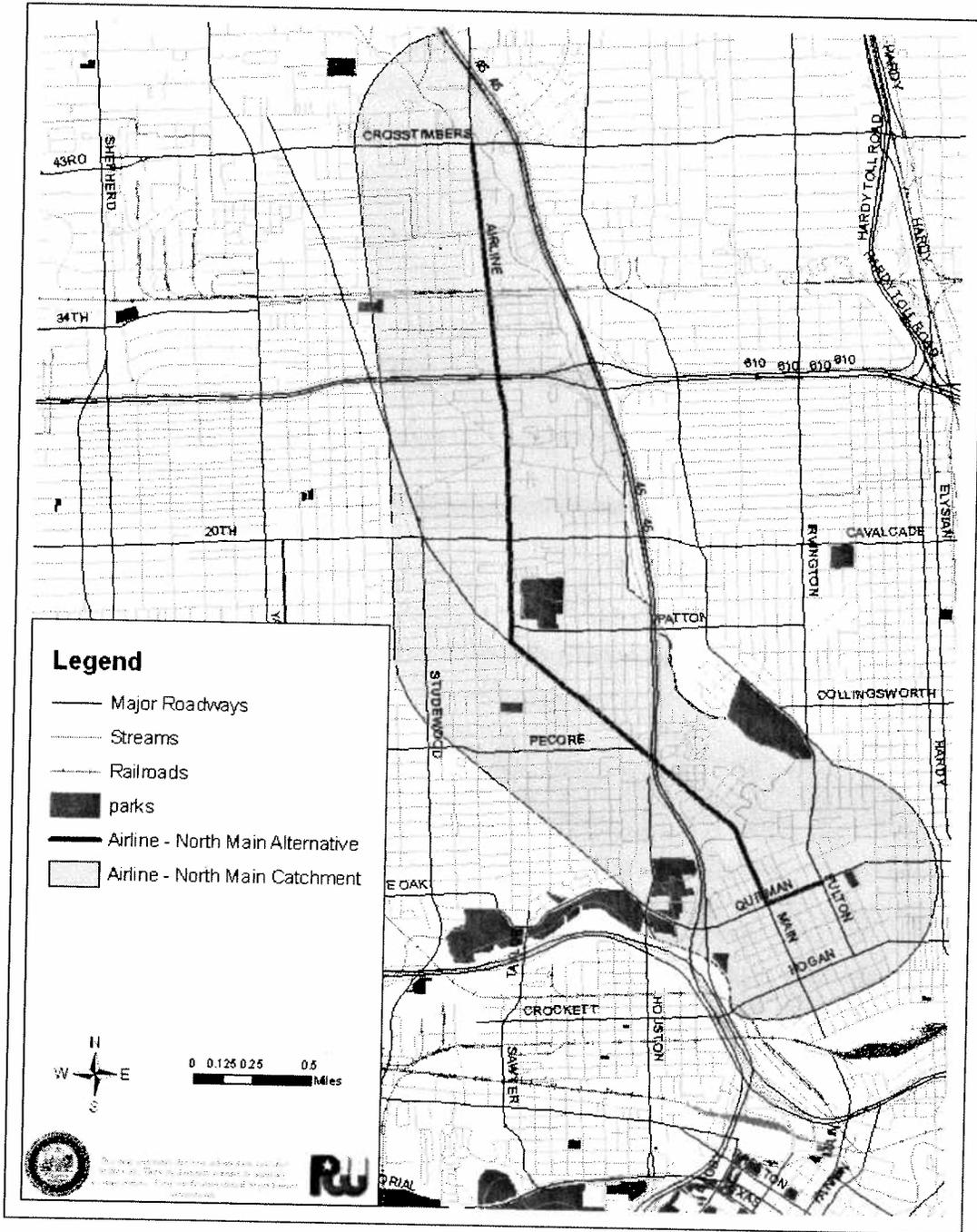
Irvington Alternative



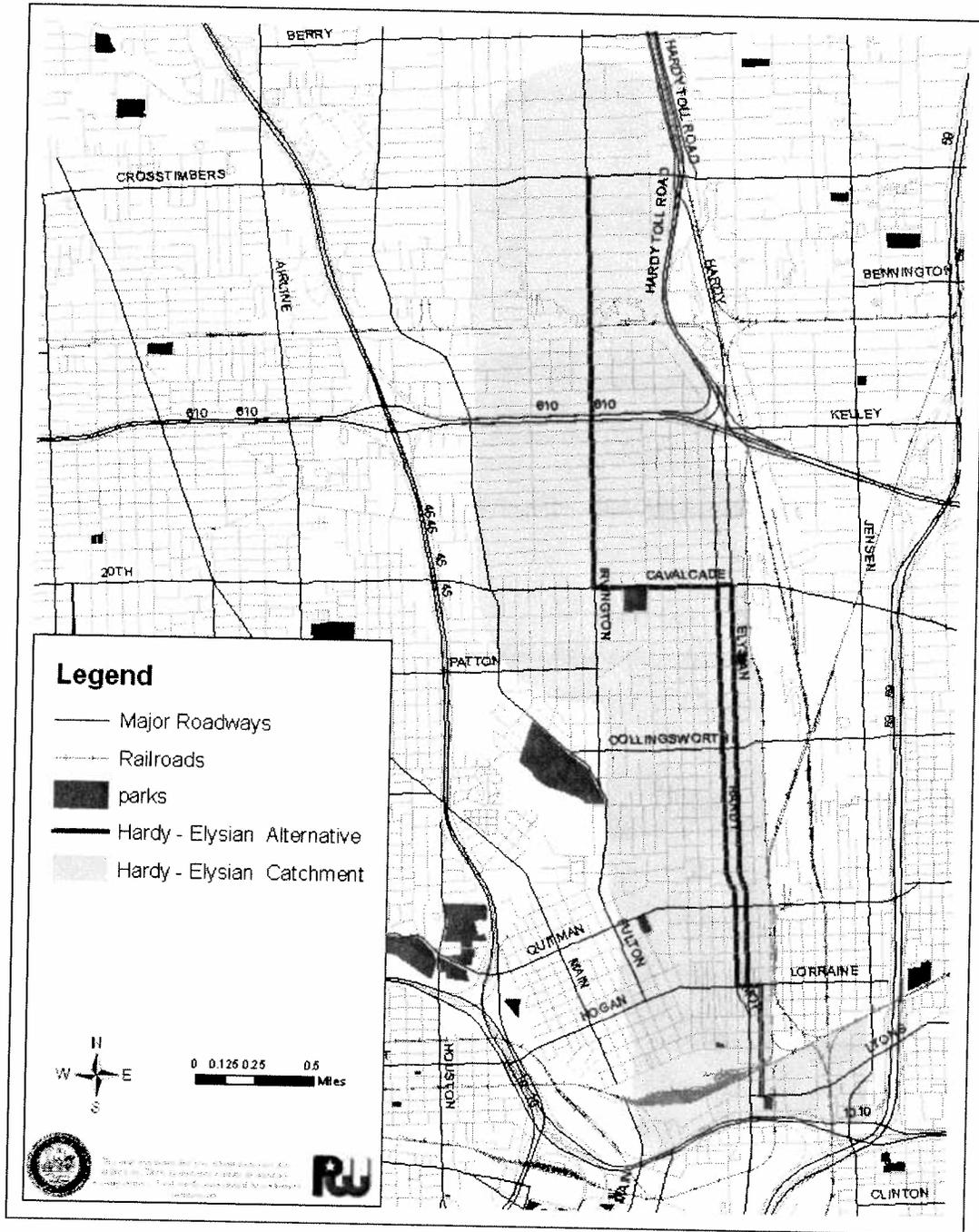
Little White Oak Bayou Alternative



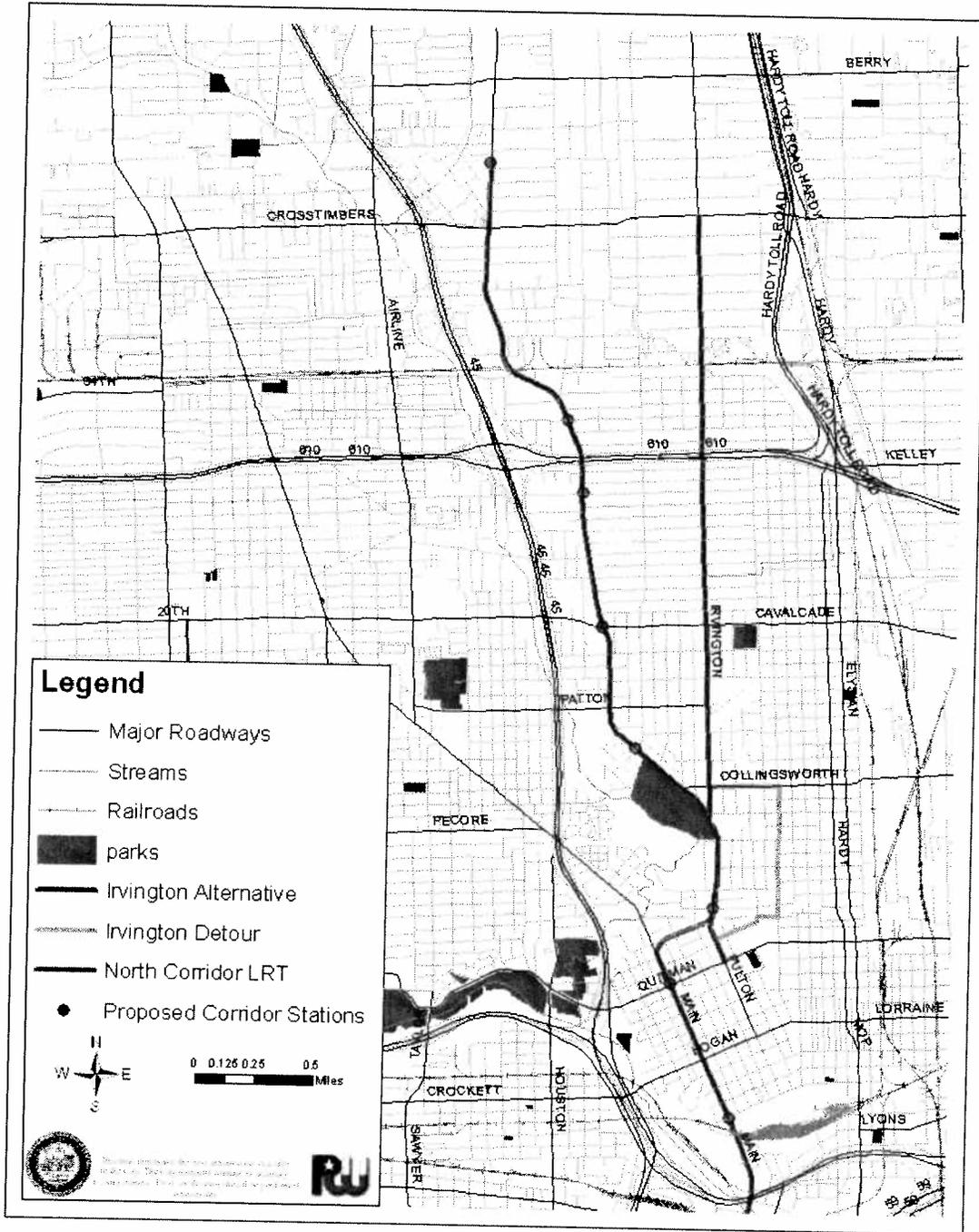
Airline - North Main Alternative



Hardy - Elysian Alternative



Irvington Detour



**Appendix: Fulton Bike Lane Relocation Analysis:
Attributes and Challenges of Alternate Alignments**

Road Configuration (speed, lane width, and presence of medians within the corridor)	Fulton	Irvington	Little White Oak Bayou	Airline – North main
<p>Speed: 35 mph</p> <p>Quitman to Irvington: (measured at Booth)</p> <ul style="list-style-type: none"> • Northbound 1 – 17 ft travel lane with a 5 ft bike lane. Divided • Southbound 1 – 16 ft travel lane with a 6 ft bike lane. Divided. <p>Irvington to Cavalcade: (measured at Patton and Averil)</p> <ul style="list-style-type: none"> • North and Southbound, 1 – 12 ft travel lane with a 6 ft bike lane in each direction. Undivided. <p>Cavalcade to 610: (measured at Canadian)</p> <ul style="list-style-type: none"> • North and Southbound, 1 – 16 ft travel lane with a 5 foot bike lane in each direction. Divided by a 13 ft two-way left turn lane. <p>Fulton underpass at 610:</p> <ul style="list-style-type: none"> • Northbound 3 – 10 ft travel lanes with a 5 ft bike lane. • Southbound 2 – 10 ft 	<p>Speed: 35 mph</p> <p>Crosstimbers to Fulton:</p> <ul style="list-style-type: none"> • North and southbound, 2 – 12 ft. wide lanes in each direction. Divided by 28 ft median. <p>Irvington underpass at 610:</p> <ul style="list-style-type: none"> • North and southbound 3 – 12 ft lanes in each direction. <p>Estimated width of ROW: ~100 ft</p>	<p>Speed: N/A</p> <p>Bayou R.O.W no current path or bikeway</p> <ul style="list-style-type: none"> • Stream is channelized from Crosstimbers to Stokes rd. • Natural earthen bank from Stokes rd to White Oak Bayou • Crossing Under 610 ~1,410ft • Crossing under I-45 ~955 ft in length 	<p>Airline: Speed: 35 mph</p> <p>Crosstimbers to 610:</p> <ul style="list-style-type: none"> • 2 - 12 ft. wide lanes in each direction, divided by a 12 ft median. *note concrete median and sidewalks on bridge crossing the HB&T RR. <p>610 to Cavalcade:</p> <ul style="list-style-type: none"> • North and southbound, 1 – 9 ft inner lane and 1 – 8 ft outer lane with a gutter pan. Divided by an 8 ft two-way left turn lane. <p>Cavalcade to North Main.</p> <ul style="list-style-type: none"> • Northbound, 1 – 11 ft inner lane and 1 – 10 ft outer lane with a gutter pan. Undivided. • Southbound, 1 – 11 ft inner lane and 1 – 9 ft outer lane with a gutter pan. Undivided. <p>North Main: Speed: 30 mph</p> <p>Airline to Boundary st:</p> <ul style="list-style-type: none"> • Southbound (into town), 1 – 9.5 ft inner lane and 	

**Appendix: Fulton Bike Lane Relocation Analysis:
Attributes and Challenges of Alternate Alignments**

	Fulton	Irvington	Little White Oak Bayou	Airline – North main
<p>Current Route Condition (current state of roadway surface and lane markings)</p>	<p>travel lanes (inside and left turn lane) with a 15 ft outer lane. No bike lane striping.</p> <p>610 to Crosstimbers: (measured at Caplin)</p> <ul style="list-style-type: none"> • North and Southbound, 10 ft inner lane and 1 – 9.5 ft outer lane with a 4.5 ft bike lane in each direction. Divided by a 13 ft median. <p>610 to Crosstimbers: (measured at Stokes)</p> <ul style="list-style-type: none"> • North and Southbound, 10 ft inner lane and 1 – 9.5 ft outer lane with a 4 ft bike lane in each direction. Divided by a 14 ft median. <p>Note: No Gutter Pan on roadway.</p> <ul style="list-style-type: none"> • Bike lane striping is worn off in some locations. • Some areas have patched pavement. 	<ul style="list-style-type: none"> • Pavement and lane markings are in fair condition. 	<ul style="list-style-type: none"> • No current path or bikeway. • Some areas have bank erosion that would and 	<p>1 – 10.5 ft outer lane with a gutter pan. Undivided.</p> <ul style="list-style-type: none"> • Northbound (out of town), 9 – ft inner lane and 1 – 11 ft outer lane with a gutter pan. Undivided. <p>Estimated width of ROW: ~60-80 ft depending on location</p>
			<p>Airline:</p> <ul style="list-style-type: none"> • North of 610, pavement is in good condition • South of 610, Pavement 	

**Appendix: Fulton Bike Lane Relocation Analysis:
Attributes and Challenges of Alternate Alignments**

	Fulton	Irvington	Little White Oak Bayou	Airline – North main
Length of Corridor (total length of corridor from Crosstimbers to connection with existing bike on Fulton, South of Boundary st.)	Approximately 3.6 miles	Approximately 3.25 miles	Approximately 3.9 miles	Approximately 4 miles
Intersecting Roadways (Complex intersections and adjacent streets pattern along the corridor)	<p>Complex intersections:</p> <ul style="list-style-type: none"> Crosstimbers, 610, Cavalcade, Irvington, Quitman, and Hogan. <p>Pattern of Adjacent Streets:</p> <ul style="list-style-type: none"> Mostly grid pattern Most roads intersect at right angles. 	<p>Complex intersections:</p> <ul style="list-style-type: none"> Crosstimbers, 610, Cavalcade, and Fulton. <p>Pattern of Adjacent Streets:</p> <ul style="list-style-type: none"> Well connected grid pattern with intersections at right angles except at Fulton Great Connectivity to the Fulton Corridor via cross streets. 	<p>Complex intersections:</p> <ul style="list-style-type: none"> Crosstimbers, 610, Cavalcade, I-45, and North Main (east of I-45). No crossing over or under 610 and I-45 <p>Pattern of Adjacent Streets:</p> <ul style="list-style-type: none"> 6 bridge crossings on bayou (not including 610 and I-45) 	<p>Complex intersections:</p> <ul style="list-style-type: none"> Crosstimbers, 610, Cavalcade, I-45. <p>Pattern of Adjacent Streets:</p> <ul style="list-style-type: none"> Mostly grid pattern along Airline (Link and Gibbs are exceptions) North Main cuts across the Grid creating intersections that are at odd angles.
Areas Served by Route (areas that are accessible, by bicycle, along the street corridor)	<ul style="list-style-type: none"> Southern area of Northline/Northside Super Neighborhood. Entire Northside Village Super Neighborhood 	<ul style="list-style-type: none"> Southern area of Northline/Northside Super Neighborhood. Entire Northside Village Super Neighborhood <p>Note:</p>	<ul style="list-style-type: none"> Southern area of Independence Heights Super Neighborhood. Eastern area of the Heights Super Neighborhood Southern area of 	<p>is in poor condition</p> <p>North Main:</p> <ul style="list-style-type: none"> Airline to I-45 pavement is in poor condition. I-45 to Boundary the pavement is in fair condition.

**Appendix: Fulton Bike Lane Relocation Analysis:
Attributes and Challenges of Alternate Alignments**

	Fulton	Irvington	Little White Oak Bayou	Airline – North main
Land Uses (land use and type of development on within a 1/2 catchment of the corridor)	<p>Adjacent land Use:</p> <ul style="list-style-type: none"> • Mostly single family residential with a few multi family residences. • Light industry on northern Fulton, south of Crosstimbers. <p>On Route Land use:</p> <ul style="list-style-type: none"> • Mix of commercial, industrial and public/institutional. <p>1/2 mile Catchment:</p> <ul style="list-style-type: none"> • Single Family: 53.96% • Multi Family: 2.3% • TOTAL Residential = 56.26% • Commercial: 11.4% <p>Retail Space: 2,117,230 SQFT</p> <ul style="list-style-type: none"> • Office: .7% • Office Space: 199,362 SQFT 	<p>Distance from Fulton bike lane 9/10 of a mile at Crosstimbers, 1/2 mi at 610 and Cavalcade, and decreasing from cavalcade to intersection at Fulton</p> <p>Adjacent land Use:</p> <ul style="list-style-type: none"> • Mostly single family residential with a few multi family residences. <p>On Route Land use:</p> <ul style="list-style-type: none"> • Mostly commercial south of Evelyn with some interspersed industry. <p>1/2 mile Catchment:</p> <ul style="list-style-type: none"> • Single Family: 67.12% • Multi Family: 1.35% • TOTAL Residential = 68.47% • Commercial: 5.93% <p>Retail Space: 1,410,845 SQFT</p> <ul style="list-style-type: none"> • Office: .53% • Office Space: 150,482 SQFT • Industrial: 5.74% • Public and Institutional: 	<p>Northside Village Super Neighborhood.</p> <p>Note: Area is limited by availability of access points.</p> <p>Note: There is a little overlapping service areas with the Shared Road on Houston - Bayland - Michaux - E. 14th st.</p> <p>Adjacent Land Use:</p> <ul style="list-style-type: none"> • Mix of single family residential and light industry. <p>1/2 mile Catchment:</p> <ul style="list-style-type: none"> • Single Family: 51.06% • Multi Family: 2.04% • TOTAL Residential = 53.10% • Commercial: 10.88% <p>Retail Space: 2,230,770 SQFT</p> <ul style="list-style-type: none"> • Office: 1.11% • Office Space: 317,578 SQFT • Industrial: 11.43% • Public and Institutional: 6% • Parks and open space: 2.76% • Undeveloped: 14.2% • Businesses: 624 	<p>Northside Village Super Neighborhood.</p> <p>Note: There is some overlapping of the service areas with the Heights Bike Lane and Signed Route on Houston -Bayland - Michaux - E. 14thst.</p> <p>Airline from Crosstimbers to 610:</p> <p>Adjacent Land Use:</p> <ul style="list-style-type: none"> • Low density single family homes. <p>On Route Land Use:</p> <ul style="list-style-type: none"> • Light industry with some commercial. <p>Airline south of 610 to N. Main and along N. Main:</p> <p>Adjacent Land Use:</p> <ul style="list-style-type: none"> • Mostly single family residential with a few multi family residences. <p>On Street Land Use:</p> <ul style="list-style-type: none"> • Mostly commercial and industrial. <p>1/2 mile Catchment:</p>

**Appendix: Fulton Bike Lane Relocation Analysis:
Attributes and Challenges of Alternate Alignments**

	Fulton	Irvington	Little White Oak Bayou	Airline – North main
Demographics (demographics, within the 1/2 mile catchment of the corridor, that are likely to utilize bicycle facilities)	<ul style="list-style-type: none"> Industrial: 9.17% Public and Institutional: 7.22% Parks and open space: 1.83% Undeveloped: 12.48% Businesses: 643 	<p>5.5%</p> <ul style="list-style-type: none"> Parks and open space: 1.75% Undeveloped: 11.39% Businesses: 569 		<ul style="list-style-type: none"> Single Family: 58.85% Multi Family: 2.26% TOTAL Residential = 61.11% Commercial: 9.25% Retail Space: 2,338,737 SQFT Office: .74% Office Space: 267,267 SQFT Industrial: 8.9% Public and Institutional: 4.96% Parks and open space: 2.23% Undeveloped: 12.13% Businesses: 827
Continuous Connectivity (effectiveness of corridor in directly linking Crosstimbers to the Intermodal terminal)	<p>1/2 Mile Catchment: Total Pop: 28,137 Total Pop Under 18: 6,237 Total Pop 65+: 2,604 Density of 11.35 people per ac. Households Classified as Low Income: 48%</p> <ul style="list-style-type: none"> Direct access to Intermodal Terminal 	<p>1/2 Mile Catchment: Total Pop: 31,781 Total Pop Under 18: 7,210 Total Pop 65+: 3,004 Density of 11.68 people per ac. Households Classified as Low Income: 48.7%</p> <ul style="list-style-type: none"> Good connectivity from Crosstimbers to Fulton. At the intersection of Fulton the adjacent streets are not suitable for bike lanes. Bike lanes on Fulton from Irvington to Boundary are 	<p>1/2 Mile Catchment: Total Pop: 26,943 Total Pop Under 18: 5,872 Total Pop 65+: 2,415 Density of 10.75 people per ac. Households Classified as Low Income: 49.24%</p> <ul style="list-style-type: none"> Limited access points to trail. A tunnel or bridge would have to be constructed at I-45 and 610 to connect trail segments. <p>East of I-45 Trail would have to go down Fulton as a</p>	<p>1/2 Mile Catchment: Total Pop: 30,583 Total Pop Under 18: 5,693 Total Pop 65+: 2,850 Density of 10.51 people per ac. Households Classified as Low Income: 41.13%</p> <ul style="list-style-type: none"> Good connectivity on Airline from Crosstimbers to North Main. Good connectivity on North Main from Airline to Boundary. North Main from Boundary to the I.T. is a

Appendix: Fulton Bike Lane Relocation Analysis: Attributes and Challenges of Alternate Alignments

	Fulton	Irvington	Little White Oak Bayou	Airline – North main
Access to Mass Transit (access to bus routes, transit centers and the future Metro North Corridor Light Rail and Intermodal Terminal)	<ul style="list-style-type: none"> • Direct connection to Northline Transit Center • 7 bus routes on or intersect this bike lane. (15, 23, 26, 27, 78, 37, 52) • Routes 23 and 52 give access to the Kashmere transit Center. • Route 26 gives connection to Heights Transit Center. • Route 27 gives access to the 5th Ward/Denver Harbor Transit Center • Future light rail and Intermodal Terminal on the route 	<p>problematic due to limited R.O.W. of the street.</p> <ul style="list-style-type: none"> • 1 mile from Northline Transit Center; can access transit center via route 23. • Routes 23 and 52 give access to the Kashmere transit Center. • Access to Heights Transit center via route 26. • Route 27 gives access to the 5th Ward/Denver Harbor Transit Center • 7 bus routes on or intersecting this bike lane. (78,23,26,27,15,37,52) • 5 of 8 light rail stations within 1/2 mile and all 8 within a mile 	<p>bike lane or run along bayou and or adjacent streets to connect to proposed multi-use path along White Oak Bayou.</p> <ul style="list-style-type: none"> • Access to Northline Transit Center Via route 23. • Access to Heights Transit Center via intersection with route 26 or 34. • Route 27 gives access to the 5th Ward/Denver Harbor Transit Center • 8 Bus routes intersect or parallel this bike path. (23,24,79,34,26, 27, 15,78) • 4 of the 8 light rail stations within 1/2 mile 	<p>problem due to light rail and limited R.O.W.</p> <ul style="list-style-type: none"> • Access to Northline Transit Center via route 23. • Route 27 gives access to the 5th Ward/Denver Harbor Transit Center • Less than 1/2 mile from Heights Transit Center. Also accessible via intersection with routes 9, 34, and 26. • 8 Bus routes on or intersecting this bike lane. (79,44,23,24,34,9,26, 27) • 2 of the 8 light rail stations within 1/2 a mile.
Barriers to Mobility (any factor that impedes mobility bicyclist such as narrow bridges, railroads, underpasses and Highways.	<ul style="list-style-type: none"> • East-west mobility is limited by I-45 to the east and the Hardy toll and rail lines along Maury to the east. • 610 and the HB&T Railroad act as a choke point to north-south mobility. • Only access to 	<ul style="list-style-type: none"> • East-west mobility is limited by I-45 to the east and the Hardy toll and rail lines along Maury to the east. • 610 and the HB&T Railroad act as a choke point to north-south mobility. • Only access to 	<ul style="list-style-type: none"> • Over all mobility is limited due to lack of trail heads to access to the route. • Eastern mobility limited by close alignment to I-45. • 610 and I-45 are not crossable in the current configuration. A tunnel 	<ul style="list-style-type: none"> • Eastern mobility limited by close proximity to I-45 and Little White Oak Bayou. • 610 and the HB&T Railroad act as a choke point to north-south mobility with bike lane widths being limited by current bridge structure.

Appendix: Fulton Bike Lane Relocation Analysis: Attributes and Challenges of Alternate Alignments

	Fulton	Irvington	Little White Oak Bayou	Airline – North main
<p>Route Safety (any factors that might make the route unsafe for bicyclist, such as complex intersections, freeway interchanges, high traffic and truck traffic volumes, high speed roadways)</p>	<p>downtown is Via N. Main, the Elysian Viaduct, or Maury.</p> <ul style="list-style-type: none"> • Observed Traffic on route is relatively low. • Complex intersections at Crosstimbers, 610, Cavalcade and Fulton. • Some thru truck traffic due to industrial land uses and Pilot Truck Stop @ Patton and I-45. • No exit for Fulton from 610 reduces traffic volume. 	<p>downtown is Via N. Main, the Elysian Viaduct, or Maury.</p> <ul style="list-style-type: none"> • Observed traffic volumes were higher than Fulton. • Exit for Irvington from 610 leads to higher levels of thru traffic into area. • Complex intersections at Crosstimbers, 610, Cavalcade and Fulton. • Large tucking yard at on Irvington between Weiss and Erin as well as industrial land uses promotes trucking traffic. (note: truck yard might be developed per northside village economic redevelopment plan) • Higher traffic speeds due to long straight roadway with little traffic control. (4 lights along the 2.6 mile corridor from Crosstimbers to Fulton) • Possible safety crossing the light rail tracks at boundary, if the crossing isn't at a 90 degree angle 	<p>or bridge would have to be built.</p> <ul style="list-style-type: none"> • Safe route due to lack of traffic. • Issues where the bayou crosses the streets where there is no access to under bridge routes • Conflict points at crossings of 610 and I-45; would require a tunnel or bridge to safely cross. • Flooding along Little White Oak Bayou could pose a safety concern or close the route. 	<ul style="list-style-type: none"> • Observed traffic volume was much higher than Fulton. • Complex intersections at Crosstimbers, 610, Cavalcade, and I-45. • Industrial area to the north and tucking terminal on Airline at Sylvester promotes high truck traffic. • Entry and exit to HOV lane at 40th 1/2 St could lead to higher speed traffic. • Streets entering North Main at odd angles reduce visibility of bicyclist. • Some businesses on North Main have diagonal street parking in front. • Sight distance issue on airline where the bridge crosses over the HB&T RR tracks, bikers on the other side of the crest of the bridge will not be visible to drivers.

**Appendix: Fulton Bike Lane Relocation Analysis:
Attributes and Challenges of Alternate Alignments**

	Fulton	Irvington	Little White Oak Bayou	Airline – North main
Patterns of Future Development (potential areas of future development/redevelopment that can effect bike usage and acceptance)	<ul style="list-style-type: none"> Major potential for redevelopment and gentrification along rail lines. Possible T.O.D.'s at rail stops Planned T.O.D @ the intermodal terminal 12.48% of lane currently undeveloped 	<ul style="list-style-type: none"> Very good potential for redevelopment and gentrification in the area due to proximity to the light rail line and amount to vacant land. Possible redevelopment of truck yard at Patton. Economic redevelopment node along Irvington from Cavalcade to Hays (northside village economic redevelopment plan) 11.39% of land currently undeveloped 	<ul style="list-style-type: none"> Areas west of I-45 have some potential for redevelopment due to expansion of gentrification in the Heights. East of I-45 near Fulton rail line has a very high potential for redevelopment. 14.2% of land currently undeveloped 	<ul style="list-style-type: none"> Possible potential for redevelopment from gentrification expanding in the Heights. East of I-45 on north main there is very high potential for redevelopment due to the rail line and economic redevelopment nodes along N. Main from the I.T. to Quitman (northside village economic redevelopment plan) 12.13% of land currently undeveloped
Destinations Served (areas accessible by bike lane/multi use path)	<ul style="list-style-type: none"> Northline Commons shopping area Northline Transit Center commercial activity along the road 12 schools in the area (8794 students), Moody Park, Carnegie Library 6 civic art attractions 2 colleges (@ Northline) Intermodal Transit Center Businesses: 643 	<ul style="list-style-type: none"> Northline Commons shopping area Northline Transit Center commercial activity along the road 10 schools in the area (7109 students), Moody Park, Carnegie Library 6 civic art attractions 2 colleges (@ Northline) Intermodal Transit Center Businesses: 569 	<ul style="list-style-type: none"> Heights transit center 3 parks 1 arts and cultural destination 10 Schools (7175 students) Montie Beach Park West of I-45 possible access to cultural centers, Intermodal Terminal but that depends on alignment of route Businesses: 624 	<ul style="list-style-type: none"> Heights transit center 2 parks 1 arts and cultural destination 10 schools (7685 students) Montie Beach Park West of I-45 the bike lane could access many cultural centers, and the Intermodal Terminal depending on the on alignment of the route Businesses: 827
Aesthetics (visual environment,	<ul style="list-style-type: none"> Tree lined Roadway Medians with grass and 	<ul style="list-style-type: none"> Boulevard layout with 28 ft medians has potential for 	<ul style="list-style-type: none"> Has the most potential to be a scenic route with some bayou clean up 	<ul style="list-style-type: none"> Lack of a median south of 610 reduces chance of improvement.

**Appendix: Fulton Bike Lane Relocation Analysis:
Attributes and Challenges of Alternate Alignments**

	Fulton	Irvington	Little White Oak Bayou	Airline – North main
landscaping, roadway design)	<p>trees</p> <ul style="list-style-type: none"> • Slow traffic speeds and wide lanes create a comfortable riding environment. • Curvature of the road creates terminating vistas that creates a more pleasant visual experience. • Crosstimbers • Stokes • Cavalcade • Lyons 	<p>improvement</p> <ul style="list-style-type: none"> • Long, straight, wide roadway area visually unappealing • Could be made to resemble the Heights Blvd. bike lane • Higher traffic volumes and speed reduces bicyclist comfort levels • Crosstimbers • Cavalcade • Could request that stokes be extended by Metro to connect to Irvington. <p>Note on Stokes Route: At the HB&T Rail Road line (next to Stokes) the light rail line will be elevated; Metro might be willing to extend the Stokes route down the R.R. R.O.W. to Irvington or create signed route on neighborhood streets.</p>	<p>and maintenance.</p> <ul style="list-style-type: none"> • Pocket park like settings with landscaping 	<ul style="list-style-type: none"> • Visually unappealing land uses in northern extent of corridor. • Limited ROW and roadway width in areas reduces chance of streetscaping • Traffic volumes and speed reduces bicyclist comfort levels • Crosstimbers • Cavalcade • Stokes • Many bike lanes and shared roads in the heights area would be accessible.
Connection to Existing Bike Network (where the route connects to current bike facilities)	<ul style="list-style-type: none"> • Crosstimbers • Stokes • Cavalcade • Lyons 	<ul style="list-style-type: none"> • Crosstimbers • Cavalcade • Could request that stokes be extended by Metro to connect to Irvington. 	<ul style="list-style-type: none"> • Crosstimbers • Stokes • Cavalcade. 	<ul style="list-style-type: none"> • Crosstimbers • Cavalcade • Stokes • Many bike lanes and shared roads in the heights area would be accessible.
Ridership Potential (factors within the catchment area that identify potential to bike use)	<ul style="list-style-type: none"> • Population: 28,137 • Total Pop Under 18: 6,237 • Total Pop 65+: 2,604 • Population density: 11.35 people are ac. • Low Income Households: 48% • No vehicle – 20.8% 	<ul style="list-style-type: none"> • Population: 31,781 • Total Pop Under 18: 7,210 • Total Pop 65+: 3,004 • Population density: 11.68 people are ac. • Low Income Households: 48.7% • No vehicle – 20.8% 	<ul style="list-style-type: none"> • Population: 26,943 • Total Pop Under 18: 5,872 • Total Pop 65+: 2,415 • Population density: 10.75 people are ac. • Low Income Households: 49.24% • No vehicle – 19.38% 	<ul style="list-style-type: none"> • Population: 30,583 • Total Pop Under 18: 5,693 • Total Pop 65+: 2,850 • Population density: 10.51 people are ac. • Low Income Households: 41.13% • No vehicle – 17.3%

Appendix: Fulton Bike Lane Relocation Analysis: Attributes and Challenges of Alternate Alignments

	Fulton	Irvington	Little White Oak Bayou	Airline – North main
Required Maintenance (what would be required to maintain the corridor as a usable bikeway)	<ul style="list-style-type: none"> • Non – vehicle trips to work (walking, bike, public transit) – 13.86% • Trip attractors: see destinations served • Maintenance of striping. • Clearing bike lane of obstructions and trash. 	<ul style="list-style-type: none"> • Non – vehicle trips to work (walking, bike, public transit) – 13.86% • Trip attractors: see destinations served • Maintenance of striping. • Clearing bike lane of obstructions and trash. 	<ul style="list-style-type: none"> • Non – vehicle trips to work (walking, bike, public transit) – 13.68% • Trip attractors: see destinations served • Keep path clear of obstructions and trash, especially after a flood events. • Land adjacent to the bike lane would need to be mowed and maintained by the parks department. 	<ul style="list-style-type: none"> • Non – vehicle trips to work (walking, bike, public transit) – 12.8% • Trip attractors: see destinations served • Maintenance of striping. • Clearing bike lane of obstructions and trash.
Developmental Issues (possible issues with development of the bike lane/multi use path)	N/A	<ul style="list-style-type: none"> • Bike safe drainage inlets and bike responsive traffic signal <p>Crosstimbers to Fulton:</p> <ul style="list-style-type: none"> • Would have to expand the roadway or subtract from the median to accommodate bike lane. <p>Bike lane on Fulton from Irvington to Boundary:</p> <ul style="list-style-type: none"> • Special signalized intersection would have to be developed at Boundary and Irvington to ensure the safety of bicyclist. • Design of proper safe crossing of light rail 	<ul style="list-style-type: none"> • Have proper signalized crossing at intersecting arterial roadways and the HB&T Railroad • Would have to purchase R.O.W. along Bayou. • Some areas of Little White Oak Bayou have very limited R.O.W. • Many areas have bank erosion that would need to be stabilized. 	<ul style="list-style-type: none"> • Bike safe drainage inlets and bike responsive traffic signal • Narrow roadways would have to be widened. • Many sections of the roadway are in need of repair and would need to be repaved.

**Appendix: Fulton Bike Lane Relocation Analysis:
Attributes and Challenges of Alternate Alignments**

	Fulton	Irvington	Little White Oak Bayou	Airline – North main
		tracks at Boundary Construction Detour: • Possible detour following Collingsworth, Cochran, Reynolds/Morris, and Genova during construction of light rail on the Fulton segment.		