

# Planning Livable Military Communities **APPENDIX**



**PLANNING**  
LIVABLE MILITARY COMMUNITIES

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## APPENDIX A | STAKEHOLDER INTERVIEWS





## Stakeholder Interviews

Stakeholder Interviews	
Organization or Entity	
Northwest Tarrant Chamber of Commerce	Executive Director
Tri-City Area Chamber of Commerce	Member
City of Sansom Park	City Administrator
City of River Oaks	City Administrator/Director of Public Works
City of White Settlement	City Manager
City of Westworth Village	City Administrator
City of Lake Worth	City Manager
City of Benbrook	City Manager
City of Fort Worth	City Manager
Tarrant County Transportation Department	Planning Manager
Tarrant County Community Development	Director
Fort Worth South Inc.	Chair (RCC)
Fort Worth Air Power Council	Chairman
Fort Worth Civic Leaders Association	Chairman
Lockheed Martin	Vice President of Strategic Planning
East Lake Worth Neighborhood Association	President
Neighborhood Association of South Lake Worth	Steering Committee Chair
Scenic Shores	President
City of River Oaks	Councilmember
City of Benbrook	Deputy City Manager
City of White Settlement	Economic Development Director
Lockheed Martin	Manager of Community Relations
Fort Worth Chamber of Commerce	Vice President of Economic Development
Northwest Tarrant Chamber of Commerce	Executive Director
Tri-City Area Chamber of Commerce	Member
River Oaks Chamber of Commerce	President
City of Fort Worth	City Manager
Fort Worth South Inc.	Chair (RCC)
Lockheed Martin	Vice President of Strategic Planning
City of Fort Worth	Economic Development Manager
Tarrant County	Economic Development Coordinator
City of Sansom Park	Sansom Park EDC
City of Benbrook	Benbrook Economic Development Corporation
City of Lake Worth	Lake Worth EDC
City of White Settlement	White Settlement EDC Director

## APPENDIX B | CORRIDOR WORKSHOP RESULTS





# Corridor Workshop

September 10 - 14, 2012



# Corridor Workshop Presentation

- 1- Project Overview and Study Area Tour
- 2- Community Vision and Corridor Design Concepts
- 3- Corridor Workshop Process
- 4- Proposed Design Concepts
- 5- State Highway 183 Corridor
- 6- State Highway 199 Corridor





The map shows the Fort Worth area with a shaded study area. Key locations labeled include Coffeyville, Sanson Park, River Oaks, Westworth Village, and the Naval Air Station Joint Reserve Base Fort Worth. Major highways 621, 183, and 100 are also indicated.

# Project Overview and Study Area Tour

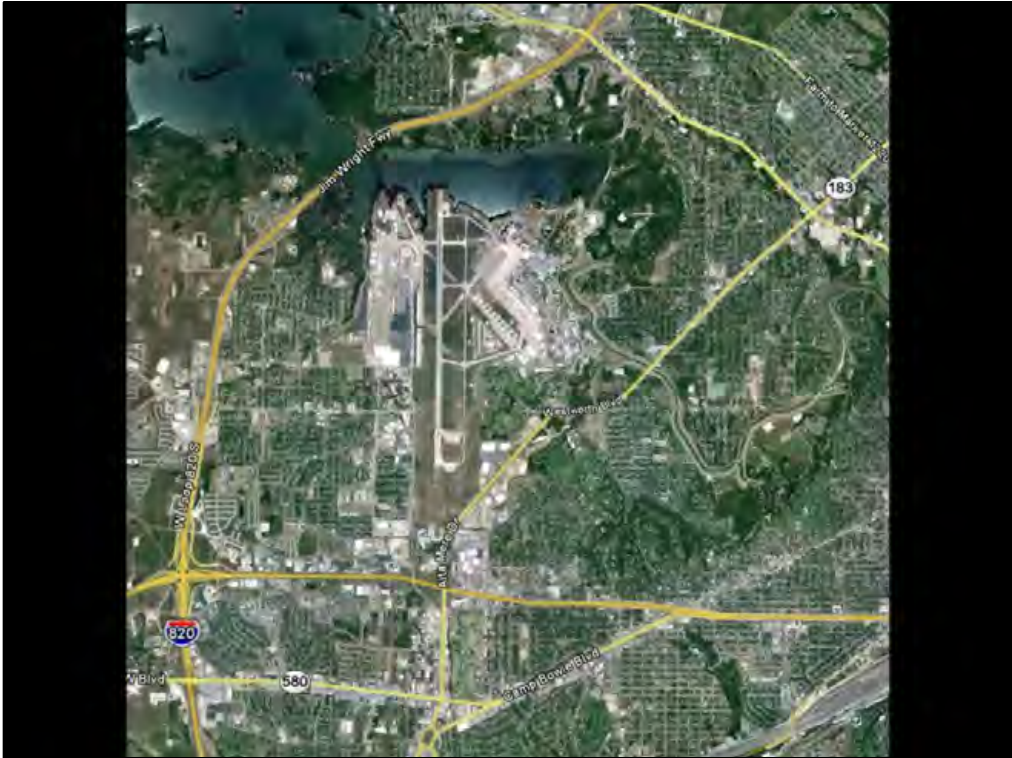




The corridor workshop kick-off meeting was held on Monday September 10, 2012 at the River Oaks Community Center and was attended by residents, officials, community leaders, property owners, and stakeholders. The kick-off presentation included an overview of the Planning for Livable Military Communities project as well as the goals of the corridor workshop. The purpose of the corridor improvement workshop was to develop transportation design interventions and revitalization strategies to build a sense of place, provide gateways for individual communities, foster economic revitalization, and maximize the safe, comfortable accommodation of multiple transportation user types, including cars, transit, pedestrians and bicyclists.

The corridor workshop focused on two primary corridors--State Hwy 199 (Jacksboro Hwy) from Interstate 820 to Hwy 183; and State Hwy 183 (River Oaks Blvd) from Interstate 30 to State Hwy 199. The resulting corridor improvement plans are intended to serve as case studies, with strategies and techniques that can be readily replicated in planning for other corridors in the study area.





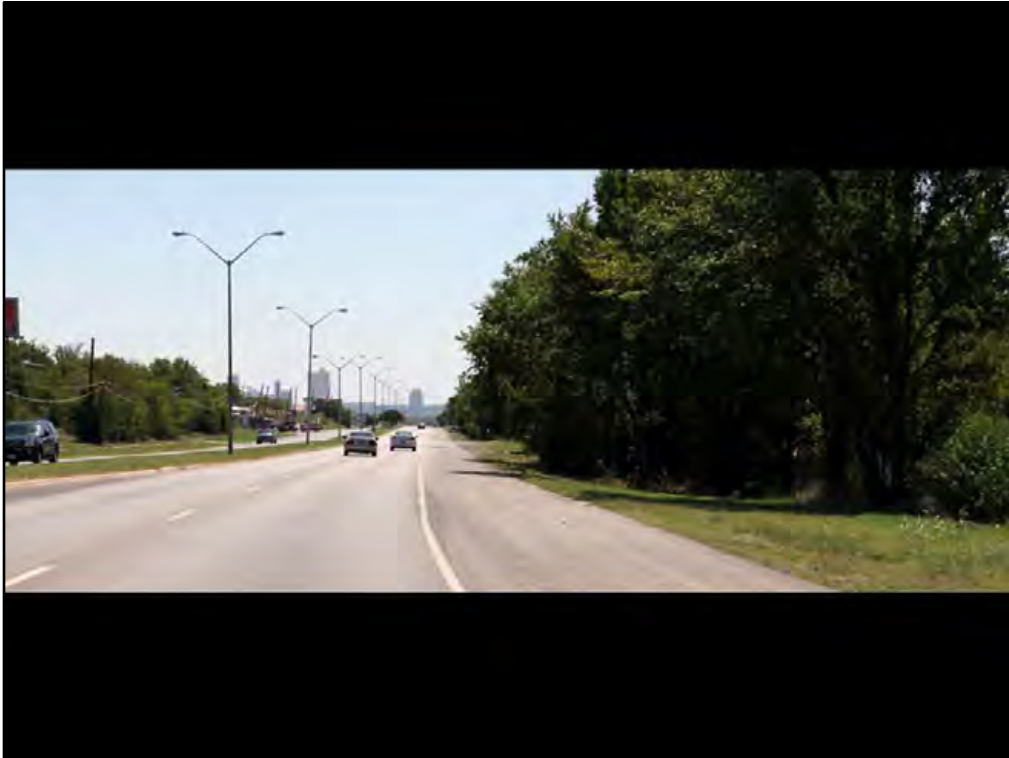
Corridor workshop study area aerial.



Tour of Highway 199 corridor: north end of corridor. The street's scale and design is automobile-oriented. The street edges favor automobiles and disadvantage pedestrians and cyclists. The scale and design of the street encourages high traffic speeds.



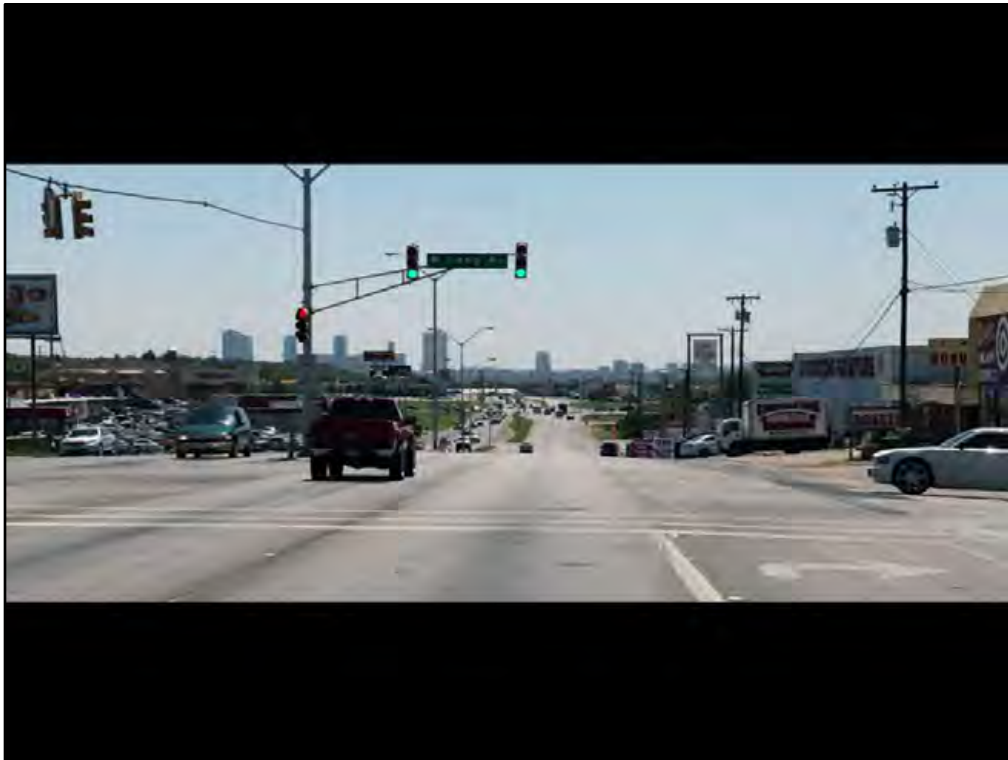
Tour of Highway 199 corridor: typical building along 199 corridor. The ambiguous street edge does not encourage safe traffic flow and lacks pedestrian and bicycle facilities. The large signage is oriented to automobile traffic and is not a human scale.



Tour of Highway 199 corridor: This segment of 199 represents a more natural character area—bordered large shoulders and trees. The corridor is scaled for automobile speed, but has the potential to be a great walking corridor.



Tour of Highway 199 corridor: This slide represents typical conditions along the 199 corridor, which include primarily auto-oriented uses such as tire and auto-body shops, pawn shops, and strip shopping centers. The property values along the corridor are relatively low and the building type is primarily one-story concrete block. This corridor demonstrates a potential for redevelopment and change.



Tour of Highway 199 corridor: This slide represents a typical intersection along the 199 corridor. The intersection is auto-centric, with limited pedestrian facilities. If you design a street like a gun barrel, cars drive like bullets.





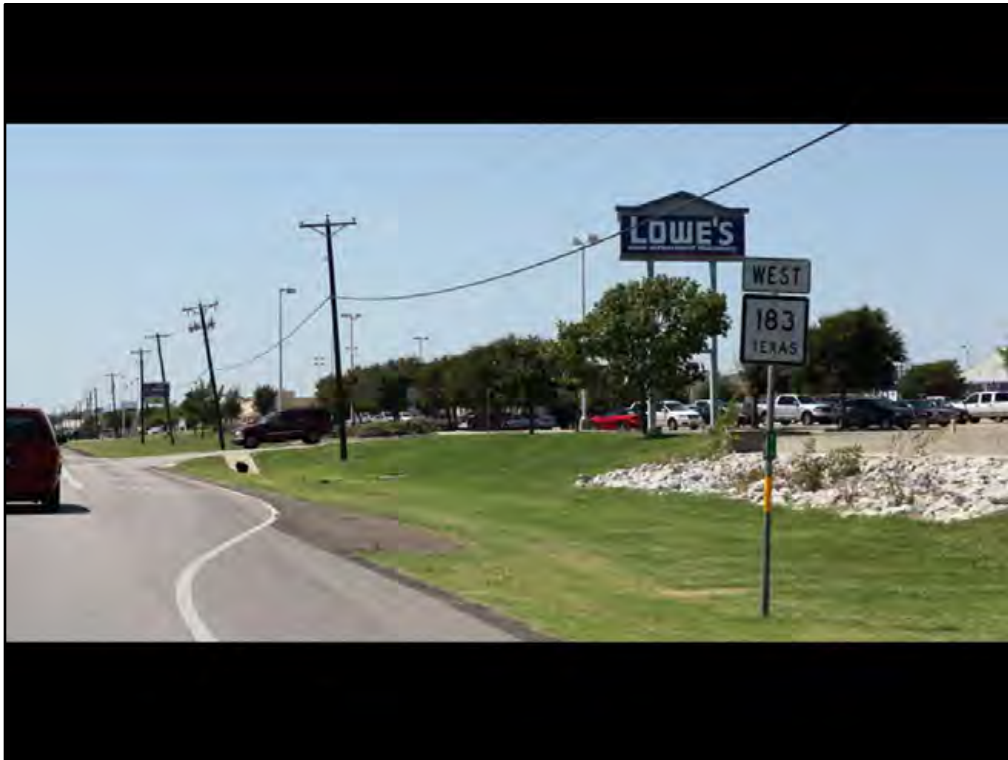
199 and 183 intersection: new Quick Trip gas station.



Tour of Highway 183 corridor: This slide represents typical driveway conditions along 183. There is no defined driveway, just large open asphalt space. This condition is unsafe for pedestrians and bicyclists and reduces the attractiveness of the physical environment.



Tour of Highway 183 corridor: The represents a natural area along the 183 corridor, where the street is bordered by trees.



Tour of Highway 183 corridor: As one drives south along Highway 183, the development becomes newer and larger, including big-box retailers such as Wal-Mart and Lowe's. These large-format developments are auto-oriented and lack pedestrian or bicycle facilities.

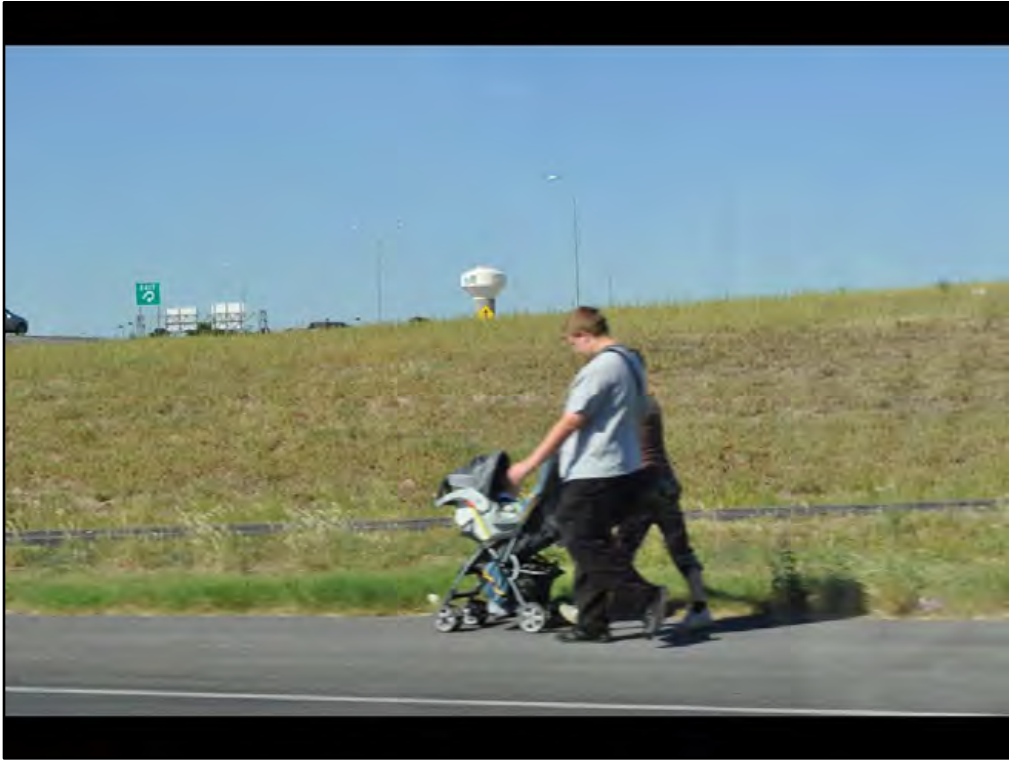


Tour of Highway 183 corridor: As one drives south along Highway 183, the development becomes newer and larger, including big-box retailers such as Wal-Mart and Lowe's. These large-format developments are auto-oriented and lack pedestrian or bicycle facilities.

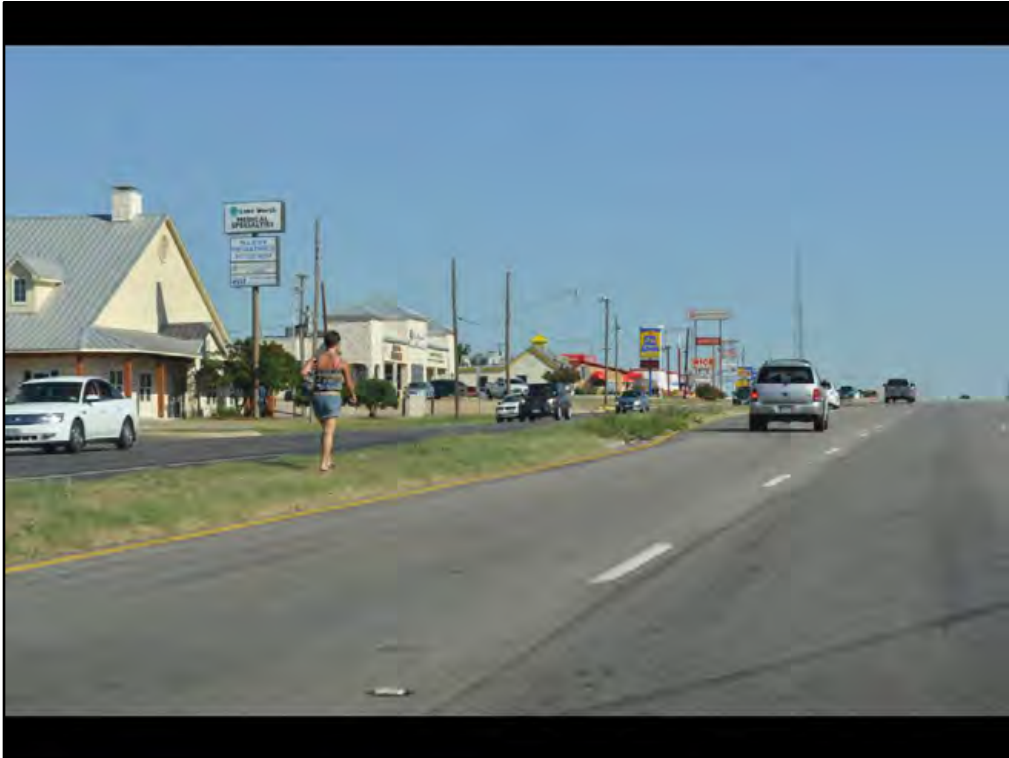


As one drives south along Highway 183, the development becomes newer and larger, including big-box retailers such as Wal-Mart and Lowe's. These large-format developments are auto-oriented and lack pedestrian or bicycle facilities.





Tour of Highway 183 corridor: No pedestrian facilities and sidewalks are available yet people walk.



Tour of Highway 183 corridor: No pedestrian facilities and sidewalks available.

A faded map of the Fort Worth, Texas area serves as the background. The map shows major highways like I-35 and I-40, and various neighborhoods including Cedar Hill, South Park, River Oaks, and Westworth Village. The title 'Community Vision and Corridor Design Concepts' is centered over the map in a large, bold, dark green font.

# Community Vision and Corridor Design Concepts

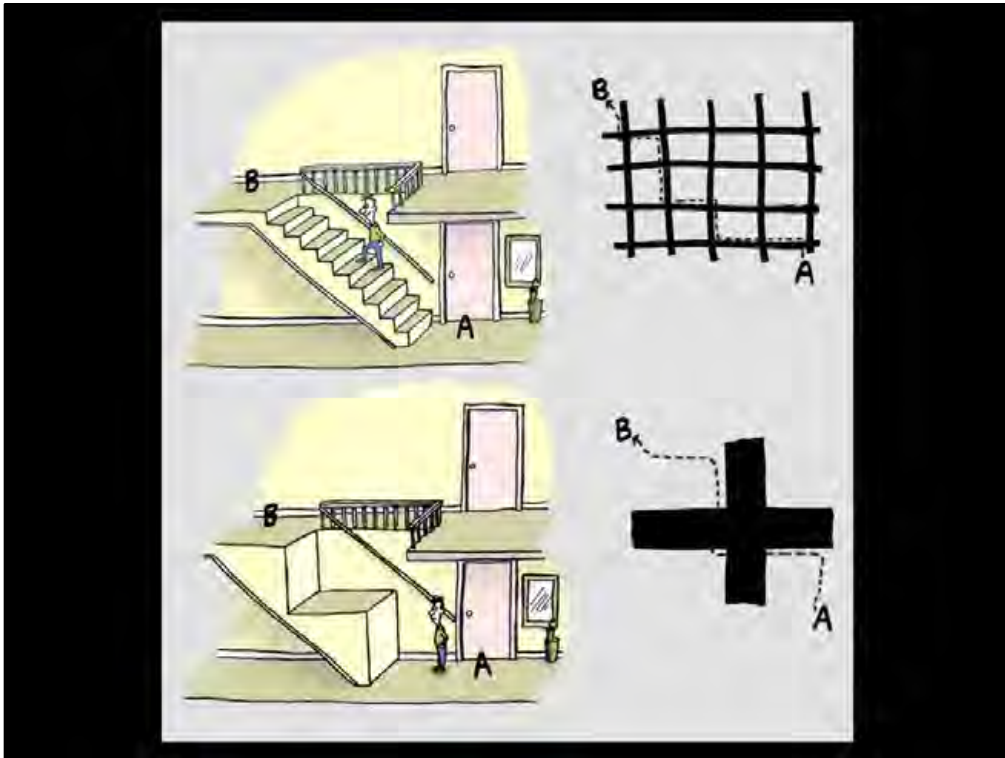




The corridor workshop team worked with participating residents to develop the community's vision. The vision is intended to represent what the 199 and 183 corridors *ought* be— how the corridors should contribute to community identity, encourage investment, and provide access and connections for all users. The vision has two parts: the qualitative, including how the corridors should feel and what they should look like—and the quantitative, including what types of vehicles and development should be on the corridor—multiple modes, mixed uses, etc...

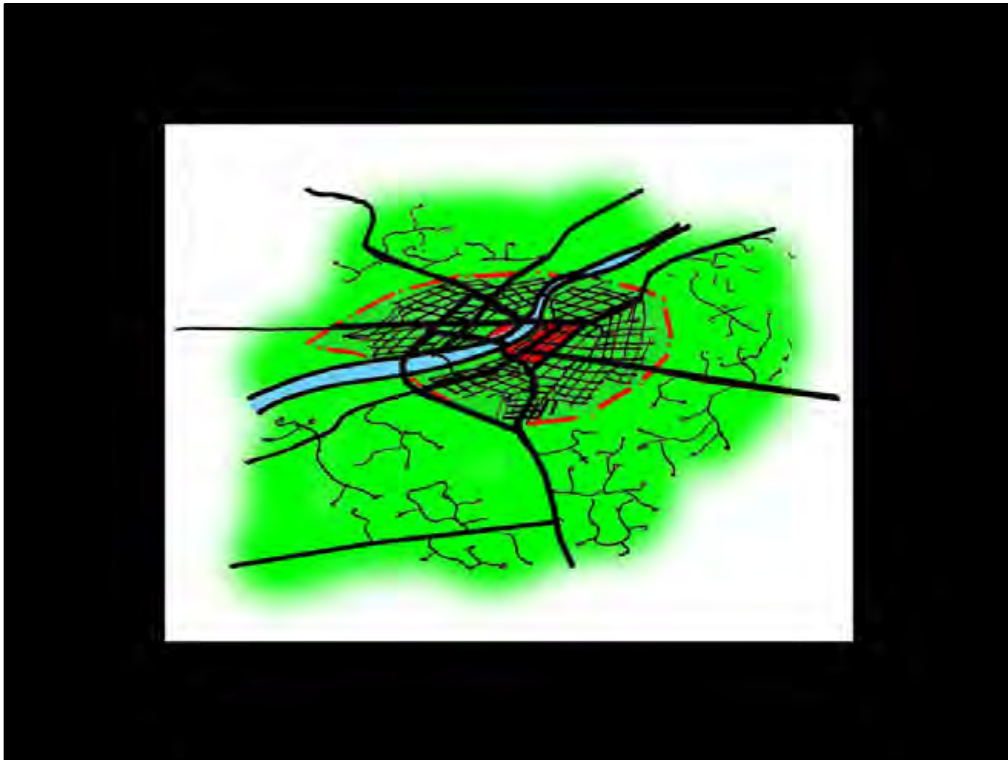


Good street design allows a street to do more than just carry cars. A well-designed corridor can nurture businesses, provide recreational routes, build identity, and still accommodate automobiles, cyclists, and pedestrians of all ages.



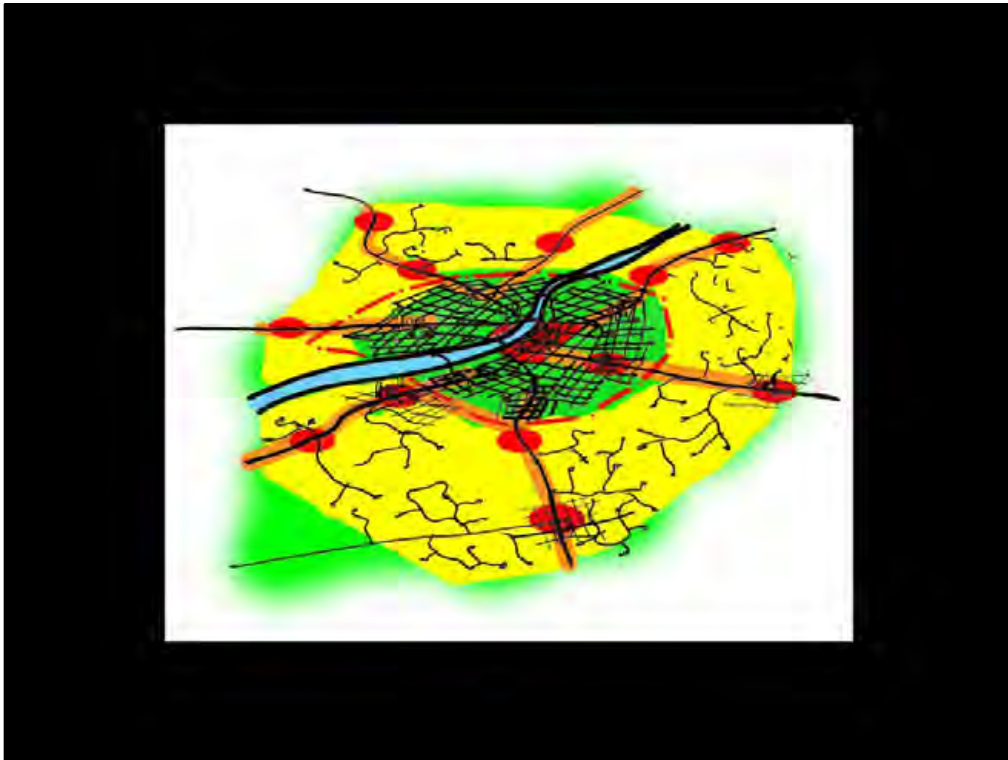
This diagram illustrates the benefits of a well-connected block structure and street network. Parallel routes allow for smaller streets with fewer lanes, which are easier for pedestrians to cross and creates a walkable scale within communities. Such a block structure also gives all users more choices, more access and direct travel routes.



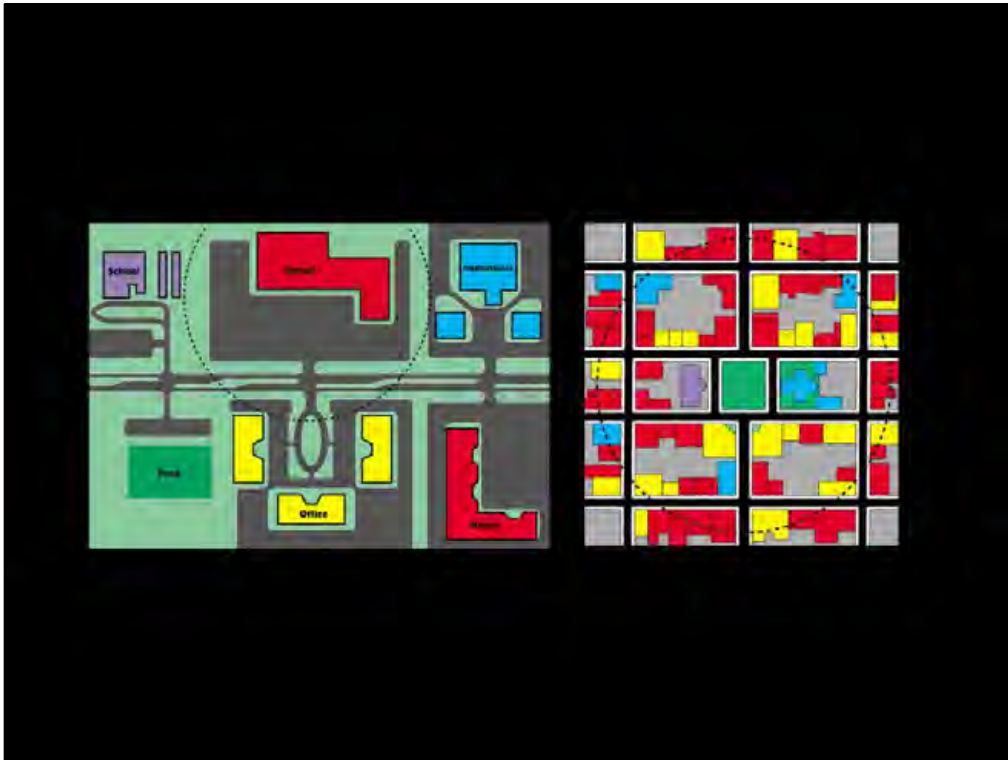


This illustration represent the typical suburban development pattern found in many older cities, with development occurring on open land along old farm to market roads. The wedges between farm roads form large suburban tracts. Over time, the farm to market routes were widened, traffic speeds were increased, and strip shopping centers spread--just like 183 and 199.

This sprawl pattern can continue to spread along corridors until specific policies are put into place to shape growth and development patterns in a way that fits the community's vision. These re-envisioned corridors are resilient, flexible, and able to change.

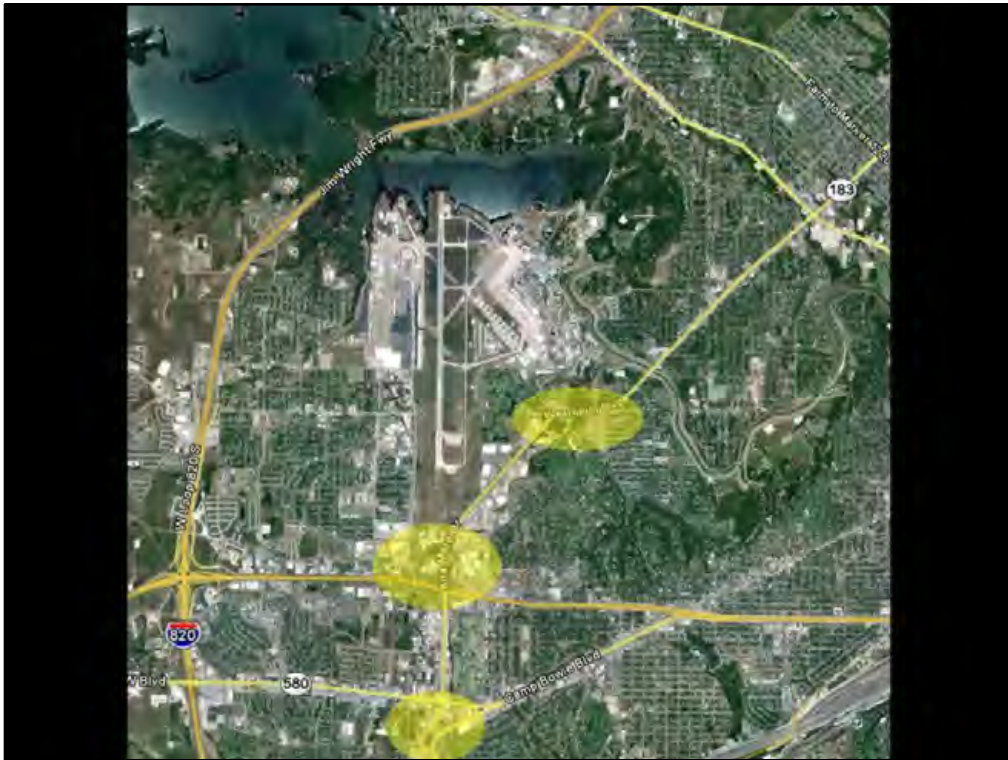


New nodes or mini downtowns along these corridors can provide services and places to shop, work, and live for nearby suburban residential communities. Mixed-use nodes can offer jobs, services, and amenities, allowing residents to meet needs closer to home. Additionally, such corridors will be positioned to be 'transit ready' in the future. Charlotte, North Carolina used this strategy for its new transit plan. Highway 199 has a lot of transit potential.



This diagram illustrates how a network around a developing node transforms the environment from an auto-scale to human scale—with many uses within a short walk.





This photo illustrates the major confluence areas addressed as part of the corridor workshop: Meandering Road and State Hwy 183 (top); State Hwy 183 and Interstate 30 interchange (middle); traffic circle at Camp Bowie and Highway 183 (bottom)



Trip Type	% By Trip Type
Work	18.0%
Work Related	2.6%
Shopping	20.2%
Doctors & Dentist	1.5%
Family & Personal	24.2%
Church & School	8.8%
Social Recreational	24.5%
Other	0.2%
	100.0%

Source: Federal Highway Administration & New York Times

These tables outline a description of how people typically travel within a day. As shown, only about 20% of daily trips are for work. If we can create nodes that provide 80% of the uses that people need on a routine basis, then they will not have to make as many daily trips over long distances. Nodes will ideally create work options as well.





Winter Park, Florida mall example: In this example, a defunct mall in Winter Park is turned into mixed use development node. The mall was located on a couple of arterial roads. As it became less successful, the decision was made to tear it down and start over. A network of streets was established, including a more walkable scale, and buildings up to the street.





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Photos from Winter Park mall redevelopment. These photos illustrate the character of the area—it is walkable, accessible and attractive to all ages. It has been economically successful and serves as a social destination. The mix of houses, offices, and retail is more successful relative to single-use places like malls.



Photos from Winter Park mall redevelopment.





Photos from Winter Park mall redevelopment.



Photos from Winter Park mall redevelopment.



Traffic circle in New Jersey. This traffic circle is slightly smaller than the existing traffic circle located on Highway 183. Such large circles are dangerous, encourage high speeds, have high accident rates, and increase congestion.





This photo illustrates a mini circle and roundabout.



Roundabouts are preferred to traffic circles because they slow cars down and offer safer pedestrian crossings, as shown here.



Roundabouts can also accommodate bicycles.



Roundabouts can also accommodate larger vehicles and emergency vehicles.

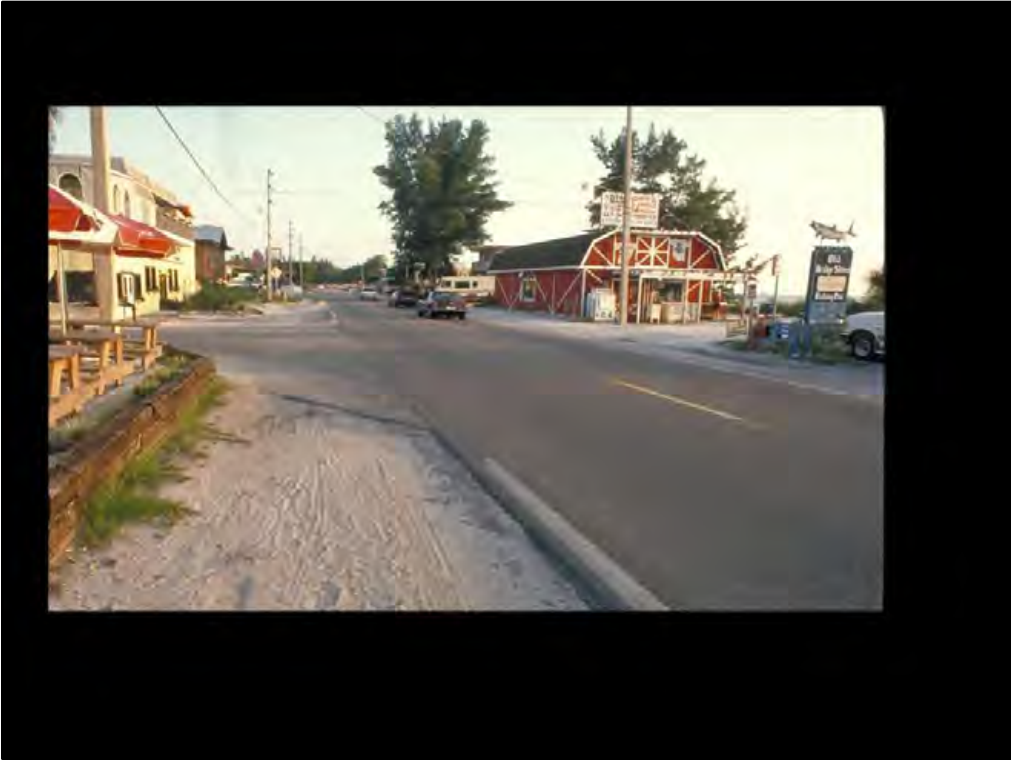




Clearwater, Florida roundabout redevelopment. This roundabout accommodates 30-50,000 cars a day and 5-7,000 pedestrians a day. Cars, kids on school break, retirees, and tourists all use the environment successfully.

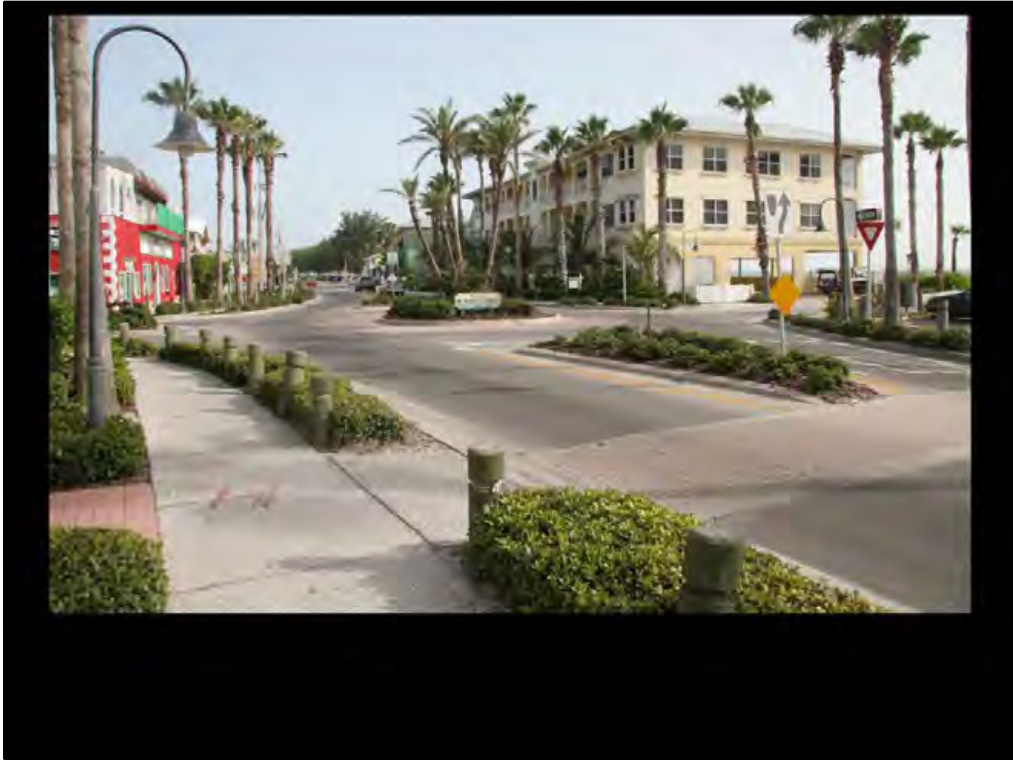


This photo shows roundabouts being used at interchanges—they're well-suited for more than just small roads.



Before and after sequence—redevelopment following a new roundabout.

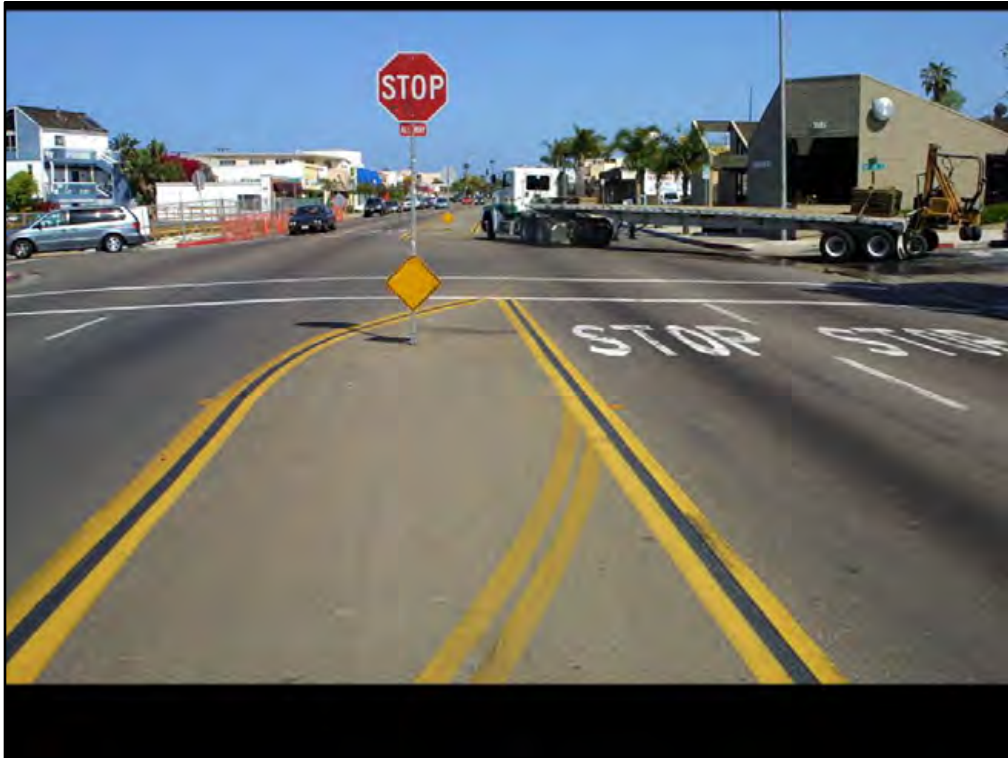




Before and after sequence—redevelopment following a new roundabout.



Roundabout in Miami-the construction of a new roundabout supported mixed use development. The roundabout can handle a greater capacity than the previous intersection signals.

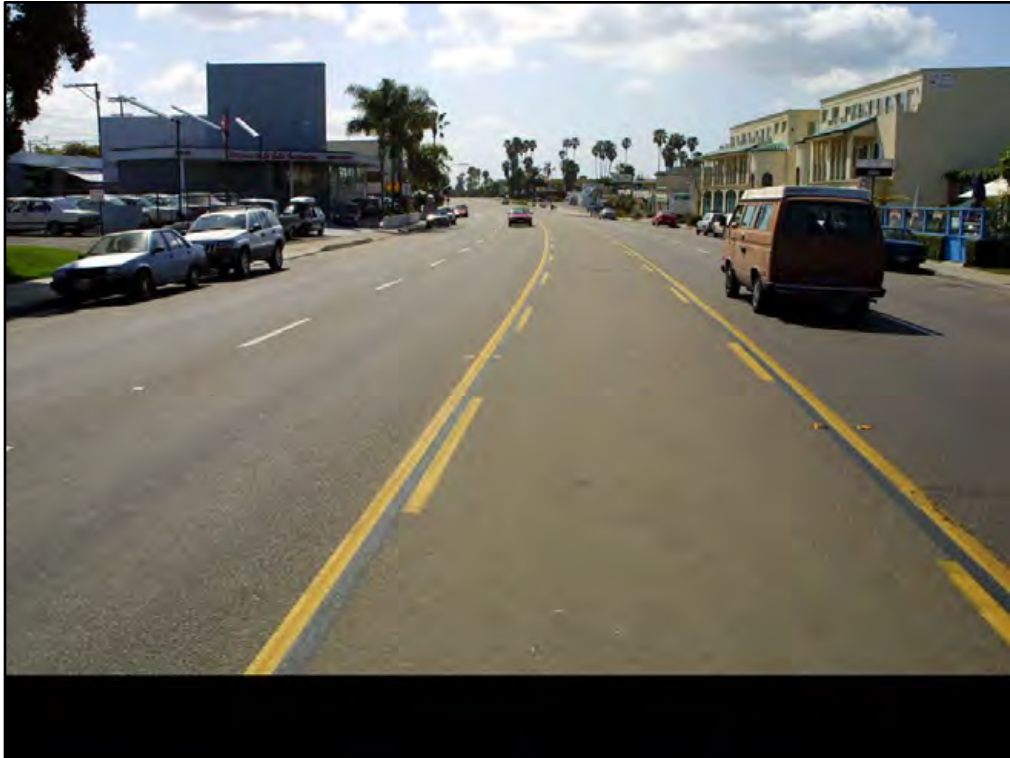


Before and after sequence: A five lane road became a two lane road with roundabouts because the roundabouts did not require all the turn lanes and storage lanes (California).



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Before and after sequence: 3 after photos illustrating the improved condition along the edges of the site in California. The roundabouts and corridor became a centerpiece of the community instead of a barrier, as it was before.

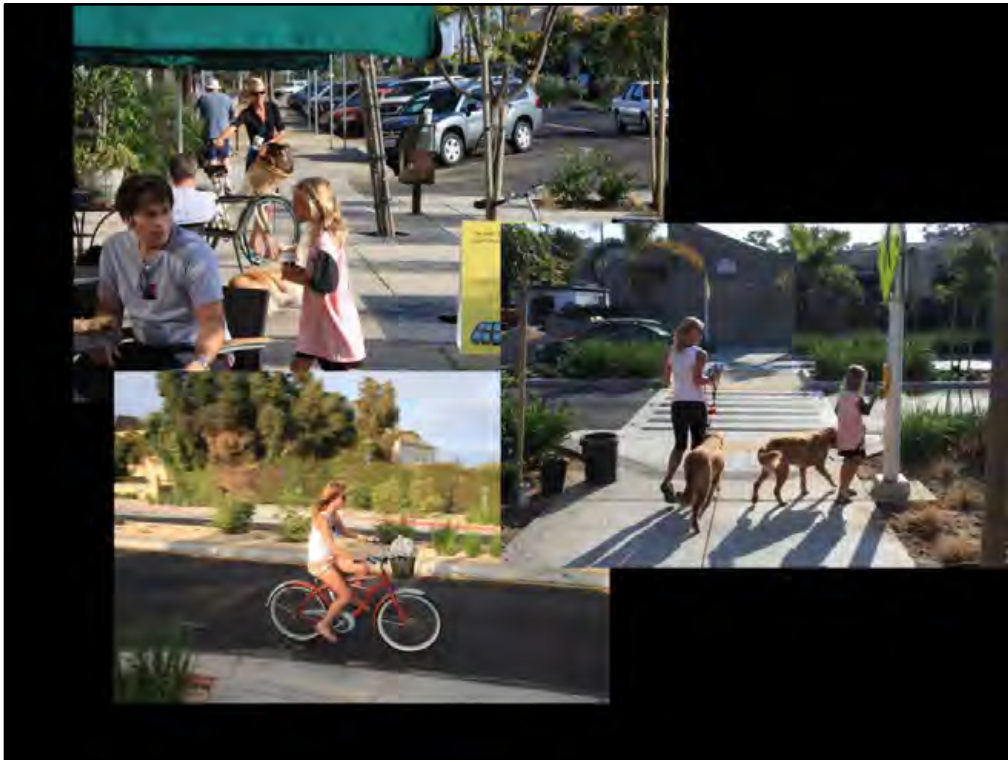


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# Corridor Workshop Process





Kick-off presentation.



At the kick-off meeting, the workshop team asked the community to participate in a visioning exercise. Each resident filled out three post-it notes relating to the three guiding themes: the purple post-its show residents' values—or the things they like and want to preserve; the blue post-its show the challenges—or the things they want to change; and the yellow post-its show the vision of each participant.

# Guiding Themes



## Guiding Themes

*VALUES*

*CHALLENGES*

*VISION*

# Guiding Themes

## **VALUES**

Proximity  
Accessibility  
Cultural Character

## **CHALLENGES**

## **VISION**

Highlights from the post-it exercise. These values, challenges, and vision statements were prevalent among participating residents and served as the basis for the workshop teams concepts and interventions.

# Guiding Themes

## **VALUES**

Proximity  
Accessibility  
Cultural Character

## **CHALLENGES**

Road Design  
Aesthetics  
Business Type

## **VISION**

Highlights from the post-it exercise. These values, challenges, and vision statements were prevalent among participating residents and served as the basis for the workshop teams concepts and interventions.

# Guiding Themes

## **VALUES**

Proximity  
Accessibility  
Cultural Character

## **CHALLENGES**

Road Design  
Aesthetics  
Business Type

## **VISION**

Bicycle/Pedestrian Facilities  
Business Variety/Mixed Use Nodes  
Destination Community

Highlights from the post-it exercise. These values, challenges, and vision statements were prevalent among participating residents and served as the basis for the workshop teams concepts and interventions.







In addition to the exercises engaging community residents, the workshop team also conducted stakeholder interviews with business owners, property owners, elected officials, community leaders, residents, and transportation representatives. Stakeholders met with the workshop team to discuss their values, challenges, and visions. Stakeholder feedback also shaped and guided the workshop team's concepts.



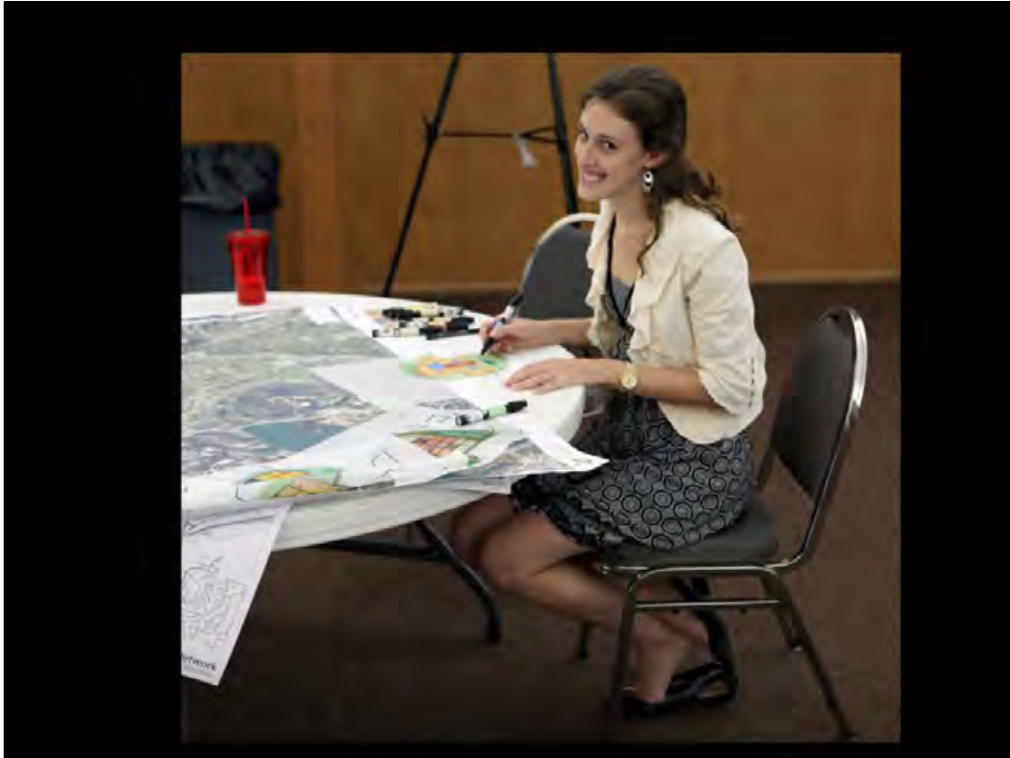
Workshop team member working.



On Wednesday September 12 the workshop team held an informal 'pin-up.' Stakeholders were invited to attend and review the team's working ideas and give feedback.



The workshop team refined the concepts and designs based on feedback received from participants of Wednesday's pin-up. The process was highly collaborative, including workshop team members and NCTCOG staff.



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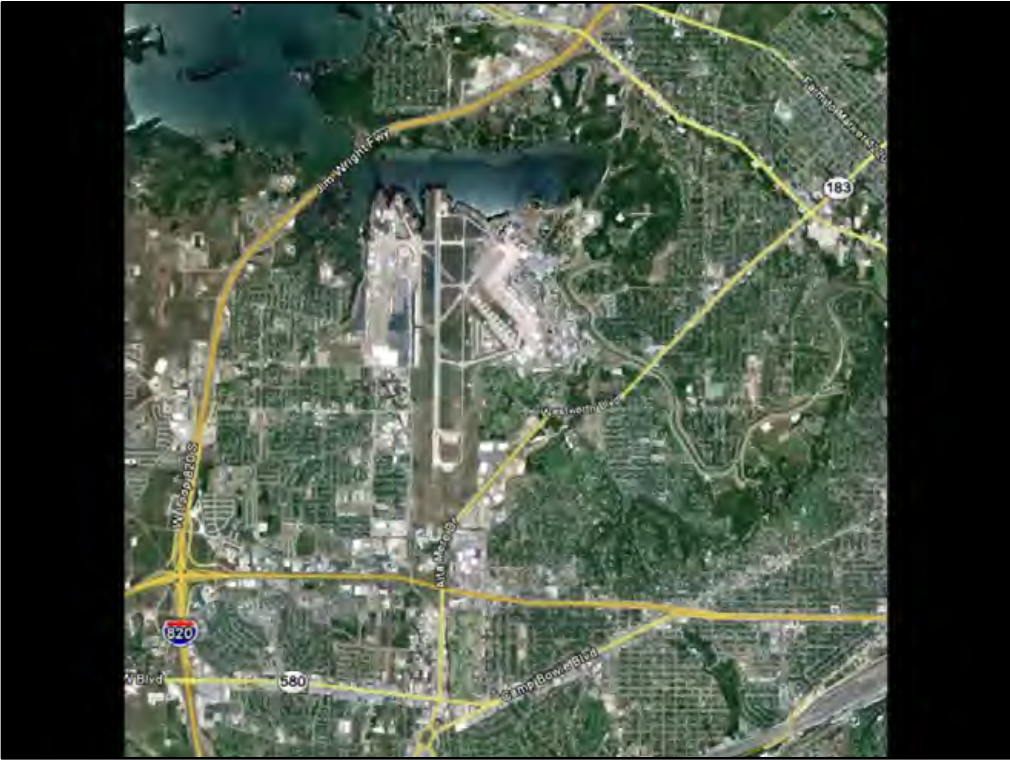




The workshop team refined the concepts and designs based on feedback received from participants of Wednesday's pin-up. The process was highly collaborative, including workshop team members and NCTCOG staff.

# Proposed Design Concepts





Aerial of study area.



This graphic illustrates many of the workshop team’s concepts laid over the study area. Zoom in to see the concepts in detail or see following slides.

- Starting on the northern end of corridor 199, the concept includes new parallel routes, which would relieve congestion and allow redevelopment of properties on north end.
- At the conjunction of 183 and 199, the concept includes a more robust parallel connective network. In this area there are some large parcels and parking lots that allow an intervention, which could spread further into the corridor over time. The western quadrant of the 199/183 intersection has a new gas station on it, making this site relatively constrained for short-term redevelopment; however, the new parallel routes could alleviate the flow through this major intersection by providing routing choices for local traffic.
- The node concept in the center of the 183 corridor creates a new route into the base and gives new routes to alleviate pressure on Roberts Cutoff Road and provides some incentive for redevelopment.
- The design intervention at the conjunction of White Settlement Road and Highway 183 creates parallel networks to alleviate traffic congestion—the concept intends to establish a network of streets including several 2 to 3 lane streets to distribute traffic loads, rather than directing all traffic through a single road. The concept also creates a new park system and network along the river. The new street network creates a block structure that can support redevelopment of the area.
- The concept in the area surrounding the main entrance to the base includes a development node. This node could include a small downtown area. The corridor also provides more opportunity for infill redevelopment further south on 183.
- Design concept at Interstate 30 and Highway 183 interchange: There is a great need for connections between the communities on each side of base. The existing auto-oriented interchange leaves little opportunity for development and lacks any human scale connections. The concept illustrates a redevelopment opportunity to the west. The noise and safety issues associated with NAS Fort Worth JRB create some development constraints in this area. The development concept envisions non-residential uses, particularly on the western side of the mall property and south of the runway.



Photo of the Interstate 30 interchange.





This photo illustrates the possibility of redesigning the interchange to allow for a more connected network of parallel routes.





This photo illustrates the possibility of redesigning the interchange to allow for a more connected network of parallel routes.



This photo illustrates the possibility of redesigning the interchange to allow for a more connected network of parallel routes. This network would simplify and enhance interstate access and allow for more direct connections north-south and east-west.



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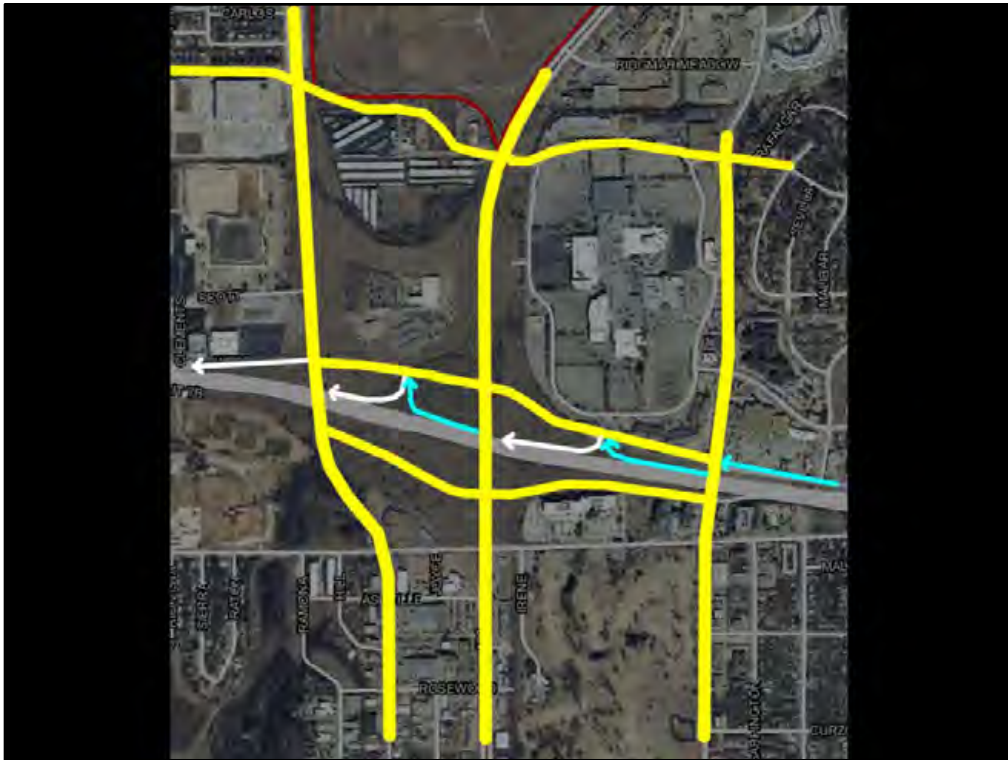


This diagram illustrates the possibility of one proximate interchange ramp. The proximate interchange ramp has several advantages: it allows drivers to access the ramp from any direction and from any of the streets. Providing access options allows for better traffic flow than can be offered by a conventional single purpose ramp.



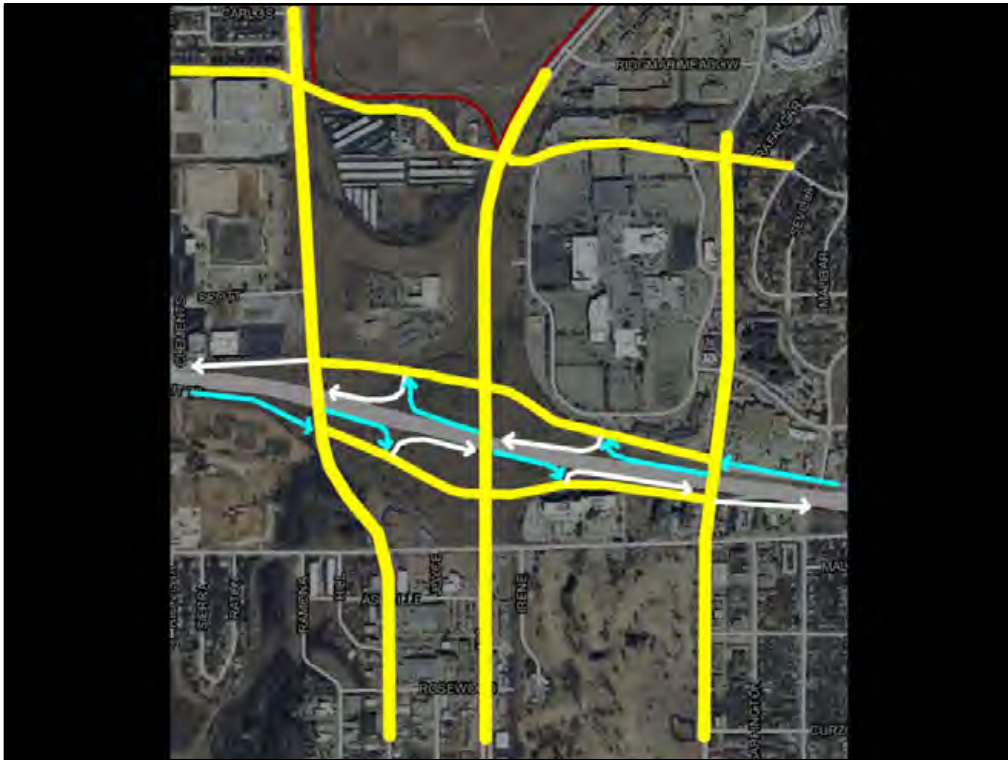
More proximate interchange ramps offer more access points and more choices for drivers, thus alleviating congestion and providing redundancy.





This diagram shows additional proximate off-ramps as well, which connect to the network with regular intersections or roundabouts.

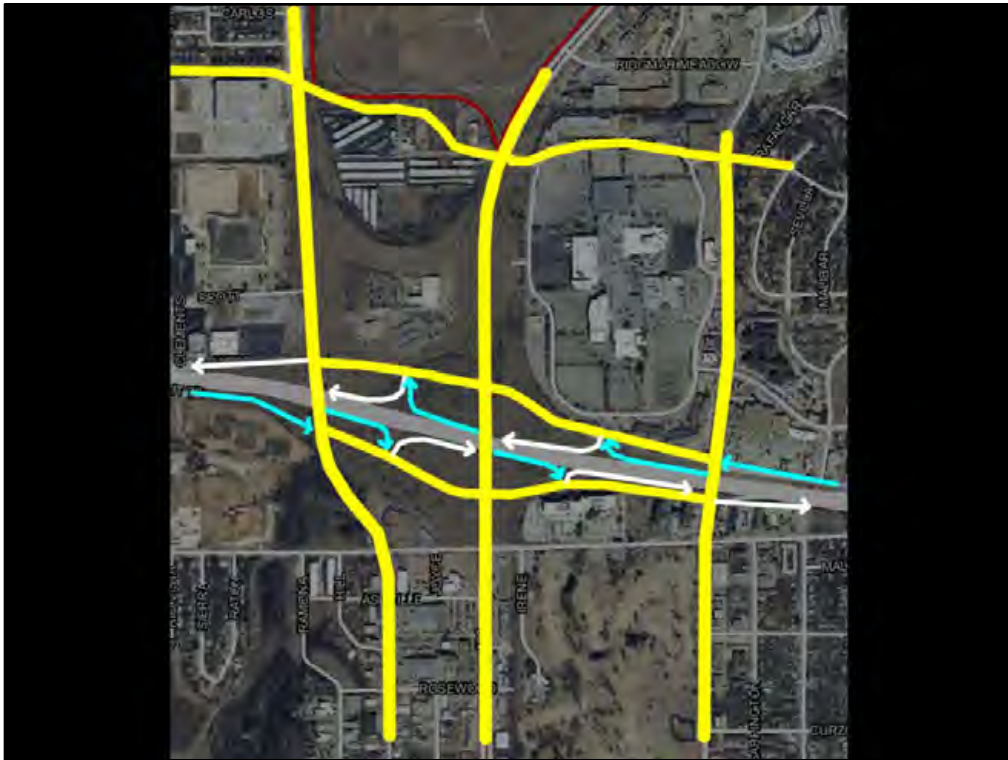




This network of streets and proximate access and off ramps allows for approximately the same number of access points as today, but there is more redundancy, so drivers have more choices for access. This network is also more development-friendly, bike-friendly, and context-sensitive than the traditional clover-leaf configuration.



Camden, NJ example. This site includes a college expansion to the east and a new hospital/medical campus to the west. The new network and proximate interchange ramps are able to better distribute the loads, are more development friendly, are less expensive, and are at a more human scale than rejected alternatives such as a partial clover leaf interchange. The same is true for the Interstate 30 interchange.



This design concept also creates a new block structure that could foster redevelopment.



This design concept also creates a new block structure that could foster redevelopment.







This diagram shows the new concept and the large traffic circle to the south, which also offers an opportunity for redevelopment.





This diagram shows the new concept and the large traffic circle to the south, which also offers an opportunity for redevelopment.



Large traffic circles have very high speed entry speeds, high speed merge and high speed exit. This photo shows a large traffic circle in Kingston, New York being replaced with a smaller roundabout in the middle.

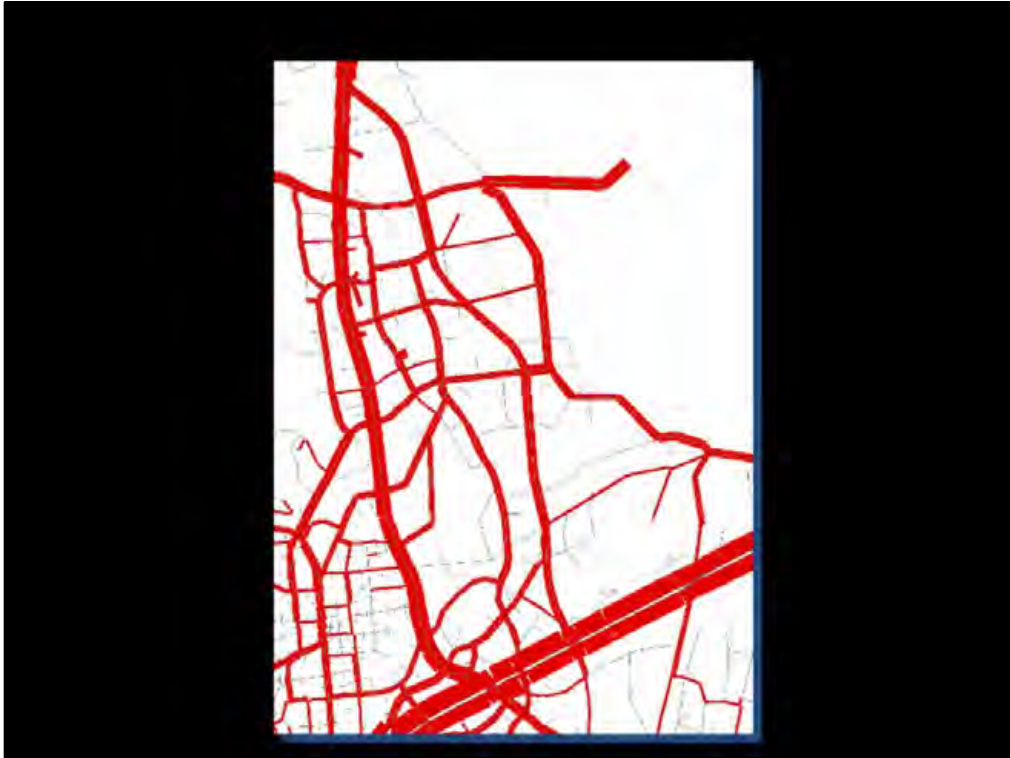


Case Study: This diagram illustrates a case study with an old traffic circle and new development opportunities. New development would be disadvantaged if a large highway interchange were constructed in the area.

- An at grade "parkway"
- New network connections to provide parallel routes to 202 and 31
- Work with property owners to manage access and support approved development plans



Case Study: This illustrates the proposed street network in the area, which better connects the new development opportunities.



Case Study: This illustrates the proposed street network in the area, which better connects the new development opportunities and accommodates motorists, cyclists, and pedestrians better than the proposed highway.





Case Study: This is a photo of the old traffic circle.





Case Study: This photo shows the highway interchange proposed by the DOT.



Case Study: This diagram illustrates the network and smart growth plan proposed to replace the old traffic circle.



Case Study: This diagram illustrates the network and smart growth plan proposed to replace the old traffic circle. The network offered a higher level of service than the DOT interchange which concentrated all the traffic into the one interchange.



The concepts of the case study are applicable to the traffic circle on 183.



The concepts of the case study are applicable to the traffic circle on 183. The street network can be extended south—offering more direct connection options for drivers.





The concepts of the case study are applicable to the traffic circle on 183. The bike route can be extended south.





The concepts of the case study are applicable to the traffic circle on 183. A third street can be connected to the south to further fill in the network and offer drivers more connections and routes. A park is proposed in the area between the new north-south street and the proposed bike route. There are existing streets to the north and south of the park site and businesses along the western edge. The trail will provide an edge along these businesses. The concept proposes to reroute the street behind the existing businesses on the eastern edge to give a proper edge to the park.





This graphic illustrates three representative redevelopment nodes.



This diagram illustrates a representative design concept for the Camp Carter site. While we do not anticipate the camp relocating in any short-term, this concept illustrates a redevelopment possibility if the camp were to move in the future. Further investigation is required to ensure there are no conditions in the land deeds—one area on the eastern edge of the site is known to be deed restricted and not available for future redevelopment.

The concept provides needed additional access points to the northern side of the base, which would reduce the number of cut-through drivers who regularly travel through community to get to the base. The concept also provides an additional park system along the water front. It also anchors a high school, elementary school, and middle school, as schools attract families to the community. Lockheed Martin and the base provide thousands of jobs in the region; however, many of the employees do not live in the adjacent communities. This redevelopment concept could provide desirable housing options to these employees. The concept also includes a small downtown to provide services, retail, and amenities to residents and base employees.





This diagram illustrates a concept for the secondary entrance to the base on Meandering Road. The concept extends the street through existing parking lots and part of the post office property. The area surrounding these streets is constrained, but there would be some redevelopment opportunity because of the added street network.



This diagram shows the southern quadrant of the intersection of Highways 199 and 183. In this concept, the existing street network is extended and filled out with new street connections. The concept provides a small main street perpendicular to Highway 199, creating a visible address on 199 to attract people into the area. The new block structure and scale is positioned to allow for parking garages to replace surface parking over time and to also allow for greater densities and mixed uses.





This diagram shows the same site in the southern quadrant of the Highway 183/199 intersection if Wal-Mart or other big box retailer were to move into the site. The street and block structure are designed to allow the big box retailer to take up one entire block; therefore, when the big box site is redeveloped in the future, the infrastructure is ready for redevelopment with walkable-scaled blocks and streets.



This photo illustrates a big box (Home Depot) redevelopment example in West Palm Beach. The street network is established so the big box retailer takes up one block. Each surrounding building is up to the street. If Home Depot were to go away, the area could continue to grow in an urban, walkable pattern.



This photo illustrates a big box (Home Depot) redevelopment example in West Palm Beach. The street network is established so the big box retailer takes up one block. Each surrounding building is up to the street. If Home Depot were to go away, the area could continue to grow in an urban, walkable pattern.



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This photo illustrates the next slide's point of view of the Home Depot site.



This photo shows the view from the blue cone shown on the previous slide.



This illustration shows an example of street section with single story buildings that might be considered for any node in the study area.

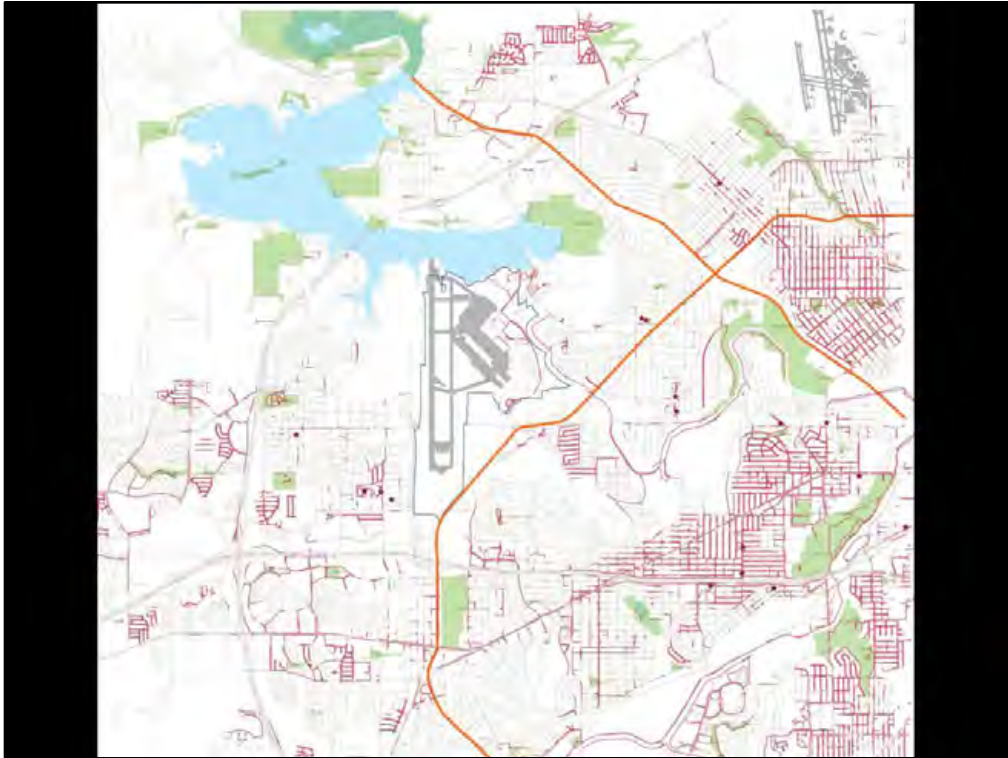


This illustration shows a street section with greater density.

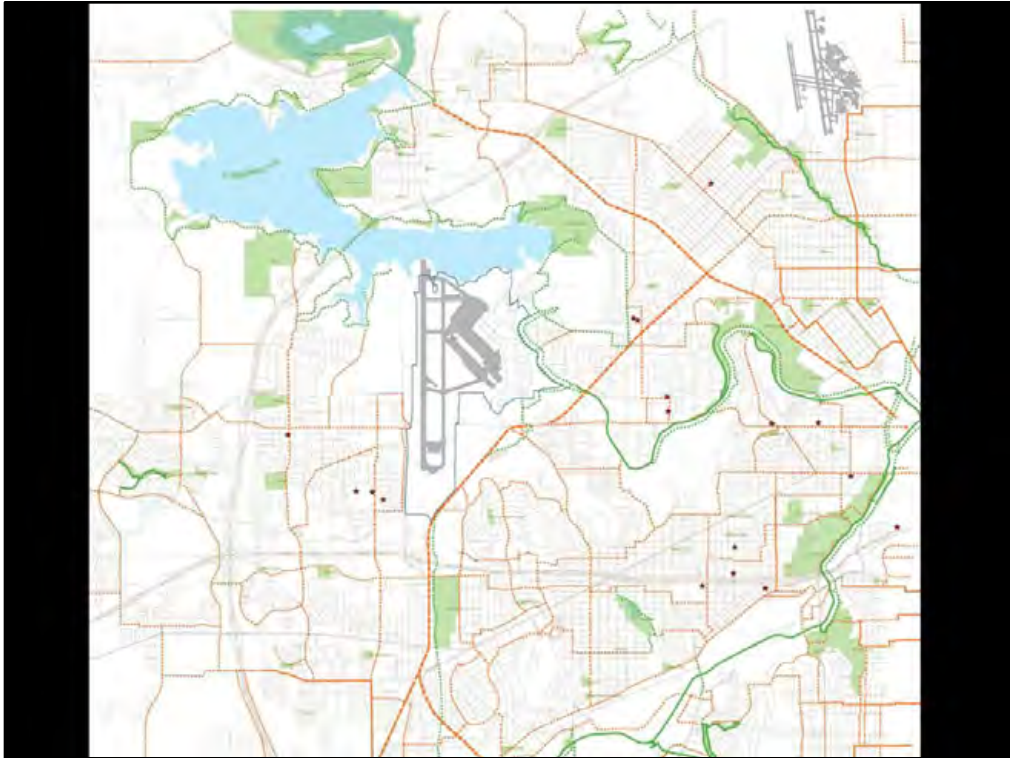


This illustration shows a street section with greater density.





This map illustrates the existing pedestrian facilities (shown in red) within the study area. They are not well-connected and do not provide a complete network. Priority should be given to increasing walkability along the two arterials and within the future nodes.



This map illustrates the proposed bike network, which was shaped by the feedback received from participants in the workshop.

Dashed orange lines are proposed on street bicycle facilities

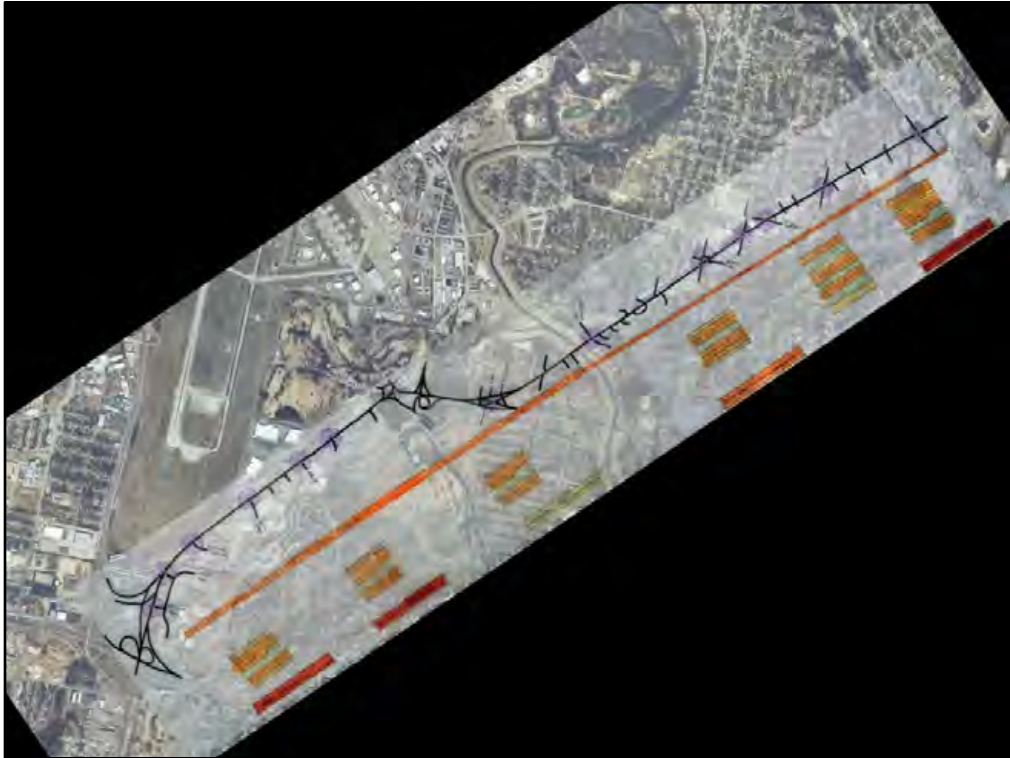
Solid orange lines are proposed on street bicycle facilities

Dashed green lines are proposed off road trails

Solid green lines are existing off road trails

# State Highway 183 Corridor



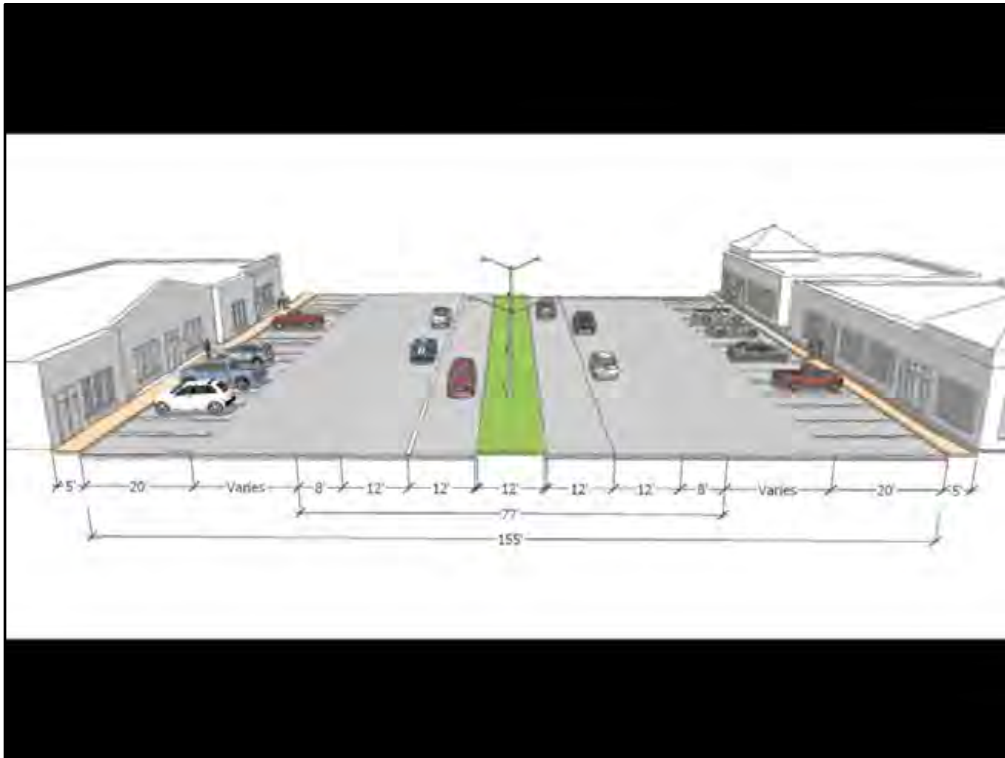


This diagram illustrates the existing conditions along the 183 corridor. The purple circles represent intersections in need of pedestrian facilities and improvements. The orange bar illustrates relative traffic volumes along the corridor and the diagrams along the bottom illustrate the existing street conditions along the corridor.



This corridor has great potential for redevelopment. The existing right of way allows for a median and pedestrian and cycling facilities.





This corridor has great potential for redevelopment. The existing right of way allows for a median and pedestrian and cycling facilities. This illustration shows what the corridor might look like if redesigned into a boulevard.



This corridor has great potential for redevelopment. The existing right of way allows for a median and pedestrian and cycling facilities. This illustration shows what the corridor might look like if redesigned into a boulevard.

## Frontage Road Design Challenges



**Conventional Approach (theoretical)**

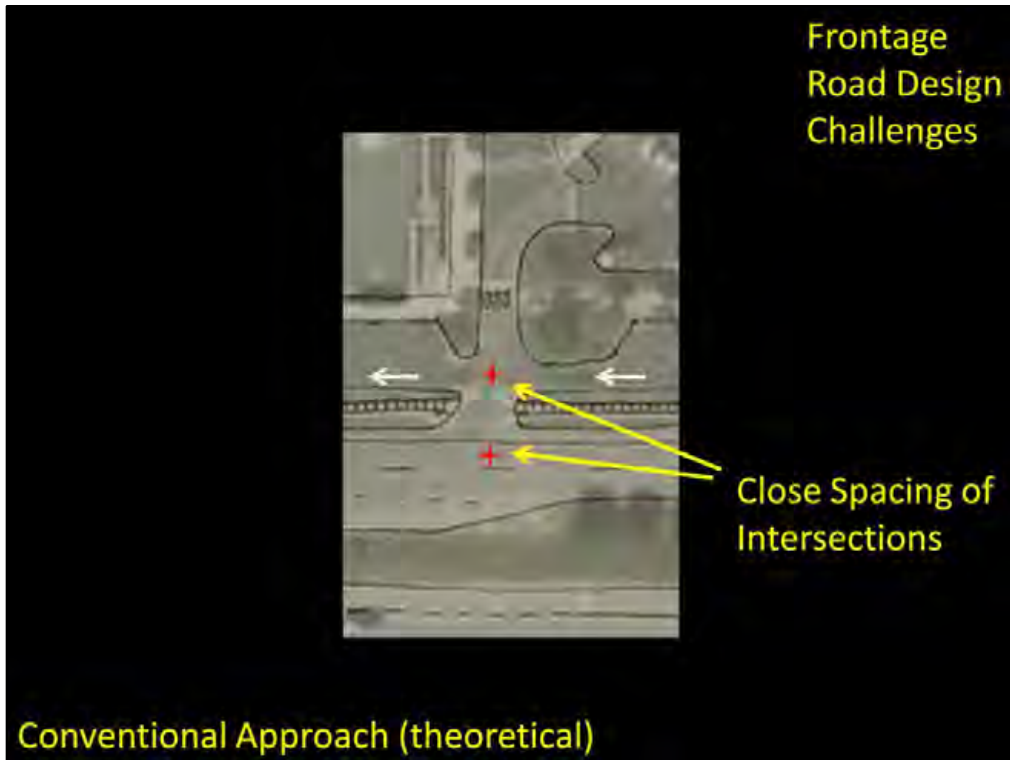
Many segments along the 183 corridor include parallel frontage roads. This next series of slides illustrate the problems caused by frontage roads moving in the same direction as the adjacent arterial and illustrate a proposed solution. In the current frontage road design, the intersections are closely spaced and provide a short queuing distance, which cause backups on the arterial.

## Frontage Road Design Challenges



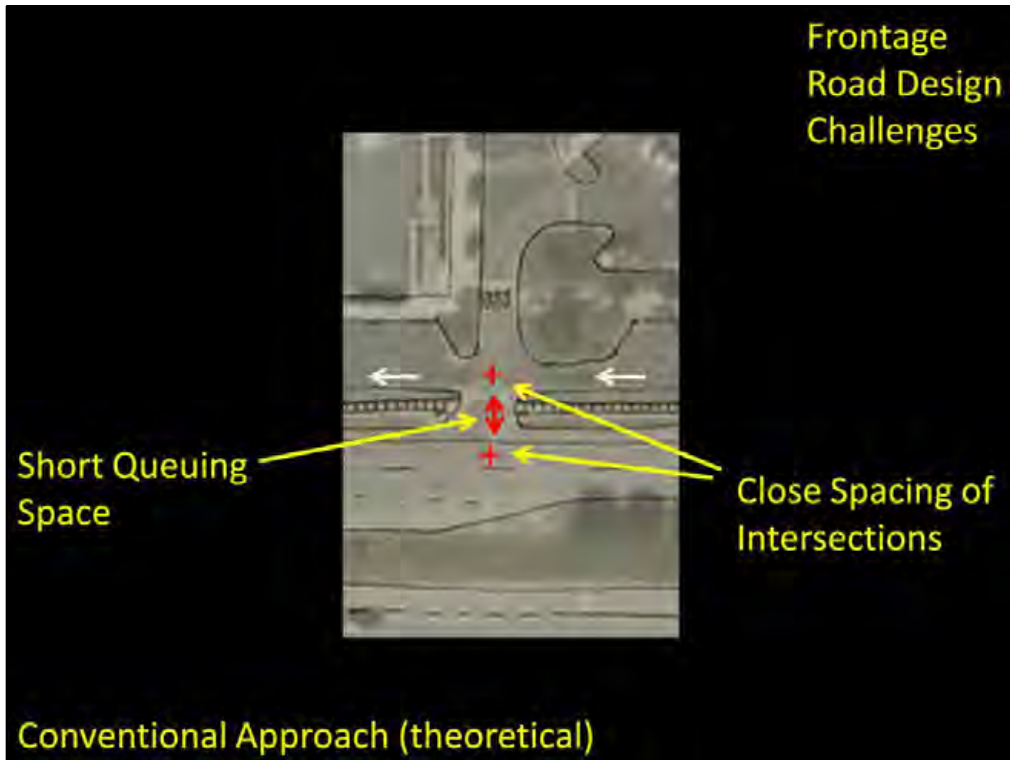
**Conventional Approach (theoretical)**

In traditional frontage road design, the frontage road flows in the same direction as the adjacent arterial.



The intersections are closely spaced.





Which provides a very short queuing space.

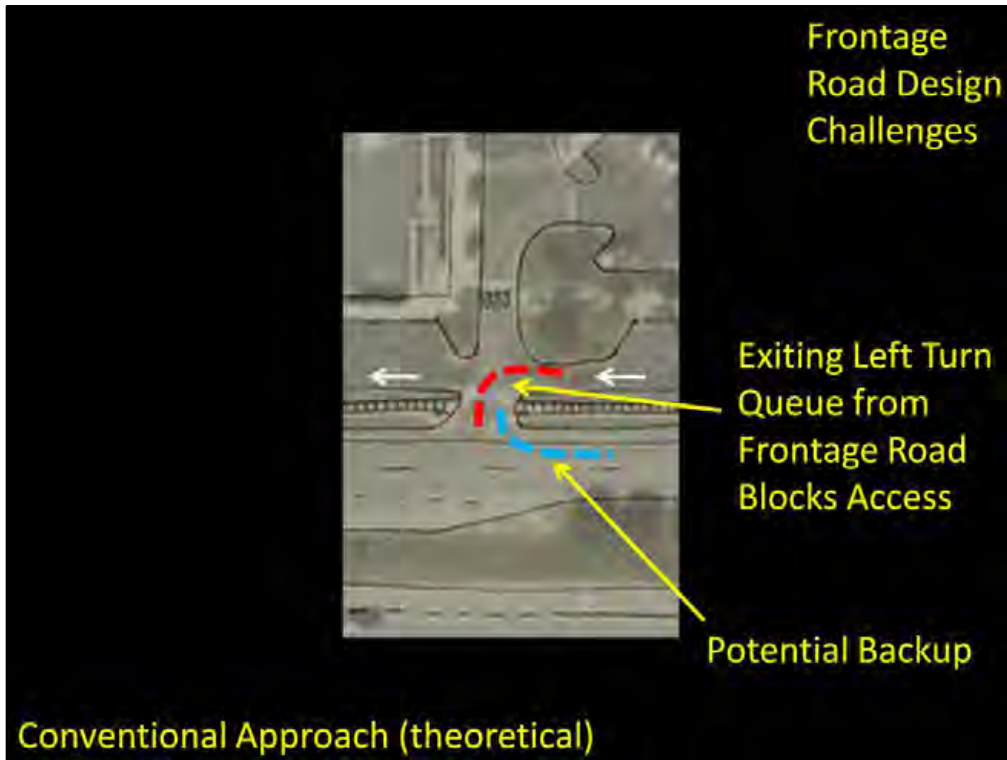
Frontage  
Road Design  
Challenges



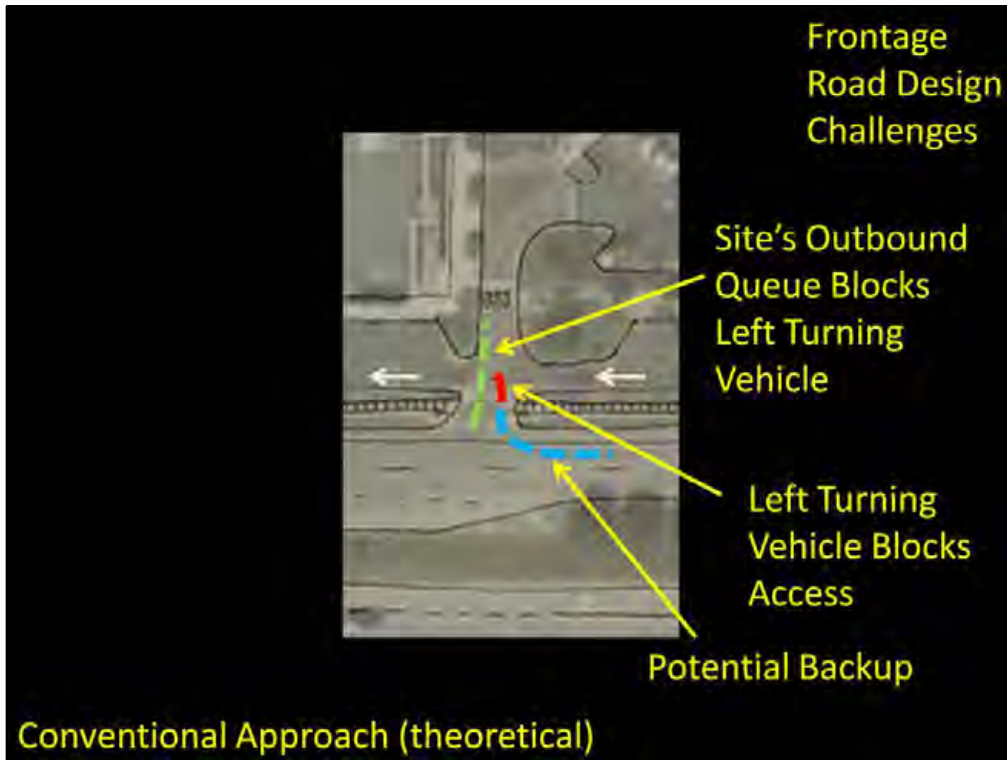
Difficult Sight  
Line for Drivers  
(they have to look  
behind them)

Conventional Approach (theoretical)

It's hard for drivers to see because the approaching traffic is behind them.



This diagram illustrates the problematic left turns out of the frontage road blocking inbound traffic that then backs up onto the arterial.



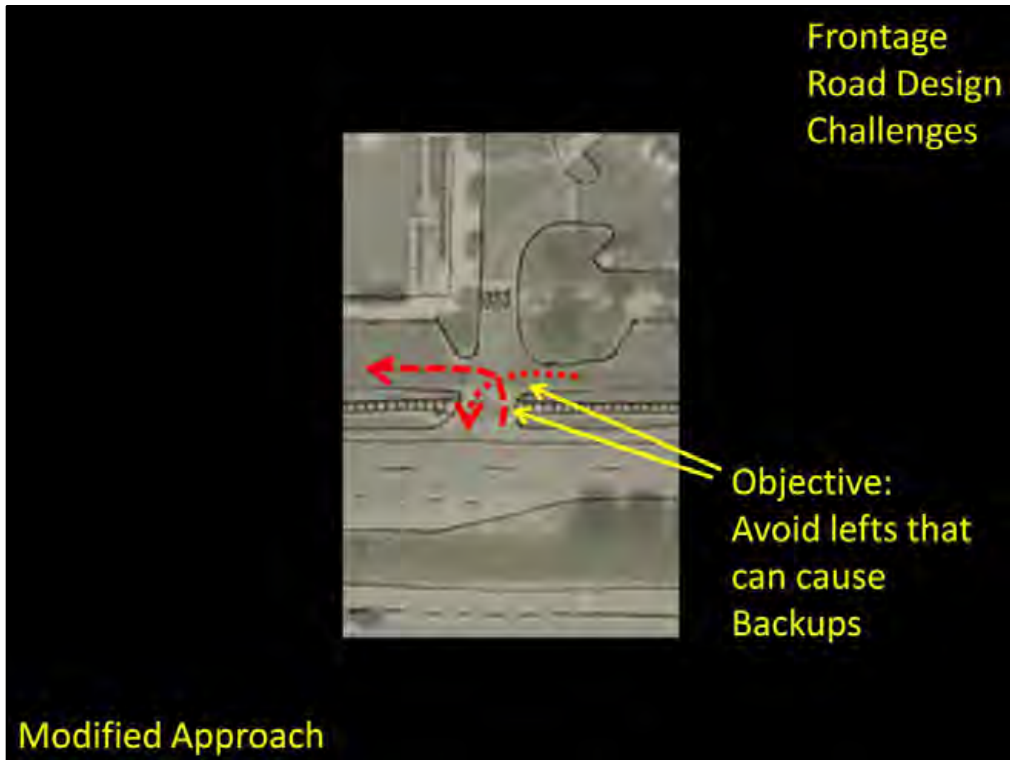
This diagram illustrates the problematic left turns onto the frontage road that can be blocked by drivers leaving the site. Consequently, inbound drivers may cause a queue onto the arterial.

## Frontage Road Design Challenges



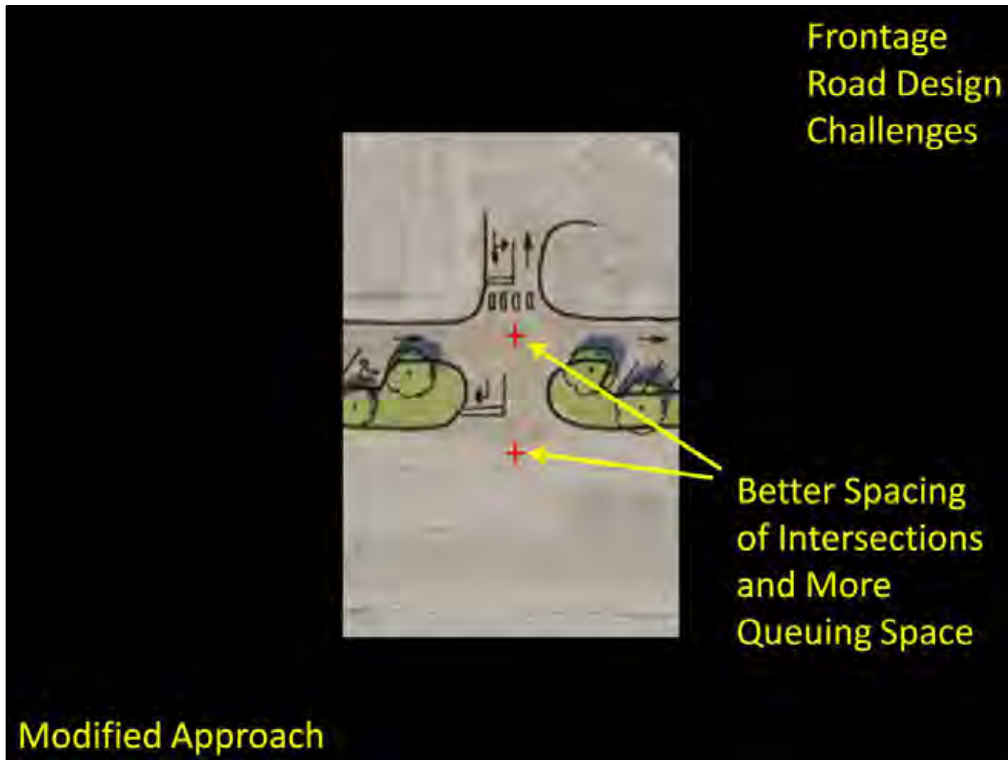
### Modified Approach

This series of slides shows a proposed design in which the flow of the frontage road and arterial move in opposite directions. Parking shifts to the side of the road closest to the arterial. This could be head in angle parking, safety parking, or parallel parking on both sides. Regardless of which type of parking is used, the space between the two intersections grows and gives more queuing space—which helps the intersection’s function.

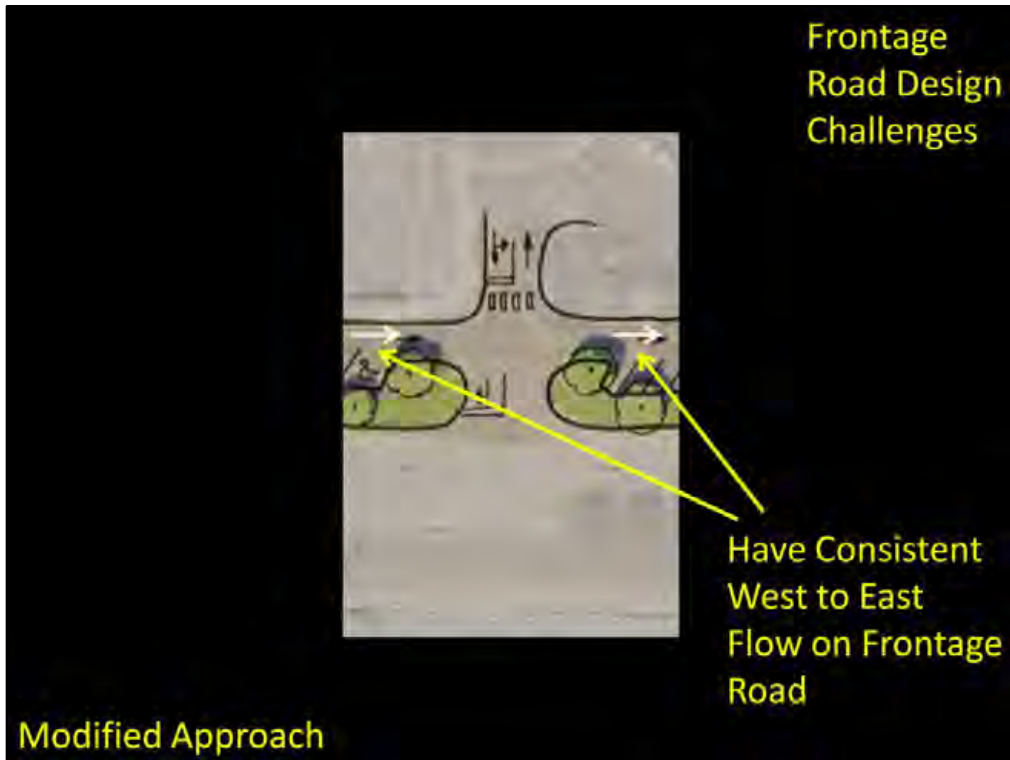


These are the problematic left turns that are eliminated.





This shows the greater distance between the two intersections.



The flow goes the other way.

Frontage  
Road Design  
Challenges

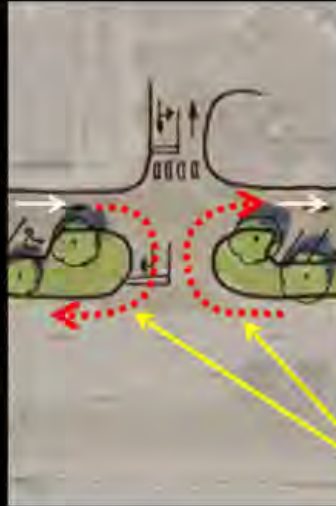


Excellent Sight  
Lines for Drivers

Modified Approach

Which results in better sight lines for drivers leaving the frontage road.

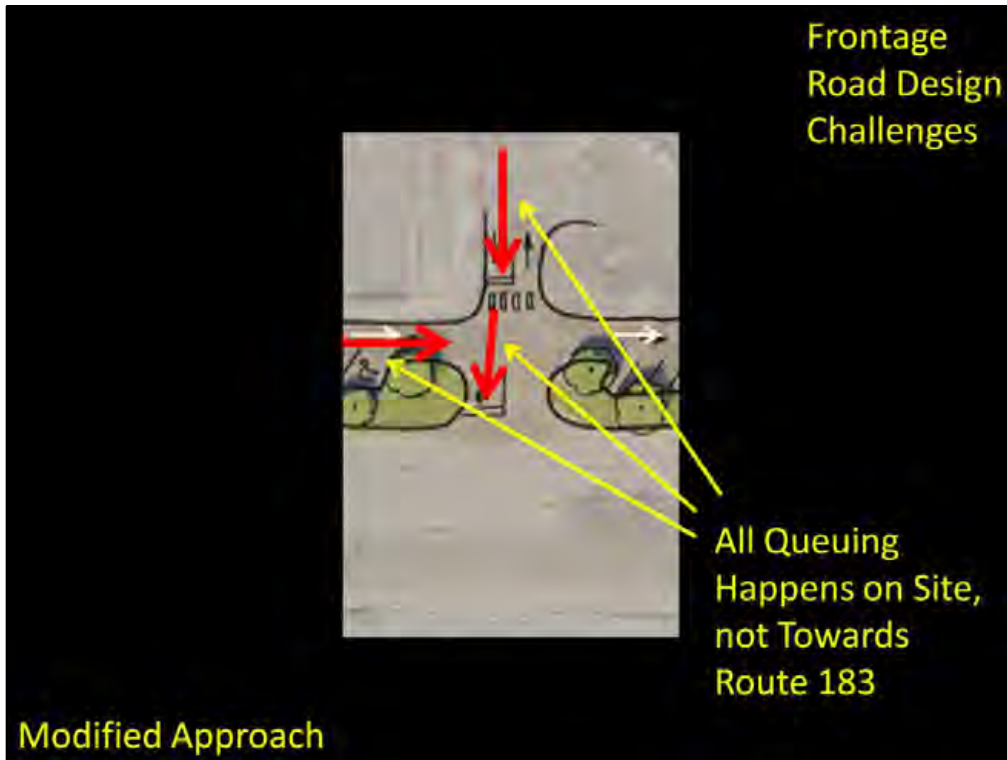
Frontage  
Road Design  
Challenges



No Problematic  
Lefts

Modified Approach

Access in and out of the frontage road is provided by right turns. This eliminates many conflicts and, this, is far more simple and easy to do than before, with the left turns.



Any queuing that does occur happens on site or on the frontage road, not on the arterial, which is a huge safety advantage over the existing situation.



Example frontage road scheme in Alexandria, Virginia.





This series of slides illustrates the advantages of safety (back-in) parking.



This series of slides illustrates the advantages of safety (back-in) parking. It's easy to do; just the first half (the easy half) of a parallel parking maneuver.



This series of slides illustrates the advantages of safety (back-in) parking. Watch how easy it is to do.



This series of slides illustrates the advantages of safety (back-in) parking.

Safety parking allows for better visibility when leaving the parking space. There is no backing up into a live lane of traffic (like with head-in angled parking) or pulling out only using your mirrors (like with parallel parking). You can see!





This series of slides illustrates the advantages of safety (back-in) parking.

Safety parking orients the trunk towards the sidewalk, allowing for safe access. Safety parking also allows for open doors to guide children and passengers safely toward the sidewalk rather than toward the street.



This series of slides illustrates the advantages of safety (back-in) parking.

Safety parking orients the trunk towards the sidewalk, allowing for safe access. Safety parking also allows for open doors to guide children and passengers safely toward the sidewalk rather than toward the street.





This series of slides illustrates the advantages of safety (back-in) parking.

Safety parking is safer for bicyclists.



Safety parking doubles parking supply relative to parallel parking and works well in mixed use places.



Fleet managers utilize safety parking because of its efficiency and safety.



Corridor 183 proposed boulevard street section.



Corridor 183 proposed boulevard street section.  
Before photo.



Corridor 183 proposed boulevard street section. Complete street design, including facilities for all users.

After photo. It's really the same location; notice the same businesses to the right in the before and after photos.



# State Highway 199 Corridor

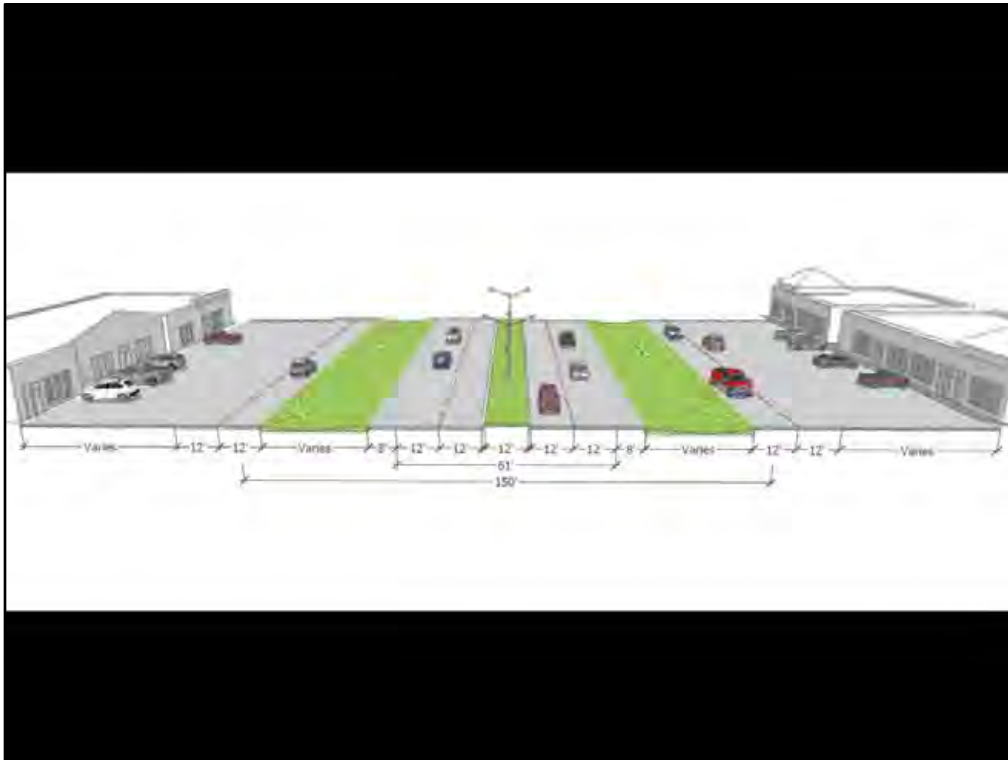




This diagram illustrates existing conditions along the 199 corridor. The purple circles represent intersections in need of pedestrian facilities. The orange bar illustrates relative traffic volumes along the corridor and the diagrams along the bottom illustrate the existing street conditions along the corridor.



Corridor 199 before photo.



Corridor 199 existing street section.



Corridor 199 proposed boulevard street section.

This street design is better for automobile drivers, cyclists, pedestrians, and businesses.







Future character of the proposed street design along 199.

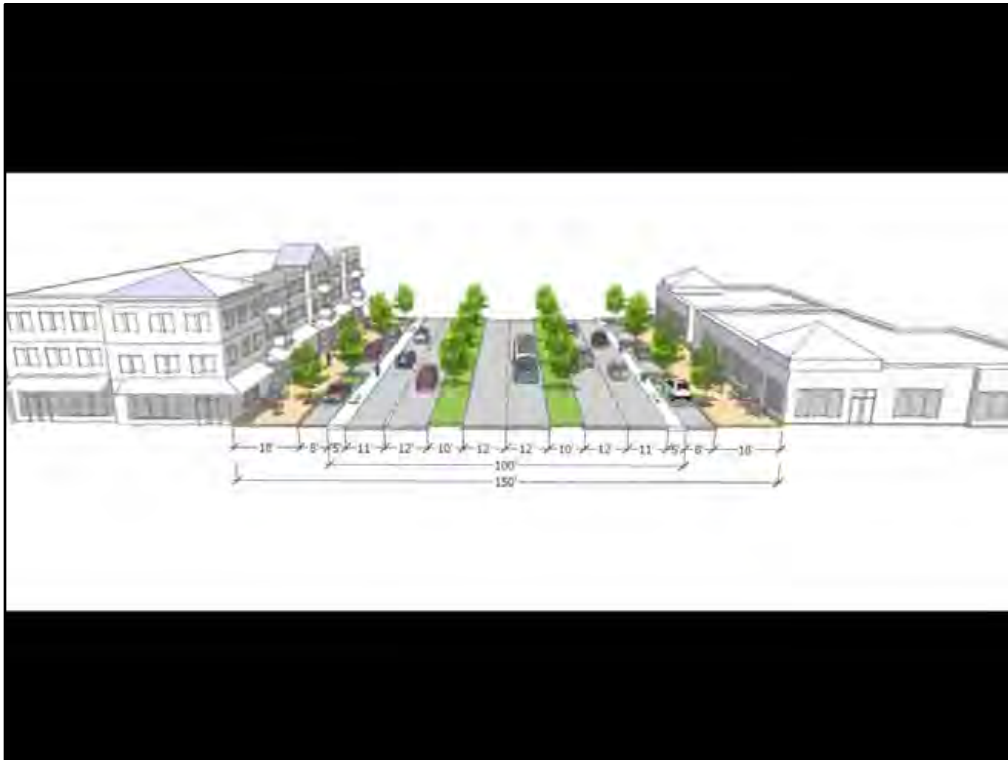
This street design is better for automobile drivers, cyclists, pedestrians, and businesses.



Roundabout example. Imagine a series of roundabouts, one at each of the intersections along Highway 199.



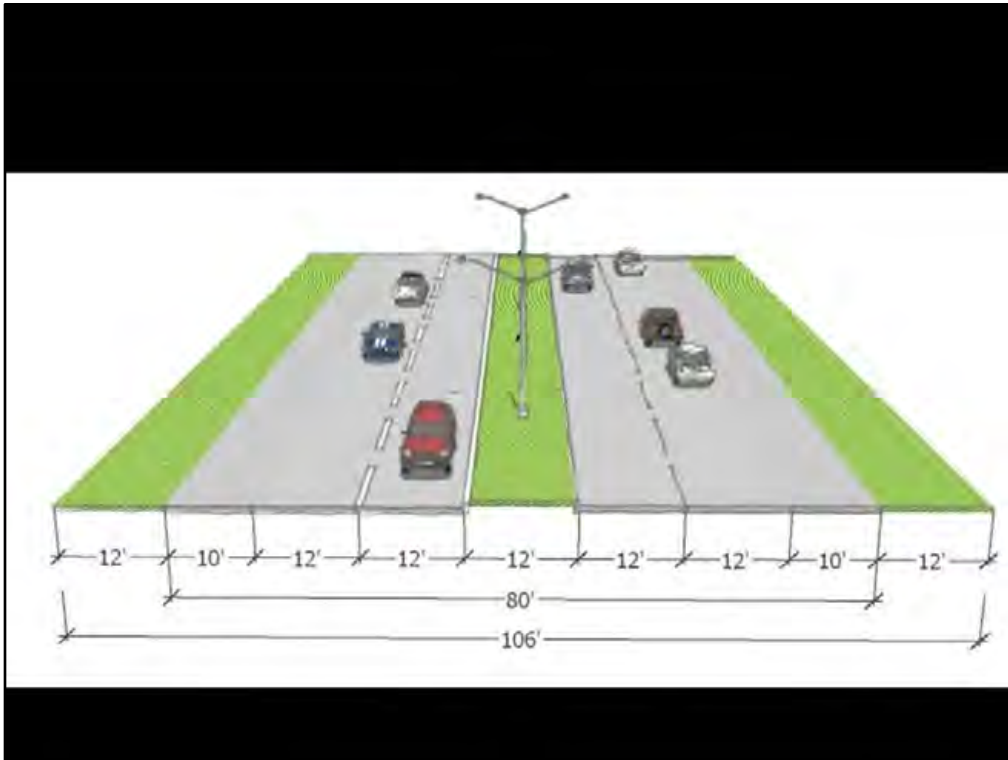
Roundabout example. Imagine a series of roundabouts at each of the intersections along Highway 199.



In this concept for 199, the roundabouts' splitter islands are widened and there is a generous median. The street could operate as it does today, but would be more friendly for pedestrians and cyclists. This design scheme also positions the corridor for transit in the future—bus rapid transit or light rail could use the middle of the center median. The space would already be there and the trees would not have to be moved. The higher order transit in the median would typically move straight through roundabouts with priority, making transit very competitive.

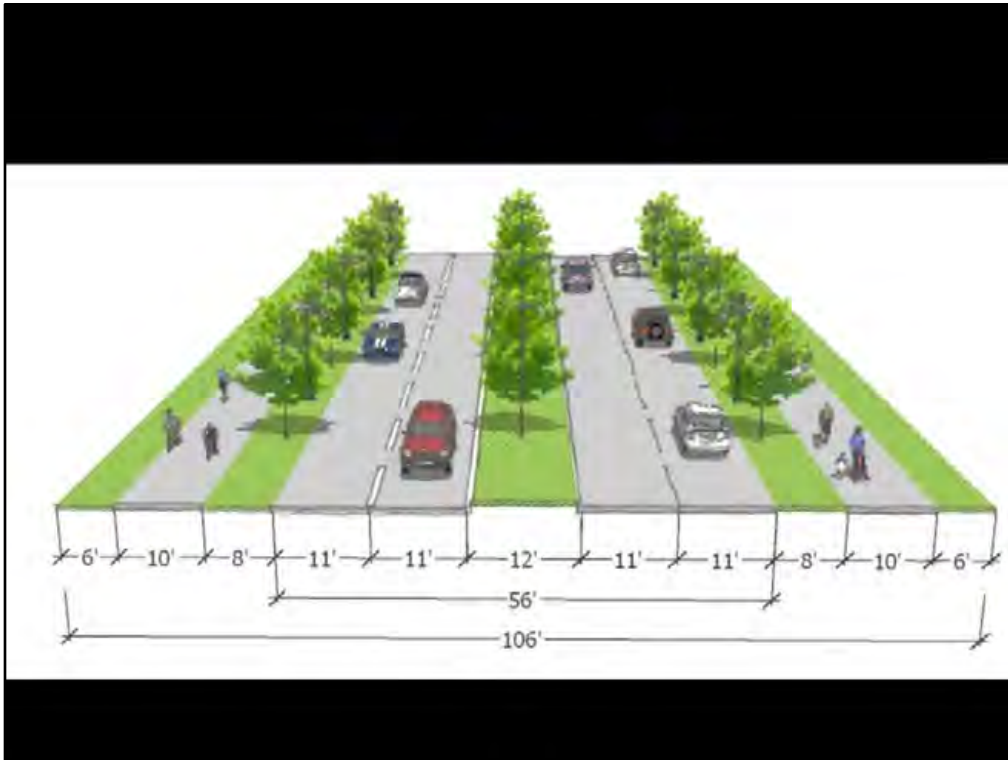


Rural character along 199.



Existing street section along 199.





Proposed 199 boulevard section with tree plantings and pedestrian and cycling paths.



Proposed 199 boulevard section with tree plantings and pedestrian and cycling paths and transit in center.



Rural character along 199 'before' photo.



Rural character along 199 after proposed boulevard redesign concept.



The corridor plans require two things: vision and predictability. The vision should be articulated in each community's comprehensive plan and supported by relevant codes and land use policies to ensure that future development contributes to desired outcomes. Plans should also identify the proposed street network so that new development occurs in conjunction with complementary transportation infrastructure - or at the very least prevent inconsistent development patterns from interrupting this new network.

Well-designed corridors show a commitment to quality transportation options including walking, biking and transit and can attract people and investment.

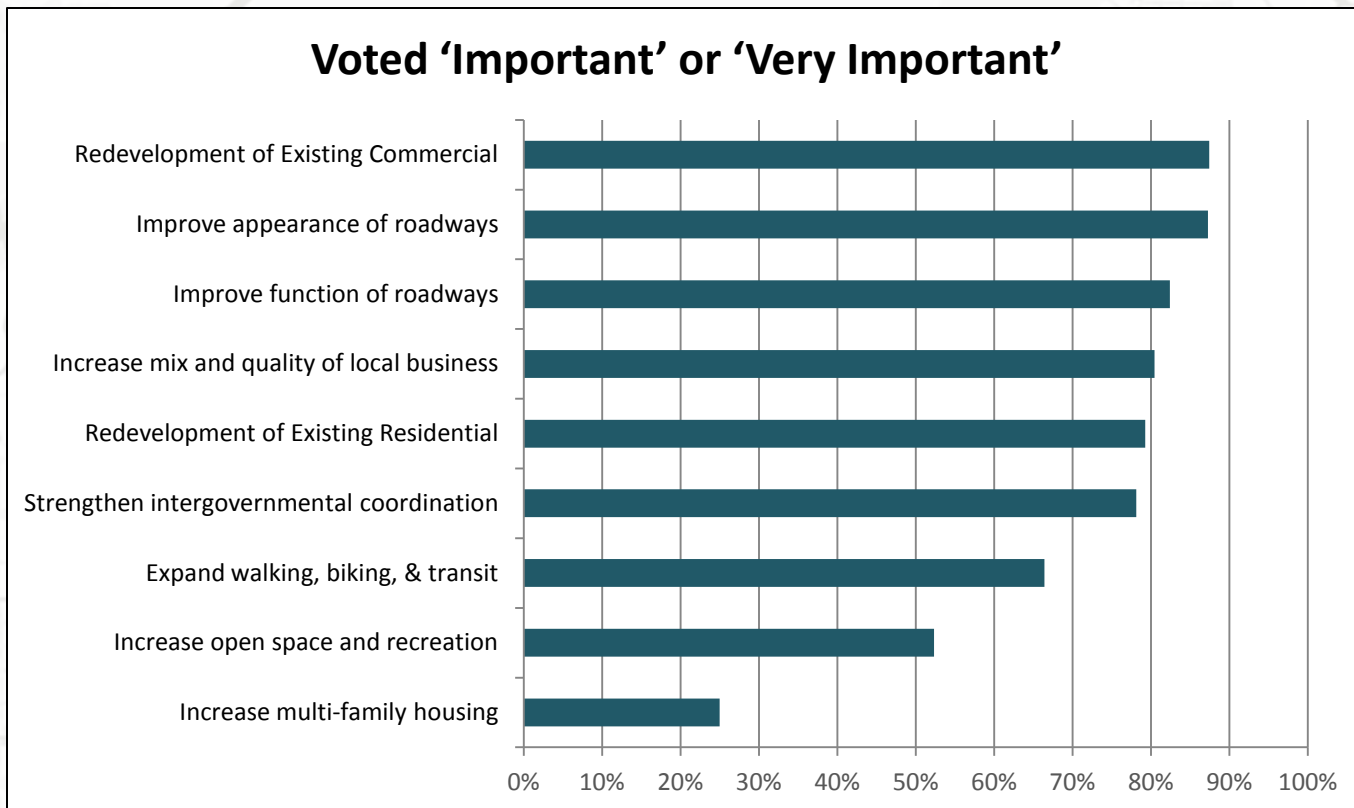
APPENDIX C | COMPREHENSIVE PLAN WORKSHOP RESULTS





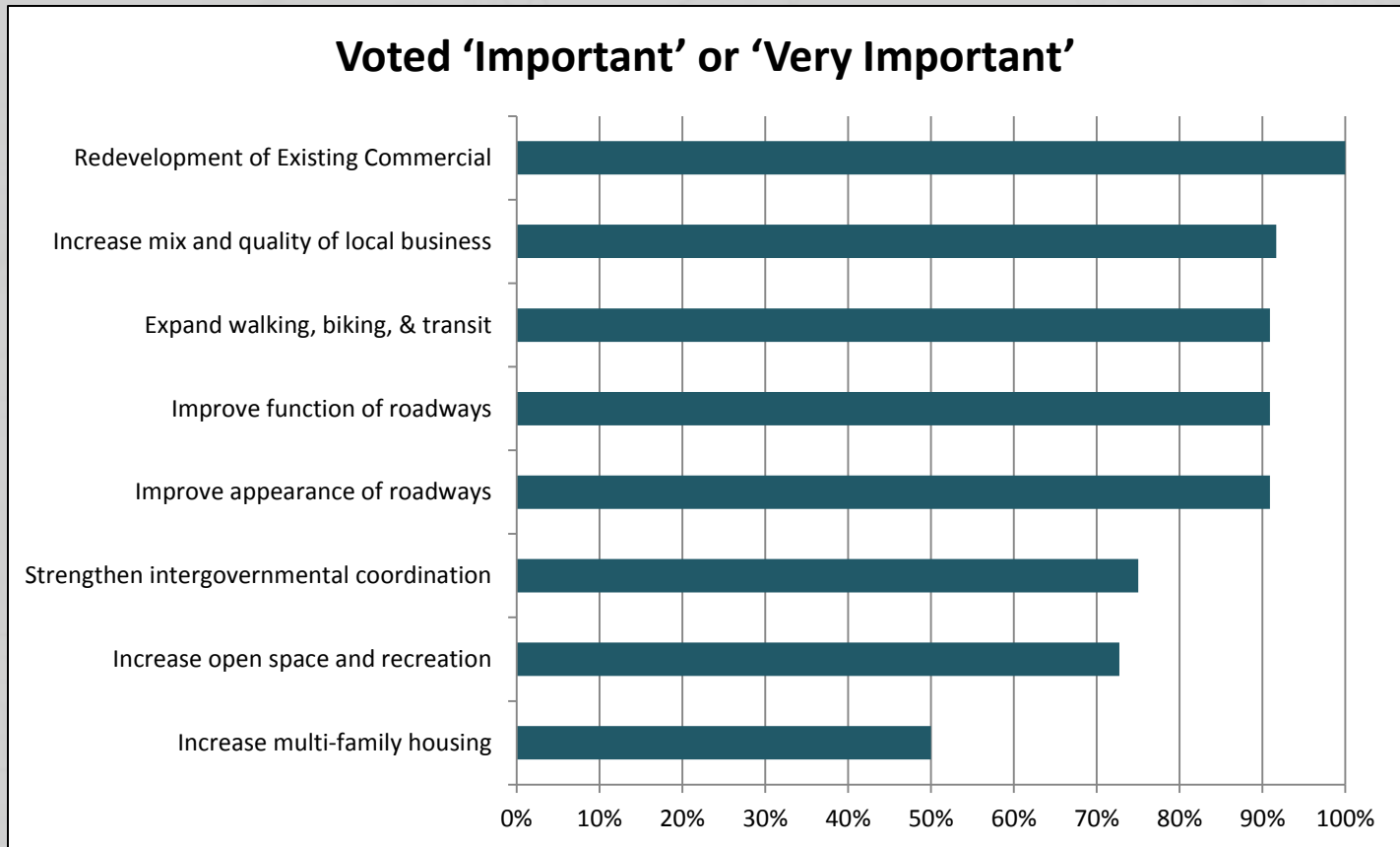
# REGIONAL - Prioritization Results

## All Meetings Combined



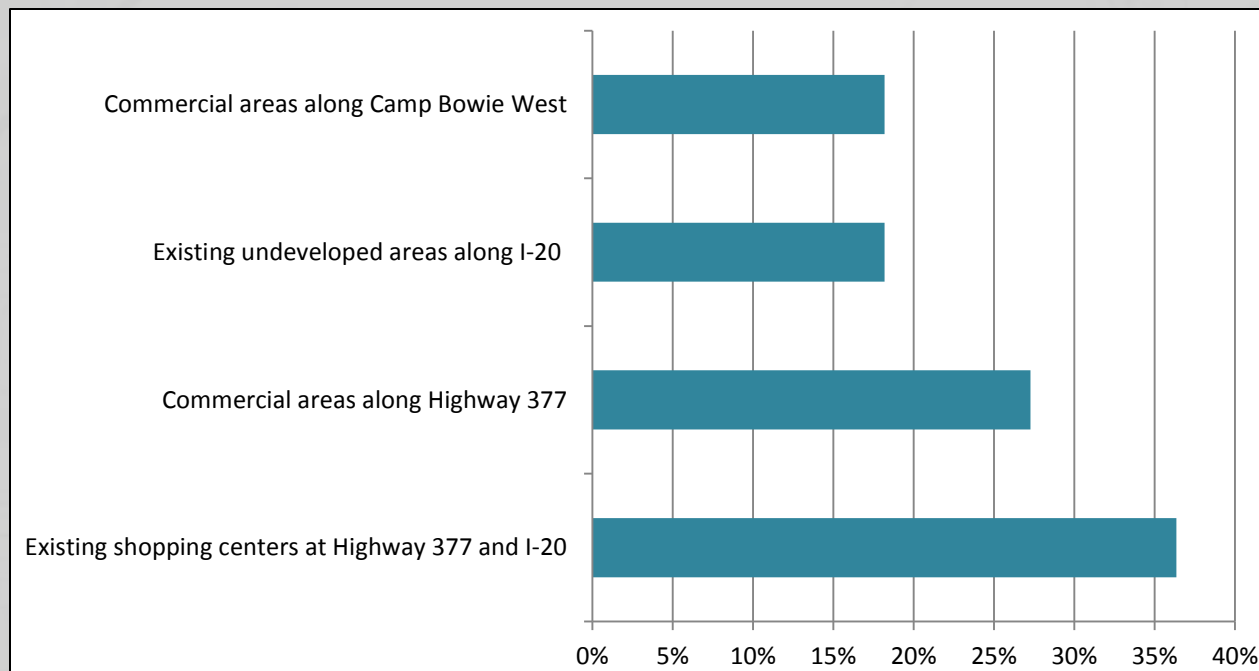
# BENBROOK – Workshop Prioritization Results

Sansom Park



# BENBROOK – Workshop Prioritization Results –

Benbrook's Unique Question - What areas do you think should be the highest priority for development or redevelopment in Benbrook?



# BENBROOK – ‘Sticky Note’ Exercise:

*On each sticky note, write down one word that you that you would use to describe your community to someone who does not live here.*



# BENBROOK – Regional ‘Sticky Note’ Exercise:

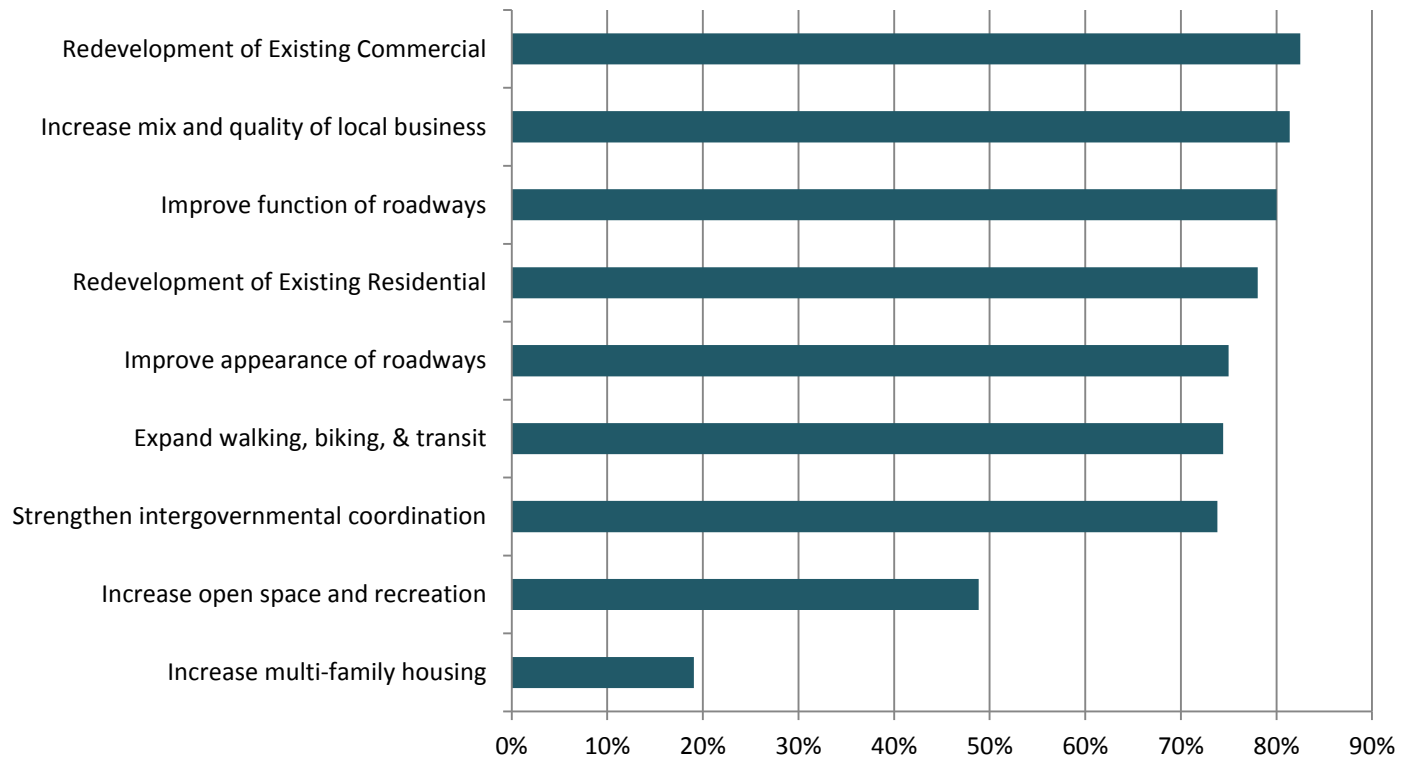
*On each sticky note, write down one word that you that you would use to describe the region surrounding NAS Fort Worth, JRB to someone who does not live here.*

More livable  
International  
Better than Dallas

# LAKE WORTH – Workshop Prioritization Results

Sansom Park

## Voted 'Important' or 'More Important'





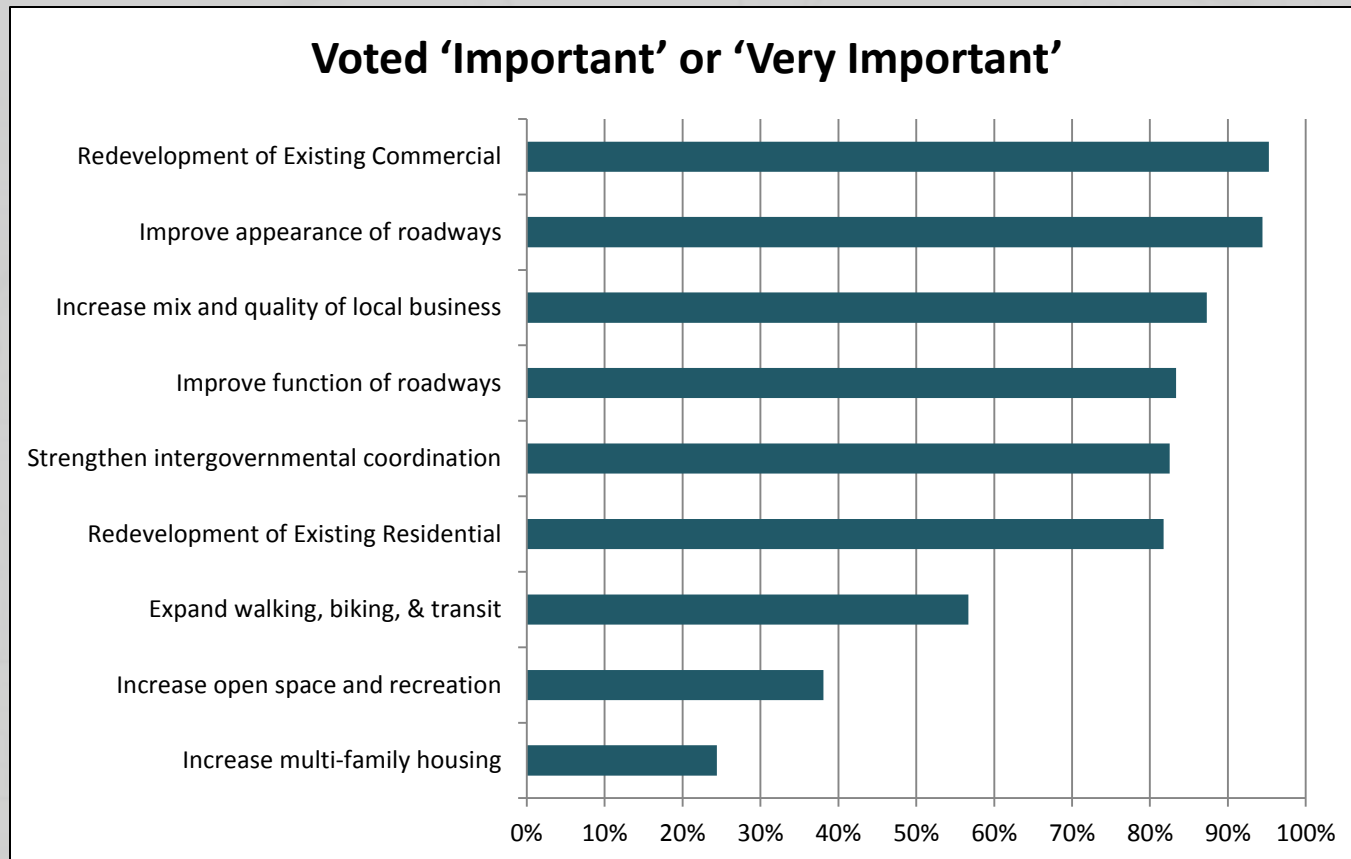
**LAKE WORTH – ‘Sticky Note’ Exercise:** *On each sticky note, write down one word that you that you would use to describe your community to someone who does not live here.*



Westworth Village

Fort Worth

# RIVER OAKS – Workshop Prioritization Results



# RIVER OAKS – ‘Sticky Note’ Exercise: *On each sticky note, write down one word that you that you would use to describe your community to someone who does not live here.*

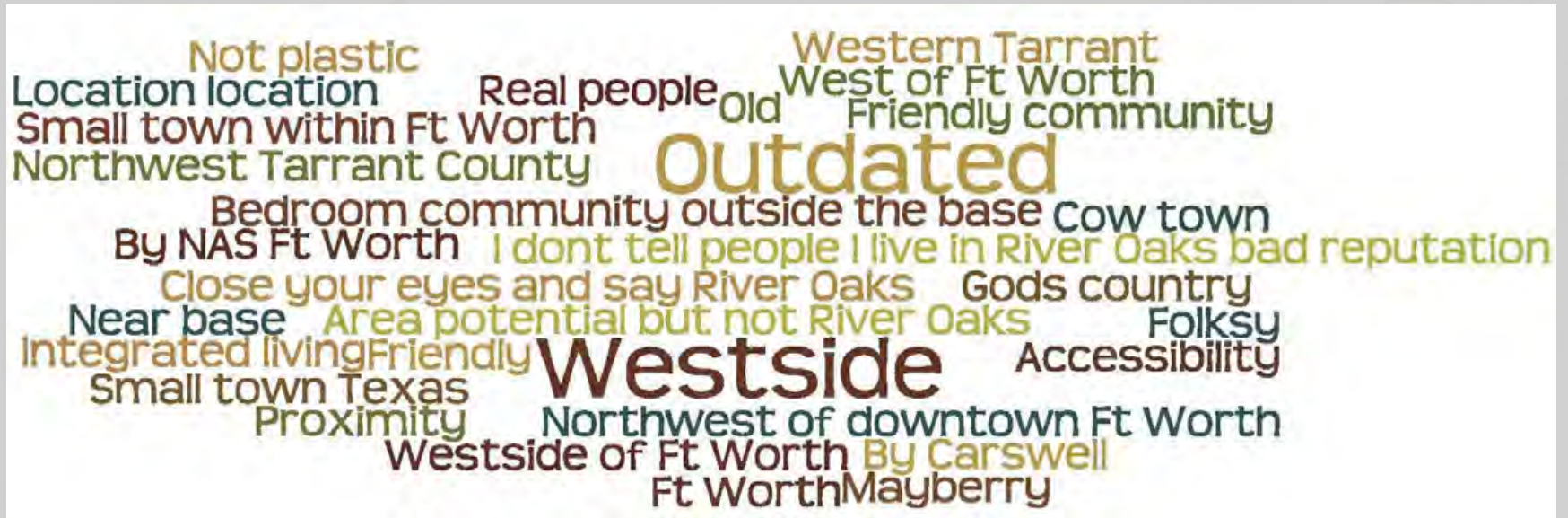
Bright  
Growing Peaceful Outdated  
Hooterville Beautiful Perfect location  
Clean with quality living Same just updated  
10 minutes from downtown Cozy Great city services  
Central to it all Mayberry with more income  
Big city access  
Family oriented **Small town** stagnant  
Small town surrounded by the big city In the country  
**Up and coming** Middle class community  
Small town atmosphere  
Old Family retiree oriented community **Clean**  
**Safe place to live** **SAFE** **Safe** Hidden gem  
Unique  
Live work play community Forward looking  
A friendly community Friendly Wellness oriented  
Bedroom community Progressive Quaint  
Well cared for houses Folksy  
Communal  
Shiny Suburb

Fort Worth



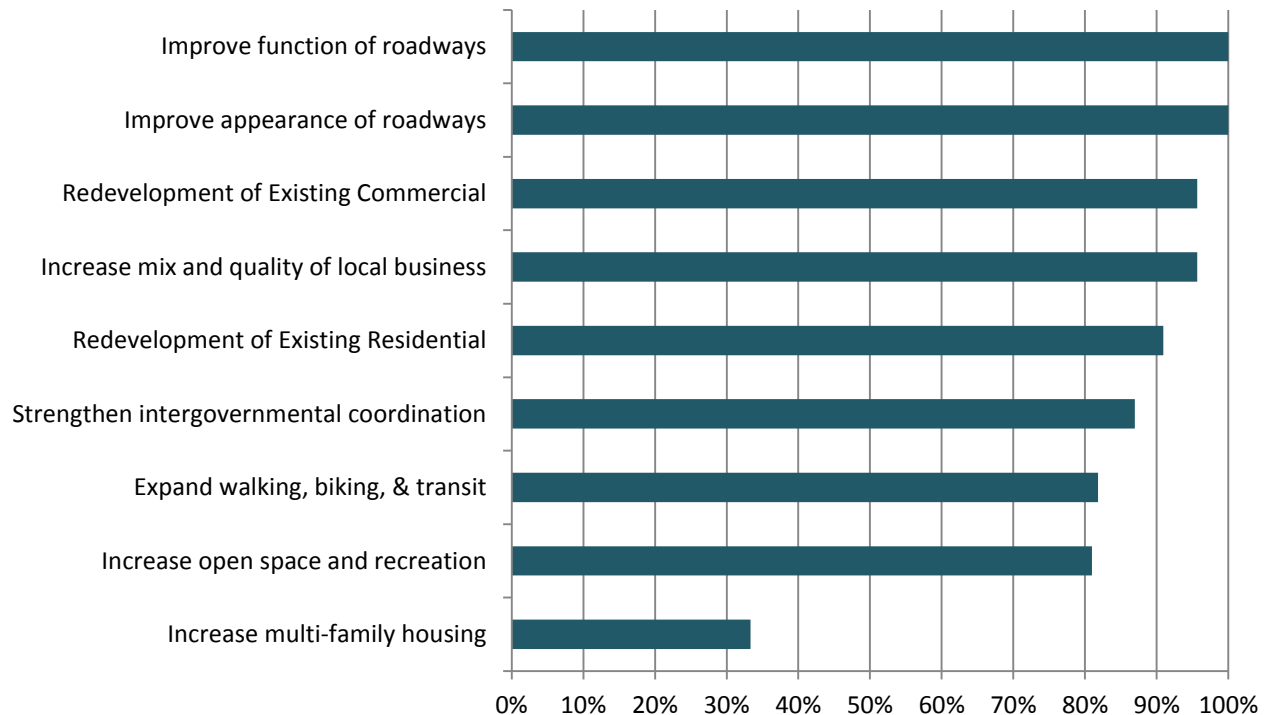
# RIVER OAKS – Regional ‘Sticky Note’ Exercise:

*On each sticky note, write down one word that you that you would use to describe the region surrounding NAS Fort Worth, JRB to someone who does not live here.*



# SANSOM PARK– Workshop Prioritization Results

## Voted 'Important' or 'Very Important'



# SANSOM PARK – ‘Sticky Note’ Exercise:

*On each sticky note, write down one word that you that you would use to describe your community to someone who does not live here.*

Entrepreneurial  
Improve the city  
A walkable community Mixed use  
Improving A community that has it all  
Family oriented community Ma and Pop community  
Would not live anywhere else Sense of community  
Jewel of the west Best little city in Ft Worth  
Revitalized Gateway to Ft Worth Clean  
Premier community Updated  
Nice place to live

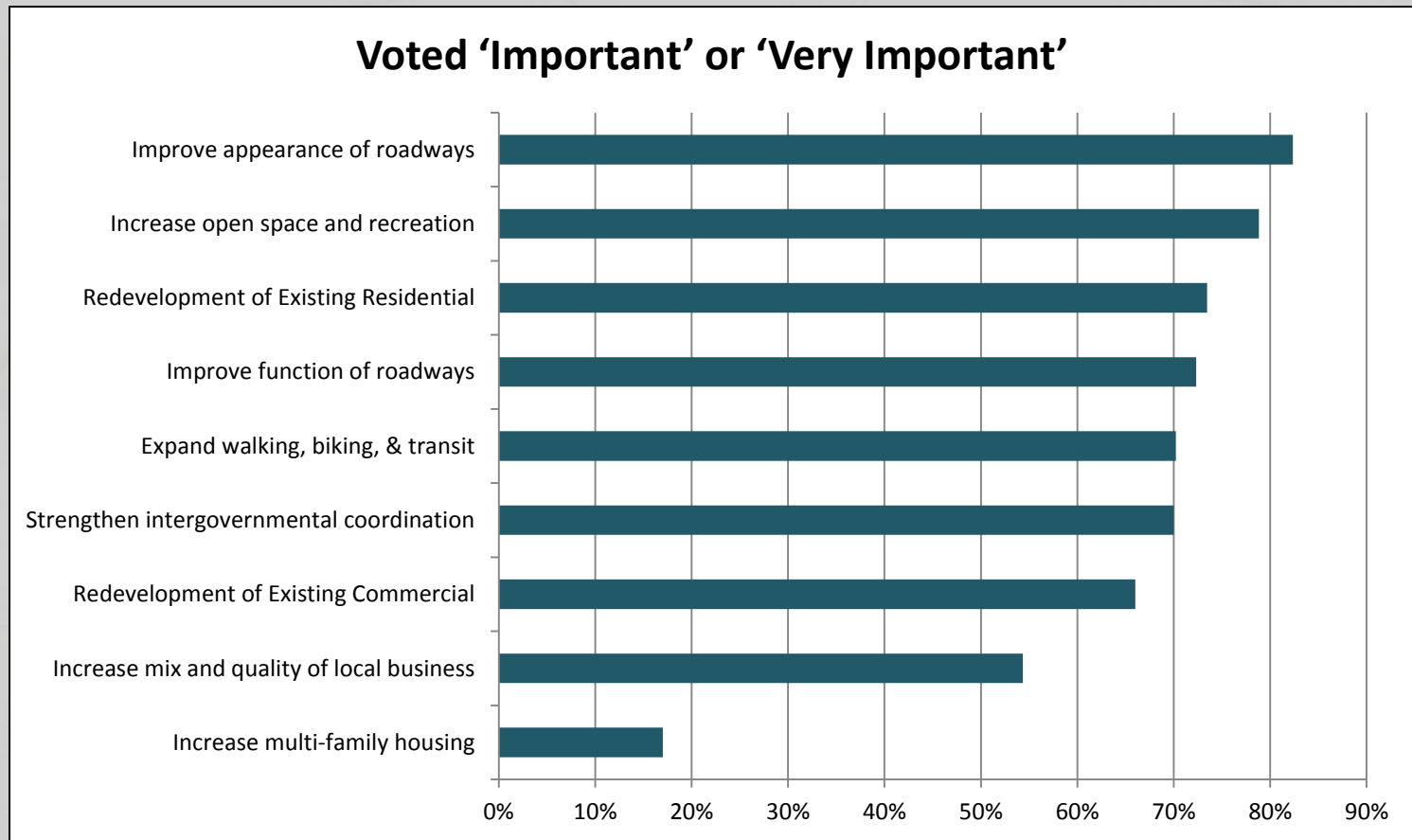


# SANSOM PARK – Regional ‘Sticky Note’

**Exercise:** *On each sticky note, write down one word that you that you would use to describe the region surrounding NAS Fort Worth, JRB to someone who does not live here.*

North Ft Worth  
Good area to live in  
Gateway to Ft Worth  
West TC  
Bedroom community  
Northwest Tarrant  
Military friendly  
Home  
Near Carswell AFB  
Northwest side  
Base area  
West Ft Worth

# WESTWORTH VILLAGE– Workshop Prioritization Results

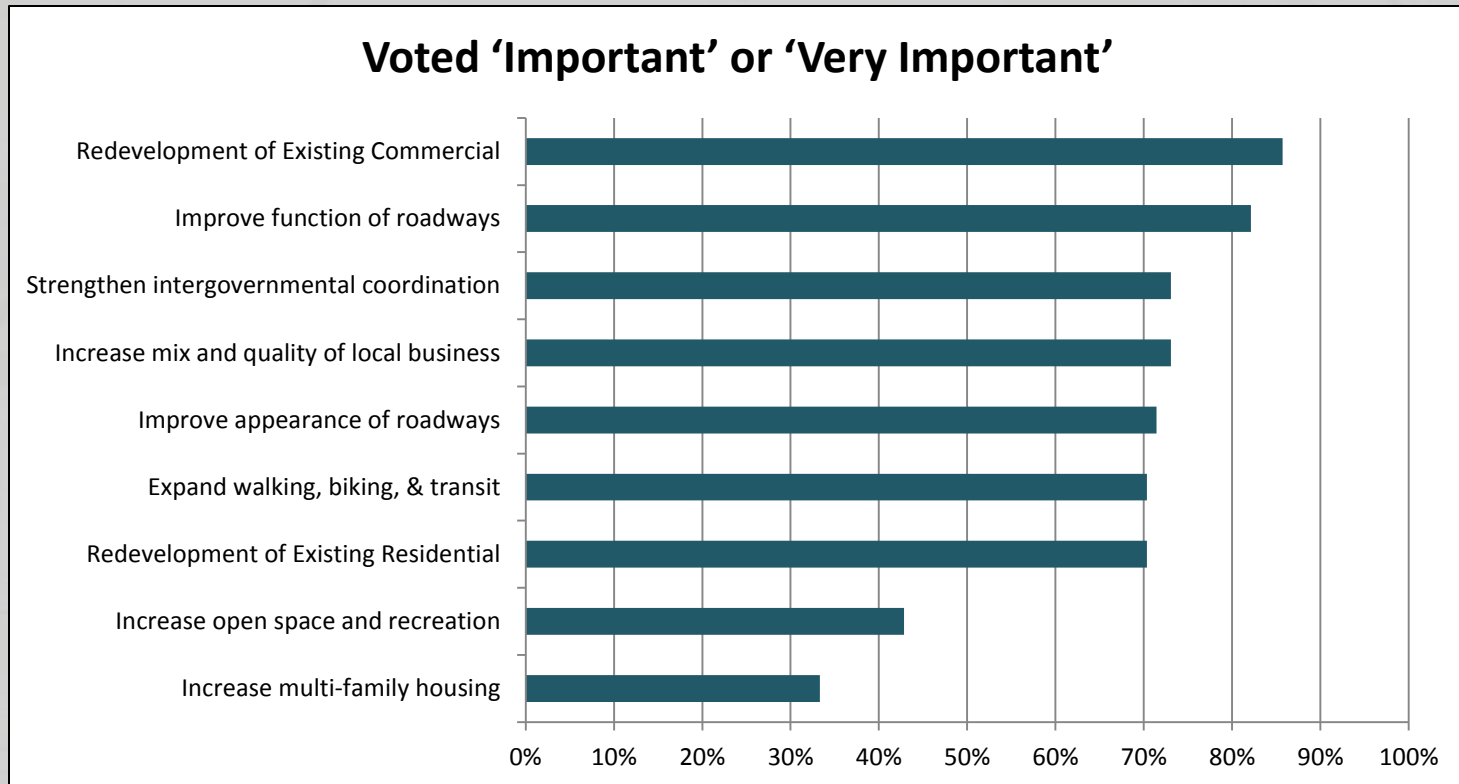


# WESTWORTH VILLAGE – ‘Sticky Note’ Exercise:

*On each sticky note, write down one word that you that you would use to describe your community to someone who does not live here.*

Progressive  
Hometown feel  
Home sweet home  
Diverse  
Very mixed grounds and cities  
Growth  
Financially strong  
Very much in transition  
Blue collar area

# WHITE SETTLEMENT – Workshop Prioritization Results



# WHITE SETTLEMENT – ‘Sticky Note’ Exercise:

*On each sticky note, write down one word that you that you would use to describe your community to someone who does not live here.*



A word cloud of community descriptions. The words are arranged in a roughly rectangular shape, with 'Friendly' and 'Small' being the largest and most prominent. Other words include 'Best west', 'Awesome', 'Fighter town', 'Bomber town', 'Old community', 'Close to everything', 'Access to all types of opportunities', 'Good community', 'Family', 'Access to lots of shopping', 'Relaxed', 'Near highway to get anywhere', 'Residential suburb', 'Congested', 'Small town feel', 'Convenience', 'Social', 'Land locked', and 'Livable'.



# WHITE SETTLEMENT – Regional ‘Sticky Note’

**Exercise:** *On each sticky note, write down one word that you that you would use to describe the region surrounding NAS Fort Worth, JRB to someone who does not live here.*

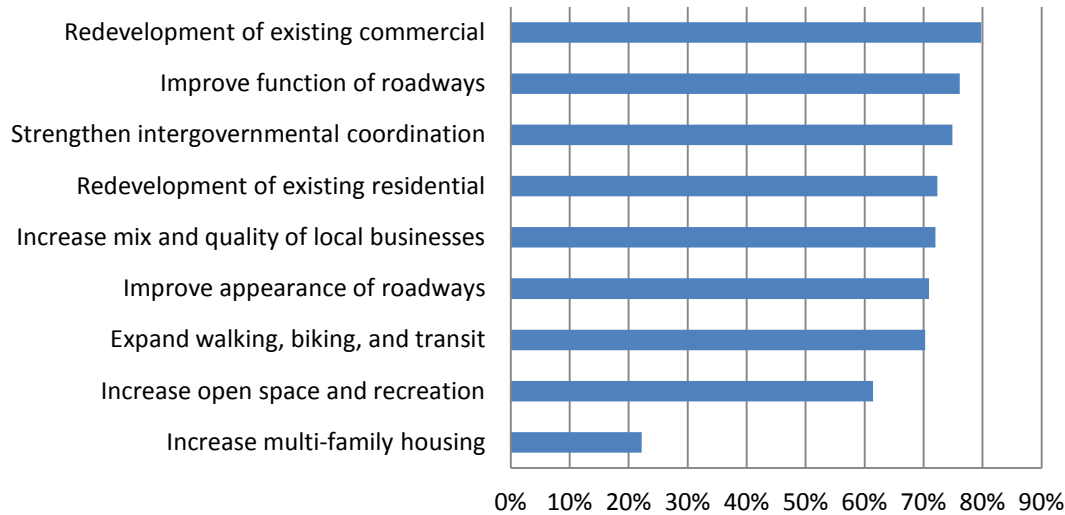
Unfriendly  
Fighter town  
Northwest Freeway I-30 inside Loop 820  
Industrial Bomber town  
341 across from the runway  
Close to base  
Dated  
Cheap  
Middle of NW Ft Worth like an island  
Westside Spur  
West of the JRB



### Online Survey Results Overview

Priority	Voted Important or Very Important
Increase multi-family housing	22.18%
Increase open space and recreation	61.43%
Expand walking, biking, and transit	70.29%
Improve appearance of roadways	70.92%
Increase mix and quality of local businesses	72.00%
Redevelopment of existing residential	72.35%
Strengthen intergovernmental coordination	74.86%
Improve function of roadways	76.10%
Redevelopment of existing commercial	79.78%

### Voted 'Important' or 'Very Important'



Date Started	In what community is your home located?	What do you like about the community where you live?	If you could live anywhere in the region, what would be the most important factors in your decision?	What are the major issues/challenges in the community where you live?	How important is it for your community to encourage redevelopment of existing commercial areas?	How important is it for your community to encourage redevelopment of existing residential areas?	How important is it for your community to increase parks, open space, recreational, and community facility amenities?	How important is it for your community to improve the appearance of major highways?	How important is it for your community to improve the function of existing roadways?	How important is it for your community to expand transportation options, including walking, transit and biking?	How important is it for your community to increase the number of multi-family housing choices?	How important is it for your community to increase the mix and quality of local businesses?	What transportation improvements would you most like to see in your community?	What three words would you use to describe your community to someone who does not live here?	Please provide any additional comments you may have.
12/10/2012	Benbrook	Safe neighborhood	Affordability of housing;Safe neighborhood;Close to parks/recreational areas	Physical appearance of community;Traffic congestion;Lack of growth	Very important	Not very important	Neutral	Very important	Very important	Very important	Not important	Not very important	More bicycle/pede	Word 1 = Convenient;Word 2 = Safe;Word 3 =	
12/12/2012	Benbrook	Schools;Safe neighborhood;Close to parks/recreational areas/lake	Schools;Close to family/friends;Safe neighborhood	Crime;Physical appearance of community;Quality of schools	Important	Important	Important	Important	Neutral	Important	Not very important	Important	More bicycle/pede	Word 1 = Older;Word 2 = Family ;Word 3 = Qu	
12/13/2012	Benbrook	Good place to raise a family;Safe neighborhood;Close to parks/recreational areas/lake	Close to work or good jobs;Close to family/friends;More urban feel	Lack of quality shopping/entertainment options;Lack of jobs/economic opportunities;Lack of growth	Very important	Neutral	Important	Important	Important	Important	Very important	Very important	More public transp		
12/13/2012	Benbrook	Good place to raise a family;Safe neighborhood;Close to parks/recreational areas/lake	Close to work or good jobs;Schools;More urban feel	Lack of multi-family housing options;Lack of quality shopping/entertainment options;Lack of jobs/economic opportunities	Very important	Neutral	Important	Important	Neutral	Important	Very important	Very important	More public transp	Word 1 = Safe;Word 2 = Recreational;Word 3 =	
12/13/2012	Benbrook	Best City services around ;Safe neighborhood;Close to parks/recreational areas/lake;Neighbors/sense of community	Affordability of housing;Safe neighborhood;Close to parks/recreational areas	Quality of schools;Lack of quality shopping/entertainment options;Traffic congestion	Very important	Very important	Very important	Very important	Very important	Not important at	Not important a	Very important	New roadways	Word 1 = Safe ;Word 2 = Friendly ;Word 3 = Sa	Best managed city around. City services are second to none.
12/16/2012	Benbrook	Affordability of housing;Good place to raise a family;Neighbors/sense of community	Affordability of housing;Safe neighborhood;Ability to walk or bike		Neutral	Neutral	Neutral	Not very important	Not very important	Not very important	Neutral	Neutral	More public transp	Word 1 = friendly;Word 2 = small;Word 3 = sa	
1/15/2013	Benbrook	Close to work or good jobs;Schools;Good place to raise a family	Affordability of housing;Schools;Safe neighborhood	Lack of quality shopping/entertainment options;Lack of jobs/economic opportunities;Lack of growth	Very important	Important	Important	Neutral	Very important	Important	Neutral	Very important	More public transp	Word 1 = safe;Word 2 = close;Word 3 = comm	Need to STOP letting in all the fast food restaurants and cultivate full sit down restaurants.
1/15/2013	Benbrook	Good place to raise a family;Safe neighborhood;Close to parks/recreational areas/lake	Close to family/friends;Safe neighborhood;Open space/more rural feel	Too much growth	Neutral	Not important a	Important	Important	Important	Neutral	Not important a	Not very important	Operational impro	Word 1 = Quiet;Word 2 = Less People;Word 3 =	Need a decent grocery store. NOT ALDI or FIESTA don't want a bunch of mexicans in the area.
1/15/2013	Benbrook	Close to shopping;Safe neighborhood;Neighbors/sense of community	Availability of transit;Safe neighborhood	Lack of public transportation options	Very important	Neutral	Important	Not very important	Neutral	Very important	Not important a	Important	Enter your state he	Word 1 = Safe;Word 2 = Friendly;Word 3 = Sch	Lack of public transportation is the most important thing I would like to see improved.
1/15/2013	Benbrook	Schools;Safe neighborhood;Close to parks/recreational areas/lake	Affordability of housing;Open space/more rural feel;Ability to walk or bike	Lack of quality shopping/entertainment options;Traffic congestion;Lack of public transportation options	Important	Important	Important	Important	Very important	Important	Neutral	Important	Operational impro	Word 1 = great;Word 2 = walkable;Word 3 = a	
1/15/2013	Benbrook	Property taxes (not necessarily the rates) are increasing and that is disturbing.;Affordability of housing;Close to parks/recreational areas/lake	Urban feel in a rural area - that might need explanation.;Availability of transit;Close to parks/recreational areas;Ability to walk or bike	Physical appearance down 377 looks like a trailer park community.;Physical appearance of community;Lack of quality shopping/entertainment options;Traffic congestion	Very important	Important	Very important	Very important	Very important	Very important	Not very important	Very important	Public transportati	Word 1 = Fast-food-hell;Word 2 = rural;Word 3 = almighty dollar. BTW...	Benbrook in a horrible direction. We have lost both of our other grocery stores and who knows how many other small businesses. In the future, I would hope our City officials will have better insight into the types of businesses they pursue and not pursue just for the
1/15/2013	Benbrook	Schools;Good place to raise a family;Neighbors/sense of community	Close to work or good jobs;Schools;Safe neighborhood	Lack of public transportation options	Important	Important	Neutral	Very important	Very important	Important	Not very important	Important	More public transp	Word 1 = town;Word 2 = friendly;Word 3 = ed	
1/15/2013	Benbrook	Affordability of housing;Close to work or good jobs;Safe neighborhood	Affordability of housing;Schools;Safe neighborhood	Physical appearance of community;Quality of schools;Lack of walking or biking options	Important	Neutral	Neutral	Not very important	Important	Important	Neutral	Important	More bicycle/pede	Word 1 = Quiet;Word 2 = Safe;Word 3 = Borin	
1/17/2013	Benbrook	Good place to raise a family;Safe neighborhood;Close to parks/recreational areas/lake	Safe neighborhood;Close to parks/recreational areas;Open space/more rural feel	Quality of schools;Traffic congestion	Very important	Neutral	Not important at	Neutral	Important	Important	Not important a	Important	More public transp	Word 1 = safe;Word 2 = recreation;Word 3 =	We have enough Taco establishments. We are in need of a grocery store, I do not like being limited for convenience to Wal Mart only.
1/18/2013	Benbrook	Close to work or good jobs;Safe neighborhood;Neighbors/sense of community	Close to work or good jobs;Safe neighborhood;Ability to walk or bike	Lack of jobs/economic opportunities;Lack of public transportation options	Neutral	Neutral	Neutral	Neutral	Neutral	Important	Not very important	Important	a restriction to par	Word 1 = Quiet;Word 2 = Safe;Word 3 = Distr	Good public elementary schools, close to most major private schools, bike lanes throughout, police presence, new shopping complex to come soon, community involvement opportunities, well-established neighborhoods at a medium income range.
1/18/2013	Benbrook	Affordability of housing;Good place to raise a family;Close to parks/recreational areas/lake	Safe neighborhood;Close to parks/recreational areas;Open space/more rural feel	We want a clean, safe and convenient dog park! Ft. Wolf is a great example (minus the long drive), White Settlement is NOT.;Lack of quality shopping/entertainment options;Traffic congestion	Important	Neutral	Important	Important	Important	Neutral	Not very important	Neutral	Operational impro	Word 1 = Clean;Word 2 = Safe;Word 3 = Parks	lived in Benbrook in the same house for 42 years. We have seen military families come and go and have made some very good friends. I think military make for nice, clean communities - at least around our area. For this to grow, I believe we need a safe & large dog park, nice

Date Started	In what community is your home located?	What do you like about the community where you live?	If you could live anywhere in the region, what would be the most important factors in your decision?	What are the major issues/challenges in the community where you live?	How important is it for your community to encourage redevelopment of existing commercial areas?	How important is it for your community to encourage redevelopment of existing residential areas?	How important is it for your community to increase parks, open space, recreational, and community facility amenities?	How important is it for your community to improve the appearance of major highways?	How important is it for your community to improve function of existing roadways?	How important is it for your community to expand transportation options, including walking, transit and biking?	How important is it for your community to increase the number of multi-family housing choices?	How important is it for your community to increase the mix and quality of local businesses?	What transportation improvements would you most like to see in your community?	What three words would you use to describe your community to someone who does not live here?	Please provide any additional comments you may have.
1/21/2013	Benbrook	Good place to raise a family;Neighbors/sense of community	Close to family/friends;Safe neighborhood;Open space/more rural feel	Too much Section 8 housing in neighboring communities;Quality of schools;Lack of public green space;parks/recreational facilities	Important	Important	Very important	Very important	Very important	Very important	Not important	Important	Rail from Benbrook	Word 1 = Safe;Word 2 = Friendly;Word 3 = Co	
1/21/2013	Benbrook	Close to shopping;Good place to raise a family;Safe neighborhood;More urban feel	Close to shopping;Safe neighborhood;More urban feel	Lack of restaurants;Lack of jobs/economic opportunities;Lack of public transportation options	Important	Important	Important	Very important	Very important	Very important	Very important	Very important	Operational impro	Word 1 = peaceful;Word 2 = clean;Word 3 = re	
1/22/2013	Benbrook	Close to work or good jobs;Close to shopping;Close to parks/recreational areas/lake	Where they don't allow semi truck cabs to park anywhere they want in residential neighborhoods and they aggressively enforce the codes already in existence;Safe neighborhood;More urban feel;Ability to walk or bike	Realize this ain't a retrial community any longer. Many people moving here from other parts of the country;Physical appearance of community;Lack of public transportation options	Important	Very important	Very important	Very important	Very important	Very important	Not important	Neutral	More bicycle/pede	Word 1 = Accessibility ;Word 2 = Police;Word 3 =	Six years and I have watched as the few codes we do have are not aggressively enforced. At some point when you have older neighborhoods the government must pass codes to guarantee that the neighborhoods don't become ghettos. Yes, Benbrook has many
1/24/2013	Benbrook	Close to work or good jobs;Good place to raise a family;Safe neighborhood	Close to family/friends;Safe neighborhood;Ability to walk or bike	Lack of real restaurants;Lack of quality shopping/entertainment options;Traffic congestion	Very important	Important	Very important	Important	Important	Important	Not important	Very important	More bicycle/pede	Word 1 = friendly;Word 2 = safe;Word 3 = YM	YMCA needs to be bigger more gyms and fitness room
1/24/2013	Benbrook	Safe neighborhood;Neighbors/sense of community	Safe neighborhood;Open space/more rural feel	Lack of jobs/economic opportunities;Traffic congestion;Too much growth	Neutral	Important	Important	Neutral	Very important	Not very importa	Not very importa	Not very importa	Operational impro	Word 1 = neighborly;Word 2 = Safe;Word 3 = f	
1/25/2013	Benbrook	Used to have a small town feel, not so much now;Close to work or good jobs;Close to parks/recreational areas/lake	Close to shopping;Safe neighborhood;Open space/more rural feel	Traffic congestion;Lack of public transportation options;Too much growth	Very important	Very important	Not very importa	Important	Important	Very important	Not important	Very important	More public transp	Word 1 = good;Word 2 = city;Word 3 = govern	We have too many fast food places, no good restaurants, need another food store that can compete with Walmart.
12/10/2012	Fort Worth	my city has a good recycling program;Affordability of housing;Schools	Affordability of housing;Close to work or good jobs;Schools	Lack of quality shopping/entertainment options;Lack of walking or biking options;Too much growth	Not important	Not important	Important	Not very importa	Important	Important	Not very importa	Important	Operational impro	Word 1 = affordable;Word 2 = safe;Word 3 = b	
12/10/2012	Fort Worth	Good place to raise a family;Close to parks/recreational areas/lake	Affordability of housing;Schools;Open space/more rural feel	Physical appearance of community;Traffic congestion;Too much growth	Important	Important	Very important	Important	Important	Important	Neutral	Important	Operational impro	Word 1 = quiet;Word 2 = woodland;Word 3 = e	
12/11/2012	Fort Worth	Affordability of housing;Close to work or good jobs;Close to shopping	Affordability of housing;Close to work or good jobs;Safe neighborhood	Homes are too close together! Little to no privacy when in back yard or having curtains open.	Important	Important	Very important	Important	Very important	Very important	Neutral	Important	More public transp	Word 1 = Subdivision ;Word 2 = Nice;Word 3 = f	
12/11/2012	Fort Worth	Close to work or good jobs	Safe neighborhood	Physical appearance of community;Quality of schools;Lack of quality housing	Very important	Very important	Very important	Very important	Very important	Very important	Neutral	Very important	More bicycle/pede		
12/11/2012	Fort Worth	Close to work or good jobs;Schools;Good place to raise a family	Type of housing available;Schools;Safe neighborhood	Lack of walking or biking options	Neutral	Neutral	Important	Important	Important	Important	Neutral	Neutral	More bicycle/pede	Word 1 = family friendly;Word 2 = small town	
12/11/2012	Fort Worth	Affordability of housing;Close to work or good jobs;Schools	Affordability of housing;Close to entertainment/culture;More urban feel	Lack of affordable housing near jobs	Important	Very important	Neutral	Very important	Neutral	Important	Neutral	Important	Operational impro	Word 1 = quiet ;Word 2 = peaceful ;Word 3 = s	
12/11/2012	Fort Worth	Affordability of housing;Close to work or good jobs	Safe neighborhood	Lack of quality shopping/entertainment options	Important	Not very importa	Important	Neutral	Neutral	Neutral	Not important	Important	More bicycle/pede	Word 1 = affordable;Word 2 = clean;Word 3 =	
12/11/2012	Fort Worth	Safe neighborhood	Safe neighborhood	Traffic congestion;Lack of walking or biking options;Lack of public green space;parks/recreational facilities	Very important	Important	Very important	Neutral	Very important	Very important	Not important	Not important	More bicycle/pede	Word 1 = Nice;Word 2 = Safe;Word 3 = Afford	
12/11/2012	Fort Worth	Close to work or good jobs;Close to shopping;Good place to raise a family	Affordability of housing;Close to work or good jobs;Schools	Traffic congestion;Lack of public green space;parks/recreational facilities	Very important	Very important	Very important	Very important	Very important	Very important	Neutral	Very important	New roadways	Word 1 = Very Commercial;Word 2 = Good Sch	
12/11/2012	Fort Worth	Close to shopping;Schools;Safe neighborhood	Close to work or good jobs;Schools;Safe neighborhood	Traffic congestion	Not important	Not very importa	Important	Not very importa	Very important	Not very importa	Not very importa	Neutral	Hov lanes on the 3	Word 1 = Friendly;Word 2 = Clean;Word 3 = Sa	
12/11/2012	Fort Worth	Affordability of housing;Close to entertainment/culture;Neighbors/sense of community	Close to work or good jobs;Close to entertainment/culture;Close to family/friends	Physical appearance of community;Quality of schools;Lack of public transportation options	Important	Important	Important	Very important	Important	Very important	Neutral	Important	Operational impro	Word 1 = Fast Growing;Word 2 = Friendly;Wo	
12/13/2012	Fort Worth	Affordability of housing;Close to work or good jobs;Close to shopping	Availability of transit;Safe neighborhood;Ability to walk or bike	Crime;lack of public transportation options;lack of walking or biking options	Neutral	Neutral	Neutral	Neutral	Important	Very important	Not very importa	Neutral	More bicycle/pede	Word 1 = rundown;Word 2 = quite;Word 3 = o	Sidewalks needed. Parks need patrolling.
12/13/2012	Fort Worth	Close to entertainment/culture	Close to entertainment/culture;Safe neighborhood	Crime;Traffic congestion	Important	Important	Not very importa	Not important	Very important	Not very importa	Not important	Neutral	Operational impro	Word 1 = Strong;Word 2 = Livable;Word 3 = Q	
12/13/2012	Fort Worth	Affordability of housing;Close to shopping;Schools	Affordability of housing;Safe neighborhood	Lack of public transportation options	Important	Neutral	Important	Important	Important	Important	Not very importa	Neutral	More public transp		
12/14/2012	Fort Worth	Affordability of housing;Close to work or good jobs;Close to parks/recreational areas/lake	Affordability of housing;Close to work or good jobs;Ability to walk or bike	Physical appearance of community;Traffic congestion	Very important	Very important	Important	Neutral	Very important	Very important	Neutral	Important	Operational impro	Word 1 = Small town atmosphere;Word 2 = Gr	
12/14/2012	Fort Worth	Close to work or good jobs;Close to shopping;Safe neighborhood	Affordability of housing;Close to shopping;More urban feel	Plenty of retail shops but very few quality grocery stores;Traffic congestion;Lack of public transportation options	Very important	Important	Important	Very important	Very important	Neutral	Neutral	Important	More public transp	Word 1 = Family oriented;Word 2 = Friendly;W	on Hwy 183 through River Oaks needs modernization. It appears so run down and lack luster - it's so unappealing (I think it looks the same now as it did when I was a kid 40-50 years ago). River Oaks needs to encourage new businesses into their city limits.

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12/14/2012	Fort Worth	Affordability of housing;Close to shopping;Schools	Affordability of housing;Schools;Open space/more rural feel	Lack of quality shopping/entertainment options;Traffic congestion;Lack of public green space/parks/recreational facilities	Important	Very important	Very important	Neutral	Important	Not very important	Not important at all	Important	SIDEWALKS!!!!!!!	Word 1 = convenient;Word 2 = ruralish;Word 3 = safe	Westpoint, White Settlement Road NEED SIDEWALKS. George Markos Park NEEDS IMPROVEMENT. It looks semi kept up on the end by Lockheed, but the Chapel Creek end SUCKS. The bridge rails are rusted and unkept, the erosion is unbelievable, there is nothing for older kids
12/15/2012	Fort Worth	Affordability of housing;Close to shopping;Safe neighborhood	Affordability of housing;Availability of transit;Safe neighborhood	Lack of public transportation options	Very important	Very important	Very important	Very important	Very important	Very important	Very important	Very important	More public transp	Word 1 = Safe;Word 2 = Growing;Word 3 = Services for everyone.	Fort Worth Needs better Public Transportation for all. Expand the T
12/16/2012	Fort Worth	Good place to raise a family;Safe neighborhood;Neighbors/sense of community	Close to work or good jobs;Safe neighborhood;Open space/more rural feel	Traffic congestion;Lack of public green space/parks/recreational facilities	Very important	Very important	Very important	Important	Important	Important	Not important at all	Important	Operational impro	Word 1 = Safe;Word 2 = Quiet;Word 3 = Friends	
12/17/2012	Fort Worth	Close to work or good jobs;Close to entertainment/culture;Safe neighborhood	Close to work or good jobs;Schools;Close to family/friends	Quality of schools;Traffic congestion;Lack of walking or biking options	Very important	Important	Important	Important	Important	Very important	Neutral	Very important	Operational impro	Word 1 = Stable;Word 2 = Diverse;Word 3 = U	I think improving the existing transportation is very important but equally important is developing an integrated regional system
12/17/2012	Fort Worth	Affordability of housing;Close to work or good jobs;Close to entertainment/culture	Close to work or good jobs;Close to entertainment/culture;Ability to walk or bike	Crime;Physical appearance of community;Traffic congestion	Very important	Very important	Very important	Very important	Very important	Important	Neutral	Important	Operational impro	Word 1 = Congested;Word 2 = Cultural;Word 3 =	
12/17/2012	Fort Worth	Close to work or good jobs;Close to entertainment/culture;Close to parks/recreational areas/lake	Close to work or good jobs;Schools;Close to parks/recreational areas	Physical appearance of community;Lack of quality housing	Important	Important	Neutral	Not very important	Neutral	Important	Not very important	Important	More public transp	Word 1 = historic;Word 2 = close knit;Word 3 =	built/developed housing near NAS; potential buyers must understand that NAS is a critical facility to national defense as well as a vital economic engine. It is unrealistic for developers to continue to build non-military housing in near proximity to NAS only to have buyers demand
12/17/2012	Fort Worth	Affordability of housing;Close to shopping;Safe neighborhood	Affordability of housing;Close to family/friends;Safe neighborhood	Physical appearance of community;Quality of schools;Lack of public green space/parks/recreational facilities	Neutral	Neutral	Important	Important	Very important	Neutral	Neutral	Important	Operational impro	Word 1 = Quiet ;Word 2 = family;Word 3 = old	Taxpayer-provided Economic development money spent at the expense of our infrastructure (roads and bridges) is money misspent! It is a slap in the face of long-time residents. Stop the corporate welfare!
12/17/2012	Fort Worth	Good place to raise a family;Close to parks/recreational areas/lake;Neighbors/sense of community	Affordability of housing;Safe neighborhood;Ability to walk or bike	Lack of jobs/economic opportunities;Traffic congestion	Not very important	Not very important	Not very important	Not very important	Important	Important	Not important at all	Important	Operational impro	Word 1 = Vibrant;Word 2 = diverse;Word 3 = f	
12/17/2012	Fort Worth	Close to work or good jobs	Close to work or good jobs;Safe neighborhood;Ability to walk or bike	Crime;Traffic congestion;Lack of public green space/parks/recreational facilities	Very important	Very important	Important	Important	Important	Very important	Neutral	Important	Operational impro	Word 1 = Crime;Word 2 = Rate;Word 3 = Up	
12/17/2012	Fort Worth	nothing	Safe neighborhood	Crime;Physical appearance of community;Too much growth	Neutral	Neutral	Very important	Important	Very important	Important	Not very important	Neutral	Operational impro	Word 1 = packed;Word 2 = loud;Word 3 = ghe	
12/17/2012	Fort Worth	Affordability of housing;Close to work or good jobs;Close to shopping	Affordability of housing;Close to work or good jobs;Schools	Traffic congestion	Very important										
12/17/2012	Fort Worth	Affordability of housing;Schools;Good place to raise a family	Affordability of housing;Schools;More urban feel	Crime	Important	Important	Important	Not very important	Important	Important	Neutral	Neutral	More public transp		
12/17/2012	Fort Worth	Affordability of housing;Close to work or good jobs;Close to shopping	Affordability of housing;Close to family/friends;Safe neighborhood	Quality of schools;Lack of public transportation options;Lack of walking or biking options	Very important	Very important	Important	Important	Very important	Very important	Not important at all	Very important	Operational impro	Word 1 = FRIENDLY;Word 2 = SAFE;Word 3 = f	
12/17/2012	Fort Worth	Affordability of housing;Close to work or good jobs;Safe neighborhood	Affordability of housing;Type of housing available;Safe neighborhood	Lack of affordable housing near jobs;Lack of quality housing;Lack of walking or biking options	Important	Important	Important	Neutral	Important	Important	Important	Important	More bicycle/pede	Word 1 = safe;Word 2 = quiet;Word 3 = family	
12/17/2012	Fort Worth	Close to work or good jobs;Schools;Good place to raise a family	Close to work or good jobs;Availability of transit;Close to family/friends	Physical appearance of community;Lack of quality jobs/economic opportunities	Very important	Very important	Very important	Neutral	Important	Not important at all	Not important at all	Very important	MORE Lite Rail - &	Word 1 = FRIENDLY;Word 2 = EASY ACCESS TO	
12/17/2012	Fort Worth	Affordability of housing;Neighbors/sense of community	Affordability of housing;Close to shopping;Ability to walk or bike	Crime	Important	Important	Important	Not very important	Important	Neutral	Not very important	Neutral	Operational impro	Word 1 = Quality;Word 2 = Neighbors;Word 3 =	Keep streets in good condition. Control criminal activity.

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12/17/2012	Fort Worth	Affordability of housing;Close to shopping;Good place to raise a family	Affordability of housing;Close to shopping;Close to family/friends	Physical appearance of community;Lack of jobs/economic opportunities;Lack of public transportation options	Important	Important	Important	Important	Important	Important	Neutral	Important	More public transp	Word 1 = N A S;Word 2 = base noise;Word 3 =	1947, has become my home. Things have been cleaned up a lot since I moved here. I very much dislike the idea that the City of Fort Worth Council has approved some persons to keep large horses close by. One person has kept one continually after being told he could not keep
12/19/2012	Fort Worth	Affordability of housing;Close to work or good jobs;Safe neighborhood	Affordability of housing;Close to family/friends;Safe neighborhood	Quality of schools;Traffic congestion	Very important	Very important	Important	Neutral	Very important	Important	Not very important	Neutral	More bicycle/pede	Word 1 = Connected;Word 2 = Valued;Word 3 =	since 1994, it still gives me great joy to introduce this city to new residents. Because of the combined effort of our cities, community leaders and private businesses we have overcome many challenges and continue to address big city issues with
12/31/2012	Fort Worth	Affordability of housing;Close to shopping;Safe neighborhood	Safe neighborhood	Lack of public green space/parks/recreational facilities	Neutral	Neutral	Very important	Very important	Very important	Neutral	Not important a	Neutral	Operational impro	Word 1 = Quiet;Word 2 = Safe;Word 3 = New	
1/3/2013	Fort Worth	It is on Lake Worth;Safe neighborhood;Neighbors/sense of community	Close to parks/recreational areas;Open space/more rural feel;Ability to walk or bike	Crime on Cahoba Dr/ Mosque Point area	Important	Neutral	Very important	Neutral	Important	Not very important	Not important a	Important	More frequent ma	Word 1 = Lake;Word 2 = Quiet;Word 3 = Friend	
1/6/2013	Fort Worth	Schools;Safe neighborhood	Safe neighborhood;More urban feel;Ability to walk or bike	Lack of affordable housing near jobs;Traffic congestion;Lack of walking or biking options	Not very impo	Not very impo	Not very impo	Not very impo	Very important	Very important	Very important	Very important	More bicycle/pede	Word 1 = SAFE;Word 2 = CLOSE TO SCHOOL;W	Communities, businesses, MEDICAL/DENTAL Offices treat us the Military in a respectable way. I've been here since Nov 2012 and have not gotten any fair treatment outside the Military facilities. Just be more kind, friendly towards us.
1/11/2013	Fort Worth	Affordability of housing;Close to shopping;Safe neighborhood	Type of housing available;Safe neighborhood;Ability to walk or bike	Physical appearance of community;Quality of schools;Lack of walking or biking options	Neutral	Neutral	Neutral	Neutral	Neutral	Important	Neutral	Neutral	New roadways	Word 1 = Quiet;Word 2 = friendly neighbors;W	
1/11/2013	Fort Worth	Close to work or good jobs;Close to parks/recreational areas;lake;Neighbors/sense of community	Close to shopping;Schools;Close to entertainment/culture	Quality of schools;Lack of public transportation options;Lack of walking or biking options	Very important	Neutral	Not important at	Important	Very important	Very important	Not important a	Very important	Operational impro	Word 1 = Rural;Word 2 = Friendly;Word 3 = In	The area around Lake Worth does not need any more Apartments. Low class residents of apartments have increased crime and trash problems around the lake. High end condos might be OK but no more apartments.
1/11/2013	Fort Worth	Close to entertainment/culture;Safe neighborhood;Neighbors/sense of community	Close to parks/recreational areas;More urban feel;Ability to walk or bike	Lack of affordable housing near jobs;Quality of schools;Lack of walking or biking options	Neutral	Neutral	Important	Not important at	Neutral	Very important	Very important	Important	More bicycle/pede	Word 1 = Convenient;Word 2 = Affordable;Wo	Please look at connecting 2 Boaz park to the Trinity Trail system via the Bomber Spur
1/11/2013	Fort Worth	Close to work or good jobs;Close to shopping;Close to entertainment/culture	Close to work or good jobs;Close to entertainment/culture;More urban feel												
1/11/2013	Fort Worth	trees, green spaces, bike trails, we need bike lanes;Schools;Safe neighborhood;Close to parks/recreational areas;lake													
1/13/2013	Fort Worth	Close to work or good jobs;Close to shopping;Neighbors/sense of community													
1/14/2013	Fort Worth	Close to work or good jobs;Schools;Good place to raise a family	Close to work or good jobs;Schools;Safe neighborhood	Lack of quality shopping/entertainment options;Lack of public transportation options;Lack of walking or biking options	Very important	Important	Important	Not very impo	Very important	Important	Neutral	Important	More bicycle/pede	Word 1 = bedroom;Word 2 = suburban;Word	
1/15/2013	Fort Worth	Affordability of housing;Schools;Safe neighborhood	Close to work or good jobs;Schools;Safe neighborhood	Lack of quality shopping/entertainment options;Lack of public transportation options	Neutral	Important	Important	Neutral	Very important	Important	Not very impo	Important	More bicycle/pede	Word 1 = comfortable;Word 2 = safe;Word 3 =	
1/16/2013	Fort Worth	Affordability of housing;Schools;Good place to raise a family	Affordability of housing;Schools;Safe neighborhood	Lack of jobs/economic opportunities;Lack of public transportation options;Lack of walking or biking options	Important	Important	Very important	Neutral	Important		Not very impo	Neutral	More bicycle/pede	Word 1 = suburban;Word 2 = warm climate;W	We love the Fort Worth Area. Greatest wish is for more community areas for physical activity (i.e. hiking and biking).

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1/16/2013	Fort Worth	Close to shopping;Close to entertainment/culture;Safe neighborhood	SAFE pedestrian walkways;Close to shopping;Close to entertainment/culture;Availability of transit	My school, Applied Learning Academy, does not have sidewalks, a school zone, a cross walk, or safe access to the nearest bus stop.;Lack of public transportation options;Lack of walking or biking options	Very important	Very important	Very important	Not important at	Not important at	Very important	Important	Very important	The Academy at Ca	Word 1 = busy;Word 2 = pedestrian un-friendly	
1/21/2013	Fort Worth	Close to work or good jobs;Close to entertainment/culture;Safe neighborhood	Affordability of housing;Close to work or good jobs;Schools	Quality of schools;Lack of quality housing;Lack of quality shopping/entertainment options	Important	Very important	Neutral	Important	Neutral	Important	Not important at	Neutral	More public transp	Word 1 = Quite;Word 2 = Safe;Word 3 = Small	rate.
1/29/2013	Fort Worth	I would also like to select Neighbors/sense of community. We R a close-nit neighborhood having lived here for well over 70+ yrs.;Affordability of housing;Good transportation;Good place to raise a family	Affordability of housing;Availability of transit;Close to family/friends	Crime;Physical appearance of community;Lack of growth	Very important	Very important	Neutral	Not very importa	Neutral	Neutral	Not important a	Very important	rail - RAIL & RAIL t	Word 1 = FRIENDLY;Word 2 = WIDE-OPEN;Wo	CITY OF FORT WORTH IS A great place to live, work & play. Many areas have more advantages than my neighborhood. The closeness to downtown Fort Worth is a good selling point for anyone seeking to improve their way of life.
12/11/2012	Lake Worth	Affordability of housing;Close to work or good jobs;Schools	Close to work or good jobs;Schools;Safe neighborhood	the base entrances are oddly placed causing extra time for commute;Traffic congestion;Lack of public transportation options	Very important	Very important	Important	Neutral	Very important	Very important	Neutral	Neutral	New roadways	Word 1 = affordable;Word 2 = developing;Wo	
12/11/2012	Lake Worth	Affordability of housing;Close to work or good jobs;Safe neighborhood	Affordability of housing	Lack of jobs/economic opportunities;Lack of public green space/parks/recreational facilities	Very important	Very important	Important	Neutral	Neutral	Not very importa	Important	Neutral	More bicycle/pede	Word 1 = Clean;Word 2 = Safe;Word 3 = Friens	None
12/10/2012	River Oaks	Close to shopping;Close to entertainment/culture;Safe neighborhood	Close to work or good jobs;Close to entertainment/culture;Safe neighborhood	Physical appearance of community;Lack of walking or biking options;Lack of growth	Very important	Important	Neutral	Important	Very important	Important	Not important a	Important	More bicycle/pede	Word 1 = Small town feel;Word 2 = Safe, very	
12/10/2012	River Oaks	Affordability of housing;Close to work or good jobs;Safe neighborhood	Affordability of housing;Close to work or good jobs;Safe neighborhood	Physical appearance of community;Lack of quality shopping/entertainment options;Lack of growth	Important	Very important	Important	Very important	Neutral	Important	Very important	Important	More bicycle/pede	Word 1 = Peacefull;Word 2 = Safe;Word 3 = Re	
12/10/2012	River Oaks	Affordability of housing;Safe neighborhood;Neighbors/sense of community	Affordability of housing;Safe neighborhood;Ability to walk or bike	Lack of quality shopping/entertainment options;Lack of public transportation options;Lack of walking or biking options	Important	Not very importa	Important	Not very importa	Not very importa	Very important	Not very importa	Important	More bicycle/pede	Word 1 = safe;Word 2 = quite;Word 3 = friend	
12/13/2012	River Oaks	Close to entertainment/culture;Safe neighborhood;Close to parks/recreational areas/lake	Schools;Close to parks/recreational areas;Ability to walk or bike	Lack of quality housing;Lack of walking or biking options;Lack of public green space/parks/recreational facilities	Very important	Very important	Important	Very important							
12/21/2012	River Oaks	Safe neighborhood;Neighbors/sense of community	Close to family/friends;Safe neighborhood	Quality of schools;Lack of quality shopping/entertainment options	Neutral	Not important a	Neutral	Neutral	Important	Not important at	Not important a	Neutral	some type of light	Word 1 = safe;Word 2 = friendly;Word 3 = rur	this program are not listening to the citizens in this city(river oaks) who have continuously stated and overwhelmingly stated they are NOT for multi-family. This is a 3 mile square city. We have enough apartments and multi family areas already. And the newest multi-family is
12/21/2012	River Oaks	Schools;Close to entertainment/culture;Neighbors/sense of community	Schools;Close to entertainment/culture;Ability to walk or bike	Physical appearance of community;Lack of quality housing;Lack of walking or biking options	Very important	Important	Neutral	Very important	Very important	Very important	Neutral	Very important	More bicycle/pede	Word 1 = Quiet;Word 2 = Calm;Word 3 = Old	
1/11/2013	River Oaks	Affordability of housing;Close to work or good jobs;Schools													
1/11/2013	River Oaks	Close to work or good jobs;Safe neighborhood;Close to parks/recreational areas/lake	Close to work or good jobs;Safe neighborhood;Ability to walk or bike	Physical appearance of community;Quality of schools;Lack of walking or biking options	Very important	Very important	Very important	Very important	Very important	Very important	Not important a	Very important	New roadways	Word 1 = Close to downtown;Word 2 = Safe;W	
1/12/2013	River Oaks	Close to work or good jobs;Close to shopping;Safe neighborhood	Close to entertainment/culture;Safe neighborhood;More urban feel	shopping/entertainment options. Generally, the retail and entertainment now in place in River Oaks, and being supported by the demographics of River Oaks, i.e., a low-income community, are not of the quality, upscale, urban, types like same our neighboring cities of Fort Worth (for example 7th Street), Westworth & Lake Worth. Regardless of the City's current demographics and lack of quality housing, I believe that more upscale, urban retail and entertainment will come to River Oaks when the community shows that it can support them. Due to our location, we can likely support new retail and entertainment via the traffic that is now just passing	Very important	Important	Neutral	Very important	Important	Important	Not important a	Very important	More sidewalks in	Word 1 = outdated;Word 2 = low-income ;Wo	Thank you.
1/12/2013	River Oaks	Affordability of housing;Close to work or good jobs;Safe neighborhood	Affordability of housing;Close to work or good jobs;Safe neighborhood	Physical appearance of community;Lack of quality shopping/entertainment options;Lack of growth	Very important	Very important	Important	Very important	Very important	Important	Important	Very important	New roadways		
1/13/2013	River Oaks	Affordability of housing;Close to shopping;Close to entertainment/culture	Availability of transit;Safe neighborhood;Ability to walk or bike	Lack of public transportation options;Lack of walking or biking options	Important	Important	Important	Neutral	Important	Important	Not very importa	Important	More public transp	Word 1 = Safe;Word 2 = Friendly;Word 3 = Op	
1/14/2013	River Oaks	Close to entertainment/culture;Safe neighborhood;Neighbors/sense of community	Type of housing available;Availability of transit;Safe neighborhood	Lack of quality shopping/entertainment options;Lack of public transportation options;Lack of growth	Very important	Neutral		Important	Neutral	Very important	Neutral	Neutral	More bicycle/pede	Word 1 = Friendly;Word 2 = OldSchool;Word 3 =	



Date Started	In what community is your home located?	What do you like about the community where you live?	If you could live anywhere in the region, what would be the most important factors in your decision?	What are the major issues/challenges in the community where you live?	How important is it for your community to encourage redevelopment of existing commercial areas?	How important is it for your community to encourage redevelopment of existing residential areas?	How important is it for your community to increase park, open space, recreational, and community facility amenities?	How important is it for your community to improve the appearance of major highways?	How important is it for your community to improve function of existing roadways?	How important is it for your community to expand transportation options, including walking, transit and biking?	How important is it for your community to increase the number of multi-family housing choices?	How important is it for your community to increase the mix and quality of local businesses?	What transportation improvements would you most like to see in your community?	What three words would you use to describe your community to someone who does not live here?	Please provide any additional comments you may have.
1/15/2013	River Oaks	Affordability of housing;Good place to raise a family;Neighbors/sense of community	Type of housing available;Close to family/friends;Safe neighborhood	Lack of quality shopping/entertainment options;Lack of growth;Lack of public green space;barks/recreational facilities	Important	Important	Important	Important	Important	Important	Neutral	Important	More bicycle/pede		
1/17/2013	River Oaks	Safe neighborhood	Safe neighborhood	Lack of growth	Important	Important									
1/23/2013	River Oaks	Close to work or good jobs;Close to entertainment/culture;Close to parks/recreational areas/lake	Close to entertainment/culture;Close to parks/recreational areas	Physical appearance of community;Lack of quality shopping/entertainment options;Lack of growth	Very important	Very important	Not important at	Not important at	Very important	Not important at	Not important at	Very important	Upgrade the existi	Word 1 = Small;Word 2 = poor;Word 3 = out-	anything that would ruin the view from the top of the hill with the River Oaks water treatment facility on it. As well, anything done to protect the wildlife habitat that is currently the YMCA property on both sides of the river would be good. We see deer, falcons, racoons, foxes, hawks and many
12/17/2012	Sansom Park	Close to work or good jobs;Safe neighborhood;Neighbors/sense of community	Close to work or good jobs;Close to family/friends;Safe neighborhood	Physical appearance of community;Lack of walking or biking options;Lack of public green space;parks/recreational facilities	Very important	Very important	Very important	Very important	Not important at	Very important	Very important	Important	More bicycle/pede	Word 1 = Quiet;Word 2 = Unencumbered;Wo	My city needs sidewalks desperately, and a plan to remove blight.
1/11/2013	Sansom Park	Affordability of housing;Close to shopping;Safe neighborhood	Affordability of housing;Close to family/friends;Safe neighborhood	Physical appearance of community;Lack of quality housing;Lack of public green space;parks/recreational facilities	Very important	Very important	Very important	Not very importa	Not important at	Not important at	Very important	Important	New roadways	Word 1 = quiet;Word 2 = undisturbed;Word 3 =	
12/13/2012	Unincorporated T	Affordability of housing;Good place to raise a family;Safe neighborhood	Affordability of housing;Close to family/friends;Safe neighborhood	Lack of public transportation options	Important	Important	Important	Very important	Very important	Important	Neutral	Neutral	More public transp	Word 1 = Safe;Word 2 = Clean;Word 3 = Peace	
1/14/2013	Unincorporated T	Close to work or good jobs;Good place to raise a family;Neighbors/sense of community	Affordability of housing;Close to work or good jobs;Safe neighborhood	Lack of jobs/economic opportunities;Traffic congestion;Lack of public transportation options	Very important	Important	Neutral	Neutral	Important	Very important	Not very importa	Neutral	More bicycle/pede	Word 1 = friendly;Word 2 = warm;Word 3 = in	
12/10/2012	Westworth Village	Safe neighborhood	Type of housing available	Physical appearance of community	Not important	Very important	Neutral	Not very importa	Neutral	Not important at	Not important at	Important	New roadways	Word 1 = redevelopment;Word 2 = improving	
12/11/2012	Westworth Village	Close to work or good jobs;Close to shopping;Schools	Affordability of housing;Close to work or good jobs;Schools	Lack of affordable housing near jobs;Lack of public transportation options	Important	Important									
12/17/2012	Westworth Village	Close to work or good jobs;Close to shopping;Safe neighborhood	Type of housing available;Close to work or good jobs;Safe neighborhood	Lack of affordable housing near jobs;Lack of quality housing;Lack of public transportation options	Very important	Very important	Not important at	Neutral	Neutral	Neutral	Neutral	Neutral	Operational impro	Word 1 = safe;Word 2 = quiet;Word 3 = welco	
1/11/2013	Westworth Village	Close to entertainment/culture;Close to parks/recreational areas/lake;Neighbors/sense of community	Ability to walk or bike	Physical appearance of community;Lack of quality housing;Lack of walking or biking options	Not very impo	Important	Very important	Important	Neutral	Important	Not important at	Important	Better pedestrian a	Word 1 = Convenient;Word 2 = Affordable;Wo	I would like to see the city improve walking and biking options - for recreation and transportation. Provide walking access from Roaring Springs to Airfield Falls.
12/11/2012	White Settlement	Schools;Good place to raise a family;Safe neighborhood	Affordability of housing;Schools;Open space/more rural feel	Lack of jobs/economic opportunities;Lack of public transportation options	Very important	Neutral	Important	Neutral	Important	Very important	Neutral	Important	More public transp	Word 1 = Quiet;Word 2 = Safe;Word 3 = Frein	
12/14/2012	White Settlement	Affordability of housing;Close to shopping;Schools	Affordability of housing;Safe neighborhood;Open space/more rural feel	Physical appearance of community;Lack of quality shopping/entertainment options;Lack of public green space;barks/recreational facilities	Important	Very important	Very important	Important	Important	Not very importa	Not important at	Important	SIDEWALKS!!!!!!!	Word 1 = QUIET;Word 2 = DIVERSE;Word 3 =	
1/15/2013	White Settlement	I look at the choices and see none that I can check. It is sad.	Mobility within the community allowing individuals to meet ones needs.;Type of housing available;Safe neighborhood	Our building codes which limit the types and scope of improvements which better serves our community. The seemingly lack seriousness and effort of our Council. Please look at the Council meeting appointing our RCC rep. on DVD dated Jan 8 2003. This is what you are up against. Each City needs an advisory group to and for our Reps. I am embarrassed for our City at the levity displayed. The matter was addressed in a Circus like fashion.;Physical appearance of community	Very important	Very important	Neutral	Not very importa	Very important	Very important	Not very importa	Important	Resurfacing of all o	Word 1 = derisive;Word 2 = divided;Word 3 =	inter-married that outsiders fail to understand the political makeup. Outsiders (people who band together, who have little tenure living within White Settlement) attempt to put their stamp on a town that is Home Ruled and made up of people that have live

# APPENDIX D | REAL ESTATE MARKET ANALYSIS AND ECONOMIC BASE ANALYSIS



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# 1 REAL ESTATE MARKET ANALYSIS

## A. INTRODUCTION

The following section provides an analysis of the real estate market trends and conditions impacting a six-city study area that is adjacent to Naval Air Station Fort Worth-Joint Reserve Base. The Planning Livable Military Communities (PLMC) study area includes the cities of: (1) Benbrook, (2) Lake Worth, (3) River Oaks, (4) Sansom Park, (5) Westworth Village, (6) White Settlement and (7) portions of the City of Fort Worth north of downtown. The Cities of Lakeside and Westover Hills were also considered as part of this analysis, as well as Tarrant County, which comprises much of the western portion of the Dallas/Fort Worth Metroplex.

The purpose of this analysis was to document recent real estate trends, as well as conditions as they exist within the study area. Prevailing trends are critical to understanding the market forces that have shaped the larger study area over time. Although this section examines existing conditions and commercial space inventories within each community, the analysis takes a broader macro view of the Tarrant County market and tries to identify the supply and demand forces that are creating the development patterns that are present in mid-2012.

While some data for the entire DFW Metroplex are provided for comparative purposes, the analysis focuses on areas west of the DFW International Airport, which is the geographic center-point for the greater economic region and a real dividing line between the Dallas and Fort Worth markets. For all intents and purposes, the analysis focuses on growth and development activity north of downtown Fort Worth, which is most relevant to the study area communities and happens to be where the most aggressive growth and development activity is being projected for the future.

The study presents data at various submarkets comprising Tarrant County. Typically, submarket boundaries are established by the local real estate brokerage community to track different real estate segments (i.e., industrial, office, retail, etc.). These submarkets do not often follow political boundaries, but rather are defined by major transportation corridors or changes in development patterns and real estate types, pricing, and quality of development.

## B. SUMMARY OF MAJOR FINDINGS

### Regional Economy

- The Metroplex market and economy is currently rebounding after contracting slightly in 2009. Inventories are growing, vacancies are declining, and absorption rates are increasing.
- The region's most significant development has occurred near highway interchanges and major transportation corridors, primarily IH 35W and Loop 820.
- Payroll employment increased by 69,000 jobs in the Metroplex over the previous 12 month period.
- The Dallas/Fort Worth Metropolitan Statistical Area (MSA) unemployment rate dropped to 7.1% in December 2011, down from 8.0% the previous year.

- Leisure and hospitality sectors are driving job growth in DFW, while business travel to the Metroplex continues to rise.

### **Office Market**

- The Greater Fort Worth office market comprises only 17% of the Metroplex total, indicating that the Fort Worth market is a secondary office market to Dallas.
- Major office and industrial/warehouse/distribution developments are located within 5-10 miles of the study area
- A large retail mixed-use development is being proposed on 850 acres north of the Trinity River known as the Edwards Ranch property. The main part of the development called "Clearfork" consists of 2 million SF of office space, 1.2 million SF of retail and approximately 2,500 residential units.

### **Industrial Market**

- The Greater Fort Worth industrial market accounts for 37% of the Metroplex total and has several large and expanding industrial submarkets, primarily along interstate corridors.
- In 2011, the DFW industrial market absorbed nearly 14 million SF as compared to 885,000 SF in 2010
- The warehouse/distribution market accounted for 95% of net absorption in 2011.
- There was over 1.1 million SF of new industrial space under construction at the end of 2011, of which 88% was preleased. By the 1<sup>st</sup> quarter, total construction had increased to 2.1 million SF.
- In 2011, 1.5 million SF of new industrial space was delivered in the DFW Metroplex, with 95% leased by the end of the year.
- In the 1<sup>st</sup> Quarter 2012, industrial net absorption was 3.4 million square feet (SF),
- Industrial vacancy rates declined from 10.4% in the 4<sup>th</sup> Quarter of 2011 to 9.7% in the 1<sup>st</sup> quarter 2012.

### **Retail Market**

- The City of Benbrook is working with local retail experts and developers, Buxton Company, on the approval of The Trails Shopping Center at the corner of IH 20 and Winscott Road. The new 193-acre development will support 1.5 million SF of mixed-use development, which will include retail and entertainment uses. The project is projected to create over 6,200 jobs and generate over \$375 million in annual retail sales, based on the developer's early estimates.
- The Planning for Livable Military Communities (PLMC) study area has approximately 15.3 million SF of commercial space along major transportation corridors and at major shopping destinations. Roughly 6.2 million SF, or 40.5% of existing building space, is classified as service businesses, auto-related businesses, maintenance shops, hotel/motels and other non-retail establishments.

### **Mixed-Use Development**

- Small and large mixed-use developments are gaining in popularity within Fort Worth market. Three new urban mixed-use projects will be completed near Fort Worth's Downtown Cultural District within the next few years. Museum Place, SoSeven and West 7<sup>th</sup> are creating attractive new developments taking advantage of the City's cultural and entertainment amenities and attracting new residents downtown.
- AllianceTexas is a fully intermodal facility offering air, rail and highway access. Alliance is home to over than 240 companies, including 65 from the Fortune 500, Global 500 or Forbes List of Top Private Companies. Over 28,000 employees and 7,340 single-family homes are included in this master-planned development. Primary uses include office, manufacturing, distribution, retail and service businesses.

- The level of development occurring in the North Fort Worth area is creating a “gravity effect” and is pulling more development north of the PLMC Study Area. This is not an indication that the study area is not suitable for development, but rather the market and the City of Fort Worth are making strategic investments that are attracting development interests 5 to 10 miles north of the study area. The “leap-frogging” nature of this development is creating a hyper-competitive market environment north of downtown.
- Other large-scale mixed-use developments are proposed at the Edwards Ranch and Walcott Ranch developments west of Downtown Fort Worth. These projects have the potential to draw new residents, businesses and employment to an area west of downtown Fort Worth and away from the PLMC study area.

**PLMC Study Area**

- Building values within the PLMC study area show evidence of poor building conditions, which is contributing to an erosion of the tax base in some communities.
- Affordably-priced housing is a net benefit for the region, but very low value housing attracts lower income households without other options

**C. STUDY AREA LOCATION AND HIGHWAY CONNECTIONS**

**1. PLMC Study Area Description**

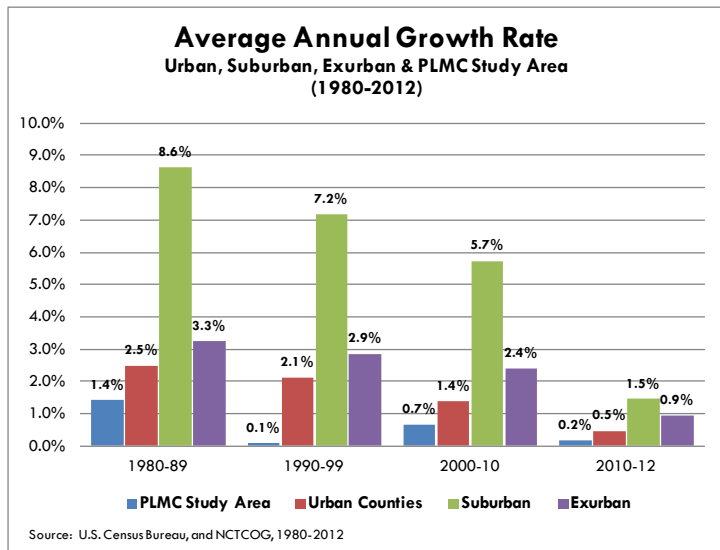
The PLMC Study Area consists of roughly a 2.5 to 3 mile radius circle around NAS Fort Worth JRB. This area consists of the cities of: (1) Benbrook, (2) Lake Worth, (3) River Oaks, (4) Sansom Park, (5) Westworth Village, (6) White Settlement and (7) portions of the City of Fort Worth north of downtown. The Cities of Lakeside and Westover Hills are not technically part of the study area, but have been examined as part of the market analysis. The majority of the PLMC Study Area sits within an area defined by IH 820 in the north and west, IH 30 in the south and IH 35 in the east. Only Lake Worth and Benbrook extend north and south of that area.

**2. Population Trends in PLMC Study Area Communities and Metroplex**

The population of the PLMC Study Area communities was estimated at 56,720, as of January 1, 2012, up roughly 10,777 or 23.5% since 1980. On an average annual basis, the study area has grown at a very slow 0.7% over the past 32 years (Figure 1). Only the City of Benbrook has exceeded this average with an annual growth rate of 1.8%. Meanwhile, the North Central Texas Council of Government (NCTCOG) region has grown at a much more rapid annual rate of approximately 3.5%.

The NCTCOG region contains 16 urban, suburban and exurban counties surrounding the cities of Dallas and Fort Worth. In 2012, it was estimated that the Fort Worth

Figure 1



Region had a combined population of 2.3 million and the Dallas Region had approximately 4.3 million people. Over the past 32 years, both sides of the Metroplex have grown at roughly the same annual rate (3.5%). However, when examined in an urban, suburban, and exurban context, it's clear that as much population growth has occurred outside the two urban counties of Dallas and Tarrant as has occurred inside the region's most populous counties.

According to recent population estimates prepared by the NCTCOG, roughly 1.72 million people have moved into the 14 suburban and exurban counties that comprise the Metroplex, while another 1.79 million have moved into Dallas and Tarrant Counties since 1980. Not surprisingly, the annual growth rates reported outside the urban counties have been much faster during this period. The most significant and fastest population gains are occurring in the three suburban counties surrounding Dallas County.<sup>1</sup> Collin, Denton and Rockwall counties have accounted for 1.27 million new population at an average rate of 13.1% per year.

While regional growth rates have slowed since the 1980s, the suburban and exurban counties are still experiencing very strong growth, by any conventional measure. During the past decade, average annual growth rates of 2.5% to 6% were typical outside the central cities. One unique aspect of the Dallas/Fort Worth Metropolitan Area is the fact that this suburban and exurban growth pattern has not been driven by urban outmigration as is typical in many U.S. population centers.

Equally unique has been the slow growth pattern exhibited within the PLMC Study Area. Compared to other suburban locations, the study area communities have experienced stagnant population growth since the 1980s. The future of these communities will depend, to some degree, on their ability to attract new residents who will support local business, reinvest in the community and strengthen civic leadership.

### **3. Highway Accessibility**

Convenient highway access is one of the PLMC Study Area's greatest economic assets. The study area is served by IH 820, which runs along the western and northern edge of the study area and creates the top of a ring-road around the City of Fort Worth. IH 820 intersects with IH 35W in Blue Mound, TX, and runs north/south. Interstate 35 is a major trade route with Mexico running through Laredo, Austin and San Antonio in the south and Oklahoma City, Wichita, Kansas City, and Minneapolis in the north. Likewise, Interstates 30 and 20 run east/west on the south edge of the study area. Interstate 20 makes up the southern portion of the Fort Worth ring-road and runs west until it connects with IH 10, then runs west through Phoenix and on to Los Angeles. In the east, IH 20 continues across the country through Jackson, MS, Birmingham, AL and eventually connects with IH 95 in Florence, SC.

Within the PLMC Study Area, SH 199 (Jacksboro Highway) runs south from the City of Lake Worth through River Oaks and connects with N. Henderson Street in Downtown Fort Worth. SH 183 is the most significant east/west highway which starts near Ridgmar Mall in the City of Fort Worth and runs north through Westover Hills and River Oaks and intersects with IH 35 just east of the study area. Another important route in the southern portion of the study area is Camp Bowie Boulevard, which runs east/west and is a significant commercial corridor.

## **D. GENERAL MARKET OVERVIEW AND GROWTH PROJECTIONS**

### **1. Military and Defense Industry Presence in PLMC Study Area**

<sup>1</sup> Urban: Dallas, Tarrant Counties, Suburban: Collin, Denton, and Rockwall Counties, Exurban: Johnson, Hood, Erath, Palo Pinto, Parker, Somervell, Wise, Ellis, Hunt, Kaufman, and Navarro Counties.



Naval Air Station Fort Worth Joint Reserve Base (NAS Fort Worth JRB) includes Carswell Field, a military airbase located roughly 5 miles west of downtown Fort Worth, Texas. This military installation functions as a joint reserve base and is operated by U.S. Navy Reserve. NAS Fort Worth JRB was formerly known as Carswell Air Force Base, one of the nation's first strategic air command bases. In 1991 the facility was closed through the Base Realignment and Closure process; federal legislation governing the closure and realignment of military bases throughout the country. The 1,775-acre installation was recommissioned in 1994 as the country's first joint reserve base serving the training needs of multiple branches of the nation's armed services.<sup>2</sup>

The base, now part of Navy Installations Command (CNIC), is under the oversight of Commander, Navy Region Southeast. It hosts a variety of fighter/attack and airlift units from the reserve components of Navy, Marine Corps and U.S. Air Force. As of 11/20/12, there were 12,337 military and civilian personnel assigned to NAS Fort Worth JRB (including active duty, reserve, national guard, and civilians).

**NAS Fort Worth JRB Personnel  
March, 2012**

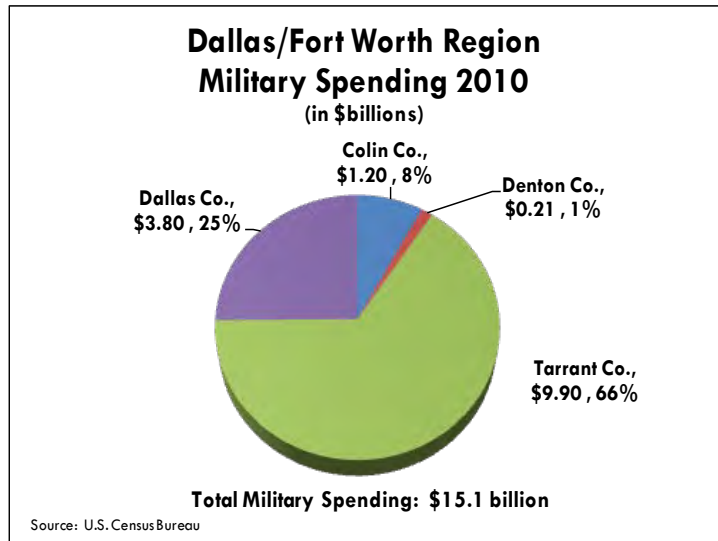
Military Service	Active Duty	Reserves	Civilians	Total	% of Total
U.S. Army	20	405	-	425	3.7%
U.S. Marine Corp.	707	928	-	1,635	14.4%
U.S. Navy	989	3,066	-	4,055	35.8%
U.S. Air Force	545	1,525	-	2,070	18.3%
Air National Guard	235	804	-	1,039	9.2%
Department of Defense	-	-	2,113	2,113	18.6%
<b>Total Personnel</b>	<b>2,496</b>	<b>6,728</b>	<b>2,113</b>	<b>11,337</b>	<b>100.0%</b>
<b>% of Total Personnel</b>	<b>22.0%</b>	<b>59.3%</b>	<b>18.6%</b>	<b>100.0%</b>	

Source: Commander's Briefing, March 2012

According to NAS Fort Worth JRB Base Command, the installation contributes approximately \$2.3 billion to the Dallas/Fort Worth MSA economy each year. The total personnel employed at the base makes NAS Fort Worth JRB the third largest employer in the State of Texas. In addition, the base serves a population of roughly 195,000 military personnel and their dependents, including a population of over 170,000 in retired military households.<sup>3</sup>

In conjunction with the military operations occurring at the installation, defense contractor, Lockheed Martin Corp. is located along the western edge of the air base and is Fort Worth's largest private employer. Lockheed is currently contracted to build the F-35 Lightning II Joint Strike Fighter. While Lockheed's presence at NAS Fort Worth JRB is not linked to the military mission, the contractor enjoys joint use of the airfield for test flights. The F-35 contract awarded to Lockheed in 2001 called for three variants of an affordable stealth fighter for the Air Force, Navy and Marine Corps and at least 10 other nations, including Britain, Canada, Turkey and Japan. The total cost is

**Figure 2**



<sup>2</sup> <http://www.cnic.navy.mil/fortworth/index.htm>

<sup>3</sup> Presentation of Commanding Officer, Capt. R.A. Bennett, March 2012.

estimated at \$395.7 billion, a 70 percent increase from a 2001 estimate equal to \$233 billion in current dollars.<sup>4</sup> About 6,100 of Lockheed’s 14,000 employees in Fort Worth are assigned to the F-35 project. With recent concerns over cost overruns, and the need to control federal spending, some defense industry experts are concerned about future production levels of the Joint Strike Fighter, which was originally set at 2,443 units. Reductions in these numbers could impact growth and economic prosperity in the region.

Annual defense spending in the Greater Dallas/Fort Worth Region equaled roughly \$15.1 billion in 2010, and included money spent on procurement contracts (90.9%), salaries and wages (5.3%), retirement and disability payments (3.6%), and federal grants (0.2%). Figure 2 shows that roughly \$9.9 billion or 66% of all annual military spending in the region occurred in Tarrant County. The PLMC study area is one of the region’s largest and most important employment centers.<sup>5</sup>

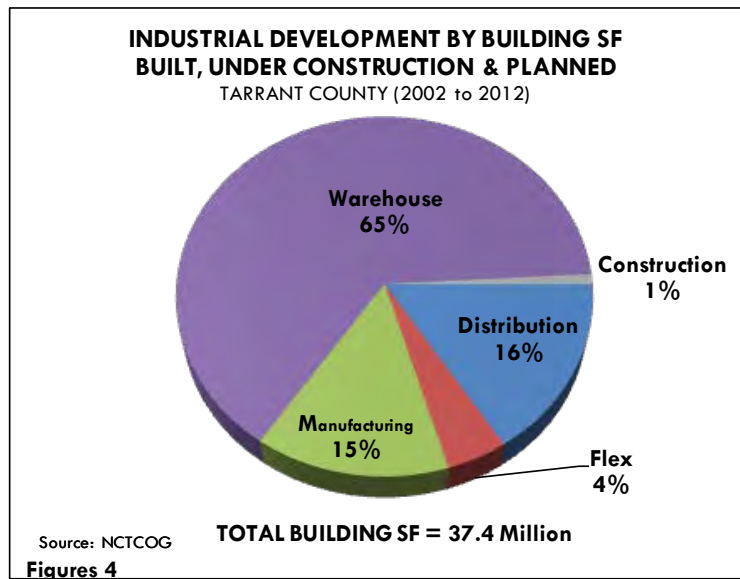
**4. Recent Development Trends (2002 to 2012)**

In order to evaluate the pace of new non-residential development in Tarrant County, the analysis tracked different types of development during the past 10-year period (2002-2012). The data used for this analysis was obtained from the North Central Texas Council of Governments (NCTCOG) Development Monitoring database. The NCTCOG tracks all new residential and commercial development activity on a quarterly basis based on type of development and total building square feet and number of units, in the case of residential development.

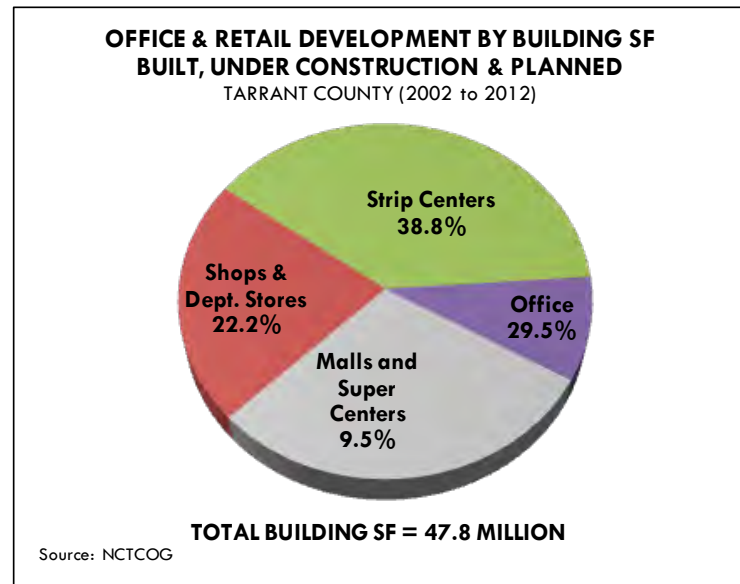
Industrial development activity was segmented into: (1) warehouse, (2) distribution, (3) manufacturing, (4) flex and (5) construction. Flex space is typically defined as single story, industrial-type building space that’s generally 25-100 percent office space, depending on the type of business. Contractors, product assemblers, Internet companies will utilize this space in different ways, thus the term “flex.”

Between 2002 and 2012, roughly 65% of all space as built, under construction and planned, in Tarrant

Figures 3



Figures 4



<sup>4</sup> <http://www.bloomberg.com/news/2012-06-19/lockheed-needs-pressure-to-pare-f-35-costs-levin-says.html>

<sup>5</sup> “Military Money Boosts Texas,” DallasNews.com, Brendan Case and Mike Setzer, March 11, 2012.

County has been classified as warehouse space and another 16% has been distribution (Figure 3). Together these two market segments total more than 28 million SF of new building space (Table 1). Another 7.1 million SF of manufacturing space has been added to the county's supply.

Approximately 10.5 million SF of new building space is currently under construction or has been proposed for development. Roughly 43% of all manufacturing space in the county is being proposed for development in the near future, as of March 2012.

In terms of office and retail development activity, more than 47.8 million SF of new building space has been constructed or has been proposed for development. This data were segmented into four categories including: (1) office, (2) shops & department stores, (3) strip centers, and (4) malls and super centers (Figure 4). Roughly 18.5 million SF or 38% of all commercial space was classified as strip centers over the past decade (Figure 4). Another 14 million SF was classified as office space (Table 2). Unlike industrial, where only 18.3% of new space was announced or conceptual, nearly 47% of office and retail space is so classified. This is seen as a very positive sign of economic recovery as most of this space is classified as strip shopping centers, shops and department stores.

Figures 5 and 6 illustrate the geographic distribution of new industrial, office and retail space throughout Tarrant County between 2002 and 2012, as well as new development under construction and announced developments. Not surprisingly, the vast majority of industrial, warehouse/distribution and flex space has been constructed or proposed in close proximity to DFW International Airport along SH 360, just south of the airport. Another cluster of industrial development has occurred in the Blue Mound area at the intersection of IH 820 and IH 35W, as well as the Saginaw area at IH 820/SH 486 (Figure 5). For the most part, the PLMC Study Area has not attracted these types of uses over the past 10 years.

**Table 1**  
**Major Industrial Development Trends**  
**Fort Worth; 2002 to 2012**

Type	Number	Square Feet	% Total SF
<b>BUILT</b>			
Distribution	14	4,697,417	73.9%
Flex	4	1,822,695	95.4%
Manufacturing	15	4,026,844	56.4%
Warehouse	61	16,364,026	74.4%
Construction	1	22,000	100.0%
<b>Total</b>	<b>95</b>	<b>26,932,982</b>	<b>72.0%</b>
<b>UNDER CONSTRUCTION</b>			
Distribution	1	141,600	2.2%
Flex	0	0	0.0%
Manufacturing	1	3,108,000	43.6%
Warehouse	1	400,000	1.8%
Construction	0	0	0.0%
<b>Total</b>	<b>3</b>	<b>3,649,600</b>	<b>9.8%</b>
<b>ANNOUNCED/CONCEPTUAL</b>			
Distribution	3	1,515,875	23.9%
Flex	1	88,828	4.6%
Manufacturing	0	0	0.0%
Warehouse	11	5,226,128	23.8%
Construction	0	0	0.0%
<b>Total</b>	<b>15</b>	<b>6,830,831</b>	<b>18.3%</b>
<b>TOTAL</b>			
Distribution	18	6,354,892	17.0%
Flex	5	1,911,523	5.1%
Manufacturing	16	7,134,844	19.1%
Warehouse	73	21,990,154	58.8%
Construction	1	22,000	0.1%
<b>Total</b>	<b>113</b>	<b>37,413,413</b>	<b>100.0%</b>

Source: North Central Texas Council of Governments Development Monitoring Data and RKG Associates, Inc., (2002-2012)

**Table 2**  
**Major Office and Retail Development Trends**  
**Fort Worth; 2002 to 2012**

Type	Number	Square Feet	% Total SF
<b>BUILT</b>			
Office	29	7,049,300	50.0%
Shops & Dept. Stores	22	4,544,358	42.8%
Strip Centers	32	6,678,660	36.0%
Malls and Super Centers	13	4,095,423	100.0%
<b>Total</b>	<b>96</b>	<b>22,367,741</b>	<b>47.2%</b>
<b>UNDER CONSTRUCTION</b>			
Office	5	1,250,000	8.9%
Shops & Dept. Stores	4	326,000	3.1%
Strip Centers	7	1,435,954	7.7%
Malls and Super Centers	0	0	0.0%
<b>Total</b>	<b>16</b>	<b>3,011,954</b>	<b>6.4%</b>
<b>ANNOUNCED/CONCEPTUAL</b>			
Office	14	5,789,905	41.1%
Shops & Dept. Stores	7	5,740,600	54.1%
Strip Centers	19	10,435,817	56.3%
Malls and Super Centers	1	0	0.0%
<b>Total</b>	<b>41</b>	<b>21,966,322</b>	<b>46.4%</b>
<b>TOTAL</b>			
Office	48	14,089,205	29.8%
Shops & Dept. Stores	33	10,610,958	22.4%
Strip Centers	58	18,550,431	39.2%
Malls and Super Centers	14	4,095,423	8.6%
<b>Total</b>	<b>153</b>	<b>47,346,017</b>	<b>100.0%</b>

Source: North Central Texas Council of Governments Development Monitoring Data and RKG Associates, Inc., (2002-2012)



Figure 5

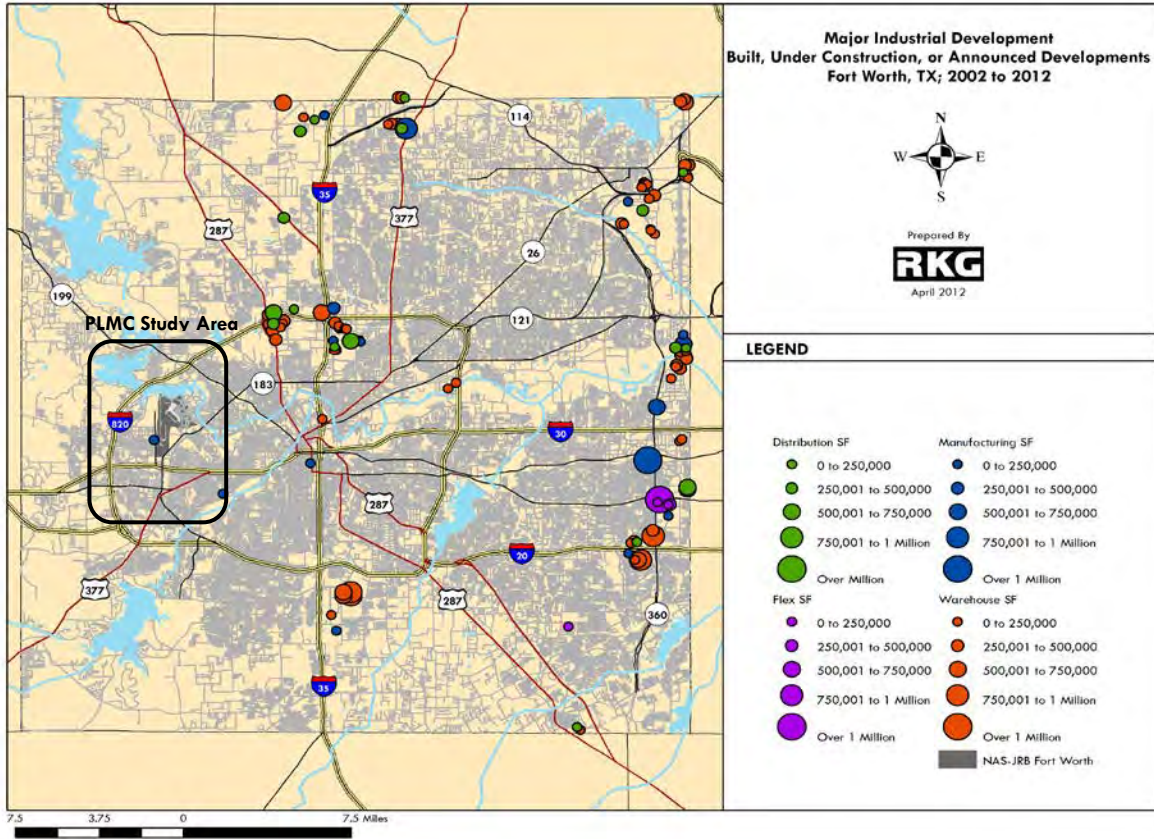
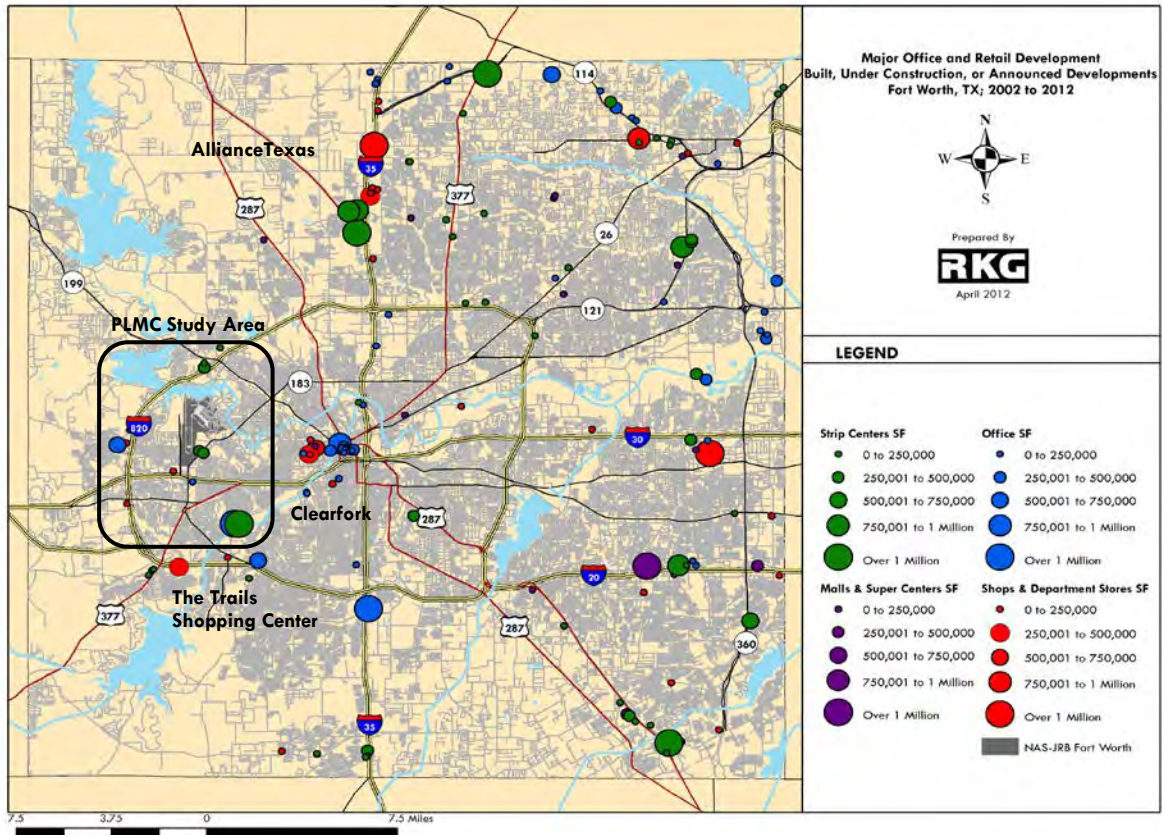


Figure 6



The distribution of office and retail development has been quite different, as much of the new development has clustered around the IH 35W corridor. The largest clusters appear at the intersection of IH 35W and IH 30 (office), downtown Fort Worth (office and strip retail) and in the AllianceTexas area, where large scale office, industrial, distribution, residential and retail development is occurring (Figure 6). The only area within the PLMC Study Area that has experienced significant industrial and commercial development is in the City of Lake Worth, where between 500,000 and 1 million SF of big box retail has been developed at the junction of Loop 820 and SH 199 (Jacksboro Highway) within the past decade.

A large cluster of retail, office and mixed-use development has been proposed on 850 acres north of the Trinity River known as the Edwards Ranch property. The main part of the development called “Clearfork” consists of 2 million SF of office space, 1.2 million SF of retail and approximately 2,500 residential units. This proposed development, located off Vickery Road, will be served by a new toll way called the Chisholm Trail Parkway. The six-lane parkway will extend 8.7 miles from the City of Fort Worth’s Central Business District at IH 30 to southwest Fort Worth. In the future, the parkway will be extended 19 miles west to U.S. 67 in Cleburne, Texas.

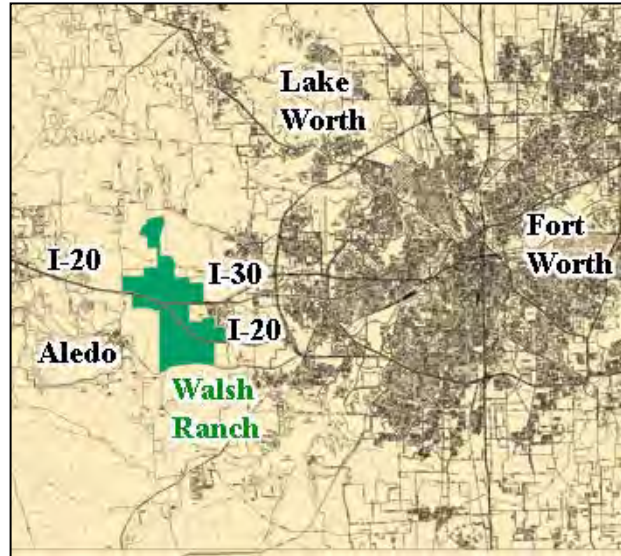
Within the PLMC Study Area, the City of Benbrook is working with local retail experts and developers, Buxton Company, on the approval of The Trails Shopping Center at the corner of IH 20 and Winscott Road. The new 193-acre development will support 1.5 million SF of mixed-use development, which will include retail and entertainment uses. The project is project to create over 6,200 jobs and generate over \$375 million in annual retail sales, based on the developer’s early estimates.<sup>6</sup>

The largest single proposed development within the PLMC Study Area is known as the Walsh Ranch. Walsh Ranch is located in western Tarrant County and eastern Parker County about 3 1/2 miles west of the intersection of IH 30 with W. Loop 820. It is approximately 9 miles from the property to Downtown Fort Worth and 6 miles to Lockheed Martin production facility. Walsh Ranch has served as the headquarters of the Howard Walsh Family ranching operations for almost 60 years and is roughly 7,275 acres.

The Walsh Ranch is projected to achieve build-out at more than 44,000 residents over several decades. The development would consist of:

- **Residential** - 18,157 units (Priced from \$150,000 to \$1 million)
- **Office** - 6.6 million SF
- **Commercial** – 1.8 million SF
- **Employment** - 37,000 jobs.<sup>7</sup>

Walsh Ranch Property



<sup>6</sup> <http://www.bizjournals.com/dallas/news/2011/07/06/regional-shopping-center-planned-for.html>

<sup>7</sup> <http://www.walshranch.com/index.html>

In addition to the larger mixed-use developments described above, there are a number of urban mixed-use developments occurring within close proximity of the PLMC study area. Mixed-use developments are not tracked in the same way that other conventional developments are, because real estate development in this country has typically separated major land uses from each other. However, today's consumers are becoming more accepting of mixed-use projects where residential units are closely mixed with retail shopping, office space and entertainment facilities. In fact, three significant urban mixed-use projects that are present, or are currently being constructed in downtown Fort Worth near the city's cultural district.

A strong selling point for these developments is the opportunity for residents to live in an urban setting and to enjoy the cultural, transit and entertainment amenities available in a revitalized Downtown Fort Worth. Many of the people moving to these developments may work downtown and are seeking to eliminate or reduce their daily commutes and the fuel costs associated with getting into and out of the city. Below is a summary of these projects as prepared by the Congress for the New Urbanism.

a.) West 7<sup>th</sup>

Former abandoned industrial zone between museum district and revitalized Downtown. West 7th is the infill redevelopment of approximately six city blocks in Fort Worth's Cultural District near the Modern Art Museum of Fort Worth (designed by Tadao Ando). Property formerly occupied by Acme Brick. All former buildings were demolished and a new urban form established.

West 7th combines 315,000 square feet of retail, 240,000 square feet of office space, and 345 for-rent residential units. Tenants include a Movie Tavern theater, a Lucky Strike bowling alley, LA Fitness, Paciugo, and many local establishments such as Tillman's Roadhouse, Fort Worth City Market, Fred's Texas Cafe, Backwoods, Ali Baba Mediterranean Grill, and more.

Land area (in acres):	13 acres
Retail area (in sq. ft.):	315,000 SF
Office area (in sq. ft.):	240,000 SF
Number of residential units (include live/work):	345 Units
Project team designers:	Good, Fulton, & Farrell, Gideon Toal, and RTKL
Project team developers:	Cypress Equities
Features:	Bus transit, Mixed uses, Rail/fixed guideway transit.

b.) SoSeven

SoSeven sites on an undeveloped infill site in a former abandoned industrial zone between the museum district and revitalizing Downtown Fort Worth. SoSeven is a 25-acre mixed-use development on a former undeveloped infill and greenfield sites adjacent to Trinity Park in Fort Worth's Cultural District. SoSeven combines 130,000 square feet of ground-level retail space with 72 upper-floor lofts, upper-floor office space, 59 Palladian townhomes, 65 modern condos, a Residence Inn hotel, and The Stayton at Museum Way high-rise retirement condo development. Currently announced retail tenants include Performance Playground, a bicycle shop, Primo's Bar & Grill, Hola! Tapas, Saint-Emilion, and Vino Jean Michael. The development features a new interior street system on the former greenfield site and several fountains & public plazas. Planned Fort Worth modern streetcar will run directly in front of development.

Land area (in acres):	25 acres
Retail area (in sq. ft.):	130,000 SF
Number of hotel units:	Residence Inn Hotel
Number of residential units (include live/work):	367 units
Project team designers:	Good, Fulton, and Farrell; Selzer Associates, Inc.
Project team developers:	Hughes Development
Features:	Bus transit, Civic buildings & parks, Mixed uses, Rail/fixed guideway transit.



c.) Museum Place

Museum Place sits on a former abandoned infill area adjacent to the museum district and revitalized Downtown. Museum Place is an 11 acre mixed-use infill development in Fort Worth's Cultural District, directly adjacent to the Modern Art Museum, Kimbell Art Museum, and Carter Art Museum. The project restores urbanity to an existing street grid and creates new neighborhood center. The development totals 1,050,000 square feet of infill: 173,000 square feet of retail space, 40 for-purchase condos, 500 apartments, and 130,000 square feet of Class A office space, plus a new 6,000 square foot Post Office designed by Robert Venturi.

Land area (in acres):	11 acres
Total built area (in sq. ft.):	1,050,000 SF
Retail area (in sq. ft.):	173,000 SF
Office area (in sq. ft.):	130,000 SF
Number of residential units (include live/work):	540 units
Civic uses (type and size):	Post Office, public plazas
Project team designers:	Museum Place Development, Robert Venturi
Project team developers:	Museum Place Development
Features:	Bus transit, Civic buildings & parks, Mixed uses, Rail/fixed guideway transit. <sup>8</sup>

**5. North Fort Worth Development Gravity**

The AllianceTexas area, which is home to one of the region's largest employment centers, is a 17,000-acre master planned, mixed-use community located approximately 14 miles north of downtown Fort Worth. Billed as the world's first purely industrial airport, it was developed in a joint venture between the City of Fort Worth, the Federal Aviation Administration, and the Hillwood Development Company, a real estate development company owned by Ross Perot, Jr. The official groundbreaking occurred in July 1988, and the airport officially opened the following year. The airport is owned by the City of Fort Worth and managed by Alliance Air Services, a subsidiary of Hillwood Development, and is the second largest airport facility in North Texas, behind only Dallas/Fort Worth International Airport (DFW).<sup>9</sup>

AllianceTexas is a fully intermodal facility offering air, rail and highway access. Alliance is home to over 240 companies, including 65 from the Fortune 500, Global 500 or Forbes List of Top Private Companies. Over 28,000 employees and 7,340 single-family homes are included in this master-planned development. Primary uses include office, manufacturing, distribution, retail and service businesses.<sup>10</sup>

In recent years, residential and retail development have become more active as Alliance has expanded its mixed-use footprint beyond being a large airport commerce hub. Alliance Town Center is a 538,000 SF regional hybrid retail center. Phase I includes a 300-acre power center and lifestyle mixed-use development, which opened in Fall of 2008. A joint venture between Trademark Development and Hillwood Development, Inc., Alliance Town Center integrates retail, office, residential and hospital uses with seven national anchor stores.

The level of development occurring in the North Fort Worth area is creating a "gravity effect" and is pulling more development north of the PLMC Study Area. This is not an indication that the study area is not suitable for development, but rather the market and the City of Fort Worth are making strategic investments that are attracting development interests 5 to 10 miles north of the study area. The "leap-frogging" nature of this development is creating a hyper-competitive market environment north of downtown. In order to capture a fair share of future growth, the PLMC Study Area communities will have to reposition themselves as an attractive, in-close alternative to other rapidly growing areas like Alliance.

<sup>8</sup>Congress for the New Urbanism: <http://www.cnu.org/taxonomy/term/236>

<sup>9</sup> [http://en.wikipedia.org/wiki/Fort\\_Worth\\_Alliance\\_Airport](http://en.wikipedia.org/wiki/Fort_Worth_Alliance_Airport)

<sup>10</sup> [http://www.fortworthcoc.org/eco/industrial\\_bus.html#1](http://www.fortworthcoc.org/eco/industrial_bus.html#1)

## E. PLMC PROPERTY VALUES AND GENERAL BUILDING CONDITIONS

In order to understand the relative condition of buildings in the PLMC Study Area, an analysis of assessed property values was conducted for all residential, commercial (i.e., office and retail), and industrial/warehousing/distribution properties in Tarrant County. This analysis was supported by field research to verify conditions on the ground. Utilizing Tarrant County property assessor's data obtained from NCTCOG at the parcel level, assessed building values for each property, on a per square foot basis, was compared to the average assessed building value per square foot for all other properties within the same land use category. As an example, each residential structure (not including land) was compared against the average assessed building values of all other residential structures in Tarrant County. The individual values of each property (\$/SF) were then calculated as a percentage of the average value in that building category. The comparison of per square foot values equalized differences between very large homes and modest size homes.

The analysis used average assessed values as a proxy for building conditions. In other words, the lower a building's value is (on a per square foot basis), as compared to other similar buildings, the more likely it is that the building is of lower quality. Typically, buildings are assessed at lower values when they become structurally or functionally obsolete or the structure has not been maintained. Although not a perfect indicator of building condition, the analysis highlights concentrations of properties that are valued comparatively lower, on average, than other properties in the same category. Areas where there are concentrations of lower values are represented as red or dark red and higher value buildings are depicted as pink. Parcels without buildings are not shown in Map 1.

The majority of buildings in the study area communities have values that are equal to at least half the average value of buildings in the County, if not greater. Compared to Tarrant County as a whole, the neighborhoods and Towns near NAS Fort Worth JRB are not drastically higher or lower than the average. However, there are pockets of comparatively low values (less than 50% of the average) that occur at several locations. In the future, these lower value areas may become prime revitalization areas. In such cases, strategies designed to encourage private owners to reinvest in their properties may be necessary to avoid further erosion of the city's tax base. In more extreme circumstances, property abandonment and blight conditions can increase the presence of crime and change neighborhoods over night.

Some of the areas of greatest concern include:

- Sansom Park – An area along the western side of Jacksboro Highway from IH 820 to Sansom Park's southern boundary shows signs of disinvestment. Much of this area is characterized as older, lower value commercial properties, many of them poorly suited for today's retail and service environment. Jacksboro Highway is an important commuting and commercial corridor leading into downtown Fort Worth. The traffic counts are in excess of 34,000 (both directions) at the intersection of IH 820 and Jacksboro Highway. Heading south on SH 199, traffic counts drop to roughly 17,000 vehicles per day (vpd) at the intersection with N. University Drive. Traffic volumes increase again heading into downtown Fort Worth. After crossing the Trinity River on N. Henderson vehicle counts exceed 33,000 vpd.<sup>11</sup>

Behind that row of commercial properties are several residential neighborhoods. Given the prime location, roughly 1 mile south of the interstate, revitalization of this area may be possible.

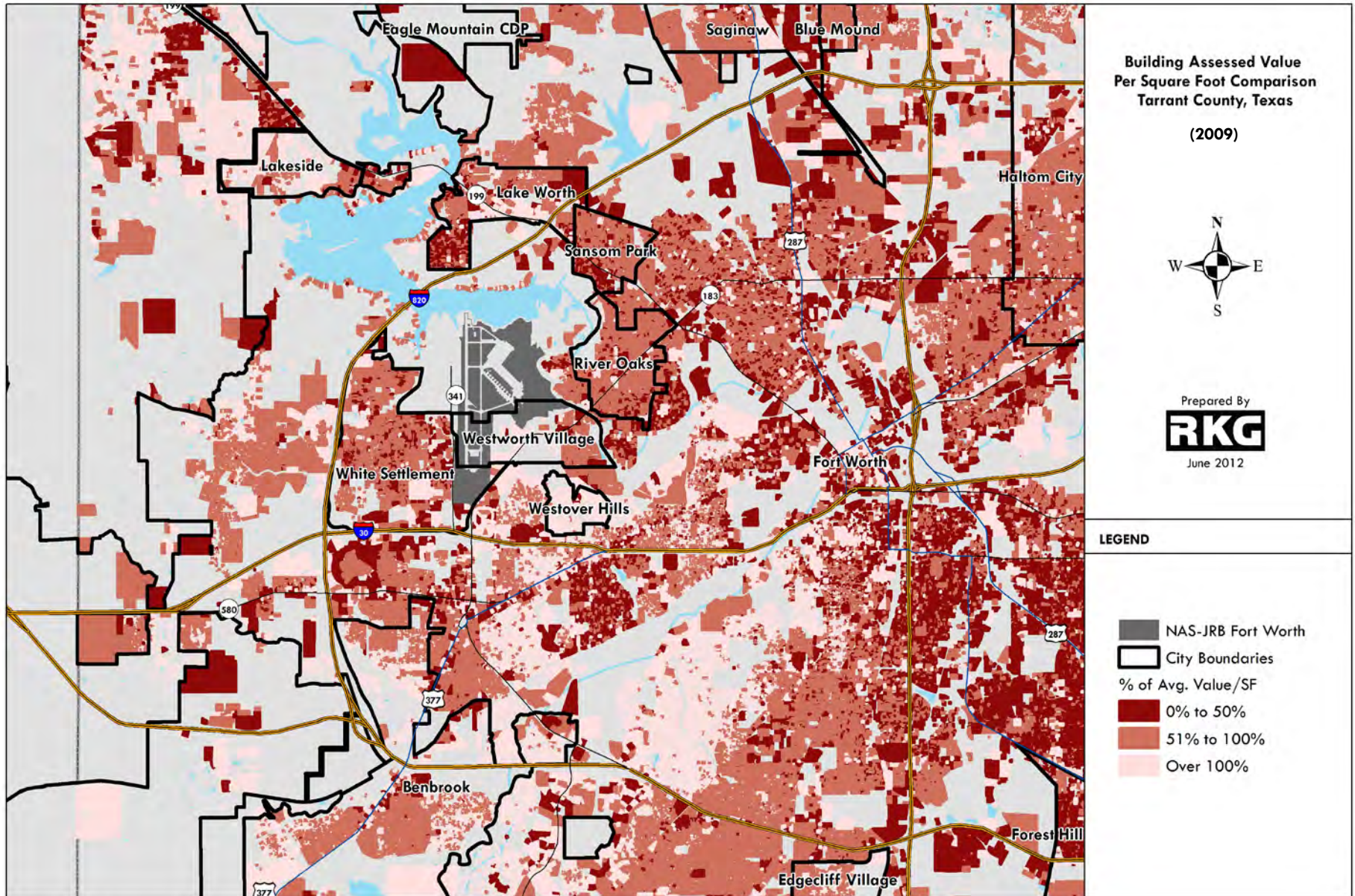
- Lake Worth – On the southwestern side of Lake Worth, a similarly situated group of residential neighborhoods exists. The homes are older and smaller and perhaps only need exterior repairs. The most sizeable concentration of lower property values occurs in the area

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<sup>11</sup> Historical Traffic Counts, NCTCOG (<http://www.nctcog.org/trans/data/trafficcounts/>)

- bounded by Navajo Trail (south), Hiawatha Trail (west), Comanche Trail (north) and Dakota Trail (east).
- River Oaks – A cluster of lower property values exist just outside the southeastern border of the River Oaks community. This area is bounded by Brookside Drive (south and east), Ester Drive (north), and Churchill Road.
  - Fort Worth – A large, higher density apartment complex located on the southeast quadrants of the Interstate 820 and 30 intersection appears to be valued at less than 50% of the average assessed value of other apartment complexes in the County.

Map 1





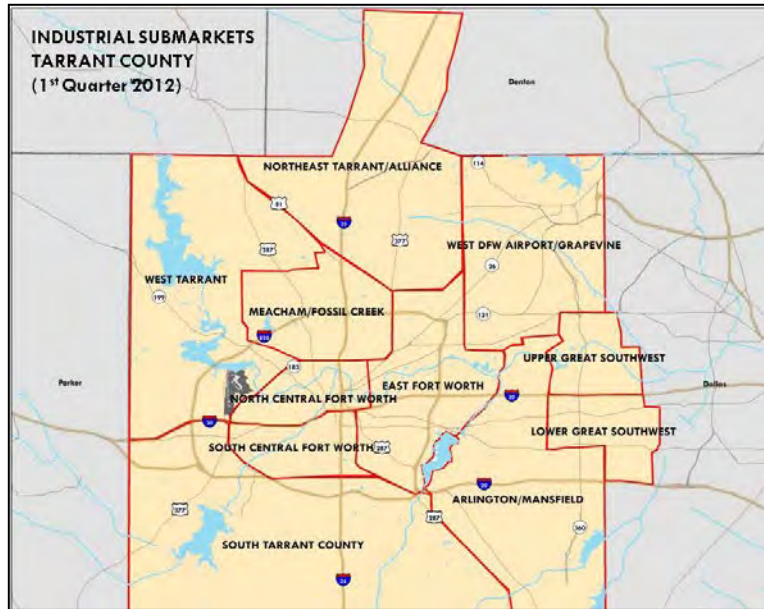
**F. INDUSTRIAL MARKET**

**1. Submarket Description**

The Tarrant County industrial market is comprised of 11 submarkets (Figure 7). The submarkets are devised by local brokers and market reporters. The data used for this analysis was obtained from Transwestern, a national commercial real estate services firm located in Houston, Texas with offices throughout the country. Transwestern’s industrial submarket boundaries generally follow major highways or sometimes natural boundaries. In Tarrant County, the industrial submarkets include:

- Northeast Tarrant/Alliance
- West Tarrant
- West DFW Airport/ Grapevine
- Meacham/Fossil Creek
- North Central Fort Worth
- East Fort Worth
- Upper Great Southwest
- Lower Great Southwest
- South Central Fort Worth
- Arlington/Mansfield
- South Tarrant County

Figure 7

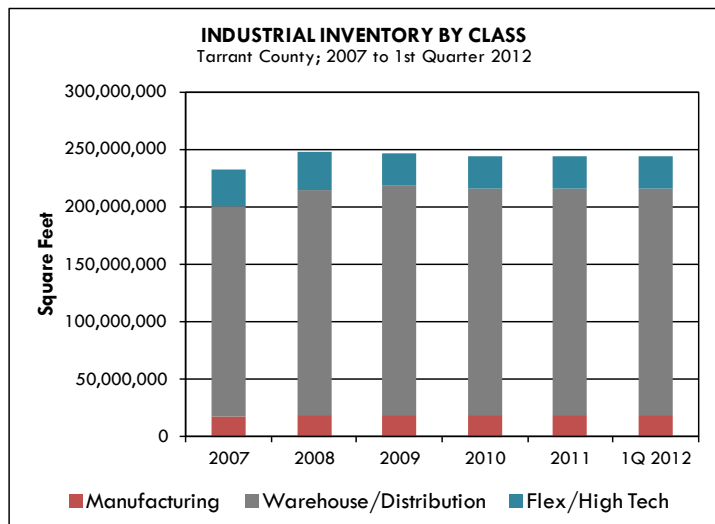


The Tarrant County industrial market is particularly well positioned by virtue of the region’s interstate highway system. In fact, 10 of the 11 submarkets are served by at least one interstate highway. The only exception is the West DFW Airport/Grapevine submarket, which happens to benefit from its proximity to DFW International Airport.

**2. Inventory Trends**

The Tarrant County industrial inventory has remained fairly stable over the past five years. Since the beginning of the last recession in December 2007, the region realized a slight increase in industrial building supply from around 232 million SF to approximately 244 million SF in the first quarter of 2012. This resulted in a 5.1% increase in a little over four years (Figure 8). As a point comparison, the Dallas industrial market had roughly 458 million SF of industrial space in 19 submarkets in the first quarter of 2012. It should be noted that the inventory numbers

Figure 8



Source: Dallas/Ft. Worth Metropolitan Outlook, Transwestern (2007-2012)

reflect only non-owner-occupied buildings of at least 50,000 SF.

Approximately 197 million SF or 81% of the Tarrant County industrial supply is classified as warehouse/distribution space. Flex/High Tech space comprises 11.6% and manufacturing accounts for 9.5%. Industrial flex/high tech space is typically defined as single story, industrial-type building space that's generally 25-100 percent office space, depending on the type of business. Contractors, product assemblers, Internet companies will utilize this space in different ways, thus the term "flex."

Since 2007, nearly all the net new industrial space added to the supply has been classified as warehouse/distribution space. Figure 9 illustrates how industrial space is distributed through the region by submarket. Two of the largest industrial submarkets include Upper Great Southwest (41 million SF) and Lower Great Southwest (29 million SF), which are located adjacent to DFW International Airport. These two submarkets account for nearly 29% of all industrial space in the Tarrant County market. The second largest submarket is located a few miles east of the PLMC Study Area, where nearly 31.5 million SF is clustered in the Meacham/Fossil Creek submarket. Fort Worth Meacham International Airport is one of the busiest general aviation and corporate air facilities in the DFW Metroplex and is the centerpiece to this large warehouse/distribution center.

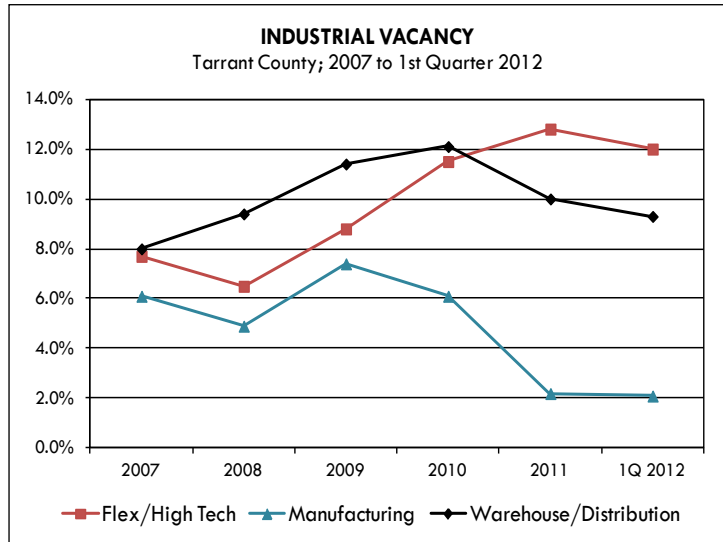
Another large and emerging industrial market is located 5 to 10 miles north of the PLMC Study Area in the Northeast Tarrant/Alliance submarket. This area contains 28.7 million SF of space, with nearly 90% classified as warehouse/distribution space. Much of this industrial space is associated with the AllianceTexas development, which is rapidly shaping development patterns in the North Fort Worth area. The West Tarrant submarket is the area that includes the PLMC Study Area and NAS Fort Worth JRB. As compared to other Tarrant County submarkets, West Tarrant is quite small, comprising only 4.3 million SF, but proportionally has the largest share of manufacturing space (37%). The West Tarrant industrial submarket does not include the Lockheed Martin facilities, which are considered owner-occupied facilities on government-owned land.

### 3. Vacancy Trends

Since 2007, industrial vacancy rates have generally increased in the flex/high tech and warehouse and distribution markets. Vacancy rates peaked in 2010 for the warehouse/distribution market and 2011 in the flex market (Figure 10). Since these recent peaks, the share of vacant space has started to decline. Overall, Dallas/Fort Worth industrial vacancies declined from 11.9% in the 1<sup>st</sup> quarter 2011 to 9.9% in the 1<sup>st</sup> quarter in 2012. The Fort Worth/Tarrant County market experienced a decline from 9.7% to 9.0% during the same period.

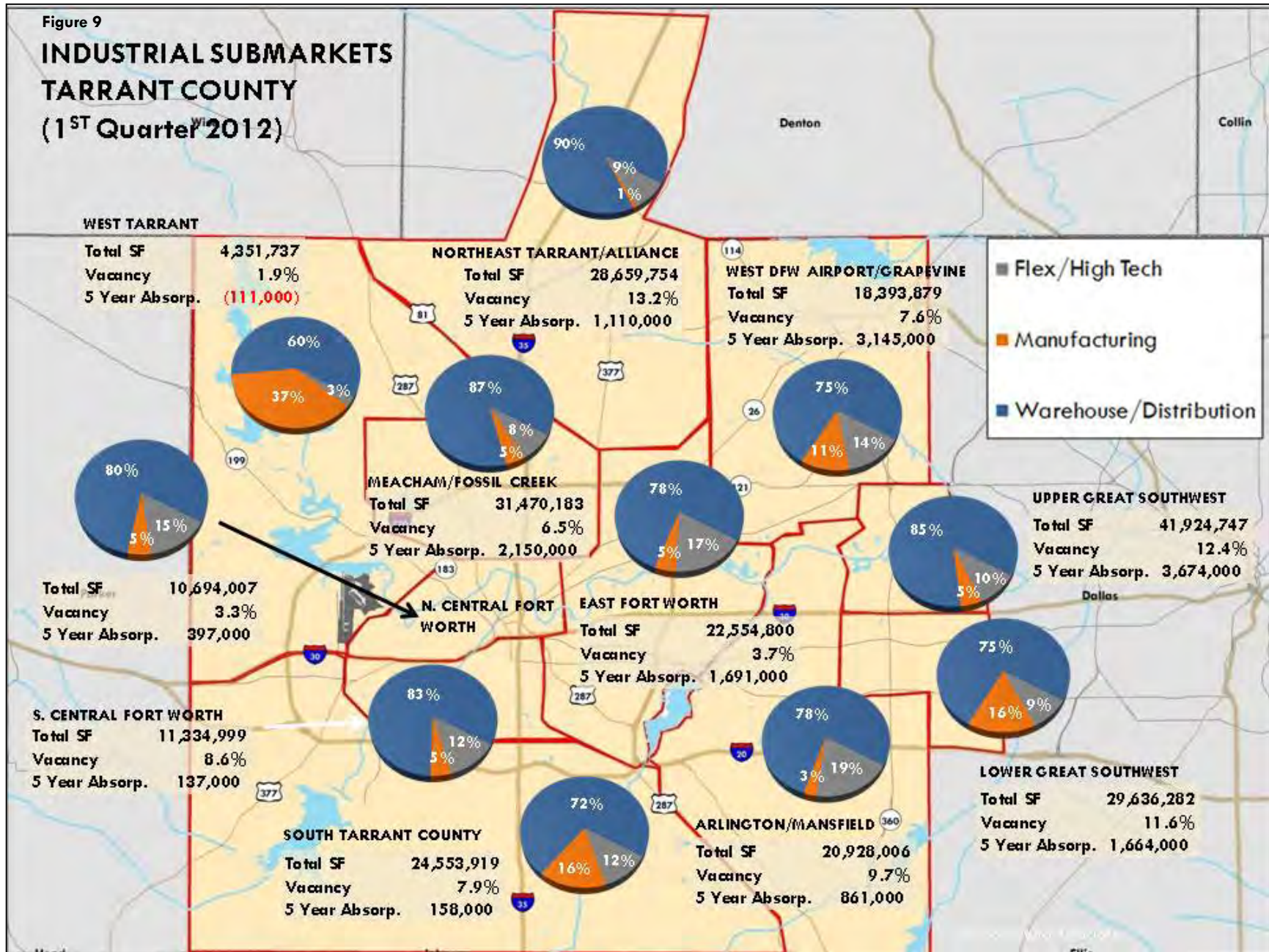
The manufacturing market, which is the smallest of the three, has seen vacancy rates drop from 7.4% in 2009 to only 2.1% in the 1<sup>st</sup> quarter of 2012. This is largely due to robust leasing activity in the Upper and Lower Great Southwest submarkets near DFW International Airport.

Figure 10



Source: Dallas/Ft. Worth Metropolitan Outlook, Transwestern (2007-2012)



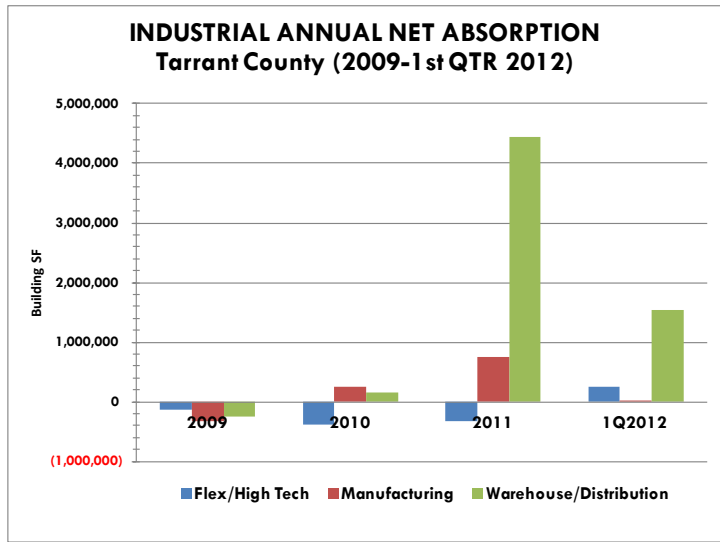


#### 4. Net Absorption Trends

Since the end of the economic recession in 2009, the Tarrant County industrial market has experienced positive net absorption of over 6 million SF (Figure 11). Most notably, the warehouse/distribution market has experienced the strongest net absorption by adding nearly 6 million SF within the past calendar year.

Since 2007, the most significant net absorption occurred in the Upper Great Southwest (3.7 million SF), Lower Great Southwest (3.1 million SF), and Meacham/Fossil Creek (2.4 million SF) submarkets (Figure 9). The West Tarrant submarket has not performed as well and has experienced negative net absorption of 111,000 SF over the past four years. However, within the past year roughly 50,000 SF of industrial space has been absorbed in this submarket.

Figure 11



Source: Dallas/Ft. Worth Metropolitan Outlook, Transwestern (2007-2012)

#### 5. Implications to PLMC Study Area

Based on the market research and an analysis of vacant land (see Map 3), the PLMC study area would seem to lack suitable land area of 50 to 250 acres to attract large-scale manufacturing or warehouse/distribution uses, similar to those found in the Meacham/Fossil Creek and the Northeast/Alliance submarkets. Integrated rail service is available to industrial users located off exits 13 and 15 of IH 820 near Meacham Airport and the Alliance area is served by Fort Worth Alliance Airport. As such, these submarkets are well equipped to meet the needs of the region’s larger industrial tenants. However, there may be opportunities off IH 820 near the PLMC Study Area where larger, undeveloped land parcels appear to be available. With population growth moving further west of the study area, it is quite likely that developers will start to seek alternatives to locating large employment uses along the heavily traveled IH 35W corridor. Perhaps these uses will be smaller in size, but less congested and more easily accessible by the region’s workforce.

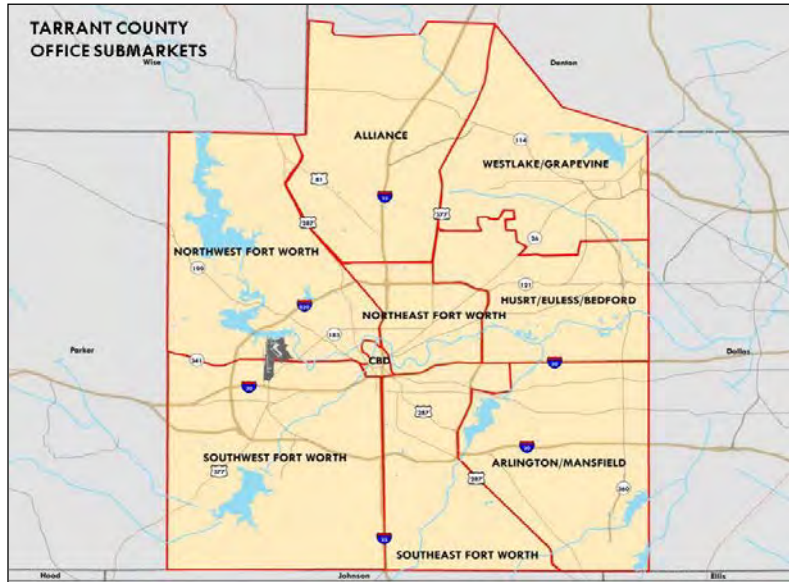
**G. OFFICE MARKET**

**1. Submarket Description**

The Tarrant County office market is comprised of 9 submarkets (Figure 12). The submarkets are devised by local brokers and market reporters. The data used for this analysis was obtained from Transwestern, a national commercial real estate services firm located in Houston, Texas with offices throughout the country. Transwestern’s office submarket boundaries generally follow major highways or sometimes natural boundaries. In Tarrant County, the office submarkets include:

- Fort Worth CBD
- Northwest Fort Worth
- Alliance Air/Fossil Creek
- Westlake/Grapevine
- Hurst/Eules/Bedford
- Northeast Fort Worth
- Arlington
- Southeast Fort Worth
- Southwest Fort Worth

Figure 12



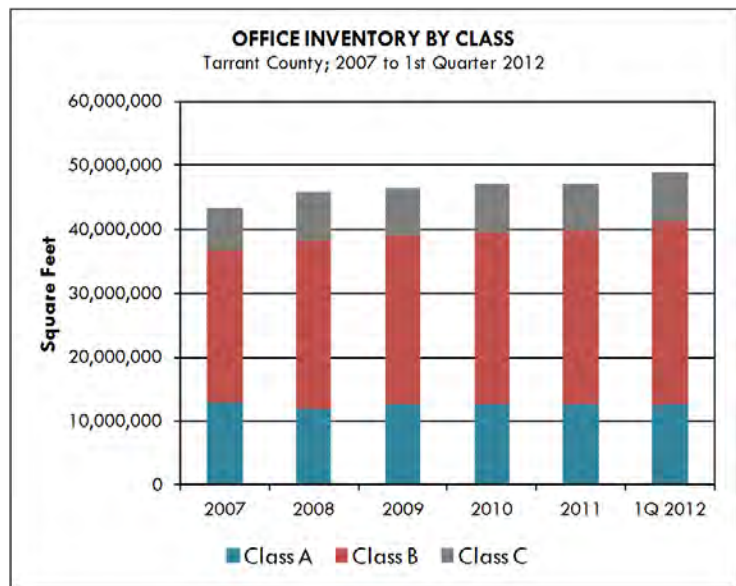
Source: Dallas/Ft. Worth Metropolitan Outlook, Transwestern (2007-2012)

**2. Inventory Trends**

Historical office inventory data from Transwestern was obtained that tracks office buildings of at least 15,000 SF in size. On a comparative basis, the Tarrant County office market is substantially less developed than the Dallas market. In the 1<sup>st</sup> quarter 2012, the total office space in Tarrant County was approximately 48.9 million SF, according to Transwestern (Figure 13). This amounted to roughly 20% of the 241 million SF office supply in Dallas during the same period.

This should not be surprising, given the difference in market size and the types of businesses located in the two markets. Dallas has been a

Figure 13



Source: Dallas/Ft. Worth Metropolitan Outlook, Transwestern (2007-2012)



premier corporate office location for decades and the supply of office space has been constructed in response to this level of demand. Although the Dallas CBD is still the region's biggest office market with over 36 million SF of building space, the Dallas suburbs now dwarf the CBD with over 204 million SF of building space.

Since the end of 2007, the Tarrant County office inventory has grown from 43.2 million SF to 48.9 million SF; an increase of 5.7 million SF or 13.2% increase during a very difficult economic period. For the most part, the Tarrant County office market is a Class B office market. Office buildings are typically classified as either A, B or C grade space. This classification is somewhat subjective and is based on a combination of location and physical characteristics. The CoStar Group, Inc., which is a national real estate market analytics firm, classifies office space in the following manner:

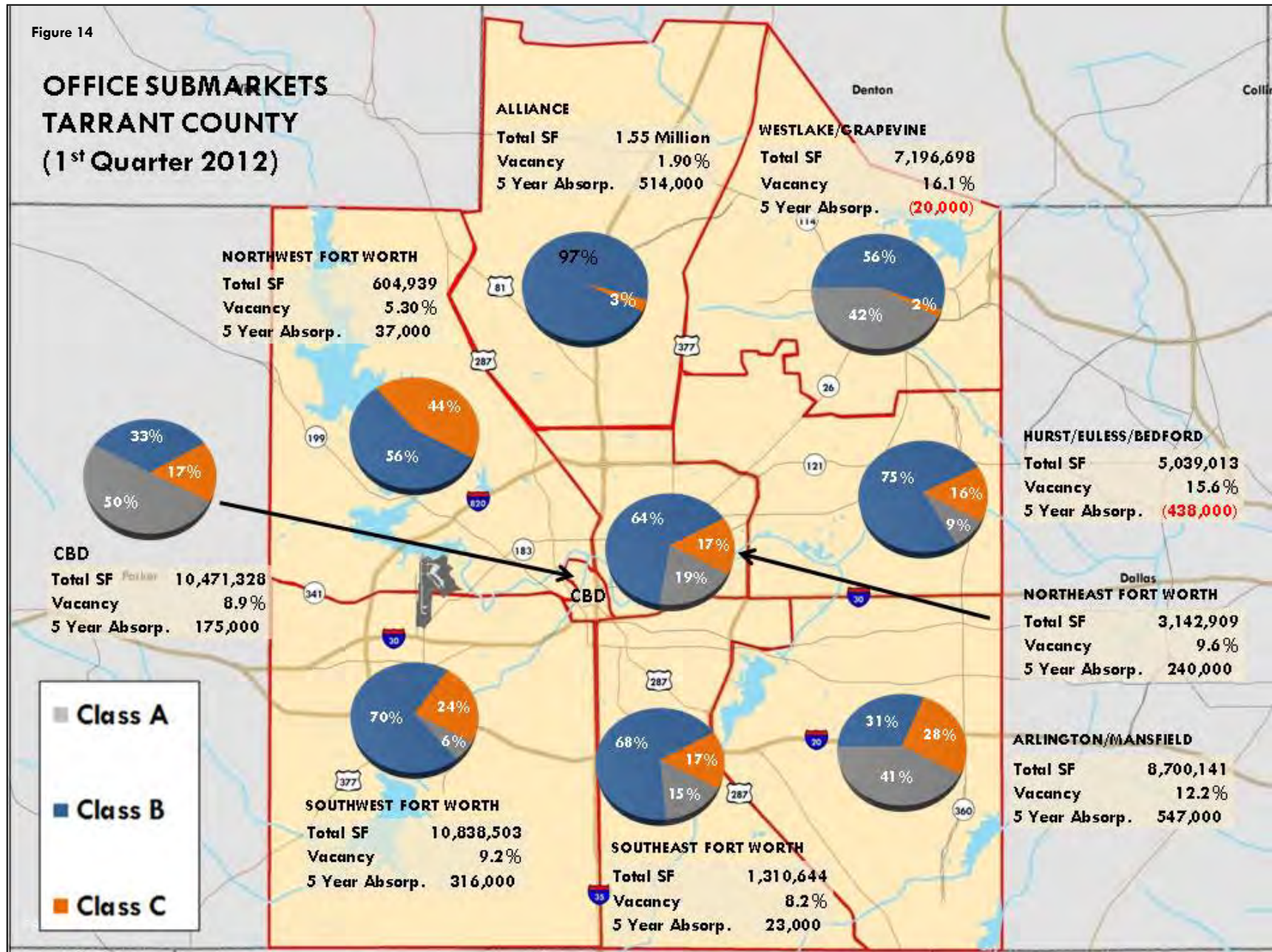
- **Class A** – Office buildings that generally qualify as extremely desirable investment-grade properties and command the highest rents or sale prices compared to other buildings in the same market. Such buildings are well located and provide efficient tenant layouts as well as high quality, and in some buildings, one-of-a-kind floor plans. These buildings contain modern mechanical systems, and have above-average maintenance and management as well as the best quality materials and workmanship in their trim and interior finishes. They are generally the most attractive and eagerly sought by investors willing to pay a premium for quality.
- **Class B** – A classification used to describe buildings that generally qualify as a more speculative investment, and as such, command lower rents or sale prices compared to Class A properties. Such buildings offer utilitarian space without special attractions, and have ordinary design, if new or fairly new; good to excellent design if an older non-landmark building. These buildings typically have average to good maintenance, management and tenants. They are less appealing to tenants than Class A properties, and may be deficient in a number of respects including floor plans, condition and facilities. They lack prestige and must depend chiefly on a lower price to attract tenants and investors.
- **Class C** – A classification used to describe buildings that generally qualify as no-frills, older buildings that offer basic space and command lower rents or sale prices compared to other buildings in the same market. Such buildings typically have below-average maintenance and management, and could have mixed or low tenant prestige, inferior elevators, and/or mechanical/electrical systems. These buildings lack prestige and must depend chiefly on a lower price to attract tenants and investors.

The Southwest Fort Worth is Tarrant County's largest office submarket at roughly 10.8 million SF in early 2012 (Figure 14). This submarket is located southwest of the Fort Worth CBD and is served by Interstates 20, 30, 820 and 35W, which makes it extremely accessible within the region. Based on the market research, an additional 2 million SF of office space may come on line within the next few years as part of the Clearfork development, which a large mixed-use development on 850-acres is known as the Edward's Ranch property. This proposed development, located off Vickery Road, will be served by a new toll way called the Chisholm Trail Parkway.

The submarkets closer to DFW International Airport such as Arlington/Mansfield, West Lake/Grapevine, and Hurst/Euless/Bedford are comprised of between 5 million and 8 million SF of office space, mostly Class B. The Northwest Fort Worth office submarket, which includes the PLMC study area, is the smallest office submarket in Tarrant County at nearly 605,000 SF. This represents about 1.2% of the total office supply in the region.

Figure 14

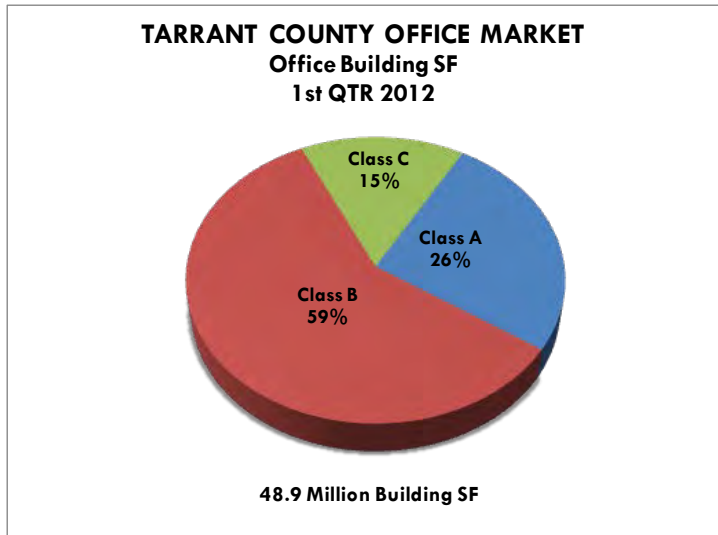
# OFFICE SUBMARKETS TARRANT COUNTY (1<sup>st</sup> Quarter 2012)



The second largest office submarket is the Fort Worth CBD, which accounts for roughly 10.4 million SF of office space. Approximately 50% of this space (5.2 million SF) is classified as Class A quality, making downtown the largest Class A office market in Tarrant County. Overall, Tarrant County is essentially a Class B office market with approximately 59% of the total supply classified in this way. Another 15% of the supply is classified as lower quality Class C space (Figure 15).

Much of the growth that has occurred in the local office market has been in Class B space, which has increased from 23.7 million SF in 2007 to 28.7 million SF, for an increase of roughly 5 million SF or 21%.

Figure 15



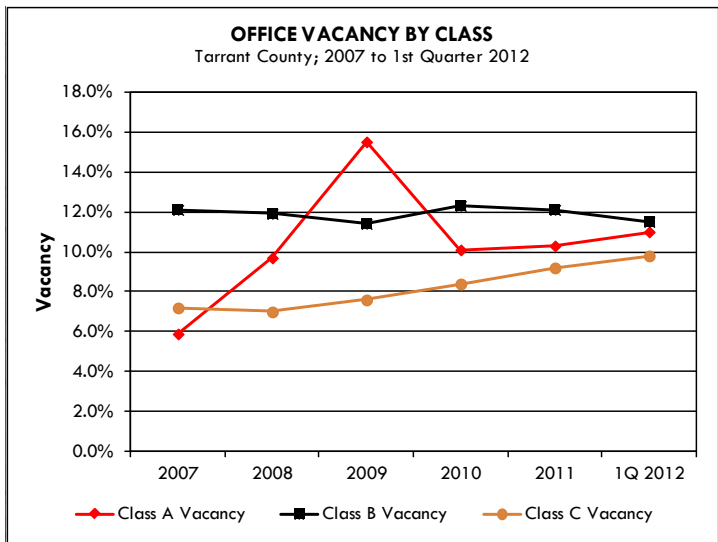
Source: Dallas/Ft. Worth Metropolitan Outlook, Transwestern (2007-2012)

The most robust office growth market has been Southwest Fort Worth, which has increased from 5 million SF to 10.8 million SF since 2007. This represents an increase of more than 116%. The Westlake/Grapevine (1.6 million SF) and Northeast Fort Worth (931,691 SF) have also experienced strong growth in the past four years.

### 3. Vacancy Trends

The Tarrant County office market has remained fairly steady in terms of vacancy rates since 2007, with the exception of Class A rates, which peaked in 2009. Total vacancy, including sublet space, has ranged from around 10% to just under 12% in early 2012 (not including sublet space) (Figure 16). Compared to the Dallas market, which has vacancy rates in close to 17% in early 2012 (including sublet space), Fort Worth has fared well.

Figure 16



Source: Dallas/Ft. Worth Metropolitan Outlook, Transwestern (2007-2012)

The office submarkets with the highest volatility are those closest to Dallas. These submarkets include West Lake/Grapevine (17%), Hurst/Euless/Bedford (26.5%), and Arlington (12.3%), which consistently experience higher office vacancy rates. The impact of subleased space is quite significant in the Hurst/Euless/Bedford submarket, 10.9 percentage points on the vacancy rate is attributable to companies occupying space left vacant by the original tenant of record.

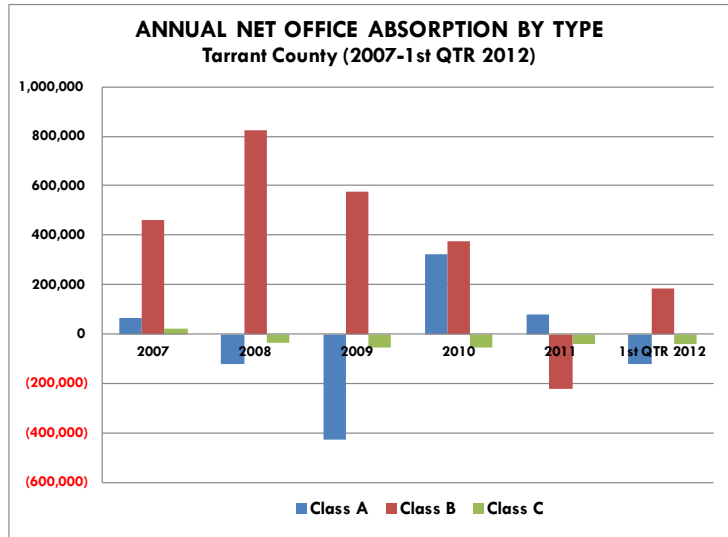


#### 4. Net Absorption Trends

According to Transwestern, the Tarrant County office market has realized approximately 1.8 million in net positive annual absorption since 2007. Net absorption measures the total amount of building square feet occupied or leased over a period of time, less the space that is vacated during the same period.

While Class A and C space experienced negative net absorption of around 200,000 SF each during the study period, Class B space generated positive absorption of roughly 2.2 million SF (Figure 17). The highest positive absorption occurred in 2008, when 665,000 SF more office was occupied than the previous year. New office construction of approximately 681,000 SF occurred in 2008, which contributed to the increased absorption levels.

Figure 17



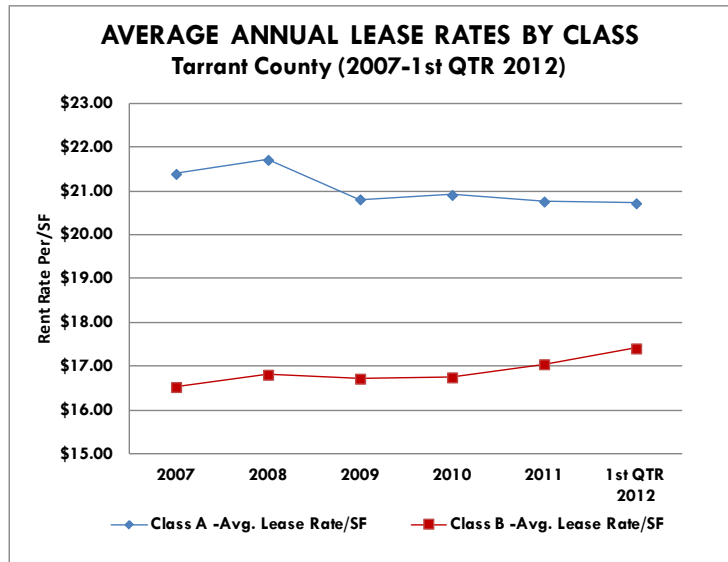
Source: Dallas/Ft. Worth Metropolitan Outlook, Transwestern (2007-2012)

Southwest Fort Worth (716,000 SF), Arlington (547,000 SF) Alliance/Fossil Creek (514,000 SF) experienced the greatest absorption increases during the study period. The Northwest Fort Worth submarket, where the PLMC study area is located, only experienced 37,000 SF of net positive absorption during the four year period.

#### 5. Lease Rate Trends

Class A office lease rates in Tarrant County have ranged from a high of \$21.73/SF in 2008 to the current low of \$20.72/SF. Conversely, as the demand for Class B space has increased over the past four years, lease rates have steadily increased as well. Over the four year study period, lease rates declined by 3.1% for Class A and rose by 5.3% for Class B space (Figure 18).

Figure 18



Source: Dallas/Ft. Worth Metropolitan Outlook, Transwestern (2007-2012)

Class B lease rates in the local market range from a low of \$14.11/SF in the Southeast Fort Worth submarket to a high of \$22.23/SF in the Fort Worth CBD submarket. Class A office rents in the CBD were averaging just under \$25/SF in the 1st quarter 2012. However, as a percentage of Class A rents, Class B rents have increased

from 77% of average Class A rent levels to over 84% in 2012. This shift from higher cost Class A space to more affordable Class B space has actually reduced the spread between the two office products. With fewer creditworthy corporate office tenants in the Fort Worth market, the highest rents will be reserved for the top submarkets such as Southwest Fort Worth and the CBD.

The Fort Worth CBD and the Southwest Fort Worth submarkets have experienced the strongest rent appreciation since 2007, as both submarkets have seen Class A and B rents rise. The strongest increase has occurred in the CBD where average Class B office rents have risen from \$17.15/SF to \$22.23/SF, for an increase of 29.6% in roughly four years. Class C office rents were not reported by Transwestern.

## **5. Implications to PLMC Study Area**

The PLMC study area did not attract new office development on a significant scale during the 2002-2012. Until the population increases to the north, west and south of Fort Worth, there may be no need to focus new regional office development between downtown Fort Worth and the Alliance development. That is not an indication that new office development couldn't occur in the study area, but rather market forces and investment decisions have caused a "leap frogging" of development to the North Fort Worth area where development constraints are less significant. This is partially due to major public infrastructure investments that have been made in highways, airports, and water/sewer lines.

## **H. RETAIL MARKET**

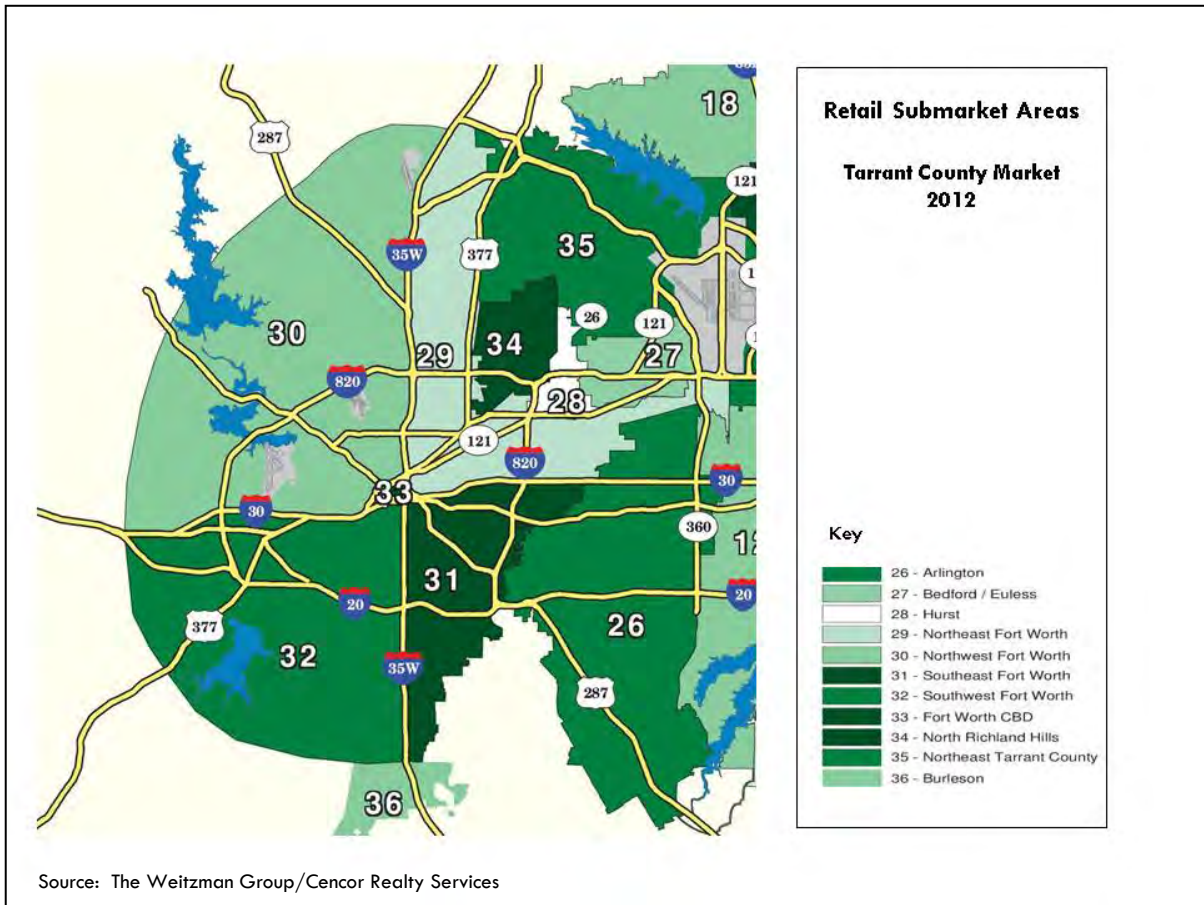
### **1. Submarket Descriptions**

Historical retail market data for the Tarrant County market was obtained from The Weitzman Group/Cencor Realty Services, an integrated real estate services company located in Dallas, Texas. Tarrant County's retail submarkets are similar but not identical to the office submarkets presented earlier. According to The Weitzman Group's definition, there are 11 retail submarkets covering the region (Figure 19).

The 11 Tarrant County retail submarkets include:

- Arlington
- Bedford/Euless
- Hurst
- Northeast Fort Worth
- Northwest Fort Worth
- Southeast Fort Worth
- Southwest Fort Worth
- Fort Worth CBD
- North Richland Hills
- Northeast Tarrant County
- *Burleson (removed from analysis)*

Figure 19



For purposes of this analysis, and to remain consistent with the industrial and office analyses, the Burleson retail submarket has been removed from this analysis. The City of Burleson is located primarily in Johnson County, Texas, although a small northern portion of the City is located in Tarrant County. With a retail inventory of approximately 1.5 million SF, the Burleson submarket comprises only 2.7% of the Tarrant County market.

**2. Inventory Trends**

As of year-end 2011, the retail inventory in Tarrant County was estimated at roughly 52.8 million SF, up 2.8 million SF or 5.7% since year-end 2007. The largest retail clusters are located in Arlington (14.2 million SF), Southwest Fort Worth (9.5 million SF) and Northeast Tarrant County (9.1 million SF). The Northwest Fort Worth submarket, where the PLMC study area is located, contains 5.3 million SF of retail space, including the Ridgmar Mall.

Despite fairly modest growth in retail supply, a number of submarkets have experienced more robust growth, in terms of building supply. The most significant new supply, more than 1 million SF, has been added to the Arlington submarket over the past four years, for a growth rate of 8%. The Northeast Fort Worth submarket increased its supply by more than 27% or 760,000 SF during the same period. The Northeast Fort Worth submarket is located on the eastern side of IH 35W and includes the Fossil Creek development and the new Alliance Town Center project. Both areas are being driven by new residential development and there are several large master planned communities that are either under

construction or proposed that will continue to drive retail expansion north of the PLMC study area. Northwest Fort Worth submarket has captured new development at a faster rate than Tarrant County as a whole. Between 2007 and 2011, more than 481,000 SF has been added to the supply, according to The Weitzman Group.

**3. Vacancy Trends**

Retail vacancies are dropping in the Tarrant County market from a high of 13.7% in 2009 (Figure 20). Comparatively, the Northwest Fort Worth submarket has performed better than the rest of the market in terms of vacancy rates. In fact, the submarket serving the PLMC study area peaked in 2008 at 12.1% and has been steadily declining each year to 10.4% at the end of 2011. The highest retail vacancies have been reported in North Richland Hills submarket (23%) and the lowest are reported in the Fort Worth CBD (8%).

**4. Net Absorption Trends**

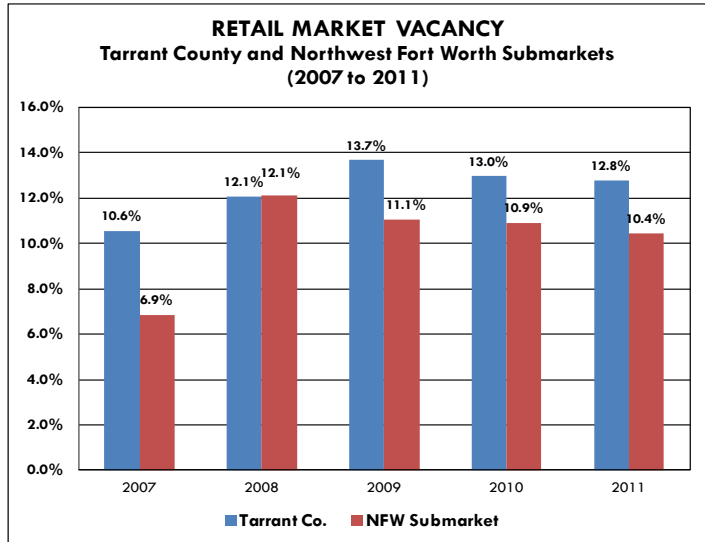
According to The Weitzman Group, the Tarrant County retail market has absorbed approximately 1.8 million SF in the past four years. The Northwest Fort Worth submarket has accounted for approximately 114,770 SF or 6.3% of the total net positive absorption (Figure 21).

The largest positive absorption has occurred in two submarkets in Arlington (1.1 million SF) and Northeast Fort Worth (1 million SF). Despite the positive industrial and office absorption in the Southwest Fort Submarket, it has experienced a negative retail absorption trend since 2007 (-334,634 SF)

**5. Lease Rate Trends**

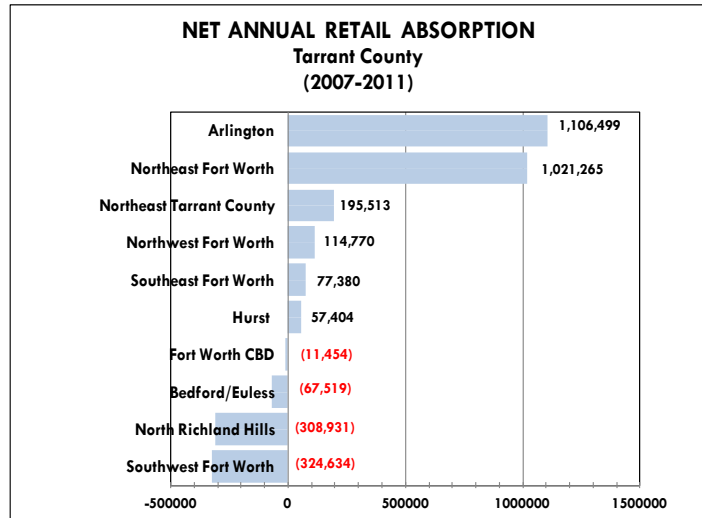
Class A retail rents in the Tarrant County market have not fluctuated

Figure 20



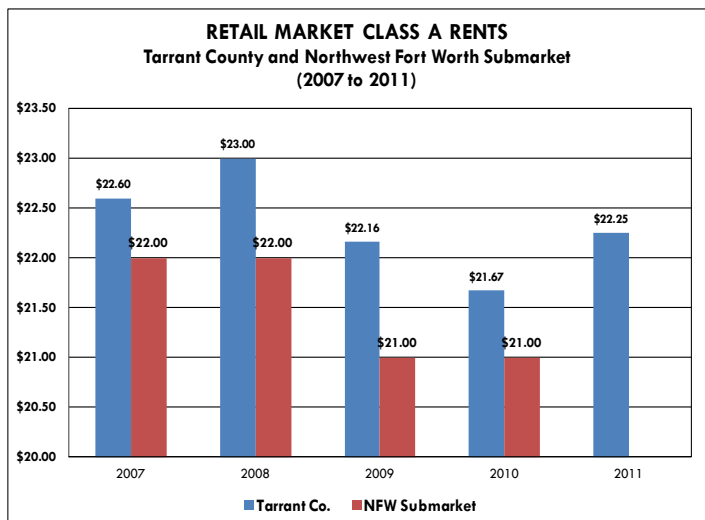
Source: The Weitzman Group/Cencor Realty Services

Figure 21



Source: The Weitzman Group/Cencor Realty Services

Figure 22



Source: The Weitzman Group/Cencor Realty Services

significantly since their recent peak in 2008. They have declined by \$0.75/SF or 4.3% and have started to rise since the end of 2010 (Figure 22). The Northwest Fort Worth submarket has followed the same trend, but local rents have lagged about 3-5% behind the market average since 2007.

In the Tarrant County market in 2010, Class A rents ranged from \$18.00/SF in North Richland Hills (2010) to a high of \$24/SF in Southwest Fort Worth and Northeast Tarrant County.

## **6. Implications to PLMC Study Area**

Retail demand is traditionally driven by changes in residential development or population growth. Also, unlike other market segments such as industrial or office, the proximity of retail development to households is very important, depending on the type of retail establishment and the retail goods being sold. Most households meet their daily shopping needs within 3-miles of their place of residence, within proximity to their place of work, or they make purchases heading to and from work. An increasing large percentage of retail sales are now being captured by on-line merchandisers who sell their goods electronically and ship their products directly to consumers.

The future of retail development in the PLMC study area will depend on the type, quality and accessibility of retail centers to the local population. Recent demographic changes have also introduced new buyers into the study area population, many of them Hispanic households. As such, as this population grows, the demand for different types of goods and services could change. This is partially evidenced by the number of Hispanic-owned and operated businesses along parts of Azle Avenue and eastern Camp Bowie Boulevard.

Regarding the potential for neighborhood serving retail to be attracted to the study area, it will depend on the availability of developable sites or existing buildings that are suitable for renovation or adaptive reuse. Along some commercial corridors, the building conditions are creating a negative environment that can discourage private investment in these areas. In addition, the study area communities must be willing to encourage new commercial development where appropriate, and in some cases, partner with commercial developers to ensure the important projects move forward.

Over the long-term, as population increases in West Tarrant County and Parker County, the demand for regional retail centers will likely increase. Currently, the county's retail gravity is being pulled up IH 35W due to the growth occurring in the AllianceTexas area.

## **I. PLMC STUDY AREA RETAIL CLUSTERS AND COMMERCIAL CORRIDORS**

The following section contains an analysis of the PLMC retail market, including an inventory of the existing building inventory, business mix, and overall market health. Where possible, the analysis was based on local data, particularly local property assessment data and in-field inspections to document the existing business mix and building vacancies. Secondary data sources were also used to estimate current consumer demand and spending potential as it relates to the local population.

### **1. Overview of PLMC Retail Clusters**

#### **a.) Mall Development**

Ridgmar Mall is the only regional mall in the vicinity of the PLMC Study Area. The mall contains 125 retail stores and five anchor stores including: Dillard's, J.C. Penney, Macy's, Neiman Marcus, and Sears, and Rave Motion Pictures movie theater. At nearly 1.3 million SF, Ridgmar Mall is one of the largest shopping venues in the region. The property is located on Green Oaks Road within a few miles of downtown Fort Worth and at the intersection of SH 183 and IH 30.

Additional retailers include Aeropostale, Bath and Body Works, Champs Sports, Claire's, Deb Shops, Forever 21, Gamestop, Journey's, Justice, Old Navy, Pac Sun, The Children's Place, and Victoria's Secret among others. Field observations indicate that some recent investment has been made in the perimeter out-parcels (i.e. Mattress Firm, Hertz, AT&T Cellular World, etc.). Vacancies appear fairly limited except for a cluster of vacant stores located along the southeast boundaries of the mall property. This grouping of centers – The Village Upper – appears to be largely vacant with an estimated 50,000 SF of space currently available for lease.

The mall is owned and operated by Macerich, which is based in Santa Monica, CA. The firm is a publically traded company on the New York Stock Exchange and is a major owner, operator and developer of retail properties throughout the U.S.

While it appears that the anchor stores and many of the other retailers in Ridgmar Mall are operating viable businesses, several market factors have coalesced to create a less than ideal tenant mix and limited appeal that once made the mall and surrounding area a regional destination and regional mall. Some of these factors include the shifting household demographics of the surrounding area since the malls inception (1976), the substantial retail and population growth occurring in north Fort Worth. The development of power centers and specialty retail in conjunction with the AllianceTexas development, and the shifting consumer preferences for open-air malls or “lifestyle centers” are making it harder for enclosed malls to compete.

#### b.) Big Box and Regional Shopping Centers

Two regional shopping centers exist within the general study area. Lake Worth Towne Crossing is located at the intersection of Jacksboro Highway (SH 199) and NW Loop 820 in Lake Worth. Ridgmar Town Square Shopping Center is located due south of NAS Fort Worth JRB at SH 183 and IH 30, just north of Ridgmar Mall in White Settlement.

- **Lake Worth Towne Crossing** - The Lake Worth Towne Crossing, and the surrounding retail area, offers a wide variety of retail, services, and casual dining. As evident by the building architecture and tenant mix the initial development occurred on the north side of Jacksboro Highway. The major anchors at these centers include Target and Wal-Mart and have a tenant mix that includes Hobby Lobby, Ross, and PetSmart as well as numerous fast food restaurants, banks, and general services. While some store fronts appear to have been renovated in the past, much of the center's storefronts are in a mature state.

Much of the new development and renovation is on the north side of Jacksboro Highway and consists of fast food restaurants and banking establishments. Although aging and facing direct competition from new center development across Jacksboro Highway, the retailers on the north side of the highway appear vibrant. Vacancy is mainly limited just a few small to mid-sized store fronts (1,000 SF to 10,000 SF), and one large store front of approximately 25,000 SF to 50,000 SF appeared vacant during the field inspection.

Development occurring on the southern side of Jacksboro Highway is relatively recent, with some construction on-going and multiple pad sites appear ready for development. In addition to the investment made in the retail sector, the western most outskirts of this portion of the SH199/IH 820 retail center is anchored by newly constructed County offices. The recently completed power center is anchored by Lowe's, Best Buy, and 24 Hour Fitness. In addition, multiple restaurants have recently opened and two more are in what appears to be the final stages of construction. As



can be expected, some vacancy exists as the center reaches completion. Some vacant storefronts appear to be the early stages of tenant “fit-out” before being occupied. Ample developable land remains in close proximity to the power center, with much of it located between the center and the perimeter retail that fronts Jacksboro Highway.

- **Ridgmar Town Square Shopping Center** - Due to the age and vibrancy of the Ridgmar Town Square Shopping Center, this retail center can be described as three distinct areas including: (1) North Town Square located north of the Alta Mere Drive, (2) East Town Square bordered by Alta Mere Drive and Ridgmar Boulevard, and (3) South Town Square bordered by Alta Mere Drive, Green Oaks Road, and Ridgmar Meadow Road. In addition, a grouping of big box retailers at the juncture of White Settlement Road and W. Loop 820 combine to create a power center.

1.) North Town Square is a relatively new power center anchored by a Wal-Mart, Sam’s Club, and Lowe’s. The southwestern perimeter of the center appears to be the initial portions of the center development. The northeastern perimeter of this center is the most recent addition, with several fast food restaurants, a bank, and smaller strip centers either recently completed or still under construction; vacancy is limited in this power center to these recently completed retail strip centers, approximately 15,000 SF to 25,000 SF. Currently, the furthest outlier is the L.A. Fitness, which appears to have developable land could accommodate future development.

2.) East Town Square, which encompasses Westover Village and the adjacent retail, is a community shopping center that, like North Town Square, is a mixture of relatively new store fronts as well as recently activated retail pads. The anchor stores include Target, Party City, Petco, and Half Price Books as well as fast food restaurants and other food and beverage establishments. This shopping center offers an eclectic mix of consumer products.

There is approximately 25,000 SF of vacancy in the shopping center, primarily comprised of two mid-sized interior store fronts and a few 5,000 to 10,000 SF storefronts. There appear to be an ample number of pad sites to accommodate additional development with visibility to Alta Mere Drive

3.) South Town Square is the oldest of the three distinct areas. It is evident from the proximity and architectural style of the buildings that this grouping of strip centers is closely linked to Ridgmar Mall. This center is plagued with high vacancy with many of the center’s buildings functioning at less than 50% occupancy; current occupants include a packaging and mailing shop, a nail salon, a discount store, a military recruiting station, a restaurant, and a movie theater.

Unlike the North Town Square and East Town Square, much of South Town Square’s store groupings are obscured from the main thoroughfare (Alta Mere Drive/183). Many of the store fronts appear to be in the early stages of the first or possibly second repurposing. While most store fronts appear to be in need of freshening, one structure containing the Big Lots and Sears Outlet has undergone a recent renovation.

- **White Settlement Road Power Center** - The power center at White Settlement Road and W. Loop 820 boasts a total of three big box stores – Wal-Mart, The Home Depot, and Albertsons, spread amongst multiple shopping center pad sites. This grouping of big boxes is complemented by CVS and Walgreens, numerous national

restaurants, salons, and banks to create a small power center experience that meets a multitude of consumer needs.

## 2. PLMC Commercial Corridors

An analysis was conducted of the primary commercial corridors within the PLMC Study Area. These corridors play a variety of roles including:

- meeting the shopping and service needs of local residents,
- serving as main commuting corridors to the region's employment centers,
- serving as gateway entrances into the study area communities, and
- moving local traffic through the study area.

In order to conduct this analysis, the major commercial corridors were broken into various road segments. The segments denote areas where significant clusters of commercial development are occurring. Where possible the road segments were measured within existing jurisdictional boundaries. Commercial space inventories within each segment included retail, service, hospitality, dining and maintenance uses. All commercially designated parcels within each road segment were identified utilizing Tarrant County property assessment records obtained from the NCTCOG. Since the assessor's data does not provide detailed building use classifications (e.g., gas station, department store, etc.), other secondary data sources were used to determine the business mix for each road segment. In order to determine square footage estimates by type of use, average space requirements for various business types were applied.

Business information for each road segment was obtained from CCIM's Site to Do Business (STDB) database, a proprietary source of geographic-based business data. Business counts by NAICS classification for each corridor segment were extracted with the use of STDB. After applying square footage estimates to each business in a segment, a proportional distribution of building square feet by business type was calculated. These distribution percentages were applied to the building square footage totals obtained from the property assessment records. For example, if department stores comprised 45% of total estimated building square feet in a given segment, and the segment contained 1 million SF of commercial building space, then it was assumed that department stores equaled 450,000 SF. While not exact inventory calculations, they provide a good proportional estimate of commercial uses along the main corridors.

In order to field check these assumptions, detailed aerial photography was used to confirm existence of major building categories such as shopping centers, big box stores, hotels and similar large buildings. The business mix was then field checked against visual inspection of the corridors.

### a.) Jacksboro Highway (Segments 1-4)

Segments 1 through 4 consist of retail establishments located along the Jacksboro Highway from the edge of the Lake Worth commercial cluster at NW Loop 820 to just north of River Oaks Boulevard (Figure 23). Segment one and the northern portions segment two consists of Lake Worth's Towne Crossing power center and adjacent power centers that converge to create a regional shopping center with approximately 1 million square feet of retail at the intersection of Jacksboro Highway and NW Loop 820. Large anchor stores include Wal-Mart, Target, Lowes and Best Buy. Grocers, pharmacies, and numerous national chain restaurants and banks round out the retail offering at this location (Table 3).

As segment two traverses NW Loop 820 and transitions into segments 3 and 4, the retail stock drastically changes; from a regional shopping center comprised of multiple power centers to an eclectic mixture of standalone establishments typically occupied with what appears to be a repurposed department store. Included in these segments are aging office buildings, a large

warehouse facility currently utilized as a community Bazaar, local restaurants and national fast food chains, independent used car lots, vehicle repair maintenance and parts stores line the highway. Interestingly, vacancy along this corridor appears to be fairly limited. This would imply that the landlord/tenant relationship is in balance with the local market demand for these unique and/or local offerings of services and products.

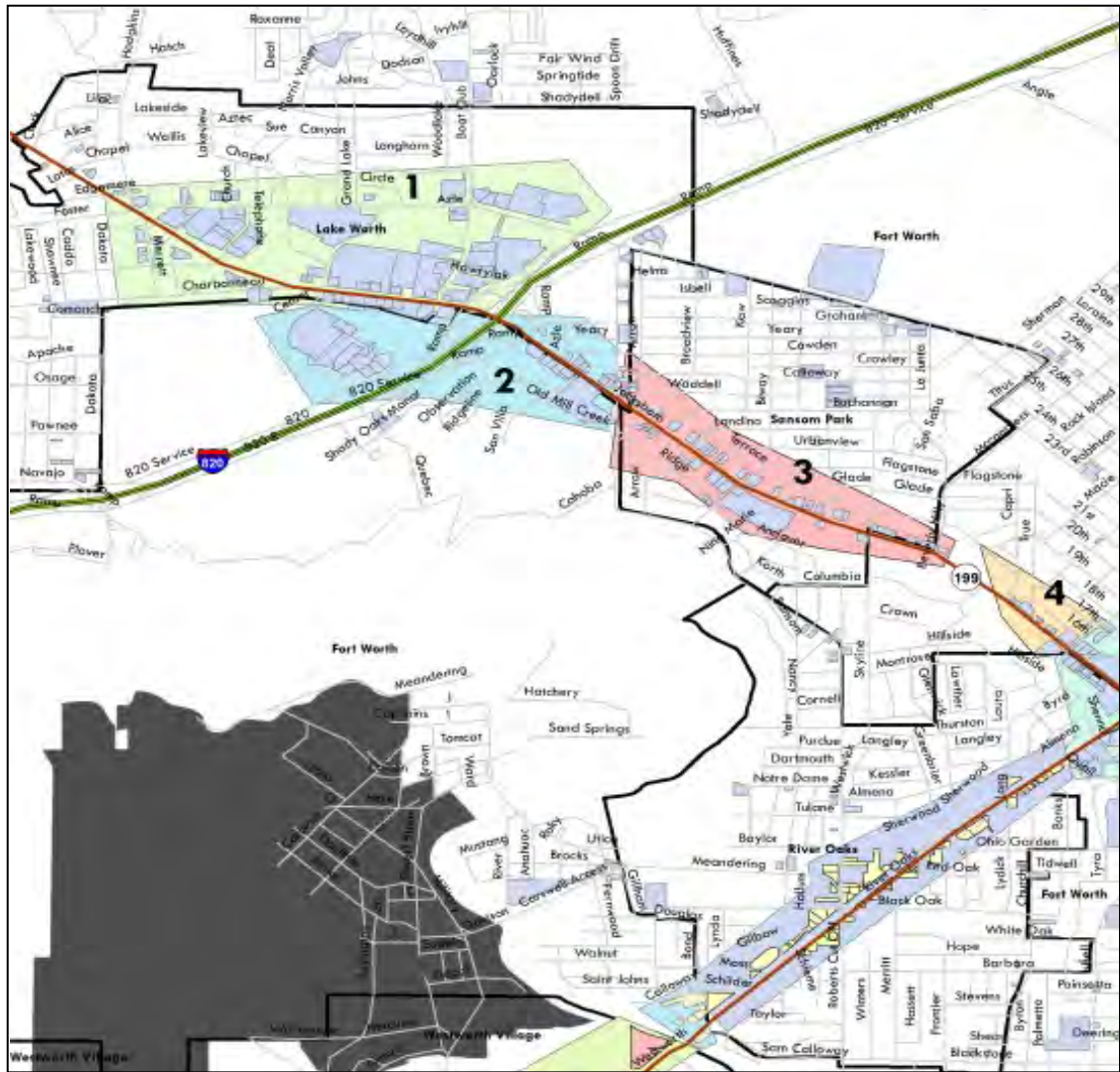
It's estimated that segments 1 - 4 contain approximately 224 retail establishments totaling an estimated 2.15 million square feet (Table 3); this places this segment 4<sup>th</sup> out of the 6 total combined segments in number of establishments and estimated square feet. As expected, the big box anchors of the regional shopping centers are evident in the General Merchandise and Building Material and Supply categories – few establishments with high associated square footage.

**Table 3**  
**Retail Composition: Jacksboro Highway (Segment 1-4)**

<b>NAICS Code</b>	<b>Description</b>	<b># of Establishments</b>	<b>Total Estimated SF</b>	<b>Average SF/ Establishment</b>
441 and 447	Motor Vehicle Parts and Gas	23	121,164	5,268
442	Furniture and Home Furnishing Stores	6	110,030	18,338
443	Electronics	4	34,653	8,663
444	Building Material and Supply	7	291,487	41,641
445	Food and Beverage Stores	13	115,262	8,866
446	Health and Personal Care Stores	8	58,325	7,291
448	Clothing and Clothing Accessories	10	51,225	5,122
451, 453, and 454	Sporting Goods, Miscellaneous and Non-store	18	256,440	14,247
452	General Merchandise	8	630,491	78,811
522 to 524	Insurance and Credit Intermediation	30	97,960	3,265
721	Accommodation	4	79,600	19,900
722	Food Services and Drinking Places	48	170,802	3,558
811	Repair and Maintenance	15	56,960	3,797
812	Personal and Laundry Services	30	82,500	2,750
<b>TOTAL</b>	--	<b>224</b>	<b>2,156,899</b>	<b>9,629</b>

Source: ESRI, Tarrant County Assessment Database, and RKG Associates, Inc.; 2012

**Figure 23**  
**Jacksboro Highway (Segments 1-4)**



**b.) Jacksboro Highway & Camp Bowie Boulevard (Segments 5-7)**

Segments 5 through 7 are located along Jacksboro Highway between SH 183/River Oaks and Camp Bowie Blvd, and Camp Bowie Blvd from W. 7<sup>th</sup> Street between Jacksboro Highway and IH 30 (Figure 24).

Segments 5 and 6 represent a completely different mix of retail establishments and target market than segment 7. As Jacksboro Highway continues southward from NW Loop 820, segments 5 and 6 continue with much of the same retail offering as segments 3 and 4. Segment 7 includes the Fort Worth Cultural District, including the Amon Carter Museum, Modern Art Museum of Fort Worth, and the Will Rogers Memorial Center, the northern border of the Trinity Park, and the western outskirts of downtown Fort Worth.

The inclusion of the Cultural District in segment 7 presents the greatest opportunity for exposure for the PLMC Study Area. The district’s composition of attractions, including multiple theaters, the Will Rogers Center and Equestrian Center, seven museums, galleries, and

restaurants, and the nearby Botanical Gardens, spans all age segments and socio-economic groups. The City's continued pursuit of the Trinity River Master Plan will enhance the existing attractions of Trinity Park and provide linkages throughout the City.

The combined segments 5 - 7 have an estimated 447 retail establishments totaling roughly 2.7 million square feet (Table 4). The majority of the retail establishments are located within segment seven. As compared to the segment totals, segment 7 ranks 2<sup>nd</sup> out of 6 in number of establishments and estimated square feet. This combined segment boasts more Furniture and Home Furnishing Stores and Repair and Maintenance establishments than any of the other combined segments. Segments 5-7 contains the most NAICS categories of all segments in Furniture and Home Furnishing Stores (16 establishments) and Repair and Maintenance (50 establishments).

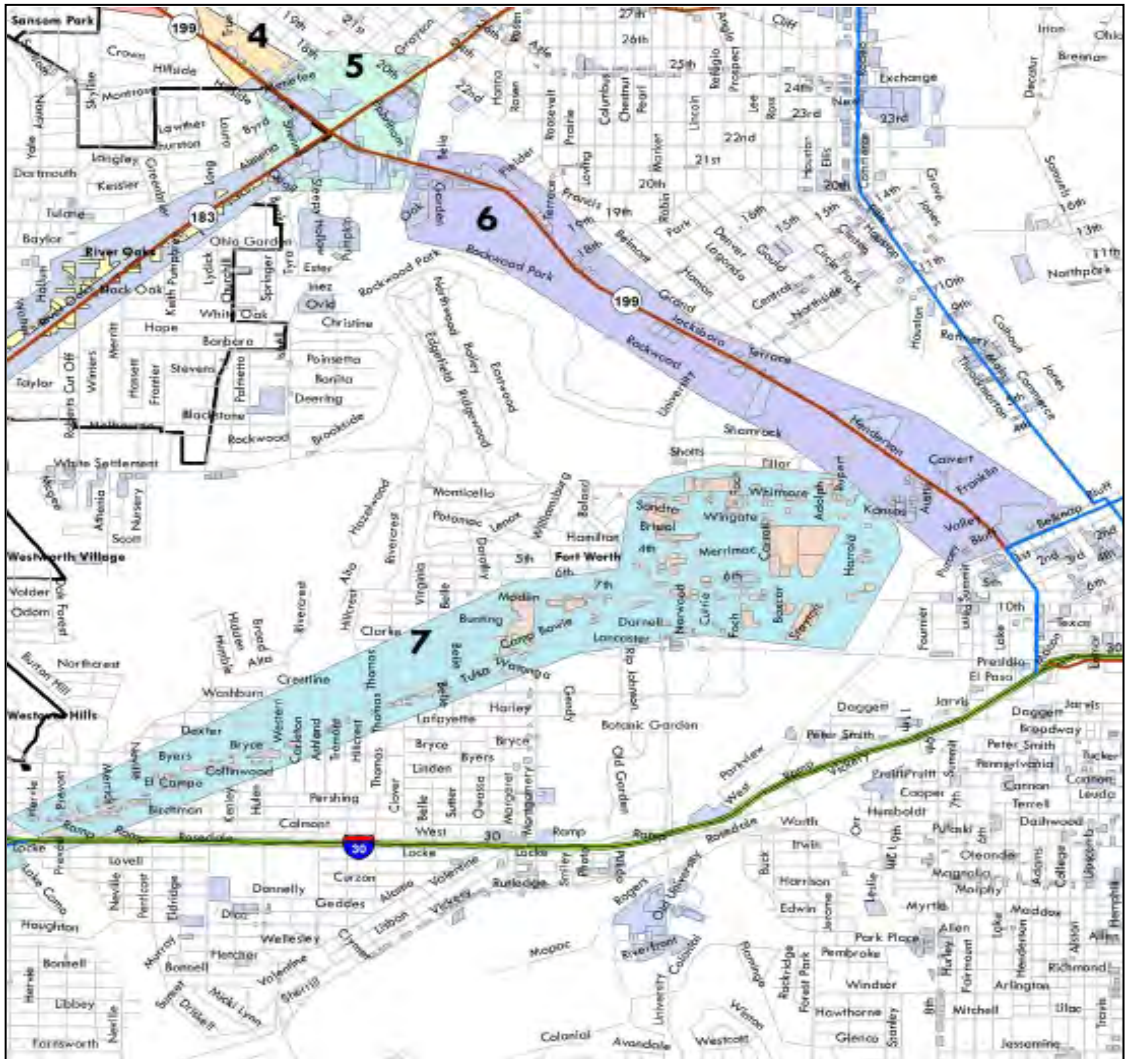
The largest single category is motor vehicle parts and gas stations, which also includes car dealerships. A total of 64 businesses comprising more than 640,000 SF fall into this category and make up nearly 25% of total building square feet. Segments 5 – 7 contain a diverse collection of retail, service and hospitality businesses. However, there are very few large retail establishments in this area.

**Table 4**  
**Retail Composition: Jacksboro Hwy./ Camp Bowie (Segments 5 – 7)**

NAICS Code	Description	# of Establishments	Total Estimated SF	Average SF/ Establishment
441 and 447	Motor Vehicle Parts and Gas	64	678,359	10,599
442	Furniture and Home Furnishing Stores	16	243,717	15,232
443	Electronics	7	26,509	3,787
444	Building Material and Supply	11	121,181	11,016
445	Food and Beverage Stores	13	45,474	3,498
446	Health and Personal Care Stores	10	72,782	7,278
448	Clothing and Clothing Accessories	29	186,188	6,420
451, 453, and 454	Sporting Goods, Miscellaneous and Non-store	52	253,643	4,878
452	General Merchandise	9	130,988	14,554
522 to 524	Insurance and Credit Intermediation	27	105,431	3,905
721	Accommodation	6	207,192	34,532
722	Food Services and Drinking Places	79	249,568	3,159
811	Repair and Maintenance	50	279,601	5,592
812	Personal and Laundry Services	74	130,933	1,769
<b>TOTAL</b>	<b>—</b>	<b>447</b>	<b>2,731,566</b>	<b>6,111</b>

Source: ESRI, Tarrant County Assessment Database, and RKG Associates, Inc.; 2012

**Figure 24**  
**Jacksboro Highway (Segments 5-7)**



c.) Camp Bowie Boulevard (Segments 8 – 10)

Segments 8 through 10 are located along Camp Bowie from IH 30 to SH 183 and further southwest to IH 20. Segment 8 encompasses the area from IH 30 to the intersection with SH 183. Segment 9 runs south along Benbrook Highway/377 from Camp Bowie to Willis Avenue, and segment 10 extends through the Benbrook Highway/377 and IH 20 juncture (Figure 25).



The stretch of Camp Bowie included in segment 8 is a vibrant, unique mixture of modernized mid-twentieth century buildings that have been adapted to house such establishments as salons and other personal services, home furnishings, sporting goods, and restaurants. Many of the newly renovated buildings are fast food restaurants and banking establishments. The availability of grocery stores and other home goods establishments provide the surrounding neighborhoods basic goods and services. Although parking appears to meet code, the high level of usage displayed during the site assessment conveyed the desirability of this segment to the local community.

As segment 8 transitions into segments 9 and 10, the retail stock begins to make a drastic shift from the unique urban village settings found in lifestyle and town centers to small retail strips and standalone establishments with a limited market draw, heavily comprise of personal services, local restaurants, and national fast food chains.

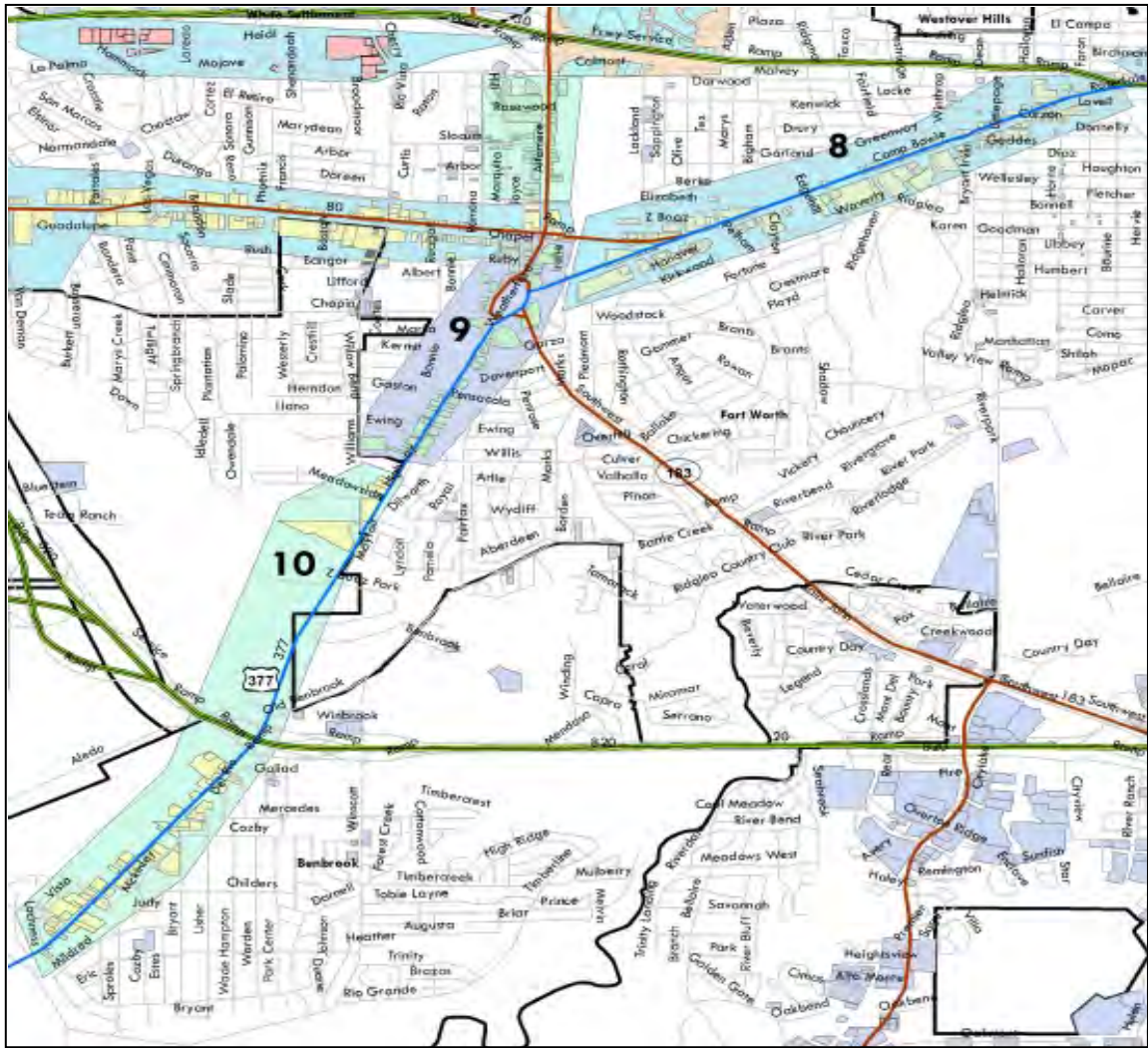
This distribution of retail is evident in the composition among the three similarly-sized segments. The high density development of the urban village and lifestyle centers of segment eight comprises 64% of the total establishments and 58% of the total estimated square footage of the combined segment totals. Small strip centers prevalent in segments 9 and 10, as well as a couple of power centers located at the SH 377 and IH 20 location account for just 36% of total establishments and 42% of total estimated square footage. Segments 8 -10 contains the most NAICS categories of all segments in Electronics (11 establishments), Food and Beverage Stores (26 establishments), Food Services and Drinking Places (94 establishments), and Personal and Laundry Services (77 establishments) (Table 5).

**Table 5**  
**Retail Composition: Comp Bowie Blvd. (Segment 8 - Segment 10)**

NAICS Code	Description	# of Establishments	Total Estimated SF	Average SF/ Establishment
441 and 447	Motor Vehicle Parts and Gas	21	187,415	8,925
442	Furniture and Home Furnishing Stores	4	233,841	58,460
443	Electronics	11	26,902	2,446
444	Building Material and Supply	7	67,377	9,625
445	Food and Beverage Stores	26	229,349	8,821
446	Health and Personal Care Stores	16	165,153	10,322
448	Clothing and Clothing Accessories	18	139,115	7,729
451, 453, and 454	Sporting Goods, Miscellaneous and Non-store	40	172,693	4,317
452	General Merchandise	13	404,670	31,128
522 to 524	Insurance and Credit Intermediation	41	181,086	4,417
721	Accommodation	3	109,416	36,472
722	Food Services and Drinking Places	94	266,160	2,831
811	Repair and Maintenance	31	174,941	5,643
812	Personal and Laundry Services	77	217,315	2,822
<b>TOTAL</b>	<b>--</b>	<b>402</b>	<b>2,575,433</b>	<b>6,407</b>

Source: ESRI, Tarrant County Assessment Database, and RKG Associates, Inc.; 2012

**Figure 25**  
**Camp Bowie Boulevard (Segments 8-10)**



**d.) Camp Bowie Boulevard (Segments 11-18)**

Segments 11 through 18 are located along SH 183, south of the Naval Air Station entrance to the junction of SH183 and IH 30; SH 183 between IH 30 and Camp Bowie Blvd./SH 580, and Camp Bowie Blvd./SH 580 from the junction of State Highways 377 and 580 and South Loop 820 (Figure 26).

This grouping of segments represents the largest composition of retail establishments and estimated square footage (28% of all study area establishments and 40% of all study area estimated square footage) (Table 4); eight of the fourteen NAICS categories summarized in this grouping of segments rank first in number of establishments when compared to all segment groups in the study area. Much of the associated 6.1M square feet in this segment grouping can be attributed to Ridgmar Mall and the Town Square area developments (Segments 16 and 17).

The grouping of segments is dominated by the regional shopping centers and numerous power centers, the former of which is becoming quickly outdated in terms of physical features and consumer preference.

Segment 11 is the continuation of Camp Bowie Blvd. (known as SH 580 along this corridor) based on segment 8 although there is a marked difference from one segment to the other. Segment 11 features a number of motels/ hotels, discounters, and new car dealerships. Segment 12 is comprised of an eclectic mix of retail store fronts with a high concentration of motor vehicle parts/gas and repair and maintenance establishments. The eastern border of segment 12 is the Z. Boaz Golf Course. Segment 13, located directly south of IH 30, has a limited number of retail establishments including a new car dealership, multiple parts/gas establishments, and multiple large self-storage establishments. Segment 14, located directly north of IH 30, is predominantly comprised of vehicle parts/gas establishments and restaurants.

These commercial segments contain the largest retail operations in or near the PLMC Study Area. Approximately 512 businesses totaling 6.1 million SF of building space are contained in these corridor segments, which include the 1.3 million SF Ridgmar Mall (Table 6). These segments benefit greatly from the presence of Interstates 20 and 30 in this area. Within the next 3 to 5 years, another 2.7 million SF of retail, hotels and entertainment uses could come on line at the 850-acre mixed-use development known as Clearfork, which is located off Vickery Road south of the Trinity River and a 193-acre commercial/mixed-use development called the Trails Shopping Center.

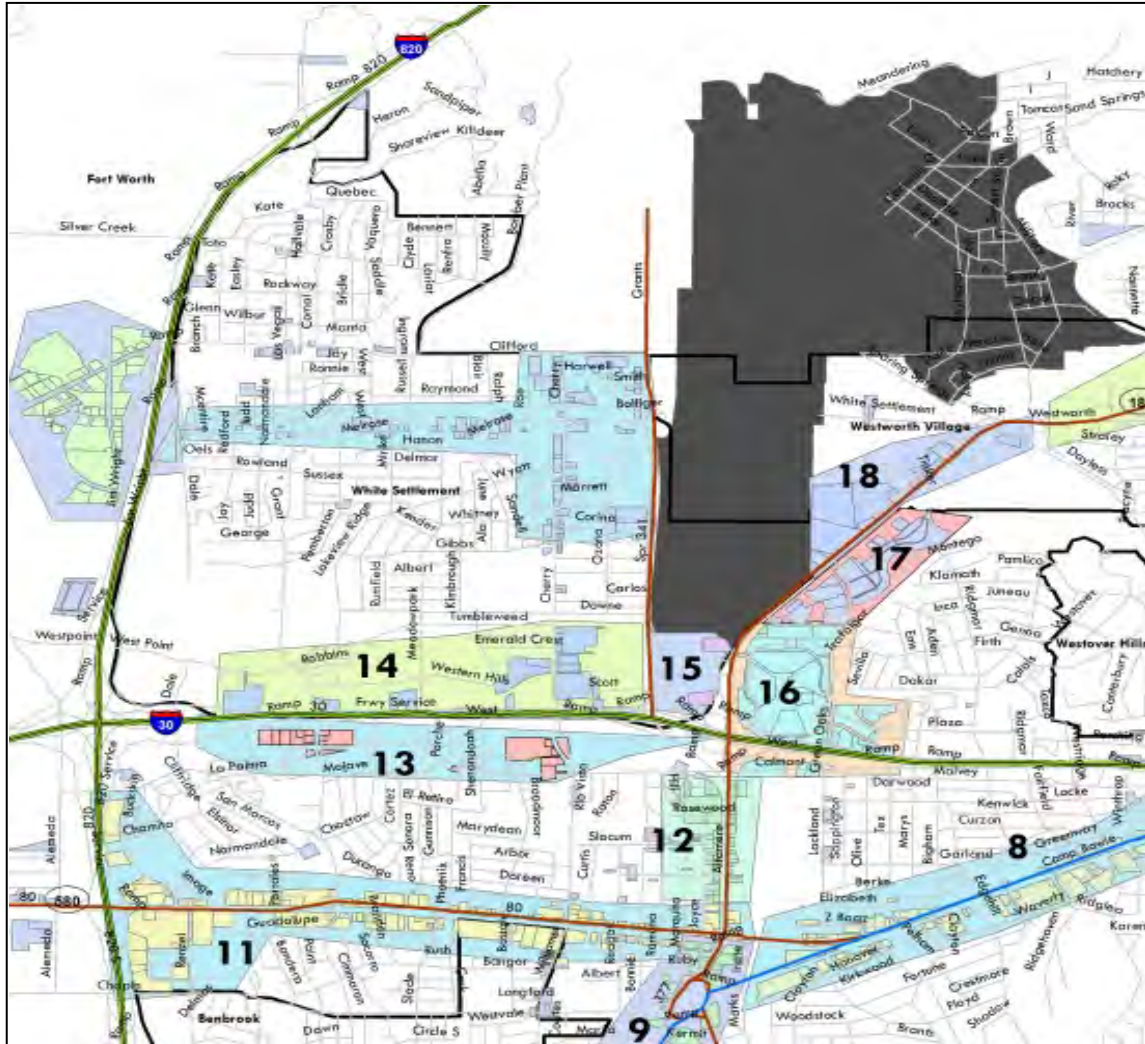
**Table 6**  
**Retail Composition: Camp Bowie Blvd. (Segment 11 - Segment 18)**

NAICS Code	Description	# of Establishments	Total Estimated SF	Average SF/ Establishment
441 and 447	Motor Vehicle Parts and Gas	77	996,506	12,942
442	Furniture and Home Furnishing Stores	8	71,003	8,875
443	Electronics	6	46,441	7,740
444	Building Material and Supply	12	320,221	26,685
445	Food and Beverage Stores	24	332,483	13,853
446	Health and Personal Care Stores	26	159,647	6,140
448	Clothing and Clothing Accessories	58	75,027	1,294
451, 453, and 454	Sporting Goods, Miscellaneous and Non-store	53	502,702	9,485
452	General Merchandise	16	2,193,319	137,082
522 to 524	Insurance and Credit Intermediation	51	187,263	3,670
721	Accommodation	16	457,533	28,596
722	Food Services and Drinking Places	80	291,555	3,639
811	Repair and Maintenance	35	370,966	10,599
812	Personal and Laundry Services	50	114,243	2,285
<b>TOTAL</b>	--	<b>512</b>	<b>6,118,909</b>	<b>11,948</b>

Source: ESRI, Tarrant County Assessment Database, and RKG Associates, Inc.; 2012

\*Segment 16 includes Ridgmar Mall

Figure 26  
Camp Bowie Boulevard (Segments 11-18)



**e.) SH 183 South (Segments 19-21)**

Segments 19, 20 and 21 encompass the SH 183 corridor between Jacksboro Highway and the NAS JRB (Figure 27). Segment 19 does not contain any retail establishments.

This grouping of commercial segments represents the smallest concentration of establishments and total estimated square feet of all combined segments with a total of 74 establishments and only 350,000 SF of building space.

Segment 20, the smallest segment, has a total of seven establishments; a 7-Eleven and a small retail strip center with a State Farm Insurance, two local restaurants, two local clothing stores and one barber shop. Although not as old as much of the retail stock located in segment twenty-one, the smaller footprint and relative close proximity to new residential housing stock as well as the new development occurring just west of the base would suggest that the aging structures are viable candidates for reinvestment.

Segment 21 has a large number of dining and drinking places and personal and laundry services (40% of total establishments) (Table 7) situated along the corridor in typical mid-twentieth century commercial strips. While many of the store fronts are “reasonably” sized, much of the infrastructure is in poor health. It appears that the present composition of retailers meet a market need as vacancy for small to mid-sized store fronts is limited to non-existent in most of the strip centers; however, many of the strip centers with mid-size to large (15K+ square feet) store fronts were vacant. With such a high composition of independent local retailers located along this strip, it’s not surprising that larger footprints remain vacant.

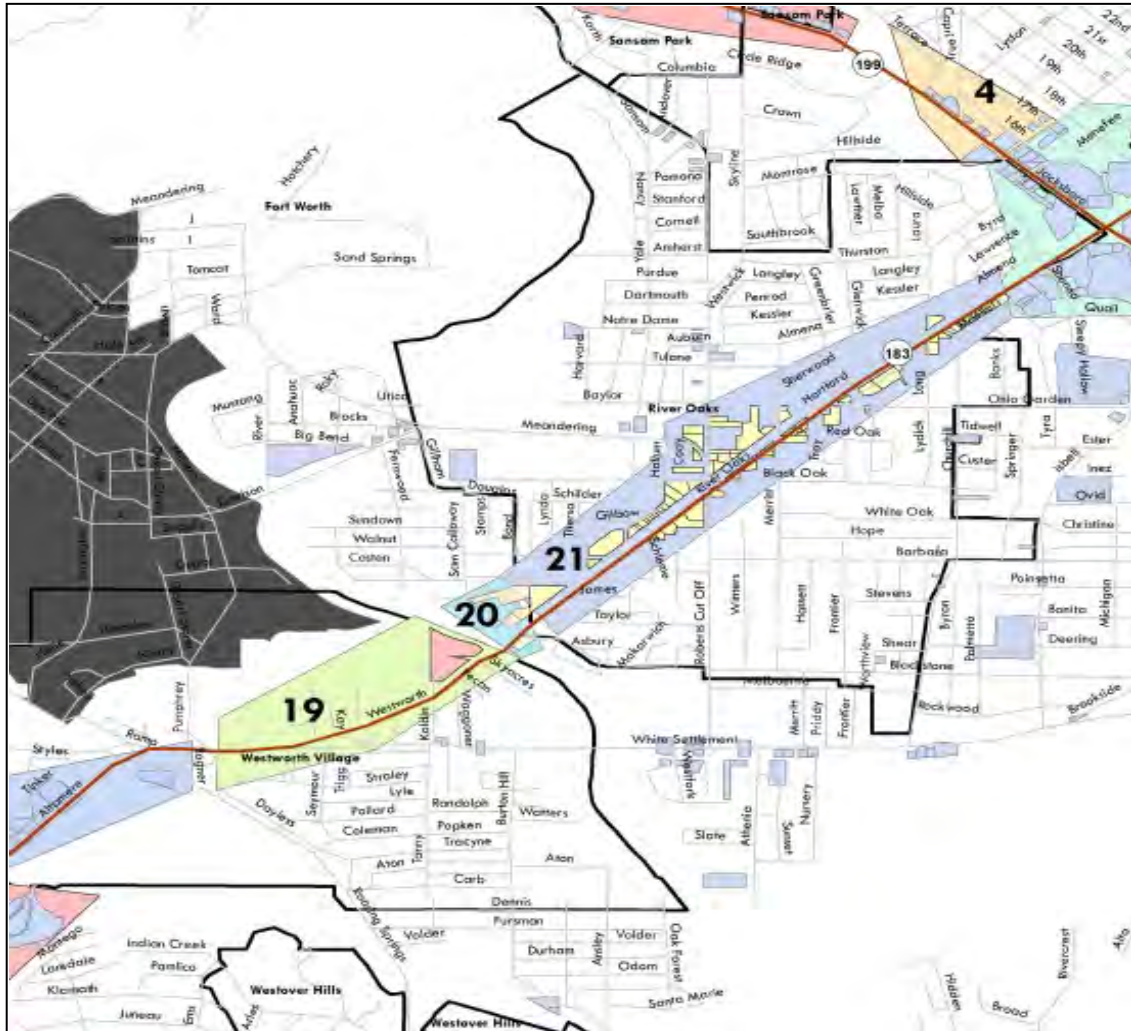
**Table 7**  
**Retail Composition: Highway 183 South (Segment 19 - Segment 21)**

NAICS Code	Description	# of Establishments	Total Estimated SF	Average SF/ Establishment
441 and 447	Motor Vehicle Parts and Gas	8	51,172	6,396
442	Furniture and Home Furnishing Stores	1	11,123	11,123
443	Electronics	1	2,225	2,225
444	Building Material and Supply	1	11,123	11,123
445	Food and Beverage Stores	4	46,228	11,557
446	Health and Personal Care Stores	3	24,582	8,194
448	Clothing and Clothing Accessories	4	9,113	2,278
451, 453, and 454	Sporting Goods, Miscellaneous and Non-store	3	10,017	3,339
452	General Merchandise	2	35,522	17,761
522 to 524	Insurance and Credit Intermediation	8	27,962	3,495
721	Accommodation	-	-	-
722	Food Services and Drinking Places	17	47,540	2,796
811	Repair and Maintenance	9	51,277	5,697
812	Personal and Laundry Services	13	21,770	1,675
<b>TOTAL</b>	<b>--</b>	<b>74</b>	<b>349,653</b>	<b>4,725</b>

Source: ESRI, Tarrant County Assessment Database, and RKG Associates, Inc.; 2012



**Figure 27**  
**Highway 183 South (Segments 19 – 21)**





f.) White Settlement Road (Segments 22-24)

Segments 22, 23, and 24 extend along White Settlement Road and the main ingress/egress of the Lockheed Martin Corporation to W. loop 820 (Figure 28).

Segments 22 and 23 are predominantly comprised of repair and maintenance, personal and laundry services, and insurance and credit intermediation establishments located in an assortment of strip centers.

Segment 23 is comprised of a collection big box retailers along with a tenant mixture of restaurants and personal services are located at the juncture of White Settlement Road and W. Loop 820. Anchoring this small power center consists of a Wal-Mart, Home Depot, and Albertsons supermarket. Complementing these big box retailers is a cluster of pharmacies, salons, national restaurant chains and a car dealership.

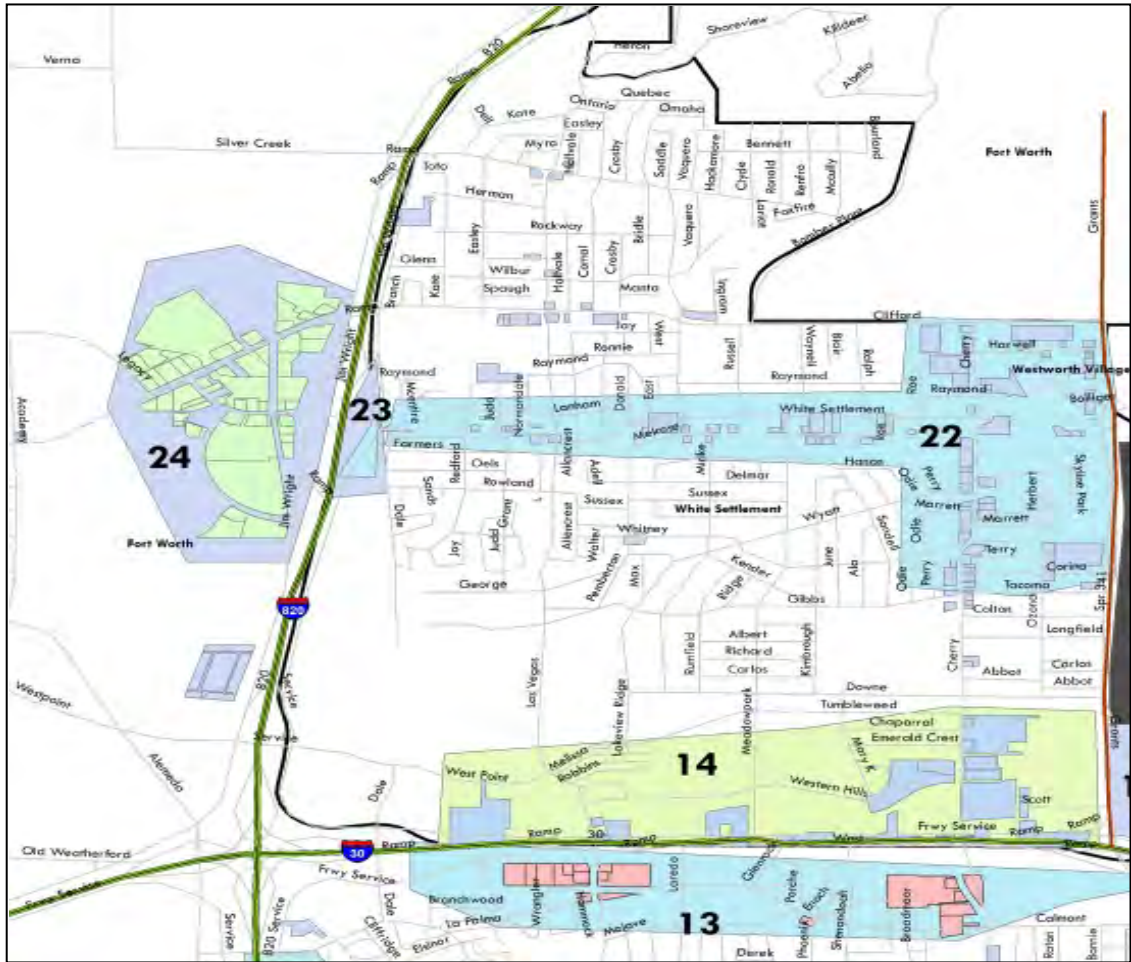
The total combined segment boasts the fifth most retail establishments (166) as well as total estimated square footage (1.4 million SF) of the six combined segments in the study area (Table8).

**Table 8**  
**Retail Composition: White Settlement Road (Segment 22 - Segment 24)**

NAICS Code	Description	# of Establishments	Total Estimated SF	Average SF/ Establishment
441 and 447	Motor Vehicle Parts and Gas	13	145,506	11,193
442	Furniture and Home Furnishing Stores	2	9,955	4,977
443	Electronics	-	-	-
444	Building Material and Supply	4	138,193	34,548
445	Food and Beverage Stores	10	140,792	14,079
446	Health and Personal Care Stores	6	45,963	7,661
448	Clothing and Clothing Accessories	2	4,374	2,187
451, 453, 454, 532	Sporting Goods, Miscellaneous and Non-store	13	53,169	4,090
452	General Merchandise	5	284,189	56,838
522 to 524	Insurance and Credit Intermediation	29	90,568	3,123
721	Accommodation	3	217,496	72,499
722	Food Services and Drinking Places	32	87,474	2,734
811	Repair and Maintenance	19	137,156	7,219
812	Personal and Laundry Services	28	44,922	1,604
<b>TOTAL</b>		<b>166</b>	<b>1,399,756</b>	<b>8,432</b>

Source: ESRI, Tarrant County Assessment Database, and RKG Associates, Inc.; 2012

**Figure 28**  
**White Settlement Road (Segments 22-24)**



**g) Distribution of Commercial Development by Community (All Segments)**

In order to analyze the distribution of commercial space within the PLMC study area, the corridor segment data was assembled by jurisdiction. Table 9 shows that approximately 15.3 million SF of commercial space exists within close proximity of the study area communities. A good share of this space is not classified as retail space, but serves the needs of a wide variety of local shoppers, businesses and visitors to the area. In fact, roughly 6.2 million SF or 40.5% of existing building space is classified as service businesses, auto-related businesses, maintenance shops, hotel/motels and other non-retail establishments.

Not surprisingly, 72.5% of all commercial space within the study area is located in the City of Fort Worth. The Cities of Lake Worth (1.5 million SF) and White Settlement (1 million SF) currently have clusters of retail development, mostly in big box or power center developments.

**Table 9**  
**Distribution of Commercial Building Space by Community**  
**PLMC Study Area**

NAICS	Description	Lake Worth	River Oaks	Sansom Park	White Settlement	Benbrook	Westworth Village	Fort Worth	Total
441 and 447	Motor Vehicle Parts and Gas	67,270	51,172	28,947	137,818	47,495	-	1,847,421	2,180,122
442	Furniture and Home Furnishing Stores	78,124	11,123	16,559	19,956	-	11,116	542,790	679,668
443	Electronics	4,412	2,225	-	2,000	1,941	-	126,151	136,730
444	Building Material and Supply	138,624	11,123	23,751	25,004	23,483	163,171	564,426	949,582
445	Food and Beverage Stores	100,802	35,026	12,633	79,976	43,835	-	637,314	909,587
446	Health and Personal Care Stores	37,371	24,582	-	10,747	28,928	-	424,824	526,452
448	Clothing and Clothing Accessories	46,951	4,449	4,274	995	7,953	-	400,419	465,042
451, 453, 454, 532	Sporting Goods, Miscellaneous and Non-store	88,320	10,017	25,307	179,434	40,334	-	905,253	1,248,665
452	General Merchandise	619,631	35,522	8,988	156,032	185,337	367,439	2,306,231	3,679,179
522 to 524	Insurance and Credit Intermediation	68,390	25,630	14,739	61,761	33,659	14,602	471,488	690,270
721	Accommodation	34,958	-	8,102	182,022	37,216	-	808,939	1,071,237
722	Food Services and Drinking Places	110,306	41,710	29,617	53,415	60,665	58,361	759,026	1,113,099
811	Repair and Maintenance	38,607	51,277	7,390	74,659	31,311	-	867,656	1,070,901
812	Personal and Laundry Services	44,828	20,021	16,844	25,964	22,309	1,667	480,050	611,684
<b>TOTAL</b>		<b>1,478,593</b>	<b>323,875</b>	<b>197,151</b>	<b>1,009,785</b>	<b>564,467</b>	<b>616,357</b>	<b>11,141,988</b>	<b>15,332,216</b>

**Distribution of Commercial Building Space by Community**  
**Percentage Share**

NAICS	Description	Lake Worth	River Oaks	Sansom Park	White Settlement	Benbrook	Westworth Village	Fort Worth	Total
441 and 447	Motor Vehicle Parts and Gas	3.1%	2.3%	1.3%	6.3%	2.2%	0.0%	84.7%	100.0%
442	Furniture and Home Furnishing Stores	11.5%	1.6%	2.4%	2.9%	0.0%	1.6%	79.9%	100.0%
443	Electronics	3.2%	1.6%	0.0%	1.5%	1.4%	0.0%	92.3%	100.0%
444	Building Material and Supply	14.6%	1.2%	2.5%	2.6%	2.5%	17.2%	59.4%	100.0%
445	Food and Beverage Stores	11.1%	3.9%	1.4%	8.8%	4.8%	0.0%	70.1%	100.0%
446	Health and Personal Care Stores	7.1%	4.7%	0.0%	2.0%	5.5%	0.0%	80.7%	100.0%
448	Clothing and Clothing Accessories	10.1%	1.0%	0.9%	0.2%	1.7%	0.0%	86.1%	100.0%
451, 453, 454, 532	Sporting Goods, Miscellaneous and Non-store	7.1%	0.8%	2.0%	14.4%	3.2%	0.0%	72.5%	100.0%
452	General Merchandise	16.8%	1.0%	0.2%	4.2%	5.0%	10.0%	62.7%	100.0%
522 to 524	Insurance and Credit Intermediation	9.9%	3.7%	2.1%	8.9%	4.9%	2.1%	68.3%	100.0%
721	Accommodation	3.3%	0.0%	0.8%	17.0%	3.5%	0.0%	75.5%	100.0%
722	Food Services and Drinking Places	9.9%	3.7%	2.7%	4.8%	5.5%	5.2%	68.2%	100.0%
811	Repair and Maintenance	3.6%	4.8%	0.7%	7.0%	2.9%	0.0%	81.0%	100.0%
812	Personal and Laundry Services	7.3%	3.3%	2.8%	4.2%	3.6%	0.3%	78.5%	100.0%

Source: ESRI, Tarrant County Assessment Database, and RKG Associates, Inc., 2012

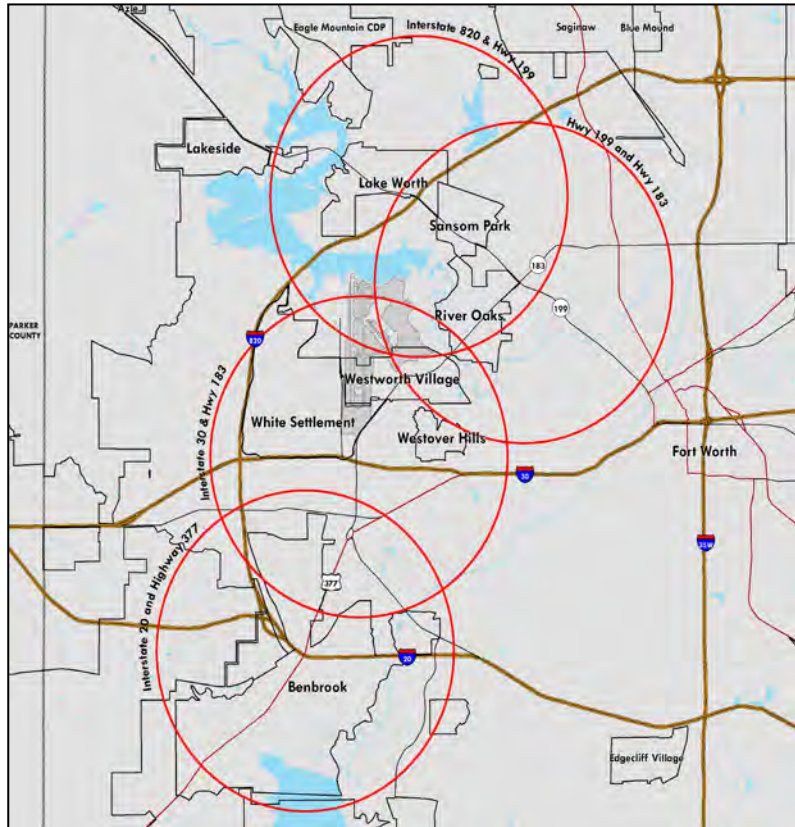
### 3. PLMC Retail Gap Analysis

The analysis assessed the supply and demand of retail sales in order to show areas that may have opportunities for additional retail as well as areas that may be over-served. The consultant analyzed four different 3-mile trade areas in order to show how different communities within study area compare. The retail trade areas are shown in Map 2. Retail supply and demand information was obtained from ESRI, a private purveyor of local and regional retail market data. The retail gap data for each of the four trade areas is shown in Tables 9 and 10, located at the end of this section.

#### a.) IH 820 and SH 199 Trade Area

The IH 820 and SH 199 Trade Area include Sansom Park and River Oaks, but also encompass Lake Worth and portions of Fort Worth located north of the base. Of all the trade areas analyzed for this report, the Lake Worth Trade Area has the lowest amount of sales surplus (\$78.2 million). Sales leakage occurs in 13 categories (excluding Non-Store Retailers). The largest categories of sales leakage occur in Grocery Stores (\$15.1 million), Automobile Dealers (\$8.4 million) and Clothing Stores (\$4.7 million). Although there is leakage in Automobile Dealers, the large amount of competition located within all three proximate trade areas diminishes the opportunity for additional dealers in the IH 820 and SH 199 Trade Area.

**Map 2  
Retail Trade Area Identification**



#### b.) SH 199 and SH 183 Trade Area

The SH 199 and SH 183 Trade Area includes the City of Sansom Park and the City of River Oaks, as well as the eastern half of Westworth Village, a small portion of southeast Lake Worth, and portions of Fort Worth located east of the base. This trade area also has a total surplus of sales (\$475.2 million). Although the surplus is less than found in the IH 30 and SH 183 Trade Area, it still shows the area is substantially over-served in retail. Downtown Fort Worth is located just east of the trade area boundaries, and the increase in development that occurs near the Downtown likely attributes to this areas large surplus. Similar to the IH 30 and SH 183 Trade Area, there is also a substantial surplus in Automobile Dealers (\$260.1 million). Dealerships in this trade area include Audi, BMW, and Land Rover.

This trade area is leaking sales in only six categories (excluding Non-Store Retailers). The largest sales leakage occurs in Book, Periodical, and Music Stores (\$2.2 million) and Clothing Stores (\$1.6 million). The other categories, including Home Furnishing Stores, Electronics & Appliance Stores, Jewelry, Luggage and Leather Goods Stores, and Sporting Goods/Hobby/Musical Instrument Stores are all leaking less than \$1 million in sales. The relatively low leakage in this trade area provides further indications that the area is over-served in retail.

c.) IH 30 and SH 183 Trade Area

The IH 30 and SH 183 Trade Area encompass the City of White Settlement, the City of Westworth Village, the Town of Westover Hills, and portions of the City of Fort Worth located south of the base. The analysis reveals that this trade area has a “surplus” of total sales (\$772.6 million). In other words, the supply exceeds local demand. Situations in which there is a surplus of sales indicate the trade area has a market cluster, or concentration of businesses, pulling sales in from outside the area. A good example of a market cluster is a large retail mall. Malls typically have several retailers offering a wide range of goods located in one place, making it more convenient for shoppers. As a result, they draw customers from a larger geographic region than if the stores attempted to locate independently. In fact, the IH 30 Trade Area is the location of the 1.27 million square foot Ridgmar Mall, located at 1888 Green Oaks Road. This mall largely contributes to the sizeable surplus of sales experienced in this trade area. In addition, there is a substantially large surplus of sales in the Automobile Dealers category (\$452.0 million). This trade area is home to a cluster of dealers including Cadillac and Nissan, as well as a variety of used-car dealers.

Although there is a large total surplus of sales in this trade area, there are some specific categories of retail that are experiencing “sales leakage.” Sales leakage indicates the demand for goods is greater than the supply of sales. When this occurs, consumers typically make retail purchases outside their trade area. Because this consumer spending is not captured by local businesses, it is said to have “leaked” to other businesses outside the local market. In such cases, conventional wisdom suggests that there may be opportunities for existing businesses to expand their product lines and for new local businesses to be created to capture this unmet spending potential.

The IH 30 and SH 183 Trade area is leaking sales in 10 of the 31 4-Digit NAICS categories of retail. The largest sales leakage occurs in Furniture Stores (\$9.6 million) and Special Food Services (\$4.5 million). The other categories of retail are all leaking less than \$2 million in sales. These include Home Furnishing Stores (\$1.1 million), Building Material and Supply Dealers (\$797,773), Specialty Food Stores (\$229,437), Book Periodical and Music Stores (\$1.1 million) and Used Merchandise Stores (\$414,126). It should be noted that Non-Store Retailers also are leaking a comparatively large amount of sales (\$13.1 million leakage); however this category of retail does not have the need for brick-and-mortar retail spaces. While the sales leakage amounts in any of the retail categories within this trade area would likely not be enough to warrant investment in a new establishment, there may be opportunity for existing stores to expand their product lines in some of these categories.

d.) IH 20 and SH 377 Trade Area

The IH 20 and SH 377 Trade Area is located south of NAS-JRB Fort Worth and primarily encompasses the City of Benbrook. There is a retail surplus of \$278.3 million in this trade area. The majority of surplus is in Automobile Dealers (\$378.9 million). The dealerships in this area include Toyota, Mazda, Infiniti, Ford, among others. There are sales leakages in 19 4-digit categories (excluding Non-Store Retailers). The larger categories leaking sales include Grocery Stores (\$50.1 million), Gasoline Stations (\$24.7 million), and Building Material and

Supply Dealers (\$10.8 million). It should be noted that Grocery Stores, in particular, have a comparatively large amount of sales leakage. This provides initial indications that the area could support a new grocery establishment.

e) Implications

All four trade areas are over-served with retail ranging from neighborhood strip center to regional shopping malls. The study area is home to clusters of automobile dealers, which accounts for the large amounts of surplus in the IH 30 and SH 183, SH 199 and SH 183, and IH 20 and SH 377 trade areas. In addition the Ridgmar Mall contributes to the large amount of surplus within the IH 30 and SH 183 Trade Area.

Despite the relatively large amount of surplus found in all the trade areas, there are certain categories in which there may be opportunity for expanded lines of retail, or in select cases, a new establishment. Most notably, the IH 20 and SH 377 Trade Area is under-served in grocery and clothing stores. This Trade Area likely has the highest potential for additional new retail establishments in these categories. Other trade areas may want to improve their retail base by redeveloping existing retail or expanding product lines in existing establishments.

As the region's population grows in the future, retail and service demand will shift based on where those growth patterns are established. New residential development north of Loop 820 along the IH 35W corridor is pulling retail gravity to North Fort Worth area. Within the next few years, an additional 2.7 million SF of retail space will be constructed at just two developments located between Interstates 20 and 30, north of Benbrook. This may start to shift the region's retail spend below the PLMC study area and will be positioned to capture growing demand from Parker County and points west of Fort Worth.

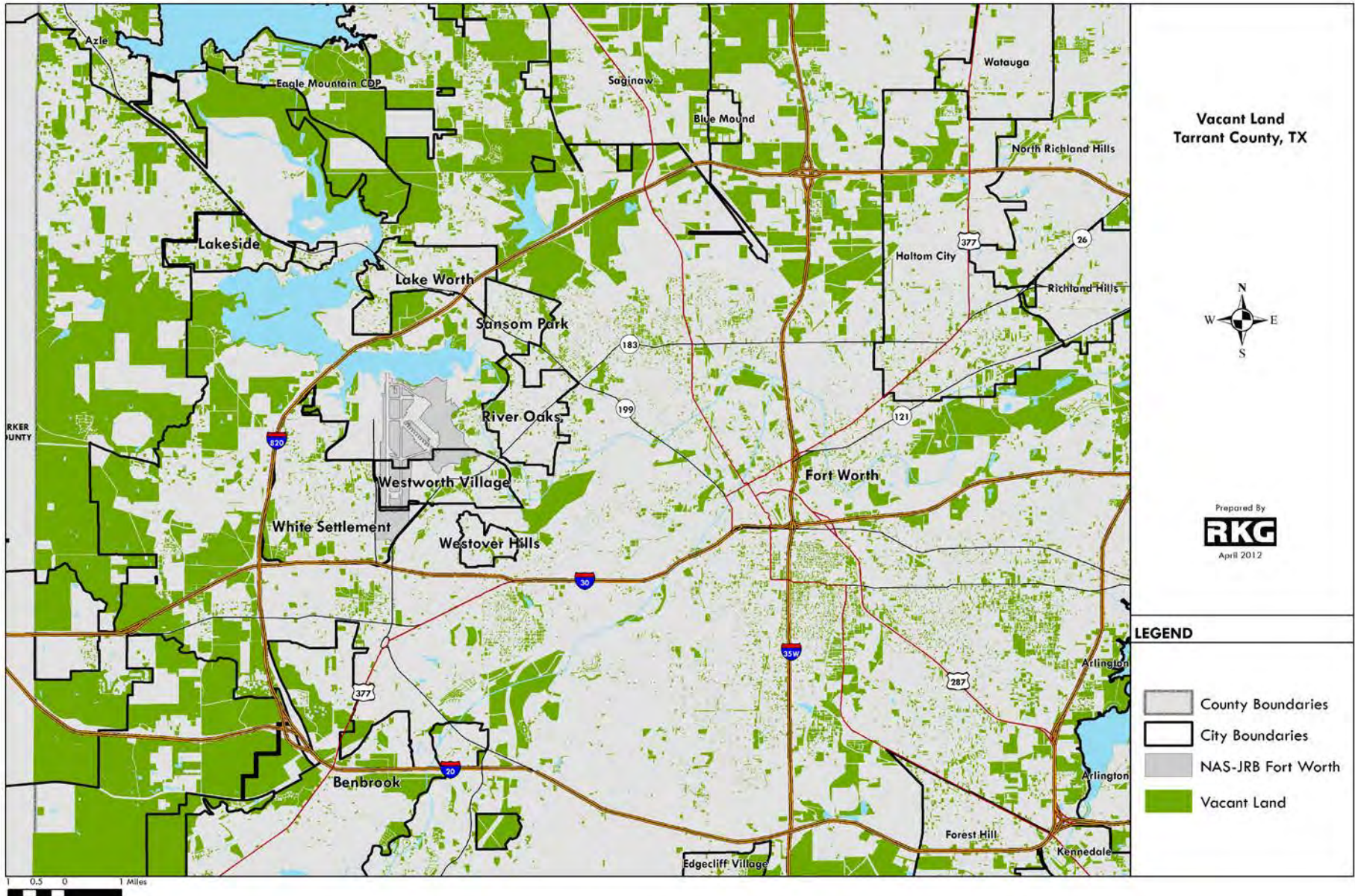
## **I. LAND AVAILABILITY**

In order to examine where future development might occur, an analysis of vacant parcels near and within the PLMC study area communities was conducted. The vacant land shown in Map 3 is representative of parcels with no buildings and classified as: (1) farmland, (2) timberland, (3) commercial, (4) industrial, and (5) undeveloped based on their land use codes. It should be noted that utilities, federally owned properties, Fort Worth Refuge, and institutional uses were sorted out of the analysis.

A particularly large cluster of undeveloped land exists within the PLMC study area near Fort Worth just south of River Oaks. It is categorized as farmland and is in a centrally located. There is also a large cluster of undeveloped land near the northeastern border of Benbrook, which is categorized as ranchland. Some of the largest vacant land parcels are located outside the study area communities along Loop 820. There are particularly large undeveloped parcels near the junction of Loop 820 and IH 20 near Benbrook. These areas appear to be unincorporated parts of Tarrant County.



Map 3



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# **APPENDIX**



**APPENDIX 1**  
Retail Gap Analysis  
1-Mile Trade Areas

NAICS	Category	Interstate 30 and Highway 183			Highway 199 and Highway 183			Interstate 820 and Highway 199			Interstate 20 and Highway 377		
		Demand	Supply	Retail Gap	Demand	Supply	Retail Gap	Demand	Supply	Retail Gap	Demand	Supply	Retail Gap
--	<b>Total Retail Sales</b>	<b>\$85,695,812</b>	<b>\$311,968,199</b>	<b>(\$226,272,387)</b>	<b>\$81,649,649</b>	<b>\$137,528,514</b>	<b>(\$55,878,865)</b>	<b>\$48,608,645</b>	<b>\$194,957,753</b>	<b>(\$146,349,108)</b>	<b>\$32,919,092</b>	<b>\$34,789,277</b>	<b>(\$1,870,185)</b>
NAICS 441	Motor Vehicle & Parts Dealers	\$17,236,662	\$67,135,451	(\$49,898,789)	\$16,864,349	\$58,238,078	(\$41,373,729)	\$9,886,882	\$7,216,304	\$2,670,578	\$6,576,705	\$460,177	\$6,116,528
NAICS 441	Automobile Dealers	\$14,833,762	\$60,600,343	(\$45,766,581)	\$14,534,745	\$56,207,373	(\$41,672,628)	\$8,531,812	\$3,660,472	\$4,871,340	\$5,613,443	\$27,339	\$5,586,104
NAICS 441	Other Motor Vehicle Dealers	\$1,141,759	\$3,833,583	(\$2,691,824)	\$1,157,208	\$113,988	\$1,043,220	\$652,292	\$467,764	\$184,528	\$480,377	\$32,185	\$448,192
NAICS 441	Auto Parts, Accessories, and Tire Stores	\$1,261,141	\$2,701,525	(\$1,440,384)	\$1,172,396	\$1,916,717	(\$744,321)	\$702,778	\$3,088,068	(\$2,385,290)	\$482,885	\$400,653	\$82,232
NAICS 442	Furniture & Home Furnishings Stores	\$2,232,423	\$2,555,620	(\$323,197)	\$2,115,364	\$3,715,209	(\$1,599,845)	\$1,259,888	\$2,973,361	(\$1,713,473)	\$922,977	\$597,438	\$325,539
NAICS 442	Furniture Stores	\$1,542,705	\$1,080,221	\$462,484	\$1,459,129	\$3,458,920	(\$1,999,791)	\$868,250	\$1,023,506	(\$155,256)	\$620,019	\$0	\$620,019
NAICS 442	Home Furnishings Stores	\$689,718	\$1,475,399	(\$785,681)	\$656,235	\$256,289	\$399,946	\$391,638	\$1,949,855	(\$1,558,217)	\$302,958	\$597,438	(\$294,480)
NAICS 443	Electronics & Appliance Stores	\$2,242,313	\$6,086,764	(\$3,844,451)	\$2,117,136	\$521,173	\$1,595,963	\$1,265,021	\$8,287,083	(\$7,022,062)	\$866,425	\$322,239	\$544,186
NAICS 444	Bldg Materials, Garden Equip. & Supply Stores	\$2,602,168	\$5,908,750	(\$3,306,582)	\$2,605,351	\$715,671	\$1,889,680	\$1,494,639	\$25,962,022	(\$24,467,383)	\$1,197,077	\$37,625	\$1,159,452
NAICS 444	Building Material and Supplies Dealers	\$2,396,863	\$4,096,496	(\$1,699,633)	\$2,392,216	\$591,729	\$1,800,487	\$1,372,296	\$25,962,022	(\$24,589,726)	\$1,099,649	\$0	\$1,099,649
NAICS 444	Lawn and Garden Equipment and Supplies Stores	\$205,305	\$1,812,254	(\$1,606,949)	\$213,135	\$123,942	\$89,193	\$122,343	\$0	\$122,343	\$97,428	\$37,625	\$59,803
NAICS 445	Food & Beverage Stores	\$14,748,755	\$61,953,114	(\$47,204,359)	\$13,939,634	\$14,979,688	(\$1,040,054)	\$8,265,709	\$16,940,080	(\$8,674,371)	\$5,500,756	\$572,067	\$4,928,689
NAICS 445	Grocery Stores	\$13,658,803	\$58,865,471	(\$45,206,668)	\$12,948,646	\$14,022,030	(\$1,073,384)	\$7,663,683	\$14,955,810	(\$7,292,127)	\$5,097,938	\$572,067	\$4,525,871
NAICS 445	Specialty Food Stores	\$448,008	\$1,282,116	(\$834,108)	\$423,697	\$482,948	(\$59,251)	\$249,959	\$357,968	(\$108,009)	\$165,200	\$0	\$165,200
NAICS 445	Beer, Wine, and Liquor Stores	\$641,944	\$1,805,527	(\$1,163,583)	\$567,291	\$474,710	\$92,581	\$352,067	\$1,626,302	(\$1,274,235)	\$237,618	\$0	\$237,618
NAICS 446	Health & Personal Care Stores	\$2,419,464	\$11,291,180	(\$8,871,716)	\$2,374,499	\$6,192,836	(\$3,818,337)	\$1,390,505	\$9,358,034	(\$7,967,529)	\$986,080	\$2,511,698	(\$1,525,618)
NAICS 447	Gasoline Stations	\$11,854,583	\$23,286,389	(\$11,431,806)	\$11,621,701	\$24,426,860	(\$12,805,159)	\$6,868,685	\$22,671,458	(\$15,802,773)	\$4,455,053	\$10,122,385	(\$5,667,332)
NAICS 448	Clothing and Clothing Accessories Stores	\$3,212,526	\$39,997,651	(\$36,785,125)	\$2,935,300	\$359,280	\$2,576,020	\$1,793,794	\$3,061,680	(\$1,267,886)	\$1,216,639	\$412,014	\$804,625
NAICS 448	Clothing Stores	\$2,562,329	\$32,322,299	(\$29,759,970)	\$2,346,838	\$80,327	\$2,266,511	\$1,433,511	\$2,424,254	(\$990,743)	\$972,121	\$412,014	\$560,107
NAICS 448	Shoe Stores	\$339,129	\$3,945,801	(\$3,606,672)	\$314,363	\$136,001	\$178,362	\$187,944	\$604,576	(\$416,632)	\$118,377	\$0	\$118,377
NAICS 448	Jewelry, Luggage, and Leather Goods Stores	\$311,068	\$3,729,551	(\$3,418,483)	\$274,099	\$142,952	\$131,147	\$172,339	\$32,850	\$139,489	\$126,141	\$0	\$126,141
NAICS 451	Sporting Goods, Hobby, Book, and Music Stores	\$1,260,623	\$9,809,736	(\$8,549,113)	\$1,138,841	\$0	\$1,138,841	\$700,357	\$1,987,711	(\$1,287,354)	\$470,494	\$0	\$470,494
NAICS 451	Sporting Goods/Hobby/Musical Instrument Stores	\$719,635	\$7,532,411	(\$6,812,776)	\$670,050	\$0	\$670,050	\$405,533	\$1,835,888	(\$1,430,355)	\$278,332	\$0	\$278,332
NAICS 451	Book, Periodical, and Music Stores	\$540,988	\$2,277,325	(\$1,736,337)	\$468,791	\$0	\$468,791	\$294,824	\$151,823	\$143,001	\$192,162	\$0	\$192,162
NAICS 452	General Merchandise Stores	\$11,638,738	\$36,678,176	(\$25,039,438)	\$11,029,137	\$11,469,059	(\$439,922)	\$6,562,429	\$45,622,359	(\$39,059,930)	\$4,442,191	\$4,927,469	(\$485,278)
NAICS 452	Department Stores Excluding Leased Depts.	\$4,512,867	\$11,251,659	(\$6,738,792)	\$4,266,900	\$0	\$4,266,900	\$2,547,478	\$34,116,739	(\$31,569,261)	\$1,748,898	\$1,647,277	\$101,621
NAICS 452	Other General Merchandise Stores	\$7,125,871	\$25,426,517	(\$18,300,646)	\$6,762,237	\$11,469,059	(\$4,706,822)	\$4,014,951	\$11,505,620	(\$7,490,669)	\$2,693,293	\$3,280,192	(\$586,899)
NAICS 453	Miscellaneous Store Retailers	\$1,028,895	\$5,765,678	(\$4,736,783)	\$982,743	\$2,728,821	(\$1,746,078)	\$585,874	\$2,911,300	(\$2,325,426)	\$408,447	\$307,901	\$100,546
NAICS 453	Florists	\$87,318	\$193,825	(\$106,507)	\$91,449	\$111,354	(\$19,905)	\$52,303	\$128,924	(\$76,621)	\$42,344	\$89,724	(\$47,380)
NAICS 453	Office Supplies, Stationery, and Gift Stores	\$377,439	\$3,430,525	(\$3,053,086)	\$359,410	\$35,049	\$324,361	\$212,518	\$1,726,215	(\$1,513,697)	\$148,555	\$4,241	\$144,314
NAICS 453	Used Merchandise Stores	\$104,176	\$151,241	(\$47,065)	\$91,896	\$919,459	(\$827,563)	\$57,106	\$53,736	\$3,370	\$37,973	\$141,741	(\$103,768)
NAICS 453	Other Miscellaneous Store Retailers	\$459,962	\$1,990,087	(\$1,530,125)	\$439,988	\$1,662,959	(\$1,222,971)	\$263,947	\$1,002,425	(\$738,478)	\$179,575	\$72,195	\$107,380
NAICS 454	Nonstore Retailers	\$2,283,057	\$897,886	\$1,385,171	\$2,147,579	\$0	\$2,147,579	\$1,306,239	\$691,426	\$614,813	\$949,171	\$13,533	\$935,638
NAICS 454	Electronic Shopping and Mail-Order Houses	\$1,603,437	\$471,908	\$1,131,529	\$1,495,344	\$0	\$1,495,344	\$899,307	\$0	\$899,307	\$621,825	\$0	\$621,825
NAICS 454	Vending Machine Operators	\$184,052	\$80,725	\$103,327	\$172,632	\$0	\$172,632	\$102,691	\$368,106	(\$265,415)	\$67,589	\$13,533	\$54,056
NAICS 454	Direct Selling Establishments	\$495,568	\$345,253	\$150,315	\$479,603	\$0	\$479,603	\$304,241	\$323,320	(\$19,079)	\$259,757	\$0	\$259,757
NAICS 722	Food Services & Drinking Places	\$12,935,605	\$40,601,804	(\$27,666,199)	\$11,778,015	\$14,181,839	(\$2,403,824)	\$7,228,623	\$47,274,935	(\$40,046,312)	\$4,927,077	\$14,504,731	(\$9,577,654)
NAICS 722	Full-Service Restaurants	\$4,978,674	\$7,933,911	(\$2,955,237)	\$4,503,085	\$7,939,283	(\$3,436,198)	\$2,777,258	\$17,946,412	(\$15,169,154)	\$1,921,955	\$2,870,314	(\$948,359)
NAICS 722	Limited-Service Eating Places	\$6,776,634	\$30,154,482	(\$23,377,848)	\$6,239,690	\$5,766,004	\$473,686	\$3,796,639	\$28,339,561	(\$24,542,922)	\$2,563,123	\$11,299,508	(\$8,736,385)
NAICS 722	Special Food Services	\$732,566	\$366,806	\$365,760	\$671,786	\$40,120	\$631,666	\$410,060	\$330,126	\$79,934	\$276,906	\$334,909	(\$58,003)
NAICS 722	Drinking Places - Alcoholic Beverages	\$447,731	\$2,146,605	(\$1,698,874)	\$363,454	\$436,432	(\$72,978)	\$244,666	\$658,836	(\$414,170)	\$165,093	\$0	\$165,093

Source: ESRI and RKG Associates, Inc., 2012

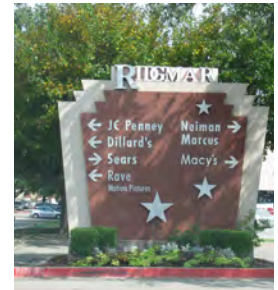
**APPENDIX 2**  
**Retail Gap Analysis**  
**3-Mile Trade Areas**

NAICS	Category	Interstate 30 and Highway 183			Highway 199 and Highway 183			Interstate 820 and Highway 199			Interstate 20 and Highway 377		
		Demand	Supply	Retail Gap	Demand	Supply	Retail Gap	Demand	Supply	Retail Gap	Demand	Supply	Retail Gap
--	<b>Total Retail Sales</b>	<b>\$818,972,012</b>	<b>\$1,591,604,549</b>	<b>(\$772,632,537)</b>	<b>\$508,943,907</b>	<b>\$984,130,800</b>	<b>(\$475,186,893)</b>	<b>\$343,035,119</b>	<b>\$421,252,943</b>	<b>(\$78,217,824)</b>	<b>\$677,483,963</b>	<b>\$955,751,404</b>	<b>(\$278,267,441)</b>
NAICS 441	Motor Vehicle & Parts Dealers	\$164,619,175	\$620,586,654	(\$455,967,479)	\$104,697,715	\$367,369,147	(\$262,671,432)	\$70,683,924	\$61,276,038	\$9,407,886	\$137,532,214	\$513,038,570	(\$375,506,356)
NAICS 4411	Automobile Dealers	\$140,906,527	\$592,890,045	(\$451,983,518)	\$90,037,798	\$350,064,270	(\$260,026,472)	\$60,754,946	\$52,360,776	\$8,394,170	\$117,811,710	\$496,756,038	(\$378,944,328)
NAICS 4412	Other Motor Vehicle Dealers	\$11,721,375	\$11,824,695	(\$103,320)	\$7,322,621	\$7,484,794	(\$162,173)	\$4,994,517	\$1,230,438	\$3,764,079	\$9,764,001	\$3,245,655	\$6,518,346
NAICS 4413	Auto Parts, Accessories, and Tire Stores	\$11,991,273	\$15,871,914	(\$3,880,641)	\$7,337,296	\$9,820,083	(\$2,482,787)	\$4,934,461	\$7,684,824	(\$2,750,363)	\$9,956,503	\$13,036,877	(\$3,080,374)
NAICS 442	Furniture & Home Furnishings Stores	\$21,997,635	\$11,272,215	\$10,725,420	\$13,288,640	\$21,572,658	(\$8,284,018)	\$9,000,804	\$8,572,237	\$428,567	\$18,652,717	\$22,285,506	(\$3,632,789)
NAICS 4421	Furniture Stores	\$15,042,707	\$5,394,486	\$9,648,221	\$9,172,016	\$17,890,634	(\$8,718,618)	\$6,180,637	\$4,920,295	\$1,260,342	\$12,768,586	\$20,041,772	(\$7,273,186)
NAICS 4422	Home Furnishings Stores	\$6,954,928	\$5,877,729	\$1,077,199	\$4,116,624	\$3,682,024	\$434,600	\$2,820,167	\$3,651,942	(\$831,775)	\$5,884,131	\$2,243,734	\$3,640,397
NAICS 443/NAICS 4431	Electronics & Appliance Stores	\$21,486,456	\$119,642,937	(\$98,156,481)	\$13,198,518	\$12,832,466	\$366,052	\$8,968,199	\$9,277,200	(\$309,001)	\$17,947,057	\$15,472,562	\$2,474,495
NAICS 444	Bldg Materials, Garden Equip. & Supply Stores	\$27,050,533	\$28,195,586	(\$1,145,053)	\$16,446,362	\$32,386,110	(\$15,939,748)	\$11,159,009	\$28,260,669	(\$17,101,660)	\$22,993,078	\$12,745,824	\$10,247,254
NAICS 4441	Building Material and Supplies Dealers	\$24,872,965	\$24,075,192	\$797,773	\$15,110,867	\$30,736,156	(\$15,625,289)	\$10,238,236	\$27,908,762	(\$17,670,526)	\$21,170,711	\$10,339,624	\$10,831,087
NAICS 4442	Lawn and Garden Equipment and Supplies Stores	\$2,177,568	\$4,120,394	(\$1,942,826)	\$1,335,495	\$1,649,954	(\$314,459)	\$920,773	\$351,907	\$568,866	\$1,822,367	\$2,406,200	(\$583,833)
NAICS 445	Food & Beverage Stores	\$138,914,571	\$226,316,000	(\$87,401,429)	\$86,813,451	\$131,902,315	(\$45,088,864)	\$57,947,617	\$45,412,800	\$12,534,817	\$113,369,952	\$58,213,256	\$55,156,696
NAICS 4451	Grocery Stores	\$128,682,616	\$215,149,029	(\$86,466,413)	\$80,606,082	\$116,988,906	(\$36,382,824)	\$53,774,310	\$38,682,257	\$15,092,053	\$104,934,113	\$54,837,289	\$50,096,824
NAICS 4452	Specialty Food Stores	\$4,191,972	\$3,962,535	\$229,437	\$2,634,555	\$3,013,946	(\$379,391)	\$1,752,906	\$992,890	\$760,016	\$3,419,897	\$416,381	\$3,003,516
NAICS 4453	Beer, Wine, and Liquor Stores	\$6,039,983	\$7,204,436	(\$1,164,453)	\$3,572,814	\$11,899,463	(\$8,326,649)	\$2,420,401	\$5,737,653	(\$3,317,252)	\$5,015,942	\$2,959,586	\$2,056,356
NAICS 446/NAICS 4461	Health & Personal Care Stores	\$23,756,274	\$40,978,627	(\$17,222,353)	\$14,820,315	\$22,959,063	(\$8,138,748)	\$9,948,733	\$20,564,176	(\$10,615,443)	\$19,377,892	\$31,343,087	(\$11,965,195)
NAICS 447/NAICS 4471	Gasoline Stations	\$112,489,447	\$113,021,597	(\$532,150)	\$71,871,786	\$80,009,636	(\$8,137,850)	\$48,351,907	\$67,259,330	(\$18,907,423)	\$91,898,625	\$67,219,040	\$24,679,585
NAICS 448	Clothing and Clothing Accessories Stores	\$30,473,500	\$53,213,233	(\$22,739,733)	\$18,394,433	\$19,146,946	(\$752,513)	\$12,431,859	\$6,589,991	\$5,841,868	\$25,394,143	\$24,210,399	\$1,183,744
NAICS 4481	Clothing Stores	\$24,279,320	\$40,659,457	(\$16,380,137)	\$14,682,169	\$13,101,233	\$1,580,936	\$9,935,461	\$5,276,666	\$4,658,795	\$20,221,805	\$20,951,386	(\$729,581)
NAICS 4482	Shoe Stores	\$3,111,474	\$5,536,080	(\$2,424,606)	\$1,956,261	\$4,461,580	(\$2,505,319)	\$1,298,323	\$994,505	\$303,818	\$2,562,979	\$1,323,840	\$1,239,139
NAICS 4483	Jewelry, Luggage, and Leather Goods Stores	\$3,082,706	\$7,017,696	(\$3,934,990)	\$1,756,003	\$1,584,133	\$171,870	\$1,198,075	\$318,820	\$879,255	\$2,609,359	\$1,935,173	\$674,186
NAICS 451	Sporting Goods, Hobby, Book, and Music Stores	\$11,962,442	\$20,055,590	(\$8,093,148)	\$7,126,043	\$6,247,301	\$878,742	\$4,890,457	\$4,246,117	\$644,340	\$9,915,374	\$7,216,595	\$2,698,779
NAICS 4511	Sporting Goods/Hobby/Musical Instrument Stores	\$6,918,217	\$16,159,064	(\$9,240,847)	\$4,193,182	\$5,549,356	(\$1,356,174)	\$2,871,397	\$3,614,968	(\$743,571)	\$5,776,288	\$5,295,713	\$480,575
NAICS 4512	Book, Periodical, and Music Stores	\$5,044,225	\$3,896,526	\$1,147,699	\$2,932,861	\$697,945	\$2,234,916	\$2,019,060	\$631,149	\$1,387,911	\$4,139,086	\$1,920,882	\$2,218,204
NAICS 452	General Merchandise Stores	\$110,845,831	\$183,830,675	(\$72,984,844)	\$68,782,396	\$98,288,350	(\$29,505,954)	\$46,236,447	\$82,219,365	(\$35,982,918)	\$91,233,405	\$97,176,119	(\$5,942,714)
NAICS 4521	Department Stores Excluding Leased Depts.	\$43,252,178	\$61,925,120	(\$18,672,942)	\$26,650,822	\$39,368,685	(\$12,717,863)	\$17,993,203	\$48,882,307	(\$30,889,104)	\$35,950,244	\$23,693,102	\$12,257,142
NAICS 4529	Other General Merchandise Stores	\$67,593,653	\$121,905,555	(\$54,311,902)	\$42,131,574	\$58,919,665	(\$16,788,091)	\$28,243,244	\$33,337,058	(\$5,093,814)	\$55,283,161	\$73,483,017	(\$18,199,856)
NAICS 453	Miscellaneous Store Retailers	\$10,026,299	\$14,556,473	(\$4,530,174)	\$6,157,706	\$17,908,996	(\$11,751,290)	\$4,182,635	\$6,384,193	(\$2,201,558)	\$8,277,956	\$6,628,582	\$1,649,374
NAICS 4531	Florists	\$936,547	\$942,737	(\$6,190)	\$573,126	\$1,649,892	(\$1,076,766)	\$396,023	\$395,034	\$989	\$784,791	\$249,075	\$535,716
NAICS 4532	Office Supplies, Stationery, and Gift Stores	\$3,643,833	\$7,795,021	(\$4,151,188)	\$2,250,134	\$4,690,283	(\$2,440,149)	\$1,515,895	\$2,277,822	(\$761,927)	\$3,030,795	\$3,123,411	(\$92,616)
NAICS 4533	Used Merchandise Stores	\$980,102	\$565,976	\$414,126	\$575,731	\$1,660,978	(\$1,085,247)	\$394,069	\$1,018,251	(\$624,182)	\$809,310	\$396,602	\$412,708
NAICS 4539	Other Miscellaneous Store Retailers	\$4,465,817	\$5,252,739	(\$786,922)	\$2,758,715	\$9,907,843	(\$7,149,128)	\$1,876,648	\$2,693,086	(\$816,438)	\$3,653,060	\$2,859,494	\$793,566
NAICS 454	Nonstore Retailers	\$22,688,704	\$9,625,393	\$13,063,311	\$13,630,287	\$9,524,782	\$4,105,505	\$9,145,000	\$2,120,977	\$7,024,023	\$18,572,490	\$4,972,322	\$13,600,168
NAICS 4541	Electronic Shopping and Mail-Order Houses	\$15,406,749	\$7,623,132	\$7,783,617	\$9,363,817	\$6,693,280	\$2,670,537	\$6,340,778	\$1,089,020	\$5,251,758	\$12,774,116	\$4,131,867	\$8,642,249
NAICS 4542	Vending Machine Operators	\$1,720,996	\$472,844	\$1,248,152	\$1,074,753	\$2,139,386	(\$1,064,633)	\$717,055	\$511,258	\$205,797	\$1,404,426	\$383,443	\$1,020,983
NAICS 4543	Direct Selling Establishments	\$5,560,959	\$1,529,417	\$4,031,542	\$3,191,717	\$692,116	\$2,499,601	\$2,087,167	\$520,699	\$1,566,468	\$4,393,948	\$457,012	\$3,936,936
NAICS 722	Food Services & Drinking Places	\$122,661,145	\$150,309,569	(\$27,648,424)	\$73,716,255	\$163,983,030	(\$90,266,775)	\$50,088,528	\$79,069,850	(\$28,981,322)	\$102,319,060	\$95,229,542	\$7,089,518
NAICS 7221	Full-Service Restaurants	\$47,491,961	\$51,356,625	(\$3,864,664)	\$28,241,292	\$83,051,216	(\$54,809,924)	\$19,228,676	\$31,129,067	(\$11,900,391)	\$39,682,316	\$38,279,771	\$1,402,545
NAICS 7222	Limited-Service Eating Places	\$64,024,746	\$86,777,503	(\$22,752,757)	\$38,968,399	\$49,304,562	(\$10,336,163)	\$26,410,682	\$45,280,770	(\$18,870,088)	\$53,355,543	\$50,984,855	\$2,370,688
NAICS 7223	Special Food Services	\$6,921,350	\$2,415,985	\$4,505,365	\$4,197,704	\$20,730,409	(\$16,532,705)	\$2,847,083	\$1,309,041	\$1,538,042	\$5,767,861	\$590,181	\$5,177,680
NAICS 7224	Drinking Places - Alcoholic Beverages	\$4,223,088	\$9,759,456	(\$5,536,368)	\$2,308,860	\$10,896,843	(\$8,587,983)	\$1,602,087	\$1,350,972	\$251,115	\$3,513,340	\$5,374,735	(\$1,861,395)

Source: ESRI and RKG Associates, Inc., 2012

# APPENDIX E | BROOKINGS - ROCKEFELLER PROJECT

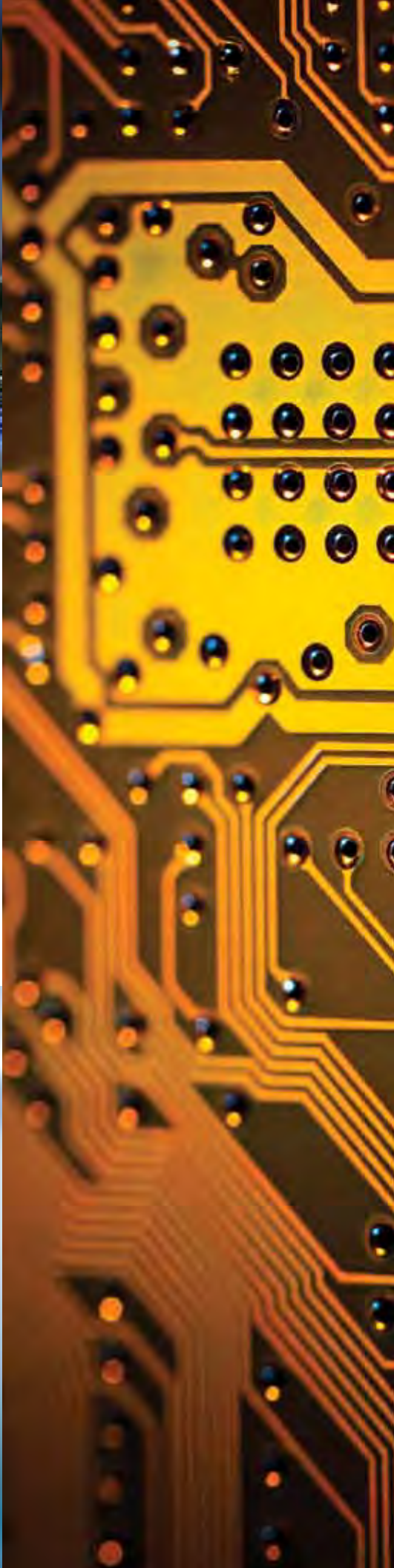
## 10 STEPS TO DELIVERING A SUCCESSFUL METROPOLITAN EXPORT PLAN







**TEN STEPS  
TO DELIVERING  
A SUCCESSFUL  
METRO  
EXPORT PLAN**







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**BROOKINGS-ROCKEFELLER PROJECT  
ON STATE AND METROPOLITAN INNOVATION**

BRAD MCDEARMAN AND AMY LIU

**METRO EXPORT  
INITIATIVE**  
TEN STEPS  
TO DELIVERING  
A SUCCESSFUL  
METROPOLITAN  
EXPORT PLAN



## SUMMARY

**M**any leaders in states, cities, and metropolitan areas across the country are exploring ways to help their firms tap into expanding markets worldwide to grow jobs at home. This brief serves as a how-to-guide for private, nonprofit, and government leaders in metro areas who are interested in developing effective action-oriented metropolitan export plans and initiatives customized to their region's unique assets and capacities. It builds on lessons learned from a one-year pilot (2011-2012) where the Metropolitan Policy Program at Brookings collaborated with leaders in four metro areas to develop localized export plans. Metro leaders play a critical role in a trade promotion and development infrastructure long served mostly by states and the federal government. Metro areas are uniquely positioned to identify and increase the number of firms ready to export and to make exports and global engagement a central, consistent part of broader regional economic strategies. This brief aims to help more metro areas adopt or refine their global trade strategies so the nation can remain a center of growth and innovation for years to come.

Ten key steps are suggested to regions seeking to deliver a successful metropolitan export plan. They are:

- ① **Go Metro to Go Global**—Markets are regional and export strategies foster regional collaboration in economic development.
- ② **Organize for Success**—The planning effort must have the stated commitment of local leaders and be well-organized at the outset to create a culture change in economic development practice.
- ③ **Produce a Data-Driven Market Scan**—A credible export plan is built on a solid foundation of data and information about the region's export performance and potential.
- ④ **Capture Local Market Insight**—At the heart of the local market assessment is direct input from firms and service providers obtained through surveys and one-on-one interviews.
- ⑤ **Champion Exports Now**—Promoting and communicating the importance of exports to the region's long-term economic future is critical to ensure the export plan is embraced.
- ⑥ **Develop a Customized Export Plan**— A clear, easy-to-read document will serve as a strong vehicle for galvanizing stakeholders to act on and support the exports opportunity.
- ⑦ **Prepare for Implementation**—A detailed implementation (or business) plan that delineates how the export plan will be executed must include details on deliverables, phasing, budgets, and the division of labor among lead organizations.
- ⑧ **Identify and Promote Policy Priorities**— Metro leaders should articulate and advance a state and federal policy agenda that will foster an environment for enabling the region's exports to thrive.
- ⑨ **Track and Publicize Progress**—The metro export team will need to identify metrics that are most realistic to collect locally and dedicate resources to maintaining, analyzing, and reporting progress.
- ⑩ **Mainstream Exports into Economic Development**—For a region's economy to fully benefit from international trade, exports must be an integral part of a multi-pronged economic growth agenda that includes innovation, transportation and logistics, and global talent.

## INTRODUCTION

**A**cross the country, regional leaders are re-examining their job and economic growth strategies in the wake of the Great Recession. At the core of their reexamination is a heightened interest in tapping the growth of expanding markets worldwide to grow jobs and the economy here at home.

New strategies make sense, as the rules for economic growth have changed dramatically, especially in recent years. While rising markets have been “emerging” for some time, it was in 2010 that the BIC (Brazil, India, and China) nations’ combined share of the economic output in the world economy first surpassed that of the United States.<sup>1</sup> As these and other countries industrialized, they also urbanized. In 2008, the majority of the world’s citizens for the first

time lived in metro areas, with that share expected to grow to 70 percent by 2050.<sup>2</sup> Even highly rural China is now majority urban.<sup>3</sup> These twin forces of rapid industrialization and urbanization have contributed to the growth of the world’s middle class and therefore purchasing power.<sup>4</sup> All told, more than 70 percent of the world’s purchasing power is now located outside of the United States.<sup>5</sup>





These trends point to a great market opportunity for U.S. firms and local economies. The more U.S. goods and services are the product or solution of choice around the world, the more increased foreign demand will translate into more jobs, greater revenue, and better wages for American businesses and workers. Further, to create globally competitive products and services requires, in part, more American workers to engage in understanding the cultures, preferences, and needs of different customers around the world.

The purpose of this brief is to provide private, nonprofit, and government leaders in U.S. metro areas a concise road-map to take advantage of the enormous market opportunity offered by exports. It serves as a “how-to” guide for regional leaders interested in developing effective action-oriented metropolitan export plans and initiatives customized to their

unique assets and capacities. This guide builds from the lessons learned from a one-year pilot (2011-2012) launched by the Metropolitan Policy Program at

Brookings in which the program collaborated with leaders in four metro areas in developing localized export plans. That pilot was further enhanced by a formal collaboration with the U.S. Department of Commerce International Trade Administration and their partner agencies within the National Export Initiative. Much was learned. Most fundamental is that while there is a laudable national goal to “double exports,” there is no one-size-fits-all approach to doing so. Though each metro area in the pilot set the common goal of doubling exports in five years, each laid out very different strategies and different operational structures to achieve that goal, reflecting the unique market advantages and contexts of their respective regions.

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A plan to boost a state or region's exports must start with a fundamental understanding of why exporting is critical to economic prosperity and why metro areas are the right lens from which to design and act on regional potential to trade and grow jobs and revenue.

### WHAT IS AN EXPORT?

There are three primary ways to define an "export" at the metropolitan or regional level: (1) the sale of goods or services produced in a metro area to a business or resident of a foreign country; (2) shipments that travel from a broader geographic area (e.g., entire country) through a port to a foreign destination; and (3) shipments that travel from a broader geographic area through a customs district on their way to a foreign destination. The second two definitions relate to the point of movement of goods based on shipments and excludes services exports (for example, in Los Angeles, shipments come from throughout the U.S. and are processed through Los Angeles and Long Beach ports before going overseas). The first relates to where the product or service is actually produced. In Brookings' "Export Nation" report, exports are defined by the first method and include these types of exports from a metro area:

- ▶ **Goods:** These are manufactured goods or parts, such as U.S.-made automobiles shipped for sale to the United Kingdom
- ▶ **Services:** Services exports come in many forms. They can be purchased overseas, such as work done by a metro-based engineer or architect on a project in China. They can also be purchased in the United States, such as foreign students from India purchasing education services at a U.S. university. Or, they can be tourism-related services, such as a Canadian resident making expenditures on such items as taxis, restaurants, entertainment, clothing, lodging, or health care while visiting a U.S. metro area
- ▶ **Royalties:** These are payments made by foreign companies to distribute U.S. film and television shows overseas, to software companies for licensing fees, or to retail firms for franchising fees
- ▶ **Secondary Exports:** These are product or service inputs into exports from companies in the supply-chain

What makes something a U.S. (or metro) export is not where the transaction takes place, but whether or not the buyer is based outside the United States.



## WHY EXPORTS MATTER

Exports matter because they represent one critical way to grow the tradable sectors of our economy— the very sectors that drive wealth, boost productivity, and grow local industries. U.S. tradable sectors have severely underperformed in the last few decades.<sup>6</sup> To reverse that trend, states and metro areas can help firms in key industry sectors grow and innovate by selling their goods and services globally. Exporting firms have been major contributors to the nation's economic recovery. Exports accounted for nearly half of the nation's economic growth in the first year of the post-recession recovery and can power economic growth over the long haul.<sup>7</sup>

The benefits of helping more firms, and the entire economy, tap and engage global markets are many:

- The production of exported goods and services creates jobs, both directly and indirectly in the supply chain. One study finds that every \$1 billion in new exports creates 5,400 additional jobs<sup>8</sup>
- The movement of goods exports and passenger travel (for business services and tourism) supports jobs and revenues in the port, airport, freight, and logistics sector<sup>9</sup>
- Education services exports, characterized by international students purchasing a U.S. education, represent a \$21.3 billion industry and generate a critical source of revenue and talent for public and private higher education institutions<sup>10</sup>
- Export sector jobs pay well. For every \$10 billion in sales in a metropolitan export industry, its workers earn 10 to 20 percent higher wages than those in nonexporting jobs<sup>11</sup>
- Small- and mid-sized firms (SMEs) that export generally experience greater revenue growth than non-exporters and weathered the recession better as a result; in one study, SME manufacturing exporters grew revenues by 37 percent while non-exporting manufacturers experienced a 7 percent decline in revenues<sup>12</sup>

- Exporting spurs innovation. Small- and mid-sized firms that export tend to innovate more in products and processes than non-exporters; further, high-exporting metro areas also generate high patenting rates<sup>13</sup>

Despite these benefits, we remain a nation of under-exporters. Only 1 percent of American firms sell a product or service outside U.S. borders.<sup>14</sup> Only about 35 percent of Americans possess a passport.<sup>15</sup> That figure is 60 percent in Canada.<sup>16</sup> The result is a U.S. economy, reliant upon domestic demand, less export-oriented – at 13 percent of its overall economy– than many of our global peers and trading partners.<sup>17</sup>

Global market trends show that past practice will not be sufficient to fuel American competitiveness. To make the shift to greater global orientation, it is time not just to embrace a national export strategy but a series of bottom-up metropolitan export strategies that will boost trade and global engagement in the very places where America's high value goods and services are produced.

## WHY METRO EXPORT PLANS

Recognizing the rationale for greater U.S. exporting, President Obama announced the National Export Initiative (NEI) during the 2010 State of the Union, with the stated goal of doubling U.S. exports in five years, from \$1.57 trillion to \$3.14 trillion by the end of 2014.<sup>18</sup> To meet the NEI goal, a multi-faceted National Export Strategy was released in June 2011 by the Trade Promotion and Coordinating Committee (TPCC), which includes grounding the strategy in states and metro areas. [See **Appendices A** and **B** for more information about the NEI and the TPCC] The President's Export Council (PEC) also reinforced the importance of federal alignment with state and local efforts in a June 2012 letter to the president.<sup>19</sup>

The focus on metro areas and metro leaders is correct. As research by Brookings and others have shown, the global economy is made up of a network of distinct metro economies.<sup>20</sup> Boosting exports requires

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a targeted strategy to grow industry specializations at the point of production in metro areas where they cluster and innovate, and then connect leading-edge goods and services to likely metro markets around the world. Already, the 100 largest metro areas are the producers of our trade economy, generating nearly 65 percent of all exports and 75 percent of all services exports.<sup>21</sup> They are the hubs of supply chains, goods movements, and business and tourism travel, handling 82 percent of the nation's air freight, 88 percent of foreign waterborne cargo weight and 92 percent of air passengers.<sup>22</sup> As a result of these economic assets, the 100 largest metro areas generate 75 percent of the nation's economic output and the majority of economic output in 47 out of 50 states.<sup>23</sup>

Regional leaders know their companies and their industry strengths best and can help bring more small- and mid-sized firms into the international marketplace.

To this end, Brookings launched the Metropolitan Export Initiative (MEI), a signature effort within the Brookings-Rockefeller Project on State and Metropolitan Innovation aimed at helping the nation and its regions and firms move from aspiration to action on exporting. The goal was to work with a limited number of state and metro leaders to develop and implement customized metro export plans. During the course of 2011 and 2012, Brookings partnered with a cross-section of leaders in four metro areas: Los Angeles, CA; Portland, OR; Minneapolis-Saint Paul, MN; and Syracuse/Central New York, NY. These metro areas were chosen in part because of their geographic diversity, variation in industry mix, strong engagement of state and regional leaders, history of effective regional collaboration, and a demonstrated commitment to exports as part of a larger economic strategy. These plans are currently being implemented.

The hard work and experimentation carried out by leaders in these four metro areas are shedding light on the critical role that metropolitan areas armed with smart metropolitan export plans can play in an export-promotion system long driven by states and the federal government. Despite some initial concerns, the early evidence suggests that metro export

plans do not usurp state and federal activities but instead supplement and fill key gaps, thereby improving the performance of the existing delivery system. So far, the plans have seemed to channel at least four major benefits of metropolitan-level problem-solving on exporting:

- Metro leaders can proactively increase the number of firms who are ready to export or export to additional markets because they have strong direct relationships with firms and know the firms and actors in their leading industry clusters
- Metro leaders can help create a more transparent, coordinated (federal, state, local alignment), and efficient export assistance system that is moving toward common goals
- Metro leaders can help facilitate the cultural shift needed to embrace global engagement by making exports and trade a mainstream part of regional economic development
- Finally, metro area leaders are best positioned to integrate exports into a broader economic strategy for growth and global competitiveness in the "next economy." This means aligning exports and foreign direct investment with innovation in manufacturing and services (including in the clean economy); transformative investments in freight and logistics; and the grooming of a globally fluent workforce.

In short, the nation's ambition to grow jobs and exports relies upon metro area leaders taking the lead, with state and federal leaders as partners. This guide gives metro area leaders the tools and steps they need to develop purposeful, tailored metro export plans that will grow their regional economies and further the economic growth of their states and the national economy as a whole.



## TEN STEPS TO DELIVERING A SUCCESSFUL METROPOLITAN EXPORT PLAN

**G**iven the compelling case for metropolitan exporting, more and more state and local leaders have expressed interest in developing and implementing unique, ground-up metropolitan export plans for their regional markets. These leaders not only aspire to increase exporting from their jurisdictions but seek practical guidance on how to get to work right away. The ten steps outlined here aim to help economic development practitioners, government leaders, businesses, and other local stakeholders not only develop a quality plan, but to develop one that has a strong chance of being effectively implemented.

- 1 Go Metro to Go Global
- 2 Organize for Success
- 3 Produce a Data-Driven Market Scan
- 4 Capture Local Market Insight
- 5 Champion Exports Now
- 6 Develop a Customized Export Plan
- 7 Prepare for Implementation
- 8 Identify and Promote Policy Priorities
- 9 Track and Publicize Progress
- 10 Mainstream Exports into Economic Development

### A PRIMER ON KEY EXPORT-RELATED TERMINOLOGY, LESSONS, AND OBSERVATIONS FROM THE FOUR METRO EXPORT INITIATIVE PILOTS

Before embarking on a metro export plan, a basic understanding of common terms, acronyms, and market conditions of the export field is necessary. **Appendix C** provides a guide to common export terms.

**Appendix D** summarizes the insights that have emerged from the first four metro area pilots on the state of U.S. and metro exporting and how concerted metro export plans benefit state and national efforts. These insights can serve as a starting point to evaluating regional markets and possibilities. These findings can help clarify why U.S. companies and industries need dedicated and sustained support to export. And these will help shed light on how best to position the metro export plan with key state and national partners.



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## **STEP 1** **GO METRO TO GO GLOBAL**

It is critical at the outset to clearly define the geography of the export plan and it should be metropolitan or regional in scope. Markets are regional and any local plans involving trade and investment should reflect that reality. While it may be tempting or seemingly easier to focus export activities at a single-city or county scale, or a statewide scale, moving to a metropolitan geography allows one to position the market to compete globally by assembling and aligning all related regional assets, such as key corporations, top industries, workforce, area higher education institutions, and transportation infrastructure.

Once they started the export planning process, the four MEI pilot metro areas immediately found that their trade and investment community was already regional in scope. Exporting companies are scattered in cities and counties throughout the metro area. The wide array of federal, state, and local export service providers, while not typically well-coordinated, tend to focus their work with companies at the regional level.

Exports can also serve as a strong unifying platform on which to build a better overall regional economic development effort and culture. Whereas many other traditional economic development activities, such as business attraction, tend to foster internal competition, exports tend to foster regional collaboration at the economic development policy and service provider level. Leaders in each of the four pilot metro areas quickly recognized that by working together on increasing exports and fostering a more globally-oriented economy, they were going to see gains made throughout the regional economy and the regional supply chain, without taking anything away from, or threatening, individual local jurisdictions.

## **STEP 2** **ORGANIZE FOR SUCCESS**

Step Two should result in a well-organized work plan to clearly guide the export plan process and better assure its success. For most metro areas, exports represent a new direction in economic development—one that requires a culture change. The planning effort must have the stated commitment of local leaders and be well-organized at the outset to shift from the status quo. Producing a successful export planning process requires at least one respected local organization, leader, or core team to convene and champion the effort and best guide the process according to plan. It requires a good deal of pre-planning, getting the right people at the table, and assembling an inventory of available resources (e.g., staff, research, existing reports) to support the planning process. One needs to determine an appropriate and realistic scope for the project, schedule a series of committee meetings upfront, establish critical deadlines, clarify deliverables, and identify the right organizations and individuals that will be committed and involved in strategy development. The process also benefits greatly from a local leader or outside consultant to facilitate and drive the local planning effort to best ensure that it moves along according to plan. Not all export planning processes can or should be the same in terms of scope and capacity, so it is important to determine what can be realistically accomplished given resources.

### **TIMING AND DELIVERABLES**

From start to finish, the export planning process should require about six to nine months to complete, although this will vary by region. This should include at least four meetings of the full steering committee of the export initiative and several interim meetings for the core team and any specialized task forces. The process should result in three key deliverables: an export market assessment, the export plan (and associated implementation or “business” plan), and a policy memo. These are each discussed in greater detail in other steps in this guide.

## CORE TEAM

The core team consists of the champion organization(s) committed to staffing and driving the export planning effort. It is best to include a representative from local and state government and the private sector in the core team as they are key during implementation, when the focus shifts to service alignment, funding, and staffing. This team will be responsible for pre-planning, securing steering committee members, scheduling and preparing meetings, conducting and assembling export research, carrying out the daily needs of the planning effort, and ensuring the export planning process is successfully completed. Each of the four pilot metro areas had different local champions and core team leaders. In Los Angeles, the core team was led by the Office of Los Angeles Mayor Antonio Villaraigosa and the city of Los Angeles, the Los Angeles Area Chamber of Commerce, and the University of California Los Angeles' Anderson CIBER. In Portland, the metro export initiative was led by the Office of Portland Mayor Sam Adams and the Portland Development Commission. In Minneapolis-Saint Paul, the core team included the Office of Minneapolis Mayor R.T. Rybak, the city of Minneapolis, and the Minnesota Trade Office. In Syracuse, CenterState CEO (the region's chamber and economic development partnership) drove and staffed the plan.

## STEERING COMMITTEE MEMBERS

In addition to the champion organization(s) that will lead and drive the effort on a daily basis, a metro export plan will require a steering committee that includes key stakeholder organizations in the region and state. It is best to secure the highest level leader from each organization (see Step Five for further discussion of this topic). Division of labor, active support, and participation from committee members are critical to ultimately producing a successful plan. These organizations also provide resources (e.g., staff, consultants, facilities, time) to the initiative. These stakeholders need to be involved not only because they bring valuable ideas and perspectives to the development of the plan, but also because their support and buy-in will be needed during the release and implementation of the plan. In the four MEI metro areas, there were 15 to 30 leaders who participated on



the steering committee. This engagement proved to quickly generate a crucial network of regional export ambassadors, some who later became instrumental in helping align federal and state efforts to the plan.

The steering committee should include a wide variety of government, civic, university, and private sector leaders who are active participants in or experts on economic development and global trade (see sidebar). This array reinforces the diversity of activities underway that need to be better aligned and coordinated. In particular, many of the MEI metro areas wished they had proactively secured the involvement of more international trade professionals (e.g., freight forwarders, bankers, lawyers) and well-performing export companies at the outset of the project. These contacts proved to be tremendous resources and often became engaged advocates for the exports effort. While some of these contacts can be surfaced through project interviews, it would be preferable to identify and include them from the outset, especially if the effort starts as a public-sector push.

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## EXAMPLE MEMBERS OF A METRO EXPORT PLAN STEERING COMMITTEE

### Metro Area

- Mayor or county executive's office
- Chamber of commerce (including any ethnic chambers of commerce groups)
- Regional economic development partnership
- Local economic development office (city/county)
- University, business school, and/or related international program
- Air and water ports
- World trade center
- Manufacturing extension program
- Industry associations
- International/trade associations
- Private-sector exporting companies
- Freight forwarders/logistics firms
- Private-sector export services firms (banks, legal)
- District Export Council (DEC)
- Small Business Development Center (SBDC)

### State

- Office of the governor
- State international/trade office
- State economic development agency
- State chamber of commerce

### Federal

- U.S. Department of Commerce (U.S. Commercial Services)
- U.S. Small Business Administration
- Export-Import Bank of the United States
- U.S. Department of Agriculture

## THE VALUE OF GOVERNMENT LEADERSHIP IN GLOBAL TRADE

It is critically important to secure the involvement of state and local elected public officials (and their staffs) in the planning and implementation process. These leaders serve an important convening role in that they can often galvanize firms from throughout the metro area to participate in the process. They will also play a critical role in implementation. In foreign countries, high-ranking U.S. federal officials, state governors and large city mayors are viewed as the top leaders representing their markets. These individuals provide the metro delegation with credibility in foreign markets that can open up doors and make connections for local companies. Hence, the committed involvement of government leaders is vital to an effective presence at global trade fairs or targeted overseas mission trips. Such leaders represent entities that can provide early seed money and in-kind support. Both are critical to the start-up phase of an export effort and can help secure matching private-sector funding for long-term operations.





## FEDERAL EXPORT SERVICES, PROGRAMS, AND STRATEGIES

It is important to get to know and engage the key federal export service providers in a metro export plan, and how existing federal programs and strategies can plug into regional efforts. There are three federal entities with a primary mission to provide export services and programs on the ground in metropolitan areas or larger local regions. They are:

- **U.S. Foreign and Commercial Services:** The U.S. Department of Commerce, International Trade Administration's (ITA) trade promotion arm, which has trade professionals on the ground to serve companies in over 100 U.S. cities and 70 foreign countries. Primary roles involve market entry services to "export ready" firms; advocacy for major projects; trade promotion via trade missions and international buyers programs; and market access casework
- **Export-Import Bank (Ex-Im Bank):** Official export credit agency of the U.S. Government; assists with loan guarantees, export credit insurance, and direct loans (to buyers)
- **U.S. Small Business Administration (SBA):** Business development and working capital financing. Helps small firms that are new to exporting, and links them to business counseling networks

These and other federal agencies serve on the Trade Promotion and Coordinating Committee (TPCC), which serves as the coordinating body designed to provide a common framework to unify the export promotion and financing activities of the U.S. Government, as well as to develop a comprehensive plan for implementing strategic priorities (including the National Export Initiative).

To learn more about the TPCC, its 20 member agencies and Export.gov, please see **Appendix B**. To learn more about the National Export Initiative and the National Export Strategy, please see **Appendix A**.

## STEP 3

## PRODUCE A DATA-DRIVEN MARKET SCAN

The first task of the core team is to develop an export market assessment. This will ensure steering committee members start with a common grounded understanding of the metro area's market position and opportunities as the basis for strategy development.<sup>24</sup> Step Three should result in a comprehensive market (or data) scan that will serve as the first critical input to the market assessment. A credible export plan is built on a solid foundation of data and information about the region's export performance and potential.

The market scan should help determine, for example, the region's current export strengths and weaknesses, what export industries or foreign markets the plan may want to target for proactive outreach, or what baseline performance metrics could be considered to evaluate progress. It should begin with an overview of the metro economy and its recent performance. This can include high-level economic data on employment, unemployment, gross metro product, and industry size, specializations, or industry clusters. Next, the scan should summarize the role of exports in the overall regional economy. This can include such statistics as total export volume, export growth, export intensity, export jobs, top exporting industries, goods and services exports, and top export markets by country. This will allow the group to hone in on its region's unique export opportunities.

Local leaders often crave more in-depth data as they try to better understand this new area of economic growth and focus, but often find detailed data, such as firm-level data, hard to come by. It is likely that additional data (other than what is outlined in this document) does not yet exist or will not greatly impact the base set of strategies. The experience in each of the four MEI metro areas is that the available export data was sufficient to produce solid export plans. Each of those metro areas continue to build on their base of knowledge as they implement their plans and will react accordingly.



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## BROOKINGS METRO ECONOMY AND EXPORT DATA

The Metropolitan Policy Program at Brookings produces and maintains a strong array of metro-oriented data related to the economy, demographics, exports, and many other topics. A good source of metro economic data for the largest 100 U.S. metro areas is the quarterly “MetroMonitor”, which provides data on employment, unemployment, gross metro product, and housing, and provides metro rankings for each factor. You can access all this data on the program’s data resources page at: <http://www.brookings.edu/about/projects/state-metro-innovation/resources>

The primary source for metropolitan-area export data based on the location of where a service or goods export is produced (not from where it is shipped) is Brookings’ latest analysis “Export Nation 2012.” This report provides the core set of export data and rankings for each U.S. metro area, as well as for all states and counties. Profiles have been developed for each of the largest 100 U.S. metro areas and all states to provide a snapshot overview of export performance.

Brookings has also developed a U.S. exports database, with export data for all 3,113 counties, all metro areas and micropolitan areas, and all 50 states plus the District of Columbia. To access the full Export Nation 2012 report, metro area export profiles, the database and related documents, go to <http://www.brookings.edu/research/reports/2012/03/08-exports>

For a more detailed description of what the Brookings’ export database provides, and to learn more about federal, state, and other export-related data resources, see **Appendix E**.

## STEP 4 CAPTURE LOCAL MARKET INSIGHT

Data analysis is essential but not sufficient. The second input for the market assessment, and arguably the most valuable, is local market intelligence. This covers information and insight that can only be secured locally through more direct outreach to firms and export services providers and assembly of all relevant local reports and articles related to trade and investment. The result of Step Four should be completion of a full market assessment, which assembles the findings from both the market scan and local market intelligence.

At the heart of local market outreach is direct input from firms and service providers obtained through surveys and one-on-one interviews. The overall purpose is to seek their perspectives on their own exporting activities (and whether they export), export opportunities, obstacles, quality of existing export services and programs, the benefits of exporting, and other issues that may arise. The surveys and interviews can be conducted simultaneously to the market scan.





## SURVEY AND INTERVIEW INSTRUMENTS AND EXAMPLE ASSESSMENTS

A company survey proved to be a highly valuable tool in the three initial MEI metros that conducted one. The three metro areas emailed surveys to thousands of companies using lists provided by area business groups, such as the state trade office, area chamber of commerce, or regional economic development partnership. From that distribution, a total of over 600 companies responded to the three surveys (an average of about 200 companies per metro area). The results helped each team to better understand which companies are exporting, how they first entered export markets, what they are exporting, where they are exporting, which markets they plan to grow, the most significant challenges they face, their awareness and satisfaction with local export services, and their top policy priorities. The company survey, developed by Brookings and the Minneapolis-Saint Paul export team, is available for use (in a form that can be adapted to local needs). However, each metro area must administer their survey, encourage companies to respond to it, and provide a written assessment of the results.

The one-on-one interviews with companies and export services providers proved to be an extremely valuable exercise. These interviews not only provided more in-depth qualitative insight into the export process, but also strengthened relationships and dialogue between the committee members and exporting firms, opening new doors for collaboration and engagement. On average, each of the four pilot metro areas conducted between 25 and 30 one-on-one interviews. A key takeaway the pilot region teams emphasize is that it is very important to start this step early on in the process because of the overall value and insight these contacts provided.

The four MEI metro areas quickly realized that the interviews served to excite and encourage these firms about the export effort and that they needed a way to channel these newly unleashed energies. For example, in Syracuse, six of the companies interviewed for the export plan ultimately joined the export committee and served as local export champions. These companies have agreed to remain involved in implementation and to mentor and guide local new-to-export companies as they enter export markets. Some

An example export survey instrument and company interview form can be found here:

<http://www.brookings.edu/about/projects/state-metro-innovation/mei>

Key common market assessment findings from the four MEI metro areas are summarized in **Appendix D.**

of these company representatives have already been recruited to serve as presenters and panel members at local trade-related events and conferences.

Interviews with government and for-profit export services providers were also conducted, including related federal, state and local agencies, and other providers who already actively work with firms (e.g., local freight forwarders, logistics services providers, banks and legal firms). These export services providers each have different missions, perspectives, resources, and performance measures. Listening to them individually will help to ensure the steering committee gains from the experiences and expertise of all actors operating in the region, that all voices are heard and respected, and that all available resources are more effectively aligned and coordinated.

Once the market scan data and the interviews and survey assessment are complete, these findings must be pulled together into a clear, cohesive market assessment that tells the story of the export market and its potential for growth. An experienced and trusted researcher, consultant, or strategist should take the lead on this critical component of the planning effort because the core findings will serve as the foundation for related export strategies. Those responsible for this scope of work must have experience in tying together and assessing both quantitative and qualitative information, turning it into a simple compelling story, and preparing it in written and presentation form. Two-page market assessment key findings summaries for each of the four MEI pilot metros are available in the associated export plans and may be helpful guides.

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## **STEP 5** **CHAMPION** **EXPORTS NOW**

This step is designed to better ensure the export plan is embraced and championed by key local leaders and stakeholders during the planning process to build the kind of support needed later to successfully implement, fund, and sustain the plan. Exporting, and an emphasis on global trade and investment, is a new agenda for many local elected officials, economic development agencies, the media, and even private-sector businesses. With the market assessment complete, the steering committee will now have the data and talking points needed to make the strong case for exports. Thus, this is a good time to begin promoting and communicating the importance of exports to the region's long-term economic future, particularly to potential funders and stakeholders of the plan who frequently contend with fierce competition for limited time and resources in today's constrained environment. Early and regular outreach is critical so that the steering committee does not end up in the position of releasing a plan that requires several additional months of gathering support from key leaders, stakeholders, and potential funders just to get the effort off the ground.

One way to do so is to secure the right committee members to participate in the development of the strategy (also discussed in Step Two). Recruitment to the steering committee is an on-going process. Certain business leaders and experts who were interviewed as part of the market assessment in the four pilot metro areas were later invited to join the steering committee, providing critical insights and serving as visible champions for the export plan. Regional economic development organizations, chambers, and certain public-private partnerships are also critical committee members, as they may ultimately become the lead implementer or "quarterback" for the new metro export plan. This was true for each of the four pilot metro areas, where at least some key portion of the metro export effort is now housed within either the regional chamber or economic development partnership-groups which typically have not had global trade and engagement as part of their missions.

It is preferable to gain the commitment of the highest ranking official from each engaged organization to participate on the export steering committee; however, this may not be realistic for many metro areas. Even when high level officials convene an export initiative, many of those participating in the regularly

scheduled meetings are likely to be the key staff leads from each organization as opposed to the top leaders. In this case, the committee should prepare an internal communications plan to keep their organizations' top leaders informed throughout the planning process, thus retaining the high level buy-in needed for the export plan. The takeaway lesson here is that one should not assume that people (including regional leaders) understand the value of exports. Early and ongoing education and engagement is important.





### **Securing High-Level Champions for Exports**

The Minneapolis-Saint Paul export initiative approached the task of securing high-level champions (stakeholders) for exporting by ensuring the highest ranking metro-based federal, state, and local officials were committed participants of the export plan steering committee at the outset of the project. By having the head of the state trade office and the mayor of Minneapolis lead the planning effort, and commit to attending all meetings, they were able to convene the highest ranking officials from most of the involved organizations from day one. By the middle of the process, top leaders from throughout the region didn't have to be sold. Having been part of the planning process, and having heard the rationale for exports, they were committed to engaging in the effort early on and quickly became champions. GREATER MSP, the region's economic development partnership, was engaged from the start and ultimately agreed to quarter-back the branding/marketing portion of the metro effort, in partnership with the Minnesota Trade Office.

In Portland, where key staff led the working effort, the committee convened a presentation of the export plan to top officials once the market assessment and an initial draft plan were complete. They conducted background interviews with media a few months before the scheduled plan release to inform the press about the initiative, educate them on basic findings and direction, and prepare them for the ultimate public release. By the time the plan was released in February 2012, the Portland export committee was able to schedule related media briefings and editorial board meetings with each of the major local news outlets with relative ease. Top economic and elected leaders led the briefings. The export plan and release event attracted wide attendance and high-quality on-message stories in major local media outlets.

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## **STEP 6** DEVELOP A CUSTOMIZED EXPORT PLAN

The core deliverable of this entire process is the metro export plan itself, the focus of Step Six. This plan should be a 15- to 25-page document that makes a simple compelling case for exports as a driver of the metro area's long-term economic success and provides a logical guide for how to get there. It should be a clear, easy-to-read document that serves as a strong vehicle for educating a wide range of audiences about the exports opportunity and how the region plans to take advantage of it.

### **Key Considerations in Developing the Plan**

In general, the export plan should cover the following sections: (a) the metro area's rationale for exports; (b) key findings from the market assessment; (c) the plan's goals and objectives; (d) core strategies and tactics that will best drive attainment of stated goals and objectives; (e) new programs and initiatives to carry out the strategies; (f) an implementation plan (e.g., roles, responsibilities, funding); and (g) performance goals to measure progress. The four MEI pilot regions each chose to include a section summarizing key policy reforms needed to best support the successful implementation of their individual export plans. Given the current resource-constrained environment, the four pilot regions came to the conclusion that the more the strategy builds off existing economic development programs, staff and resources, the more likely they were to have implementation success. For example, by integrating exports and prioritizing it in existing business retention/expansion work, the metro areas are able to move forward without major fundraising initiatives. It may prove more valuable to reprioritize exports within the current economic development structure than to create totally new structures.

To help determine the core goals and elements of a regional plan, below are some key questions to consider:

- **What are the key rationales for producing this export plan?** Why is this the right time in the region to embrace an export strategy? Describe the "export moment."
- **What are the primary goals and objectives of this export plan?** Will the plan set broader economic goals, related to job growth, income growth, or becoming more globally aware, fluent, and connected? If so, how would one quantify such goals, and what would be the timing for achieving them? How do other international efforts (e.g., foreign direct investment, imports, immigration, infrastructure) relate to economic and export goals? Each objective will lead to different strategies.
- **How will the plan leverage the metro area's distinct export industries?** Should the export plan target and prioritize certain industries or clusters for proactive export development outreach and services? If so, which clusters and why? How do top exporting industries mesh with currently identified clusters in the metro area? Is there a compelling reason to target certain industries, as opposed to providing broad export services? Are there any industries that dominate the market for exports? Are there any emerging industries in the region that should be targeted based on projected future growth?
- **Generally, what types of firms, in terms of export-readiness and size, will this plan hope to assist?** Will the plan aim to broadly serve all types of firms, or will it distinguish and prioritize between those that are export ready, New-to-Market (NTM), or New-to-Exports (NTE)? How will the region identify and define these firms?

Further, will this plan focus on SMEs (small- to medium-sized enterprises) or firms of all sizes? Why? Increasing exports among the largest firms/exporters may help the metro area reach its export goals faster; however, these firms may either



have complex needs or not require as much basic assistance. A focus on SMEs may help to grow more firms that export and open up new markets; however, it will likely require more resources and take longer to reach export growth goals. SMEs could support potential longer-term goals related to global fluency and international connections.

Similarly, how will the plan treat SMEs that are suppliers to larger exporters, but are not likely to be direct exporters themselves?

- **Should the export plan target certain countries for export development?** If so, which countries and how should they be determined? Should the focus be on countries where there is already a strong market penetration by area firms? Should the focus be on markets with the greatest demand for the dominant products and services from the region? Should the plan focus on fast growing/emerging markets (e.g. in Brazil, India, China)? What would be the proposed activity related to these countries? Target them for trade missions or foreign trade shows? Ensure companies are at domestic trade shows with international buyers from these countries? Research?
- **What current federal, state and local export programs/efforts can be better aligned or strengthened?** What are the key gaps in the current metro export system? What are the key interventions that the region can undertake to address these gaps in the export system or to better leverage opportunities? What new programs/efforts need to be created?
- **How can the export plan leverage the potential role of ethnic businesses, immigrants and/or international students prominent in the region?** How can these populations and their natural global ties benefit from or play a proactive role in helping the region achieve its export goals? How could language and cultural strengths in certain ethnic populations or by international students support efforts to globalize?



- **What metrics should be used to measure the success of the metro export effort?** What timeframe should be considered? What can be realistically measured? How would the plan tie export services and programs to desired outcomes? How will the plan measure short-, mid- and long-term success? Where does cultural and behavioral change come in?
- **What will it take to realize successful implementation, funding, and results related to the draft export plan outline?** Which organization(s) will be held accountable for organization and implementation of the metro export plan? Should it be one lead organization or a coalition of equal partners? Who “carries the flag” for exports? What resources will be available to support implementation of the proposed plan?
- **What key policy topics (obstacles/opportunities) are critical to the success of your region's export efforts and can be elevated to top federal and state policy makers?** What federal programs, resources, or regulatory relief would help facilitate the successful implementation of your metro export plan?



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## SAMPLE STRATEGIES FROM CURRENT METROPOLITAN EXPORT PLANS

Below are example strategies from the metro export plans for the Los Angeles, Minneapolis-Saint Paul, Portland, and Syracuse/Central New York regions. These strategies illustrate the different ways a metro area can choose to achieve the stated objectives within their broader export plans.

### LOS ANGELES

➤ **Create the Los Angeles Regional Export**

**Council (LARExC):** LARExC will ensure a sustainable regional export effort by coordinating existing export services and providers into a seamless regional export network with a focus on company success; developing and maintaining critical export research and a regional exports website; and supplementing existing programs with critical new additions.

➤ **Establish the “Export Champions” Program:**

Export Champions will connect partnering companies within targeted industry clusters to UCLA and USC MBA research teams that will provide tailored export services and training using a case management approach. The MBAs will fill a critical gap in export services through market research, market entry strategies, and development of customized export business plans.

### MINNEAPOLIS-SAINT PAUL

➤ **Promote Global Advantages, Starting with**

**Health and Wellness:** Engage deeply with identified local industry clusters through more intense export development and marketing, starting with Health and Wellness.

➤ **Sell MSP to the World:** Market Minneapolis-Saint

Paul and global trade opportunities both internally and externally, including generating broad awareness of the importance of global trade to long-term economic viability and growth of the region and its companies.

### PORTLAND

➤ **Support and Leverage Primary Exporters in**

**Computer and Electronics:** Provide proactive economic development support to the computer and electronics industry (which represents over

50 percent of current metro exports), including an intense focus on growing the local supply chain through strategic recruitment and existing business integration efforts.

➤ **“We Build Green Cities” - Brand and Market**

**Portland’s Global Edge:** Package Greater Portland’s cluster strengths to support new market presence for the region’s most innovative sectors. This begins with a clean tech initiative that offers regionally developed solutions to global challenges, including proactive marketing to sell Portland’s “green city” story internationally around a set of industries, companies and products with export potential and a travel and tourism component to attract international conventions, meetings and tourists.

### SYRACUSE/CENTRAL NEW YORK

➤ **Build Export Capacity of the Region’s SMEs:**

Minimize real and perceived export barriers by increasing awareness of export opportunities, streamlining export services, and creating a ‘tag-a-long’ program to connect SMEs to successful, larger local exporters with global experience and connections. Given its proximity, the region will target Canada as an ease of entry market for SMEs with little or no export experience.

➤ **Expand Exports of the Region’s Key Services**

**Sectors:** Leverage significant export potential in key services sectors (education, health care and medical services, and tourism) by establishing a focused services working group within the newly formed Regional Export Council, enhancing foreign language services to assist foreign visitors and companies, and focusing on opportunities related to nearby Canada.

The full plans from each of the four pilot metro areas, and related two-page plan summaries, can be accessed here: <http://www.brookings.edu/about/projects/state-metro-innovation/mei>



## **PREPARING THE DRAFT AND FINAL PLANS**

To begin putting ideas to paper, the core team may want to consider development of a draft “straw man” export plan that outlines preliminary findings and suggests potential strategies for the steering committee to consider during the first brainstorming meeting. This draft should be based on findings from the market assessment and could provide a strong starting point and a vehicle to solicit the committee’s reaction and foster discussion.

Finalizing the actual plan at the end of the process typically requires at least six to eight weeks and consists of the following general stages: (1) produce a solid draft plan through the core team; (2) distribute the draft to all steering committee members along

with a strict deadline for turning it back in with all comments and edits; (3) incorporate feedback and produce the next draft in its final, published form; (4) share with a smaller group of key participants and stakeholders one last time and solicit feedback; and (5) produce the final export plan. Surprisingly, the fourth stage required much more time than expected in each of the pilot metro areas. Viewing the official, published version seemed to highlight the reality that the document was about to be released and led to a flurry of changes, comments and edits. The takeaways here are to provide time for edits after publishing the plan in its final form and to remind stakeholders that this is a plan based on available information - it can be adapted in future years based on what is learned during implementation.

## **ANTICIPATING LIMITATIONS IN DEVELOPING THE PLAN**

In developing the export plan, the committee should be aware of limitations related to planning and implementation. Data limitations were discussed in Step Three, but it bears noting that there will be some export questions that do not have ready (or even available) answers. You will need to leverage the creativity and insight of the committee to develop effective strategies, even without the full benefit of all the data committee members desire to have. There are also limits to how much your metro can realistically take on right out of the gate in implementation.

How will you approach this task in a strategic way given obvious boundaries? Each of the four MEI metro areas realized a few critical things early in the planning process and moved forward accordingly: (1) new resources for export development are limited; (2) there are many local (federal, state, local, private) players in the export/trade space and the challenge is how to bring them all together as a cohesive team working towards common objectives; (3) given limited resources, proactive efforts will need to be targeted towards areas of greatest opportunity (e.g., industries, overseas markets), based on findings from the market assessment; (4) there must also be a clear export services path available for those new-to-export firms that enter

the export services system unsolicited but desire to begin exploring exports; and (5) export performance and the direct impact of your local efforts is not easy to track.

While each of the four MEI metro areas recognized these issues as critical from early on in their processes, they chose to address some related components as part of implementation. Some groups now believe it would have been better to realistically address these issues (understand all resources/players and make clear, hard choices) during the planning process, so they would not have had to scramble afterwards during actual implementation. They also stress that the export services path (system) requires a lot of thought, since joint management of economic development efforts in a network format is not in the typical economic development DNA at the federal, state or regional levels. Sharing of information and credit, and coordinating economic development efforts, are things most regions are not doing. Even if they are, it is not generally across levels of government and private groups; so this represents a true challenge and a significant change in the culture of delivering economic development services. A successful plan will require your team to confront and work through these issues.

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## **STEP 7** PREPARE FOR IMPLEMENTATION

As with most regional economic strategies, great difficulty lies in creating a clear plan of action and accountability for making the strategies operational. With the release of their metro export plans imminent, each of the four pilot metro areas was anxious to nail down final decisions about how their new plan would be funded and implemented. The hope was to demonstrate to their regions that this was not another idea on paper but a serious initiative with real commitment and high probability for short-term progress and long-term sustainability. Thus, Step Seven should result in completion of a detailed implementation (or business) plan that clarifies how the metro area will make the export plan real, including details on the deliverables, phasing, budgets, and the division of labor among lead organizations.

The following are some guidelines and lessons on how to ensure that the plan is more than a paper exercise.

### **OPERATIONALIZING THE PLAN**

Metro areas can and should adopt the same rigor as private sector business planning to bring to bear the operational and financial precision needed to clinch real commitments and resources to make these truly active efforts.<sup>25</sup> To that end, metro leaders should adopt not just the mentality but the actual business discipline of specifying all major elements of traditional business planning processes for the export initiative. Among the questions that will need answering in a systematic and explicit fashion are these:

► What new **products and services** will need to be created to implement the region's strategies? In the case of the four pilot metro areas, the planning committees determined that most of the necessary programs and services were available; however, they were not well-coordinated or adequately resourced. A few new programs, such as those related to better leveraging universities and MBA students, were added to the mix in all four metro areas to bring more on-the-ground resources directly to SMEs interested in developing export strategies.

- What are the full array of **operational elements** needed to deliver on each of the strategies and new products and services? What organizations and partners, leadership and staffing, and/or new capacities are needed to implement the plan? What is the division of labor between different actors and organizations in the region (including clarifying the role of federal, state, and local leaders) to advance the strategies in the plan?
- What are the **financial assumptions** for the plan? What is the plan's proposed budget, given staffing and other operational needs? Where will likely resources come from in the near- and longer-term, including private, philanthropic, and government funds and programs?

At the core of the implementation plan is the need to clearly identify and reach agreement on which organization (or group of organizations) will ultimately be held accountable for ensuring that the metro export plan, and all its parts, will be carried out. This means driving implementation through multiple partners and making adjustments to the goals and plan as the effort proceeds. Each of the first four MEI metro areas found different ways to establish either a "quarterback" or the institutional home for their export plan. This also implies that each engaged organization must make an autonomous and internal decision to adapt their own performance metrics to focus on exports.

Los Angeles created a new Regional Export Council, housed in the Los Angeles Area Chamber of Commerce, to coordinate the local metro export network. While the City of Portland and the Portland Development Commission (PDC) co-led the development of their export plan, the committee determined that Greater Portland, Inc., the region's new public-private economic development partnership, was the logical choice to quarterback the regional export initiative. This required the willingness of Greater Portland, Inc. to take on this new role and the willingness of the city to relinquish "ownership" of the project and turn responsibility over to Greater Portland, Inc. In Syracuse, CenterState CEO, the regional business partnership, will coordinate the effort; while in Minneapolis-Saint Paul, the effort will



## USING CRM TO JOINTLY MANAGE METRO EXPORT CALLS AND ACTIVITIES

In Minneapolis-Saint Paul, to address the critical need to coordinate export activities and better serve companies, a CRM (Customer Relationship Management) system is now being extended to the organizations in the metro export network. Currently, information gathered through traditional economic development business calls is shared between the state and regional chambers of commerce through a CRM system; however, exports have not been part of the typical set of questions asked of businesses during these regular visits. Further, most members of the export team, such as local units of government and other business organizations, have not (until now) been included in this system.

be co-led by the Minnesota Trade Office and Greater MSP. In each case, these quarterbacks will be leading a coordinated network of export service providers, as opposed to taking on sole responsibility for exports.

Another critical decision: funding. Many of the pilot metro areas were eager to secure initial seed funding prior to or immediately following the public release of their plan. The goal was to demonstrate the seriousness of their effort and to ensure the plan got started right away, without losing momentum. However, securing seed funding proved to be a significant hurdle in some cases, made starker by the budget constraints in state and local governments. The Los Angeles team was able to work with their state to secure funds from the federal STEP grant to support the MBA Export Champions program. But they had a harder time raising funds to support the newly formed export efforts within LAREx, although it appears each of the major ports in the area will be key early contributors. The Minneapolis-Saint Paul team was able to get started using the existing resources of the Minnesota Trade Office and by having Greater MSP take the lead for branding/marketing. Both the Los Angeles and Minneapolis-Saint Paul examples show the benefit of working closely with the state at the front end in the design of the metro export

plan. Syracuse plans to house their core exports effort within CenterState CEO (regional chamber and business development partnership) and raise funds from their private-sector members. Given limited new funding sources, each of these metro areas obtained basic and in-kind resources from the existing partner network to make initial implementation of the export initiative possible. However, more funds will need to be identified to ensure the plans are fully implemented as envisioned.

The ultimate reason to develop a clear operational plan for executing the metro export initiative is that neither exporting nor regional collaboration are natural acts. It is not in the DNA of U.S. firms or local economic development efforts to focus on exports. It is not in the DNA of most regions to come together, even around what is clearly in the best interest of the metro economy. Yet, as a result of the metro export initiative and the bullish focus on execution, each of the pilot metro areas is on the path to creating real culture change in their community. As one of the export team leads urged to federal leaders, the MEI has pulled together an unprecedented level of alignment and trust between state, local, civic and private actors and providers. The National Export Initiative must encourage, not further fragment, these valuable on-the-ground partnerships and action plans.

## AVAILABLE FEDERAL GRANT PROGRAMS FOR EXPORTS

Federal grant programs to support metropolitan export initiatives are currently limited; however, there are some available programs that can prove helpful to plan execution. These include: STEP (State Trade and Export Promotion), MDCP (Market Development Cooperator Program), Jobs Accelerator (Jobs and Innovation Accelerator Challenge), and TIGER (Transportation Investment Generating Economic Recovery) grants, with some being standing grants and others likely only temporary. For a more complete description of these grants, see **Appendix F**.

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## GREATER PORTLAND'S BUSINESS PLAN FOR IMPLEMENTATION

Each of the four pilot metro areas developed longer implementation plans that clarified the export plan in greater detail and assigned timelines and responsibilities for each task to various partners. The Portland team approached this task by developing a business plan. Strategy maps reveal the major activities associated with each strategy in phases, and detailed tables break each strategy down into very specific deliverables, actions, metrics, lead agencies, key partners, timelines, and budget. This internal document is designed to keep all participants on task and create clarity about what exactly needs to be done to implement strategies and ultimately achieve objectives. Partners must commit internal resources to the export initiative in a hard way (e.g., the Portland Development Commission will allow its staff to bill 10 percent of its time to exports next year). They were able to use the export plan, and the associated business plan, to conduct a series of local presentations on the export plan with key stakeholders and to secure an initial two-year funding commitment for implementation from a variety of sources, including the Port of Portland, Metro Regional Government, and the Portland Development Commission (PDC), and other metro cities and counties. They also aim to use the business plan to help secure private-sector funding.



## STEP 8

## IDENTIFY AND PROMOTE POLICY PRIORITIES

Ideally, regional leaders should develop a policy memo that highlights and discusses top priorities for federal and state governments to consider to best support a successful, sustainable metropolitan export initiative. The development of a metro export plan naturally surfaces the kind of policy barriers that impede getting strong export results on the ground. Local leaders will also quickly realize the “top-heavy” (federal and state) nature of export-related services, programs, and resources. Hence, metropolitan export initiatives will always remain highly molded by the quality, effectiveness, and capacity of state and federal programs to bring credibility and success to their firms and “customers.” For that reason, metro leaders would be wise to articulate and advance a well-constructed and supported export policy agenda that will foster an environment for enabling the region’s exports to thrive and grow.

In general, the federal government sets the global rules for trade, provides critical export financing to firms, and supports export promotion and match-making through funds to states and on-the-ground staffing and programs both domestically and abroad. A regional policy memo can identify and prioritize the extent to which free trade agreements, unfair trade practices, protection of intellectual property, tariffs, currency manipulation, export compliance and regulation, customs clearance, visa attainment, overseas staffing and resources, regulations and paperwork, export finance, and critical transportation infrastructure, among many others, are hampering or supporting export efforts. Each of the metro export teams has actively used its policy memos in meetings with Congressional delegations and federal agency contacts. They have found this kind of outreach valuable to educating federal leaders on why state and local leaders care about trade, infrastructure, and export promotion programs and how such policies and programs impact job creation and economic growth in their communities.





State governments also have a strong role to play in providing resources, commitment, and a unified promotion platform for exports, trade and investment. However, the roles and commitments of states to exports and trade vary widely and are generally lacking or constantly threatened. While Minnesota has a relatively robust exports effort through the Minnesota Trade Office, the budget of the office has been cut significantly in the past several decades and was considered for elimination in 2011. New York's Empire State Development, as with many states, has made significant cuts to its international trade budget over the past decade. The new governor, drawing from the NEI and the Syracuse/CenterState MEI, is in the process of aggressively exploring what the state's role and resources dedicated to global trade and investment should be. California eliminated its international trade office in 2001 due to budget constraints. While it does have trade-related efforts within tourism, energy, and agriculture departments and community colleges, it has no formal state-funded trade office today, such as those found in Washington, Minnesota, Oregon, or Pennsylvania. Yet, a number of states are beginning to realize that they need to work directly with regional leaders across the state if they are to more effectively and efficiently meet common export goals. Thus, a metro policy memo can articulate how the metro export initiative advances state interests

in trade and job growth and which state policies, programs, and funds can better align to the regional MEI for mutual, maximum impact.

The policy memo should be viewed as a working document, one that will evolve as policy priorities shift, as certain issues get resolved or as new issues arise during implementation. In the beginning, local leaders can rely on the local survey, company interviews, export services provider interviews, and expert input to develop a policy memo that raises the areas of greatest concern and opportunity for companies in the region.

According to the four pilot metro teams, the policy memos have already demonstrated their value in bringing the region around a unified "ask." The memos have functioned as valuable regional talking points for use when local export champions and elected officials make their way to state capitols and Washington, D.C. Firms and companies have become more engaged in the metro export initiatives due to the desire to join up and strengthen policy efforts. And some of the region's policy recommendations have already been addressed as outreach, and partnership with federal leaders has been an ongoing part of the planning process.

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**BROOKINGS  
METROPOLITAN  
POLICY  
PROGRAM**

## SAMPLE POLICY RECOMMENDATIONS TO FACILITATE METROPOLITAN EXPORTS

Each of the four pilot metro areas developed policy memos to highlight and share recommendations with federal and state officials. The current policy memos can be accessed here: <http://www.brookings.edu/about/projects/state-metro-innovation/mei>

Below are some of the policy recommendations that emerged from the four plans:



### LOS ANGELES

► **Put companies first in the provision of coordinated services and in measuring success.** The federal government must better coordinate and provide a common sense of purpose among its existing agencies involved in exports. Federal, state, and local export programs must start operating as a unified team, with shared export objectives, as opposed to fragmented and siloed operations. The federal government should develop unified performance and tracking systems that focus on clients and support unified metropolitan efforts.

► **Boost export financing and make it more effective.** Federal and state government must better clarify what is truly available in terms of export financing and how companies can access it. Firms that don't already export frequently mention financing as one of the biggest hurdles to overcome. Key aspects of the problems with financing export trade include: the amount/quantity of finance capital made available for exporting and by whom, under what conditions; methods of financing using both private sources and government guarantees; qualifying for export finance assistance; liabilities, insurances and protections and more.

### MINNEAPOLIS-SAINT PAUL

► **Sustain support for export service provider capacity.** Federal leaders and legislatures must carefully analyze and balance budgets with strategic investments that will allow local leaders to fully realize the "export moment." The successful implementation of this valuable strategic plan for the region will not be possible without support for the U.S. Commercial Service, Minnesota Trade Office, Center for International Business Education and Research (CIBER), Small Business Administration, and Export-Import Bank staffing and programs.

► **Reform current visa policies for business visitors and tourists.** Restrictions on visas for business visitors slows or halts deals that are critical for exporters in the Minneapolis-Saint Paul region. These exporters require timely and fair visa processing procedures in order to facilitate exports and remain competitive internationally.



### **PORTLAND**

- **Improve metro-level export data.** There are large export data gaps in specific categories that, if addressed, would allow for more accurate and supportive metrics for metro export planning and support. Improvements could include updated export market data to support country strategies; better tracking of services exports; export tracking by detailed industry codes; and related-party information to support supply chain strategies.
- **Develop a national freight strategy to support export growth.** Greater Portland encourages development of a true national freight strategy with attention to urban freight and the last (or first) mile and passage of a Surface Transportation Program Reauthorization with stable funding, and that includes provisions for freight corridors, and corridors of national significance.



### **SYRACUSE/CENTRAL NEW YORK**

- **Shift export service priorities.** With the understanding that federal resources are limited, the federal government should shift resources from support services in the United States to support on-the-ground activities in foreign markets. Companies are also seeking a "Team USA" approach, highlighted by greater depth of involvement with and support for U.S. companies in foreign markets, including presence and support for missions and at international trade fairs.
- **Simplify U.S. export control laws and regulatory compliance.** Many companies (particularly those selling to military markets) believe U.S. export regulations and controls are a bigger issue than those in foreign markets. While all of the laws are well intentioned, there are an excessive number of agencies involved in the review, and decisions consequently take too long. The strong recommendation by member companies is for the federal government to consolidate the review and enforcement capacity in one agency, such as the Department of Commerce.

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➤ Furthermore, the President's Export Council, composed of private sector leaders, has developed a set of letters of recommendation covering critical policy priorities. These have been submitted to the president and the latest set can be found here: <http://trade.gov/pec>



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**STEP 9 TRACK AND PUBLICIZE PROGRESS**

The metro export plan must include performance metrics to ensure that the collective efforts in the region are moving toward the broader goal of the plan. And to reiterate, the plan must identify a common set of performance metrics that the coalition of federal, state, and regional leaders can agree to, that build off the separate, organizational metrics for which they may be held individually accountable. While identifying the best performance metrics can be quite difficult, there are several key benefits to committing time, attention, and resources to measuring and communicating progress of the export initiative.

Doing so helps:

- Determine whether or not the export initiative is achieving its desired objectives and outcomes, thereby helping key partners to stay focused on the right activities or adjust accordingly
- Keep key partners aligned around common outcomes, as opposed to individual, competing performance objectives; increase awareness among area leaders and firms on the benefits of exporting, generating local buy-in and company engagement in the initiative
- Demonstrate any early wins that will provide critical initial momentum and keep stakeholders at the table. Make the case for securing and maintaining resources and funding for long-term sustainable export services and program operations
- Provide progress reports and indicators that can be shared through the regional exports website, mainstream and social media, and other means to encourage more discussion of exports and the opportunity exports represent

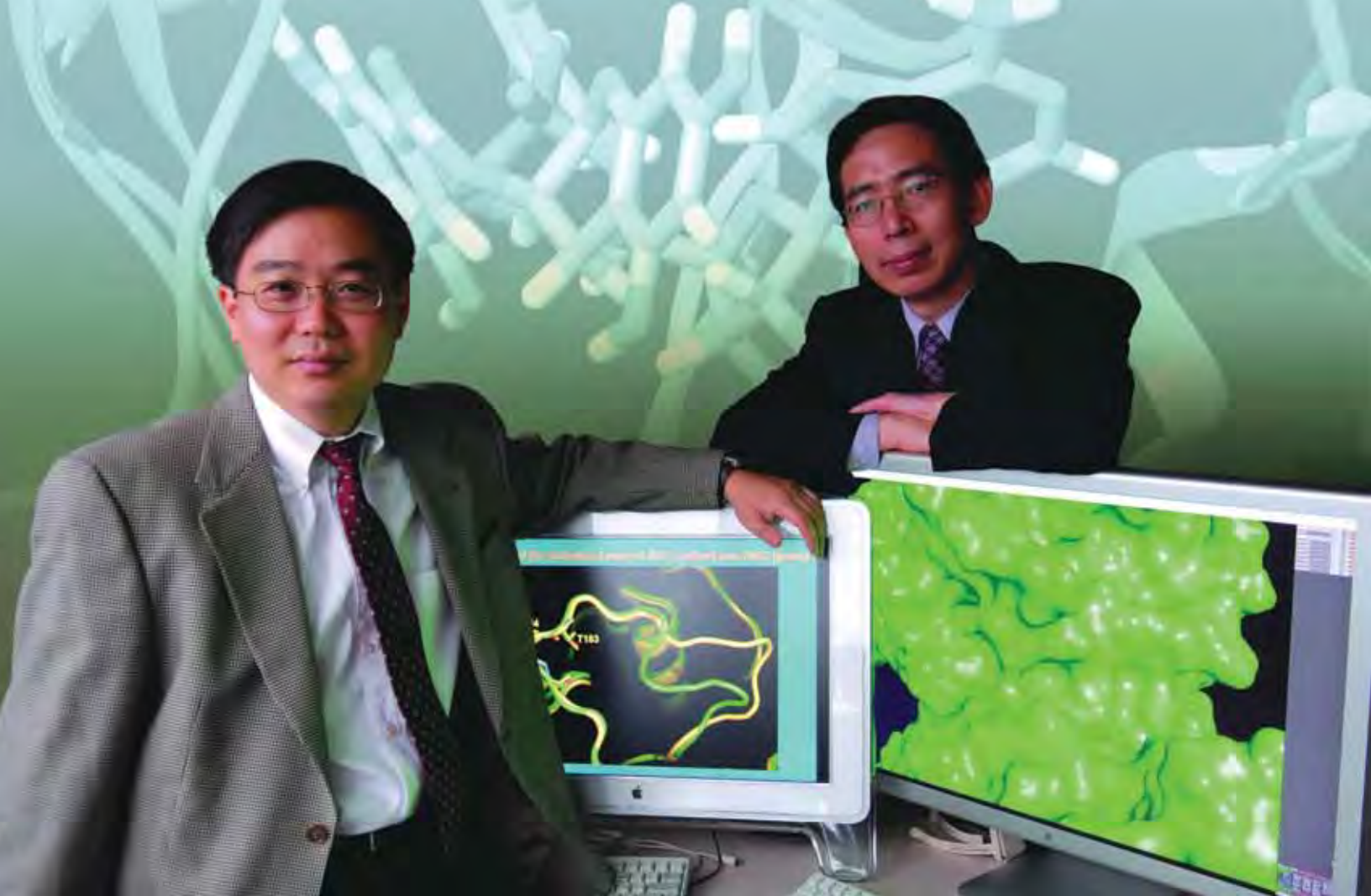
Below are some indicators to consider when determining how to best measure your metro export initiative performance:

**Macro Export Indicators** - These indicators relate to the outcomes the export initiative is trying to achieve, such as export value and growth, export jobs and growth, export intensity, export rankings, and diversification of export industries. These measures are available for each U.S. metro area in the Brookings “Export Nation” report series and the export data web page. The Export Nation report, or the data it contains, is scheduled to be updated and released on at least an annual basis.

**Company Progress Indicators** - These indicators relate to local company progress in pursuit of exports, such as an increase in the number of export ready firms; expansion of export reach (number of companies exporting; number of markets/countries to which local companies export); new firms entering the local export services system or the export supply chain; overall demand for export services and programs; success in referring companies through various stages of the export services process to the point where they make an overseas sale or sign with a distributor; and export growth and successes in specific, targeted industry clusters. These measures are not available through any national source, so the region will need to dedicate research staff to identifying, tracking, collecting, and reporting these data.

**Services and Activities Indicators** - These indicators measure export activities and client/partner satisfaction, such as customer satisfaction with export services, trade events, overseas mission trips, and export partner cooperation and performance. They are measures of activities and services that should support the export effort and lead to desired outcomes. They must also be captured and measured by the local team through detailed company tracking and surveys, requiring creative, dedicated staff to conduct this on-going research.





**Global Engagement Indicators: Cultural and Behavioral Change** - These indicators measure progress towards changing the underlying environment and culture that will allow exports and broader global engagement to thrive. These would include such indicators as recommended policies adopted; integration and elevation of exports and goals into regional planning and economic development efforts; exports established as a top local indicator of economic performance; number of foreign languages taught in schools; number of international business degrees or concentrations conferred; and change in other indicators of greater global orientation and fluency. These metrics will take some creativity to develop because it is difficult to capture and measure qualitative progress. However, committee members in each of the four MEI metro areas recognized that these qualitative indicators represent a critical component of what they are trying to accomplish—cultural change to position the region (and nation) for productive engagement in the world economy.

**Company Success Stories** - Tell the story of exports, and maintain momentum, by producing a constant stream of success stories describing local companies and their experiences exporting. This could include discussion of both their experiences in working with the local export team (the array of export services and programs) and how they successfully opened up new markets, and improved company performance and sustainability, through exports. These types of stories will provide positive real world examples for other firms and tangibly demonstrate that exports is a critical part of success in today's business world.

Tracking all aspects of export performance is not easy. As discussed previously, the data is not as rich or up-to-date as most would like; it is difficult to connect export services and programs directly to export outcomes and jobs; and it is hard to identify factors to measure the "cultural change" required to become more globally-oriented. Each metro export initiative will need to identify metrics that are most realistic to collect locally and dedicate resources to maintaining, analyzing, and reporting that progress.

**METRO EXPORT  
INITIATIVE**  
TEN STEPS  
TO DELIVERING  
A SUCCESSFUL  
METROPOLITAN  
EXPORT PLAN



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## **STEP 10** MAINSTREAM EXPORTS INTO ECONOMIC DEVELOPMENT

In order for a region to fully maximize the benefits of global trade and demand, exporting needs to be promoted as a key economic strategy within the region as well as better integrated into existing regional economic growth strategies.

To start, the region can help make exports a vital part of the metro area's economic development efforts by consistently reporting exports as a top regional (and national) economic indicator, equal to indicators such as the unemployment rate. This means using export activity indicators in regional economic benchmark reports, as performance measures in regional economic strategies, and in speeches and presentations as part of aspirational goals for the region. Regions can also push the U.S. government to elevate national and regional export performance more regularly.

Exporting firms interviewed as part of the MEI export plan process often related the difference in the level of attention given to exports as an economic indicator in the United States relative to what they see in other nations. In Brazil, China, Germany, Korea, and Japan, they say, exports are widely viewed and reported as one of the top indicators of economic performance. It is universally recognized that exports are critical to growth, jobs and sustainability, and this high level of visibility drives the desire to improve export performance at all levels. However, in the United States and in many metro areas, economic performance is more likely to be discussed based on measures of consumption, such as consumer confidence, retail sales and housing starts, or job growth only, than on the global competitiveness and progress of U.S. firms and metro economies.

State and regional economic development leaders and organizations must also mainstream exports into their everyday activities and promotion efforts. Local elected officials, academic and not-for-profit leaders, businesses, and the media (among others) must be made aware of the importance of exports, kept informed of ongoing progress and tangible successes, and brought in as export ambassadors. Exports must be tangibly made as important to economic performance as business recruitment, retention, innovation and tourism, and regional export performance tracked and reported on a consistent basis. The Syracuse/Central New York MEI team has begun to approach this by including exports prominently in their regional economic development strategic plan, by prioritizing projects that are export-driven when attempting to secure limited state resources, and by thinking about how they can build international trade and investment into the measurement criteria to evaluate all of the region's economic development programs.

An export strategy is also one of many ways that a metro area can be fully engaged in the global marketplace. In time, the region can explicitly tie the export strategy with other key initiatives and assets such as foreign direct investment, import assistance, immigrant entrepreneurship and connections, foreign languages in schools, and global supply management into a more intentional, comprehensive global engagement strategy.

Finally, the metro exports plan will be most effective if it is part of a broader regional economic plan that aligns the stated export strategies with other highly related initiatives, such as boosting innovation and commercialization in key industry clusters, enhancing human capital, and modernizing freight and logistics. A small manufacturing exporter will eventually grow into a larger firm. As the firm moves up the value chain, it will need access to leading edge technologies, skilled workers, and financing/capital to stay on the cutting edge of global competition. Thus, the region needs to be advancing an integrated economic growth strategy that improves the region's overall level of growth, productivity, and income.



## CONCLUSION

There are enormous untapped opportunities for leaders in metro areas to expand and strengthen their economies through greater exports and trade, and doing so in close collaboration with state and federal partners. But leaders and firms must be proactive and purposeful in acting on this opportunity. This guide and its associated on-line resources hopes to make the task—and culture shift—of embracing global engagement an achievable one. Like sound financial advice, firms and metro areas that diversify their portfolio by economically engaging in multiple markets will reduce their risk and secure high returns on investment. In short, leveraging American strengths and accessing global markets is a winning strategy for states and metro areas. Embracing exports and trade will build world-class metro economies that grow jobs in the short term and provide wealth and opportunity for all firms and workers in the long term.

## THE NATIONAL EXPORT INITIATIVE AND THE NATIONAL EXPORT STRATEGY

The Obama administration announced in February 2010 the National Export Initiative (NEI) with the stated goal of doubling U.S. exports over the five-year period extending from late 2009 to the end of 2014 or from \$1.6 trillion to \$3.2 trillion.<sup>26</sup> The NEI represents an effort by the administration to serve as a full partner with U.S. businesses in promoting American-made goods and services worldwide, within global trading rules.

As outlined in the “Report to the President on the National Export Initiative”, the NEI has five key components: (1) advocacy and trade promotion; (2) export financing, especially for small and medium-sized business; (3) removing barriers to the sale of U.S. goods and services abroad; (4) robustly enforcing trade rules; and (5) pursuing policies at the global level to promote strong, sustainable and balanced growth.

The National Export Strategy is the annual report of the Trade Promotion and Coordinating Committee (TPCC), an interagency task force composed of 20 federal agencies, which reports on the progress of the NEI. The June 2011 report focused on federal initiatives and plans for implementing 70 recommendations made in the September 2010 NEI report to the President. The report identifies several areas of focus for federal agencies in their export promotion efforts, including:

- Improved collaboration with states, metropolitan areas and border communities
- Support of exports by US companies selling technologies in high growth sectors, primarily through improving the US supply-chain infrastructure
- Better data collection and measurement of exporting by the services sector
- Removal of barriers to trade, including the resolution and passage of pending free trade agreements with Columbia, Panama and South Korea (which have since passed)

The “Report to the President on the National Export Initiative” from September 2010 can be found here: [http://www.whitehouse.gov/sites/default/files/nei\\_report\\_9-16-10\\_full.pdf](http://www.whitehouse.gov/sites/default/files/nei_report_9-16-10_full.pdf)

The 2011 National Export Strategy was released in June 2011 and can be found here: <http://trade.gov/publications/pdfs/nes2011FINAL.pdf>

## KEY FEDERAL AGENCIES/DEPARTMENTS INVOLVED IN EXPORTS

**The Trade Promotion Coordinating Committee (TPCC)** is an interagency task force mandated by Congress and chaired by the Secretary of Commerce. It was established pursuant to the Export Enhancement Act of 1992 to provide a unifying framework to coordinate the export promotion and financing activities of the U.S. Government, as well as to develop a comprehensive plan for implementing strategic priorities, improving service delivery, and avoiding duplication. Unlike many other countries in Europe and Asia, the United States does not have a single agency or government department responsible for enforcing a unified approach to governing export promotion. Instead, multiple departments and agencies approach export promotion from different mandates. The TPCC serves as the coordinating body designed to ensure that these agencies and departments act together and work to implement the Administration's export promotion agenda, through principals meetings and more frequent working group meetings on a variety of subjects, including training, marketing, program integration, and information sharing. Implementation of the National Export Initiative (NEI) has been the core focus of the TPCC since January 2010.

There are seven TPCC agencies and departments that provide direct export assistance:

- **U.S. Department of Commerce (Commerce)/International Trade Administration (ITA):** Market entry services to "export ready" firms; advocacy for major projects; trade promotion via trade missions and international buyers programs; and market access casework. The ITA's trade promotion arm is **US Foreign and Commercial Services**, which has trade professionals on the ground to serve companies in over 100 U.S. cities and 70 foreign countries.
- **Export-Import Bank (Ex-Im Bank):** Official Export Credit Agency of the U.S. Government; assists with loan guarantees, export credit insurance and direct loans (to buyers).
- **Small Business Administration (SBA):** Business development and working capital financing. Helps small firms that are new to exporting, and links them to business counseling networks.
- **Department of State (State):** Ambassadorial support for major projects through U.S. Embassies and Consulates, and commercial function support from Economic Officers in overseas Posts with no ITA presence.
- **Overseas Private Investment Corporation (OPIC):** Assists with U.S. investment and business management know-how in developing countries; and guarantees and finances political risk insurance.
- **U.S. Department of Agriculture (USDA)/Foreign Agricultural Service:** Complete menu of services for agricultural goods, including finance. Services delivered by state groups (State Regional Trade Groups) and trade associations.
- **U.S. Trade and Development Agency (USTDA):** Reverse trade missions, infrastructure feasibility studies, and international conferences.

There are 13 other agencies/departments involved in the TPCC:

- **U.S. Trade Representative (USTR):** Leads development and coordination of U.S. international trade and investment policy, and oversees negotiations with other countries.
- **U.S. Department of Treasury:** policy oversight role with Ex-Im Bank; negotiates export credit disciplines.
- **U.S. Department of Energy:** Co-chairs with Commerce the TPCC Renewable Energy/Energy Efficiency Working Group.
- **U.S. Department of Transportation:** Works closely with Commerce on supply chain competitiveness issues.
- **U.S. Department of the Interior:** Works closely with Commerce on travel & tourism related policies and strategies.
- **U.S. Environmental Protection Agency (EPA):** Co-chairs with Commerce the TPCC Environmental Technologies Working Group; recently launched the Environmental Technologies Export Initiative.
- **U.S. Department of Homeland Security (DHS):** Works closely with Commerce on travel & tourism related policies and strategies; also engages directly with exporters via CBP.
- **U.S. Department of Defense (DOD):** Works with Bureau of Industry and Security (BIS) on export control reform issues; a critical agency for the exporting industrial base.
- **U.S. Department of Labor:** Assists with workforce readiness issues linked to export related jobs.
- **U.S. Agency for International Development (USAID):** Working to identify overseas development projects for U.S. companies.

#### **OVERSIGHT AGENCIES:**

- **National Security Staff (NSS):** Chairing the Export Promotion Council, which is now integrated into the work of the TPCC.
- **U.S. Office of Management and Budget (OMB):** Assisting with, among other issues, the Single Window initiative along with Export.gov and Businessusa.gov.
- **Council of Economic Advisors (CEA):** Providing input and guidance on economic trends and Administration policies affecting TPCC priorities, public messaging, and goal setting.

#### **DATA AND INFORMATION**

**Export.gov:** Export.gov is designed to bring critical export data, services and program information together on one website. The federal government recognizes the need to serve an increasing number of companies to meet NEI goals and plans to release Export.gov 2.0 during 2012. Service delivery via a content-rich, robust web portal is a critical piece of the strategy to meet increased demand from clients and to reach out to new firms. This new version will be designed to allow businesses to access information and contacts via a self-service web portal, then follow-up for individualized advice and higher level counseling at a later stage in the process. The link to Export.gov is: [www.export.gov](http://www.export.gov).



## SAMPLING OF COMMON EXPORT TERMS AND ACRONYMS

Numerous terms and acronyms have become commonplace in the export world. Below is a sampling of these:

- **National Export Initiative (NEI):** An initiative launched by the Obama administration that outlines a set of steps to double U.S. exports between 2009 and the end of 2014, since exports are believed to create jobs and boost the long-term economy of the United States
- **U.S. Export Assistance Center (USEAC):** Located in major metropolitan areas throughout the United States, USEAC's are one-stop shops designed to provide businesses with local export assistance by professionals from the U.S. Department of Commerce (U.S. Commercial Service), the U.S. Small Business Administration, the U.S. Export-Import Bank and other public and private organizations
- **Gold Key Matching Service (Gold Key):** A U.S. Dept. of Commerce fee-based service that assists businesses in the United States with transactions and planning that take place overseas. The assistance includes travel planning, interpreters, and a service that matches American businesses with relevant potential clients, partners, and legislators who can help increase exports. This is one of several matchmaking services the U.S. Department of Commerce offers, in addition to activities related to foreign and domestic trade shows, as well as trade missions
- **District Export Council (DEC):** DECs are organizations of international trade professionals based in local communities who use their knowledge and international business experience to act as peer consultants to small- and medium-sized businesses that want to export their products into markets outside of the United States
- **Small- and Medium-Sized Enterprises (SMEs or SMBs):** In the United States, businesses which employ less than 500 people, adjusting for revenue and ownership structure. In 2010, SMEs made up 98 percent of all exporters and produced nearly 34 percent of all goods exports sales in the United States<sup>27</sup>
- **New-to-Export (NTE):** A business or firm that has just begun to explore exporting goods or services for the first time and must take into consideration all the factors that may pose specific challenges or advantages to selling goods in the global market
- **New-to-Market (NTM):** A term used to describe exporting firm's ready to enter into either a new market or a new segment of a current market
- **Centers for International Business Education and Research (CIBER):** A program initiated by the U.S. Department of Education to support and advance research that looks at U.S. competitiveness in global markets and better prepares businesses and future employees for international participation, with a focus on SMEs. The 33 CIBERs are primarily housed within the business schools at major U.S. research universities<sup>28</sup>
- **International Traffic in Arms Regulations (ITAR):** A set of laws that bans the sharing of all U.S. information regarding military and defense technology with institutions both inside and outside of the country; in the study of exports, it is debated as to whether ITAR is detrimental to commercial interests or crucial for defense and foreign policy purposes

## KEY LESSONS AND OBSERVATIONS FROM THE FOUR METRO EXPORT INITIATIVE PILOTS

As leaders in the four pilot metropolitan areas reached out to firms and service providers in their communities to design their metro export plans, numerous insights surfaced about the state of U.S. and metro exporting. These insights can serve as starting points to begin to evaluate the local market and produce a metro export plan. Among the themes unveiled were the following:

- **Companies fear exporting.** Many companies say that they would like to export, but fear of the unknown and comfort operating within the United States limits actual action. For these companies, numerous real and perceived risks loom large and range from difficulties associated with connecting to global partners and conducting global marketing to issues involving logistics, regulatory compliance, financing, and unfair trade practices. For their part, companies that already export often express concern about how other local companies, and the metro region as a whole, will compete in the future if they don't engage in exports and global trade.
- **Companies lack awareness of global opportunities and services.** Company awareness (particularly among SMEs) of global opportunities, foreign markets and available export services and programs is low. As a result, a relatively low proportion of firms export, and a minority of exporting firms report having ever received assistance from federal, state or local export services providers.
- **Thus, there is an inadequate pipeline of identified firms ready to enter foreign markets.** The pipeline of "export ready" companies in each of the four metro areas is not currently strong enough to meet export objectives. To build a larger pipeline of prospects, metro areas will have to be proactive in identifying and reaching out to export ready companies and in developing a system that better prepares companies for global opportunities. Initial outreach in the four metro area pilots is demonstrating that there are companies ready to start filling the export pipeline; however, the export outreach and development effort had not been identifying and bringing them into the export services system.
- **Many companies are accidental (reactive) exporters and thus may be under-exporting.** Few companies proactively target export opportunities. More often, companies reported that export opportunities were accidental or passive (e.g., the overseas company found them or a current U.S. customer moved its operation overseas). In some cases, existing export strategies were often isolated incidents and not part of a defined growth strategy (e.g., the CEO randomly knew someone in a country, and that country represents their only export market). Further, many companies are indirect exporters (through sales to U.S.-based exporting firms); however, they have no intentional export strategy of their own.

- **Company executives must be highly intentional about exporting.** Successful exporting companies stress that pursuing business opportunities in new foreign markets requires significant up-front resources and persistence. While companies can start initial exploration of exports with existing staff, venturing into exports ultimately requires the demonstrated commitment and time of the CEO (one-on-one interviews with companies in the pilot metro areas consistently revealed the need for the CEOs of small- to mid-sized companies to commit up to 25 to 50 percent of available time in year one) along with the dedication of a person or consultant to the effort on a full-time basis. This can be difficult for SMEs that lack resources to commit to the effort in the face of other demands. However, successful exporting companies claim the rewards far outweigh the risks, hassles and investment.
- **Exporting firms typically require case management support.** Most companies require one-on-one case management support to navigate their way through the process of pursuing exports. While initial broader export training for groups is valuable in the early stages of the process, companies (particularly SMEs) need more focused and tailored guidance and support if they are to ultimately make that first overseas sale or add another export market.
- **Export services vary in quality and are often fragmented.** Export services and programs provided by federal, state, and local agencies vary in quality across U.S. metro areas. Most local systems are also fragmented, have gaps, and are typically reactive in nature. Companies are often not aware of or do not fully understand the export services and programs available to them and don't know to whom they must go for help at different stages in the process. There is no clear exports roadmap to follow. However, of the companies that have received state or federal export assistance in the four pilot metro areas, a high percentage report it as being "good" to "excellent."
- **State and federal export efforts often lack sustained vision and commitment.** State and federal government frequently provide the core export services and programs in metro areas. However, the level of resources and commitment provided to these programs is often described by companies and export service providers as "cyclical". Existing companies and on-the-ground export services providers in each of the four pilot metro areas have experienced ebbs and flows in the commitment to exports, and related funding and capacities, with changing state and federal administrations. While metro area leaders can help fill some of this capacity, they are highly aware that sustained, quality state and federal programs are critical to their metro area success and credibility. Companies and export experts interviewed as part of the pilot MEI process expressed the strong and consistent opinion that peer countries— such as Germany, Korea, China, Brazil and Japan—demonstrate a stronger, more consistent commitment of resources and outreach to global trade and investment, putting the U.S. at a competitive disadvantage.

The metro export plans have surfaced at least four major benefits of metropolitan-level engagement and problem-solving on exporting:

- Metro area leaders can proactively increase the number of firms who are ready to export or export to additional markets. Currently, most state and federal service providers lack the capacity to recruit non-exporting firms or help such small- and mid-sized firms become export ready. This may explain why the number of firms selling abroad has barely budged past one percent. However, metropolitan area leaders can play a critical role here because they have strong, direct relationships with firms and know the firms and actors in their leading industry clusters. Many of these metro export plans involve metro chambers of commerce, port authorities, regional civic groups, and/or regional economic development agencies that have ongoing contact with companies. They can proactively identify and reach out to target firms, perhaps within priority industries, and help them become export-ready. They can also work with their member companies or use surveys to better identify and reach out to firms that are under-exporting and can move into additional markets
- Metro leaders can help make exports and trade a mainstream part of regional economic development. Exporting and global engagement is not yet in the economic development DNA, hindering the ability to scale up firm- and cluster-based export activities. While regional economic development officials work with companies regularly on identifying their business expansion needs, few have the expertise or awareness to recommend global market expansion as a key growth opportunity. Engaging regional economic development practitioners in a metro export plan is essential to making exports more the economic development norm than the exception
- Metro leaders can help create a more transparent, coordinated export assistance system that is moving toward common goals. Leaders in the pilot metro areas are quickly learning that firms, government, civic groups, universities, and other export service providers are not aware of the array of existing services in a region, making it difficult to efficiently refer companies to appropriate services or address the gaps and redundancies in the delivery system. Thus metro area leaders, through their export plan, are key to bringing together the vast network of export service providers and champions around a unified goal and strategy for boosting exports. This has the added benefit of giving small- and mid-sized firms a coordinated system of services that will give them the confidence that exporting is the right investment
- Finally, metro area leaders are best positioned to integrate exports into a broader economic strategy for growth and global competitiveness. Exports represent just one step in a more comprehensive regional game plan for greater global engagement. The best metro leaders are those who are aligning export strategies with parallel strategies in foreign direct investment, manufacturing innovation, freight and transportation modernization, workforce development, and immigrant outreach so they can more effectively build a globally fluent economy

## SOURCES OF METRO ECONOMY AND EXPORT DATA

No single definitive data source exists to support metropolitan export promotion efforts but a variety of entities provide important resources:

### Brookings Institution

The Metropolitan Policy Program at Brookings produces and maintains a strong array of metro-oriented data related to economy, demographics, exports, and many other topics. A good source of metro economic data for the largest 100 U.S. metro areas is the quarterly Metro Monitor, which provides data on employment, unemployment, gross metro product, and housing, and provides metro area rankings for each factor. Brookings also tracks the economic growth of 200 world cities through its annual Global Metro Monitor, which provides great context for the shifting growth markets around the globe. You can access all this data on the program's data resources page at: <http://www.brookings.edu/about/projects/state-metro-innovation/resources>

The primary source for metropolitan-area export data based on the location of where a service or goods export is produced (not from where it is shipped) is Brookings' latest analysis "Export Nation 2012." This report provides the core set of export data and rankings for each U.S. metro area, as well as for all states and counties. Profiles have been developed for each of the largest 100 U.S. metro areas and all states to provide a snapshot overview of export performance.

Brookings has also developed a U.S. export database, with export data for all 3,113 counties, all metro areas and micropolitan areas, and all 50 states including the District of Columbia.

For each geographical level, the database provides

- Nominal and real exports, total and by industry (major and detailed)
- Exports share of Gross Domestic Product
- Direct export-production jobs, total and by major industry
- Total export-supported jobs, total and by major industry
- Annualized real export growth rates, total and by industry (major and detailed)

The dataset reports on 34 major industrial categories: 26 for goods exports (3-digit level NAICS) and eight for services (U.S. Bureau of Economic Analysis service export categories). It provides export data for 212 detailed industries (subcomponents of the major export industries), both goods and services.

In addition, for each of the largest 100 metropolitan areas, 50 states, and the District of Columbia, the database provides exports by export destination (country): in aggregate, by major industry, and the top 10 markets for the top 10 detailed industries.

To access the full Export Nation 2012 report, metro area export profiles, the database, and related documents, go to: <http://www.brookings.edu/research/reports/2012/03/08-exports>



### **Federal Sources**

Data on exports is also available from the U.S. Census Bureau, Foreign Trade Statistics division (Census) and from the International Trade Administration (ITA) at the national, state and metro level. However, there are a number of limitations to export data that metro-focused users may find frustrating. Metro area data from these sources are based on movement of goods through the market and not the point of production, typically lagging state and federal data by one- or two-years; data on top foreign export markets from each metro area are not readily available; some of the more in-depth public data are available for products and not industries; identifying export firms by metro area is difficult; and much of the data cover only goods, not services. As a result of the MEI effort, the Census plans to begin releasing more up-to-date metro area data with its quarterly export updates, starting in 2013.

The Census offers more tailored export data for a relatively low fee, such as, for example, more in-depth analysis of a metro area's top exporting industries. The Census also has good data on the destination countries for U.S. exports, by product; however, this data is not available for metro areas. It does provide a good understanding of where U.S. products are in demand throughout the world and this is highly beneficial to exporting companies.

Census trade data and information may be accessed here: <http://www.census.gov/foreign-trade/>

The Census trade database may be accessed on a fee basis at this website: <https://www.usatradeonline.gov>

For a comparison of Brookings and Census metro export data, please go here: [http://www.brookings.edu/~media/Research/Files/Reports/2012/3/08exports/0308\\_exports\\_appendixb.pdf](http://www.brookings.edu/~media/Research/Files/Reports/2012/3/08exports/0308_exports_appendixb.pdf)

For ITA data, go to: <http://www.ita.doc.gov/data.asp>

The Bureau of Economic Analysis (BEA) provides quarterly and annual trade in goods and services statistics for the United States, but not for state or local areas. These data include high-level national statistics for exports (broken down by goods and services) and for services exports, broken down by major category of service. This can prove helpful for high level national export trend analysis that includes services. The BEA also produces periodic research papers covering areas, such as the nature of U.S. exports and what types of firms are exporting services.

See: <http://www.bea.gov/international/index.htm#trade>

### **State Sources**

Some states track and report export and trade data on an annual or quarterly basis and this may prove to be the best source of more localized, up-to-date statistics for certain topics. While this data is typically statewide, it can serve as a reasonable proxy for a metro area in some cases, particularly if it represents a significant portion of state exports. For example, the Minnesota Trade Office produces statewide quarterly export data for exports and growth by industry and by country of destination. This data is available because Minnesota has a robust state trade office and they have dedicated resources to tracking it. In many states, this resource unfortunately does not exist and in larger states with many metro areas—such as California, Texas and Michigan—statewide figures may not suffice.

### **U.S. Chamber of Commerce**

The U.S. Chamber of Commerce "Trade Supports Jobs" website provides a database of top exporting firms by state and congressional district. While this data also has many limitations (including overrepresentation of freight forwarders), it is a good place to start in identifying exporting firms.

<http://www.tradesupportsjobs.com/>

## FEDERAL GRANT PROGRAMS FOR EXPORTS

A number of federal grant programs, some standing and others likely temporary, are available that can prove helpful to support execution. These include:

**STEP Grants:** The State Trade and Export Promotion Grant (STEP) Pilot Grant Initiative, sponsored by the U.S. Small Business Administration, provides grants to states to develop their own small business export promotion programs. The aim of the STEP Initiative is to increase the number of small businesses that are exporting and increase the value of exports from small businesses within the state. More information can be found at: <http://www.sba.gov/about-offices-content/1/2889/resources/14315>

**MDCP Grants:** Market Development Cooperator Program (MDCP) awards include financial and technical assistance from the International Trade Administration (ITA) to support projects that enhance the global competitiveness of U.S. industries. An MDCP award establishes a partnership between ITA and non-profit industry groups such as trade associations and chambers of commerce. Such groups are particularly effective in reaching small- and medium-size enterprises. The non-profit groups compete for a limited number of MDCP awards by proposing innovative projects that enhance their industry's competitive position. Industry groups pledge to pay a minimum of two-thirds of the project cost and to sustain the project after the MDCP award period ends. On average from 1997 through 2011 projects generated \$211 in exports for every \$1 of MDCP awards made. More information can be found at: <http://www.ita.doc.gov/td/mdcp/>

**Jobs and Innovation Accelerator Grants:** The Jobs and Innovation Accelerator Challenge (Jobs Accelerator) is an inter-agency funding opportunity led by the Department of Commerce's Economic Development Administration (EDA) and designed by the Taskforce for the Advancement of Regional Innovation Clusters (TARIC), in partnership with other Federal agencies and bureaus. TARIC recognizes that regions can benefit from coordinated, flexible, regionally customized investments with stronger goals and metrics that link economic development, workforce development, small business development, and the inclusion of historically underrepresented and excluded communities. Through the coordination of Federal resources, the Jobs Accelerator supports the development of self-identified clusters that demonstrate high-growth potential. In fiscal year 2011, the funding agencies and bureaus in the Jobs Accelerator, EDA, Department of Labor's Employment and Training Administration (ETA), and SBA, awarded \$37 million to 20 clusters in a variety of industries across the United States. In addition, another 13 Federal agencies and bureaus committed technical assistance to provide streamlined support to selected clusters for qualifying projects under current appropriation authority. For more information visit: <http://www.manufacturing.gov/accelerator>.

**TIGER Grants:** The Transportation Investment Generating Economic Recovery (TIGER) grants are awarded to transportation projects that have a significant national or regional impact. Projects are chosen for their ability to contribute to the long-term economic competitiveness of the nation, improve the condition of existing transportation facilities and systems, increase energy efficiency and reducing greenhouse gas emissions, improve the safety of U.S. transportation facilities and enhance the quality of living and working environments of communities through increased transportation choices and connections. The Department also gives priority to projects that are expected to create and preserve jobs quickly and stimulate increases in economic activity, as well as those that will enhance the facilitation of exports. More information can be found at: <http://www.dot.gov/tiger/>

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# APPENDIX F | ECONOMIC DEVELOPMENT INCENTIVES & FINANCING TOOLS



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## ECONOMIC DEVELOPMENT INCENTIVES & FINANCING TOOLS

**Type A & Type B Sales Tax Incentive Grant or Loan:** The Community Economic Development Corporation(s) may consider a grant or loan for infrastructure and site improvements as well as for land, buildings, equipment, and facilities for retail, business development projects and also for projects that involve higher technologies or light manufacturing. Funding comes from sales tax revenues allocated to the Corporations.

**Business Improvement Grant:** The Community Economic Development Corporation(s) may established guidelines for a grant or revolving loan fund to encourage new investment and new improvements to the facades and building improvements of the existing retail businesses in the City.

**Chapter 380 Loan or Grant:** Custom and unique economic development incentives and public infrastructure well as other public improvements may be provided by local governments as authorized by Chapter 380 of the Texas Local Government Code through a written agreement.

**Tax Abatement:** The local governments may consider abating the real estate and/or personal property tax for development projects for up to 10 years.

**Waiving Impact Fees:** Some local governments consider waiving some or all of the road, water and wastewater impact fees for projects.

**HB 1200 Value Limitation & Tax Credit:** For major development of exceptional investment, the Texas Legislature under HB 1200 allows Independent School Districts to rebate and credit certain property taxes according to a schedule of total taxable value vs. level of planned investment. As an example Castleberry ISD may consider offering HB 1200- Value Limitation incentive for a project involving over \$60,000,000 investment. With this incentive the taxes for 8 of a 10 year period would be limited to taxing only the value of the project under \$60,000,000. Project value over \$60,000,000 would not be taxed for 8 of the 10 year period.

**Freeport Tax Exemption:** The local governments, independent school districts and Tarrant County may offer the Freeport Tax Exemption. Goods and materials transported outside of Texas not later than 175 days after the date that the goods and materials was acquired, or imported into Texas and assembled, manufactured or processed and then goods shipped out of Texas may qualify for the Freeport Tax Exemption on personal property. An application for this exemption must be filed, annually with the Tarrant County Appraisal District by April 30<sup>th</sup> of each year.

**Goods in Transit:** The local governments, independent school districts and Tarrant County may offer the Goods in Transit exemption on personal property or goods where the goods are in a building owned by an independent 3<sup>rd</sup> party and the goods are in route to a buyer. The goods cannot be in Texas more than the 175 days.

**Texas Enterprise Zone:** Projects that create more than 10 permanent jobs within the local municipality may be nominated as a project for the Texas Enterprise Zone. The local government or the business may pay the application preparation cost and the application fee. An application must gain a minimum of 60 points to be accepted. Once awarded with the Texas Enterprise Zone, a project is allowed to obtain sales tax rebates of \$2,500 per new employee on the goods and services the business purchases.

**Texas Enterprise Fund:** The local government may assist in application preparations for obtaining a Texas Enterprise Fund Grant. The grant is for the purpose of securing a significant new business or significant expansion of an existing business as part of a competitive recruitment situation. There is an extensive application process with an 11 step due diligence process. The grant application must have a unanimous approval of the Texas Governor, Lt. Governor and speaker of the Texas House.

**Texas Emerging Technology Fund:** The local governments may assist entrepreneurs in application to the North Texas Regional Center for Innovations and Commercialization for funding of awards for venture development, commercialization, leveraging capability projects with other sources of grants for emerging technologies, creating public private partnerships in developing the projects and for research with institutions of higher education.

**Skills Development Fund -Texas Workforce Commission:** In partnership with Tarrant County College, a Texas employer may obtain funding to develop training programs for employees existing and new for pre-employment training, new skills needed, small business training, veterans initiative programs and other skills development programs. The Tarrant County Workforce Development Board is the administrative branch for the funds from the Texas Workforce Commission.

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**Public Financing Tools (TIF/TIRZ's, PID's, MMD's NEZ's);** The local governments, may, in order to stimulate new investment, authorize the creation of Tax Increment Financing Districts, Public Improvement Districts, Municipal Management Districts, and Neighborhood Empowerment Zones, as appropriate and as required to stimulate and expedite new development.

**TIF/TIRZ:** Tax Increment Financing and the creation of a Tax Increment Reinvestment Zone is a governmental tool that a local government, independent school district, county government and/or county governmental taxing bodies may enact to allow for the developer of a project to be reimbursed for investment of public infrastructure and public facilities developed as part of a private investment project. The future property taxes and future sales taxes generated by the private development in a zone (TIRZ), over a period of time up to 30 years, may be used to reimburse the developer for their public infrastructure/public facilities costs.

**PID:** Public Improvement District is a governmental tool that allows for the creation of a special assessment (taxing) district to be utilized to pay for public infrastructure and public facilities developed within the district. The local municipality may levy and collect the special assessments on property within the area district.

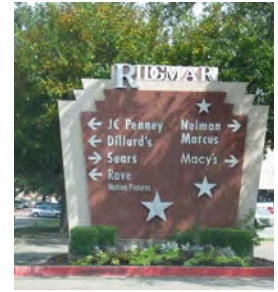
**MMD:** Often called downtown management districts, these special governmental entities are created by the Texas Commission on Environmental Quality (TCEQ). A majority of the landowners must sign a petition to create a district. Once formed the district employs rights granted to political subdivisions and may levy ad valorem taxes (inside and outside of the district), and impact fees as per State Law.

**NEZ:** Neighborhood Empowerment Zone may be enacted by a local municipality for improvements to promote affordable housing, economic development, increased social services, education, public safety and to promote rehabilitation of housing. The Zone, once created by resolution, allows the municipality to be empowered to waive building fees and impact fees, offer refund of sales tax, abate property tax for 10 years and set baseline performance standards for environmental goals.

The above list serves as a general guideline for use in considering project planning and an investment in development. This short description is offered to provide a quick review of available incentive and financing tools. Detailed requirements and application processes exist for these incentives and tools.

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## APPENDIX G | ECONOMIC DEVELOPMENT TAX BASE IMPACTS





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# **1 ECONOMIC DEVELOPMENT TAX BASE IMPACTS**

## **A. INTRODUCTION**

Development and redevelopment are two ways of facilitating economic growth. Through the expansion of the tax base and retail sales associated with new development, each of the PLMC communities has the potential to expand employment, increase payroll and grow its tax base. Based on community feedback and an analysis of the region's real estate markets, six sites were identified as possible areas for future development or redevelopment to increase local economic development opportunities. In order to understand the economic development impact of the proposed development programs, an impact analysis model was developed by RKG Associates to measure the tax revenue and employment impacts associated with various proposed economic development initiatives in different locations within the PLMC study area. Given the robustness of the City of Benbrook's economic development efforts and the multiple development initiatives currently underway, RKG did not propose an economic development initiative for the City.

## **B. METHODOLOGY**

### **1. Economic Development Tax Base Impact Model**

The purpose of the Economic Development Tax Base Impact Model is to provide an analysis of the potential economic and tax base impacts associated with various economic development initiatives in certain key locations within the PLMC study area. In order to assess the economic development potential of the proposed building programs for the six site locations, property and sales tax revenues were used as a tax base impact measure for each subject community. While there are other municipal revenues generated through new development, they are much less significant and harder to link directly to development activity and thus harder to model with great precision.

Property tax and sales tax were the focus of this analysis because they make up a substantial portion of the revenue stream for the municipalities impacted by these potential (re)development areas – Fort Worth, Lake Worth, River Oaks and White Settlement. A proposed mixed-use development scenario for the City of Westworth Village was removed from this analysis at the request of the City. In addition, no economic development scenarios were proposed for the City of Benbrook given the City's active and advanced economic development initiatives.

Tax revenues were calculated utilizing 2012 tax rates for each community. Real property value estimates for each proposed building program were developed based on construction cost estimates for the Dallas/Fort Worth region using the Marshall & Swift cost estimating manual. The land value was then added to the building construction value by calculating a proportional relationship between personal and real property value to produce a total property value for the square footage of each program.

In addition to evaluating property tax revenue, an estimate of the amount of sales for each retail use was determined. Industry sources provided the average dollar amount of sales per square foot by general building use. Based on the total estimated annual sales volume, the local sales tax rate was applied to determine the level of revenue generated from retail sales. In addition, employment produced by the development programs was modeled as another factor related to economic growth. Industry sources were used to establish an estimate of the number of employees per square foot based on the type of business.

## **2. Site Redevelopment Assumptions**

In several economic development scenarios, existing properties were hypothetically removed to accommodate the newly proposed development program. This was accomplished utilizing each community's property assessment records and under-performing properties were removed to make room for new investment. While future redevelopment may occur differently than proposed in these scenarios, it was important to reflect the fact that redevelopment requires the removal of older, under-performing properties to make room for newer development. Unlike the proposed new development, the real property value for the removed properties was established using the current appraised value. The total property and sales tax revenue and the number of employees for the removed buildings was deducted from the revenues and employees generated by the new building program for each site to determine the net revenue and employment created. Due to the fact that many of the sites cross municipal boundaries, the economic development impact was evaluated not only by location, but by municipality, as well.

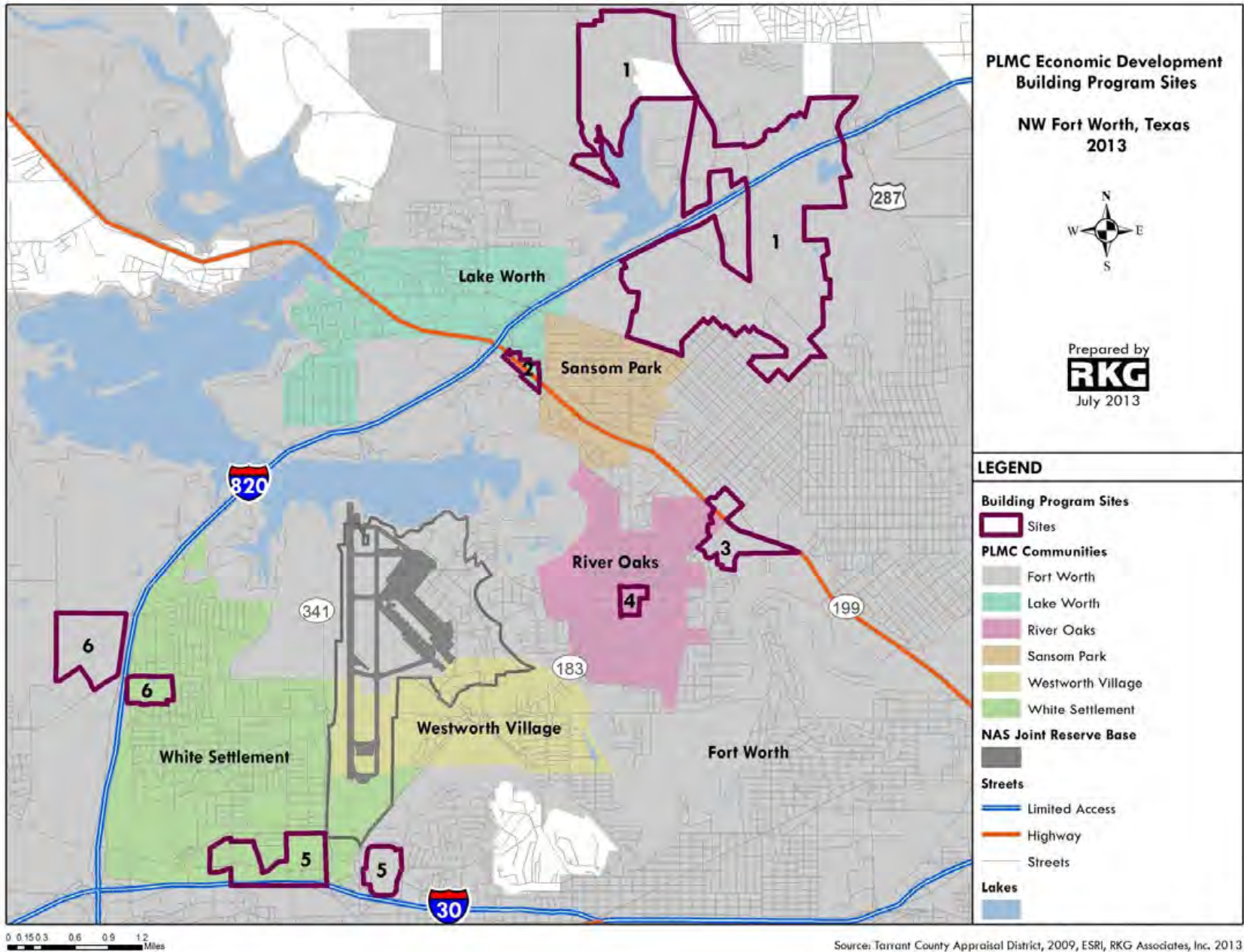
## **3. Data Sources**

A variety of data sources were used to develop the assumptions for the economic development tax base impact model. Information about tax rates and taxation in Tarrant County was found from several sources including the State of Texas, Tarrant County Appraisal District and the Tarrant County Tax Assessor/Collector. The Tarrant County Appraisal District also provided land and property values for the County and the subject municipalities. This information was used to estimate future revenues and provide information about current property values. The building cost data provider Marshall & Swift provided construction cost estimates used to determine the real estate value of future, potential development. The Urban Land Institute (ULI), Institute of Transportation Engineers and Commercial Buildings Energy Consumption Survey provided information about employees per square foot for a variety of property types. ULI also was used as a resource for sales per square foot estimates to analyze sales revenue for the model. Average square footage for apartment units and townhomes was estimated through a survey of units for rent or sale at [www.rent.com](http://www.rent.com).

## **C. DEVELOPMENT PROGRAM**

Using input from the PLMC municipalities, a conceptual building program was created to illustrate the possible economic development impacts development efforts at 6 different sites might produce. The locations for Sites 1 – 6 can be found in Map 1. All building program square footage referenced in this section can be found in Table 1. All square footage of removed uses referred to in this section can be found in Appendix Table 1.

Map 1



**Table 1**  
**Economic Development Building Program**  
**PLMC, 2013**

Land Use Category	BUILDING SQUARE FEET								
	Site 1 (Fort Worth)	Site 2 (Lake Worth)	Site 3 (Fort Worth)	Site 3 (River Oaks)	Site 4 (River Oaks)	Site 5 (White Settlement)	Site 5 (Fort Worth)	Site 6 (White Settlement)	Site 6 (Fort Worth)
Single Family High Value									700,000
Single Family Mid Value									
Townhouse			80,000						
Apartments			270,000						990,000
Industrial/Assembly									
Industrial Flex Space	500,000								
Retail - Stand Alone		80,000	300,000		10,000	150,000		100,000	
Retail - Regional Shopping							1,500,000		
Entertainment				10,000				25,000	
Restaurant		15,000	10,000	5,000	5,000			20,000	
Office	2,000,000	80,000				500,000			
Education/Training	250,000								
<b>Total</b>	<b>2,750,000</b>	<b>175,000</b>	<b>660,000</b>	<b>15,000</b>	<b>15,000</b>	<b>650,000</b>	<b>1,500,000</b>	<b>145,000</b>	<b>1,690,000</b>

Source: RKG Associates, Inc., 2013

### 1. Site 1 – Interstate 820 Regional Tradeport

Site 1 is located along the Northwestern loop of 820 in the City of Fort Worth. It is north of the City of Sansom Park and east of the City of Lake Worth. The Economic Development Building Program for this site is described as follows:

- Higher profile corporate office park,
- Joint industrial/flex park (Tarrant County, City of Fort Worth, NW Fort Worth Communities), and
- 250,000 SF workforce training center and college campus.

To develop a regional tradeport in this location, 2,000,000 SF of business park space, 250,000 SF of education or training space and 500,000 SF of industrial flex space are proposed additions to Site 1. In order to do so, an anticipated 2,790 SF of existing residential buildings will need to be removed. Overall, there will be a net gain of 2,747,210 SF of development from this program.

### 2. Site 2 – SH 199/IH 820 to Sansom Park

Site 2 is located along SH199 near the interchange for Interstate 820 in the City of Lake Worth. The site is directly east of the city limits of Sansom Park. For Site 2, the Economic Development Building Program is described as follows:

- Remake low-end retail environment into mixed retail, service and employment center,
- Mostly highway serving retail,
- Make gateway statement for Samson Park, and
- Incorporate small business park location instead of larger scale retail uses

The development program for Site 2 proposes an additional 80,000 SF of retail and service uses in a neighborhood shopping center format, 15,000 SF of limited service restaurant use and 80,000 SF of professional office space. This development would take the place of 32,573 SF of existing retail and office space. Overall, the development program creates a net gain of 142,427 SF of development.

### **3. Site 3 – Intersection of SH 199/183**

Site 3 is primarily located in the City of Fort Worth on land surrounding the intersection of SH 199 and SH 183. A small portion of the site is also located in the City of River Oaks. The proposed Economic Development Building Program is described as follows:

- Fort Worth community focus,
- Big box anchored,
- Mixed-Use where possible to improve image of the area and to attract young people and young families looking for easy access to Downtown Fort Worth,
- Possible townhomes and apartments in a town center concept, and
- Other Uses: restaurants, services, family entertainment and recreation.

The building program for Site 3 includes 50 townhouse units (80,000 SF), 300 apartment units (270,000 SF), 300,000 SF of retail and service space and 10,000 SF of restaurant space to the Fort Worth portion of the site. To accommodate this development, 444,755 SF of existing residential, warehouse, retail, entertainment and restaurant space on the site will be removed. In River Oaks, the building program adds 5,000 SF of restaurant space and 10,000 SF of family entertainment space while removing no existing structures. Overall, the building program for Site 3 creates a net gain of 215,245 SF of development in Fort Worth and 15,000 SF of development in River Oaks.

### **4. Site 4 – SH 183/Robert's Cut Off Intersection**

Site 4 is located in the heart of River Oaks near the intersection of Robert's Cut Off and SH 183. The proposed Economic Development Building Program is described as follows:

- Development plan on this site as much for beautification as for economic development,
- Upgrade retail offerings but mostly small serving commuter traffic and nearby neighborhoods and military (dry cleaners, gas station, car wash, convenience store, restaurants), and
- Gateway landscaping and roadway definition.

For Site 4, the proposed building program includes 10,000 SF of retail and service uses and 5,000 SF of restaurant space. In order to pursue this development, 16,539 SF of existing retail is anticipated to be removed. Overall, there will be a net loss of 1,539 SF for the building program associated with Site 4.

### **5. Site 5 – Interstate 30 & SH 183 & Ridgmar Mall**

The location of Site 5 is just south of NAS Fort Worth, JRB, to the east and west of SH 183 and north of IH 30. The western part of Site 5 is in the City of White Settlement. The eastern part, which includes Ridgmar Mall, is in the City of Fort Worth. The proposed building program for this site is described as follows:

- Reposition existing retail at Ridgmar Mall into a town center concept as part of a flexible approach to keep the mall viable and minimize land use incompatibilities with Accident Potential Zone I
- Introduce a grid network and create new street-fronting businesses
- Create a high amenity, pedestrian-scale environment
- Increase total retail square footage on the eastern side of the mall and near newly designed exit ramp areas.

The proposed building program for Site 5 adds 1,500,000 SF of town center-oriented retail space to replace the existing 1,124,196 SF that make up the Ridgmar Mall and associated retail buildings in



Fort Worth. This is an overall net gain of 375,804 SF of development in the Fort Worth portion of the site. The other portion of Site 5 is in White Settlement, where the program consists of developing 500,000 SF of professional office space as well as replacing 330,378 SF of existing residential, industrial, retail and restaurant space to incorporate the new office space. In addition, 150,000 SF of standalone retail/service and restaurant uses have been proposed in this location.

An alternative development consideration for the City of White Settlement would be to introduce mid-value single family homes since there is currently a lack of these types of homes in the study area. Site 5 could incorporate new residential uses, but since the area falls within the noise contours of the base, any proposed residential development in White Settlement should document the need through a housing needs assessment and the builder should coordinate with NAS Fort Worth, JRB to incorporate sound mitigation techniques to improve the indoor sound environment.

## **6. Site 6 – Interstate 820 & Clifford Road**

The location of Site 6 is on the west and east side of IH820 in the City of Fort Worth and the northwest portion of the City of White Settlement. The proposed building program consists of the following:

- Increase presence of townhomes and apartment living in signature new development in the Fort Worth portion of the site. Target young families, young professionals, military families and people looking for other housing options, and
- Introduce a mix of family entertainment, restaurants, and retail, including a new water park in the City of White Settlement.

The Site 6 building program includes an additional 150,000 SF of family entertainment, retail, and restaurant space, including a water park, to the White Settlement portion of the site. This development program will replace 31,387 SF of existing residential, retail and restaurant uses but lead to a net gain of 118,613 SF of development. It will also result in the loss of the existing ball field complex in this location, but there are several alternative recreational areas within the city. For the portion of the site located in Fort Worth, the building program consists of adding 200 high-value single family homes (700,000 SF) and 1,100 apartment units (990,000 SF). Sound mitigation techniques should be incorporated into the proposed residential areas that fall within the noise contours of the base. Due to the large amount of undeveloped agricultural land at this location, no existing uses will be removed to accommodate the new development. Therefore, the building program on the Fort Worth portion of Site 6 will create a net gain of 1,690,000 SF of residential development.

## **D. TAX BASE & EMPLOYMENT IMPACTS**

In addition to adding new uses to the six identified sites, the economic development program is targeted to impact the tax base of the municipalities. It should be noted that the analysis examines the change in tax ratables and municipal revenues without the offsetting cost of providing services. This analysis is intended to illustrate how local tax base and employment can be expanded through proactive economic development efforts. As development or redevelopment occurs in these areas, local communities should study the potential fiscal impacts associated with providing services for safety, education, roads, and other services.

Tax revenues generated by new uses that encourage demand for services, provide services that generate sales, or create value through real estate all can impact the economy of a community. Even though most of the building programs necessitate the removal of some existing buildings, in most cases the balance of these efforts leads to a net positive in municipal revenue and employment. In all cases, the projected revenue and employment figures reflect developments that are completed and occupied. Therefore, the revenues are at a level that may be several years after the start of a development project and reflect what is possible if all proposed uses are developed and occupied.

## 1. Tax Base Impacts

Table 2 at the end of this section further illustrates the anticipated net change in tax revenue for each site and the associated municipality. A full version of the tax base impacts analysis can be found in Appendix Tables 2 - 10.

a.) Site 1 (Fort Worth)

The proposed economic development building program in Site 1 calls for industrial, office education and education/training space. The site has the potential to generate \$18.5 million annually in additional tax revenue at build-out, over existing levels for the City of Fort Worth. This amount includes minor revenues lost by removing a small number of existing buildings to provide space for new development. For the most part this area of Fort Worth is undeveloped. It should also be noted that the education component of the building program is assumed to be a tax exempt entity, which may not generate tax revenues from real and personal property.

b.) Site 2 (Lake Worth)

For the proposed retail, restaurant, and office space developments, the City of Lake Worth might anticipate an annual increase of \$849,308 in property tax revenue and \$492,922 in sales tax revenue for a total of \$1,342,230 of generated revenue above the current level. This amount reflects the loss of revenue associated with the retail and restaurant spaces that were removed to accommodate the new development.

c.) Site 3 (Fort Worth and River Oaks)

Site 3 exists in two municipalities, therefore the tax base impact of the economic development building program in Fort Worth and River Oaks were analyzed separately. The townhomes, apartments, retail, and restaurants outlined in the development program for the Fort Worth portion have the potential to generate \$1,678,677 in property taxes and \$280,675 in sales tax for a total of \$1,959,353 of additional annual revenue. This gain in tax revenue is net the amount of revenue associated with removed residential, warehouse, retail, entertainment and restaurant uses to provide space as part of the redevelopment process.

In River Oaks, existing uses would remain in place. Proposed development of restaurants and family entertainment uses could generate \$77,664 in property tax revenue and \$51,492 in sales tax revenue creating an additional \$129,156 in annual tax revenue for River Oaks over existing levels. For a small community like River Oaks, this additional tax revenue would represent a 3% change over current revenue levels.

d.) Site 4 (River Oaks)

The Economic Development Building Program for Site 4 adds retail and restaurants to the commercial corridor in River Oaks. An additional \$49,331 in property tax revenue and \$19,053 in sales tax revenue has the potential to be produced from this development. A total of \$68,384 in additional annual tax revenue could be generated for River Oaks above existing revenues, even after the loss of revenue from removed retail uses to provide space for redevelopment.

e.) Site 5 (Fort Worth and White Settlement)

Site 5 has elements of its proposed building program in both the City of White Settlement and the City of Fort Worth. The impact on the tax base for each of these municipalities will be analyzed separately, similar to Site 1. In White Settlement, the proposed office and retail are projected to produce a positive net change of \$3.1 million in new tax revenue over current levels. To accommodate these new uses, a number of residential, industrial, retail and restaurant uses will be removed, leading to an overall loss of \$1.7 million annual tax revenue. However, the new development program could potentially generate more than \$4.8 million

for a net change of \$3.1 million. This is due in large part on the creation of considerable real estate value related to the construction of 500,000 SF of new office space at this location, which accounts for roughly 79% of the new tax revenues.

The Fort Worth portion of Site 5 is primarily focused on the repositioning of retail assets located at the Ridgmar Mall. It is RKG's general opinion that the mall will have to modernize its building layout in the future to remain regionally competitive. Like many regional malls throughout the country, the reconfiguration of the mall into an open air town center development is a possible scenario. This alternative scenario for the retail on this portion of the site is anticipated to add \$7.9 million in property tax revenue and nearly \$2 million in sales tax revenue, for a total of \$9.9 million in annual revenue for the City of Fort Worth. This amount is net tax revenue, after deducting revenues generated from the existing mall development.

f.) Site 6 (Fort Worth and White Settlement)

Site 6, similar to Site 5 and Site 3 exists in more than one municipality. Therefore, the tax base impacts of Site 6 on the City of White Settlement and the City of Fort Worth will be discussed separately. The entertainment, retail and restaurant uses proposed for Site 6 in White Settlement are anticipated to generate a net change of \$1.4 million annually over existing tax revenues. However, removal of a small amount of residential, retail and restaurant uses to provide space for this development will decrease sales tax revenue by \$98,236 annually.

In Fort Worth, the Site 6 building program adds a large number of single family homes and apartments. No removal of existing structures associated with this part of the Site 6 building plan is anticipated. Therefore, the City of Fort Worth can anticipate an increase in annual tax revenues by \$5,069,665 from revenues generated through property taxes.

At a municipal level, there is anticipated to be an overall net gain of tax revenue from development and redevelopment.

- Fort Worth Impacts - The City of Fort Worth adds \$35,475,340 annually from revenues generated from Sites 1, 5 and 6.
- Lake Worth Impacts: The City of Lake Worth revenues will increase by \$1,342,230 annually from taxes associated with development on Site 2.
- River Oaks Impacts - The City of River Oaks will increase its annual revenues by \$197,539 from development on Sites 3 and 4.
- White Settlement Impacts - White Settlement will add \$4,486,953 to its annual revenues based on development efforts on Sites 5 and 6.

Based on the unaudited governmental fund revenue totals for 2011, provided by each municipality, the above revenue gains represents 4.7% of the 2011 tax revenues for the City of Fort Worth; 13.3% of total tax revenues of Lake Worth; 4.6% of the total tax revenue of River Oaks and 43.4% of the total tax revenues of White Settlement. As stated previously in this analysis, a portion of these additional tax revenues would be off-set by the increased cost of providing municipal services such as police, fire, public works, education and other government services. The net difference between municipal revenues and expenses represents would represent the actual financial benefit to each community.

## 2. Employment Impacts

Investment in economic development will ultimately result in the formation of new businesses that create jobs. Job creation will in turn create a round of secondary impacts such as increased demand for local

goods and services and an increase in demand for housing due to job relocation. When employment generation is substantial, it has the potential to lead to additional employment gains and new businesses related to meeting the demand for goods that cannot be met by existing local businesses. Based on an estimation of the number of employees currently working in uses removed and those anticipated from new development, a new net number of employees were determined for each site.

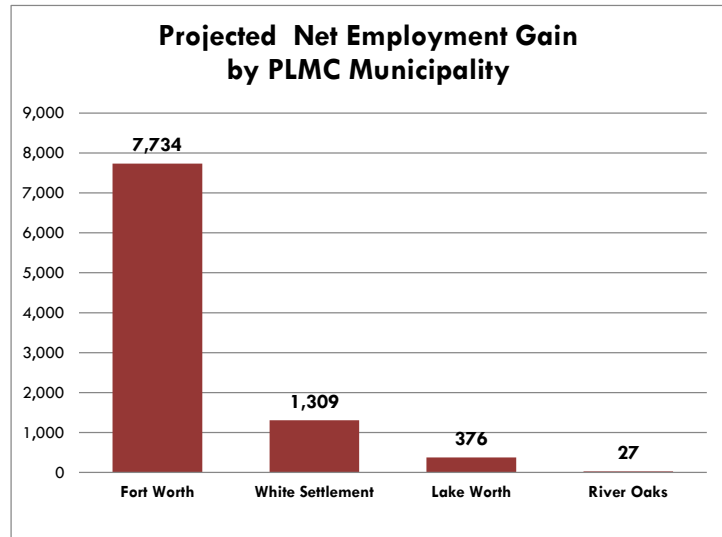
The projected change in employment was based on the type and quantity of new development added or removed.

- Site 1 - Site 1 is anticipated to produce a net change of 7,008 employees in the City of Fort Worth. This would constitute a new major employment center on the IH 820 corridor in between Fort Worth and Dallas/Fort Worth Airport.
- Site 2 - Site 2 has the potential to lead to a net gain of 376 employees in the City of Lake Worth.
- Site 3 - Site 3 has the potential to add 34 employees in the City of River Oaks, but the development program will lead to a net loss of 214 employees in the City of Fort Worth.
- Site 4 - The development program for Site 4 is also anticipated to result in a small net loss of 7 employees in the City of River Oaks. This is because slightly less building square footage is being proposed than what is currently at this location.
- Site 5 - Site 5 is anticipated to produce a net gain of 1,005 employees in the City of White Settlement and a net gain of 940 employees in Fort Worth.
- Site 6 - For Site 6, proposed development in White Settlement is anticipated to produce a net gain of 304 employees while none are anticipated to be the direct results of development for Site 6 in Fort Worth.

A complete illustration of the employment impacts associated with the building programs can be found in Tables 3-11 at the end of this section.

When aggregated by municipality, the development programs resulted in an overall net gain in employment at a local level. Fort Worth has the greatest potential net gain of 7,734 new jobs from Sites 1, 3 and 5. White Settlement has the second highest potential net gain of 1,309 jobs from Sites 5 and 6. A net gain of 376 employees is projected for Lake Worth from Site 2. The model also shows a small net gain of 27 jobs for the City of River Oaks from Sites 3 and 4. In total, RKG projects a potential employment gain of the PLMC study area would gain roughly 9,446 new jobs at build-out, which could take 10 to 20 years to achieve.

Figure 1



**Table 2**  
**Economic Development Tax Base Impact Analysis: Tax Revenues**  
**PLMC, Fort Worth Texas, 2013**

	Net Change								
	Site 1 Fort Worth	Site 2 Lake Worth	Site 3 Fort Worth	Site 3 River Oaks	Site 4 River Oaks	Site 5 White Settlement	Site 5 Fort Worth	Site 6 White Settlement	Site 6 Fort Worth
<b>REAL PROPERTY VALUE</b>									
Single Family									
High Value	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$131,943,170
Mid Value	(\$121,700)	\$0	(\$1,318,439)	\$0	\$0	(\$222,800)	\$0	(\$1,100,574)	\$0
Townhouse	\$0	\$0	\$8,584,927	\$0	\$0	\$0	\$0	\$0	\$0
Apartments	\$0	\$0	\$26,948,407	\$0	\$0	\$0	\$0	\$0	\$98,810,825
Industrial									
Assembly/Warehouse	\$0	\$0	\$0	\$0	\$0	(\$2,616,670)	\$0	\$0	\$0
Flex Space	\$39,215,067	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Warehouse/Distribution	\$0	\$0	(\$768,317)	\$0	\$0	\$0	\$0	\$0	\$0
Retail/Service									
Stand Alone	\$0	\$9,731,736	\$30,831,342	\$0	\$520,340	\$9,510,778	(\$7,587,800)	\$13,918,383	\$0
Regional Shopping Center	\$0	\$0	\$0	\$0	\$0	\$0	\$263,151,498	\$0	\$0
Entertainment	\$0	\$0	(\$1,151,010)	\$1,514,372	\$0	\$0	\$0	\$3,785,929	\$0
Restaurant	\$0	\$2,403,649	\$926,430	\$1,210,389	\$1,210,389	(\$1,269,059)	\$0	\$4,402,217	\$0
Office	\$480,619,722	\$19,224,789	\$0	\$0	\$0	\$120,154,930	\$0	\$0	\$0
Education/Training	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>\$519,713,088</b>	<b>\$31,360,174</b>	<b>\$64,053,340</b>	<b>\$2,724,761</b>	<b>\$1,730,730</b>	<b>\$125,557,180</b>	<b>\$255,563,698</b>	<b>\$21,005,954</b>	<b>\$230,753,995</b>
<b>PERSONAL PROPERTY VALUE</b>									
Industrial									
Assembly/Warehouse	\$0	\$0	\$0	\$0	\$0	(\$8,424,142)	\$0	\$0	\$0
Flex Space	\$126,249,510	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Warehouse/Distribution	\$0	\$0	(\$2,473,530)	\$0	\$0	\$0	\$0	\$0	\$0
Retail/Service									
Stand Alone	\$0	\$2,558,751	\$12,703,483	\$0	\$116,243	\$2,389,244	(\$3,126,412)	\$3,496,498	\$0
Regional Shopping Center	\$0	\$0	\$0	\$0	\$0	\$0	\$108,426,694	\$0	\$0
Entertainment	\$0	\$0	(\$474,252)	\$338,307	\$0	\$0	\$0	\$951,080	\$0
Restaurant	\$0	\$631,988	\$381,718	\$270,398	\$270,398	(\$318,806)	\$0	\$1,105,900	\$0
Office	\$198,030,442	\$5,054,745	\$0	\$0	\$0	\$30,184,646	\$0	\$0	\$0
Education/Training	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>\$324,279,951</b>	<b>\$8,245,484</b>	<b>\$10,137,419</b>	<b>\$608,704</b>	<b>\$386,640</b>	<b>\$23,830,942</b>	<b>\$105,300,282</b>	<b>\$5,553,478</b>	<b>\$0</b>
<b>PROPERTY TAX REVENUES</b>									
Real Property	\$11,418,097	\$672,491	\$1,449,303	\$63,482	\$40,323	\$2,705,399	\$5,614,734	\$452,618	\$5,069,665
Personal Property	\$7,124,431	\$176,817	\$229,374	\$14,182	\$9,008	\$513,489	\$2,313,447	\$119,662	\$0
<b>Total</b>	<b>\$18,542,527</b>	<b>\$849,308</b>	<b>\$1,678,677</b>	<b>\$77,664</b>	<b>\$49,331</b>	<b>\$3,218,888</b>	<b>\$7,928,182</b>	<b>\$572,280</b>	<b>\$5,069,665</b>
<b>SALES</b>									
Retail/Service									
Stand Alone	\$0	\$22,046,900	\$18,363,305	\$0	(\$837,256)	\$598,363	(\$7,586,060)	\$30,604,637	\$0
Regional Shopping Center	\$0	\$0	\$0	\$0	\$0	\$0	\$106,366,718	\$0	\$0
Entertainment	\$0	\$0	(\$2,335,856)	\$784,700	\$0	\$0	\$0	\$1,961,750	\$0
Restaurant	\$0	\$2,599,203	(\$1,993,680)	\$1,789,900	\$1,789,900	(\$4,842,664)	\$0	\$6,467,177	\$0
<b>Total</b>	<b>\$0</b>	<b>\$24,646,104</b>	<b>\$14,033,769</b>	<b>\$2,574,600</b>	<b>\$952,644</b>	<b>(\$4,244,301)</b>	<b>\$98,780,657</b>	<b>\$39,033,564</b>	<b>\$0</b>
<b>LOCAL SALES TAX REVENUE</b>									
<b>Total</b>	<b>\$0</b>	<b>\$492,922</b>	<b>\$280,675</b>	<b>\$51,492</b>	<b>\$19,053</b>	<b>(\$84,886)</b>	<b>\$1,975,613</b>	<b>\$780,671</b>	<b>\$0</b>
<b>TOTAL REVENUE</b>	<b>\$18,542,527</b>	<b>\$1,342,230</b>	<b>\$1,959,353</b>	<b>\$129,156</b>	<b>\$68,384</b>	<b>\$3,134,002</b>	<b>\$9,903,795</b>	<b>\$1,352,951</b>	<b>\$5,069,665</b>
<b>% of FY11 Gov. Funds Revenue</b>	<b>2.4%</b>	<b>13.3%</b>	<b>0.3%</b>	<b>3.0%</b>	<b>1.6%</b>	<b>30.3%</b>	<b>1.3%</b>	<b>13.1%</b>	<b>0.7%</b>

Source: RKG Associates, Inc., 2013



**Table 3**  
**Employment Estimates: Site 1, Fort Worth, Texas**

Land Use Category	Current Employees	New Employees	Net Change
Industrial			
Assembly/Warehouse	0	0	0
Flex Space	0	1,072	1,072
Warehouse/Distribution	0	0	0
Retail/Service			
Stand Alone	0	0	0
Regional Shopping Center	0	0	0
Entertainment	0	0	0
Restaurant	0	0	0
Office	0	5,571	5,571
Education/Training	0	365	365
<b>Total</b>	<b>0</b>	<b>7,008</b>	<b>7,008</b>

Source: ULI, 1993, ITE, 2008, CBECs, 2003, RKG Associates, Inc. 2013

**Table 6**  
**Employment Estimates: Site 3, River Oaks, Texas**

Land Use Category	Current Employees	New Employees	Net Change
Industrial			
Assembly/Warehouse	0	0	0
Flex Space	0	0	0
Warehouse/Distribution	0	0	0
Retail/Service			
Stand Alone	0	0	0
Regional Shopping Center	0	0	0
Entertainment	0	25	25
Restaurant	0	9	9
Office	0	0	0
Education/Training	0	0	0
<b>Total</b>	<b>0</b>	<b>34</b>	<b>34</b>

Source: ULI, 1993, ITE, 2008, CBECs, 2003, RKG Associates, Inc. 2013

**Table 9**  
**Employment Estimates: Site 5, Fort Worth, Texas**

Land Use Category	Current Employees	New Employees	Net Change
Industrial			
Assembly/Warehouse	0	0	0
Flex Space	0	0	0
Warehouse/Distribution	0	0	0
Retail/Service			
Stand Alone	54	0	(54)
Regional Shopping Center	2,756	3,750	994
Entertainment	0	0	0
Restaurant	0	0	0
Office	0	0	0
Education/Training	0	0	0
<b>Total</b>	<b>2,810</b>	<b>3,750</b>	<b>940</b>

Source: ULI, 1993, ITE, 2008, CBECs, 2003, RKG Associates, Inc. 2013

**Table 4**  
**Employment Estimates: Site 2, Lake Worth, Texas**

Land Use Category	Current Employees	New Employees	Net Change
Industrial			
Assembly/Warehouse	0	0	0
Flex Space	0	0	0
Warehouse/Distribution	0	0	0
Retail/Service			
Stand Alone	56	200	144
Regional Shopping Center	0	0	0
Entertainment	0	0	0
Restaurant	19	27	9
Office	0	223	223
Education/Training	0	0	0
<b>Total</b>	<b>74</b>	<b>450</b>	<b>376</b>

Source: ULI, 1993, ITE, 2008, CBECs, 2003, RKG Associates, Inc. 2013

**Table 7**  
**Employment Estimates: Site 4, River Oaks, Texas**

Land Use Category	Current Employees	New Employees	Net Change
Industrial			
Assembly/Warehouse	0	0	0
Flex Space	0	0	0
Warehouse/Distribution	0	0	0
Retail/Service			
Stand Alone	41	25	(16)
Regional Shopping Center	0	0	0
Entertainment	0	0	0
Restaurant	0	9	9
Office	0	0	0
Education/Training	0	0	0
<b>Total</b>	<b>41</b>	<b>34</b>	<b>(7)</b>

Source: ULI, 1993, ITE, 2008, CBECs, 2003, RKG Associates, Inc. 2013

**Table 10**  
**Employment Estimates: Site 6, White Settlement, Texas**

Land Use Category	Current Employees	New Employees	Net Change
Industrial			
Assembly/Warehouse	0	0	0
Flex Space	0	0	0
Warehouse/Distribution	0	0	0
Retail/Service			
Stand Alone	40	250	210
Regional Shopping Center	0	0	0
Entertainment	0	63	63
Restaurant	5	36	32
Office	0	0	0
Education/Training	0	0	0
<b>Total</b>	<b>45</b>	<b>349</b>	<b>304</b>

Source: ULI, 1993, ITE, 2008, CBECs, 2003, RKG Associates, Inc. 2013

**Table 5**  
**Employment Estimates: Site 3, Fort Worth, Texas**

Land Use Category	Current Employees	New Employees	Net Change
Industrial			
Assembly/Warehouse	0	0	0
Flex Space	0	0	0
Warehouse/Distribution	21	0	(21)
Retail/Service			
Stand Alone	824	750	(74)
Regional Shopping Center	0	0	0
Entertainment	99	0	(99)
Restaurant	38	18	(20)
Office	0	0	0
Education/Training	0	0	0
<b>Total</b>	<b>982</b>	<b>768</b>	<b>(214)</b>

Source: ULI, 1993, ITE, 2008, CBECs, 2003, RKG Associates, Inc. 2013

**Table 8**  
**Employment Estimates: Site 5, White Settlement, Texas**

Land Use Category	Current Employees	New Employees	Net Change
Industrial			
Assembly/Warehouse	236	0	(236)
Flex Space	0	0	0
Warehouse/Distribution	0	0	0
Retail/Service			
Stand Alone	494	375	(119)
Regional Shopping Center	0	0	0
Entertainment	0	0	0
Restaurant	33	0	(33)
Office	0	1,393	1,393
Education/Training	0	0	0
<b>Total</b>	<b>763</b>	<b>1,768</b>	<b>1,005</b>

Source: ULI, 1993, ITE, 2008, CBECs, 2003, RKG Associates, Inc. 2013

**Table 11**  
**Employment Estimates: Site 6, Fort Worth, Texas**

Land Use Category	Current Employees	New Employees	Net Change
Industrial			
Assembly/Warehouse	0	0	0
Flex Space	0	0	0
Warehouse/Distribution	0	0	0
Retail/Service			
Stand Alone	0	0	0
Regional Shopping Center	0	0	0
Entertainment	0	0	0
Restaurant	0	0	0
Office	0	0	0
Education/Training	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>

Source: ULI, 1993, ITE, 2008, CBECs, 2003, RKG Associates, Inc. 2013

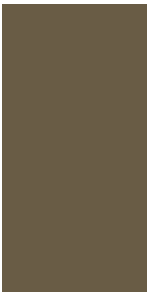
## **D. Implications**

New development or redevelopment, as described in this analysis that adds value and building square footage has the potential to produce positive tax base impacts. New development that does not require removal of existing uses is an example of this type of tax base gain, as observed in the Fort Worth portion of Site 6 and the River Oaks portion of Site 3. Similarly, redevelopment that includes the elimination of some existing uses shows a relatively notable gain in the tax base when the removed uses are of lower value than those proposed and the amount of total square footage is greater as seen in Site 1, Site 2, the Fort Worth portion of Site 3, Site 5 and the White Settlement portion of Site 6.

An overall increase in real estate value can compensate for retail sales lost from necessary demolition or repurposing in terms of total revenue, as seen in the White Settlement portion of Site 5 and Site 6. A combination of both an increase in sales, real estate value and square footage can have a relatively greater impact on revenues as seen in the Ridgmar Mall transformation from a traditional enclosed regional mall to an open air town center concept in the Fort Worth portion of Site 6. Alternatively, increased levels of residential development not only have an impact on property tax revenue, but also generate demand for area businesses by adding to the consumer base.

If not all of a proposed building program is possible, creating a balance in revenue generation between the uses that are removed and those that are added is important. Fostering a similar balance between the demand for goods and services that residential uses and employment generate with the retail and service uses that can meet that demand is also necessary. The Economic Development Building Program integrates these elements while also proposing uses that are attractive to the local community and ultimately lead to economic development through tax base expansion.

# APPENDIX H | HOUSING MARKET ANALYSIS



## INTRODUCTION

The Housing Market Analysis was prepared as part of the Planning Livable Military Communities Project funded by the US Department of Housing and Urban Development's (HUD) Community Challenge Grant. The purpose of the Housing Market Analysis is to answer specific questions related to the current housing market in the areas surrounding the Naval Air Station Fort Worth, Joint Reserve Base (NAS Fort Worth, JRB). The goal of this analysis is to determine how existing housing stock fits with net demand for housing by type and price in these market areas, and provide recommendations to promote quality and affordable housing in the area.

The Housing Market Analysis contains six components:

- A. **Community Profiles:** A review of demographic, income, and employment data for the market areas.
- B. **Housing Supply:** Describes housing stock by type, tenure, occupancy, age, price and rent range, and provides the current housing conditions within the market areas.
- C. **Housing Demand:** Results provide household and employment projections for the area to determine the housing demand by 2035.
- D. **Community Input:** Results from the visual preference and questionnaire surveys, interviews, and open house meetings.
- E. **Key Issues and Recommendations:** Key housing challenges are highlighted and preliminary recommendations are provided to address the market area housing challenges.
- F. **Implementation:** Summarizes recommendations, action steps, timelines, cost, and financial tools.

In most instances, the data for the market areas is compared to the countywide data for Tarrant County to contrast the general trends in the larger geographic area. Data was gathered from the 2000 and 2010 US Census, the 2006-2010 American Community Survey, the North Central Texas Council of Governments (NCTCOG) 2035 Demographic Forecast, and other sources. The descriptions of each indicator are supported with tables and maps.

The Housing Market Analysis distinguishes between a Primary Market Area and a Secondary Market Area. The following conditions apply for both market areas:

- The market areas are composed of selected 2010 Census tracts. Because a significant proportion of the data included in the study was gathered from the 2006-2010 American Community Survey and the 2010 Census, the 2010 tract boundaries are used to facilitate joining demographic and economic data to the proper spatial reference. The study also uses 2000 data as necessary.
- The travel time contours, the established 2.5-mile buffer study area, and Census tract boundaries were used to determine the Market Area Boundaries. Because these boundaries do not match with the city limits, the market areas include portions of cities surrounding NAS Fort Worth, JRB. (For instance, Census tracts for the city of Fort Worth are included in the market areas; however, these areas do not necessarily include the entire city.)

### Primary Market

The Primary Market Area generally corresponds to the 2.5-mile buffer used as the study area for the Planning Livable Military Communities study, with a few exceptions. The Census tracts within the Primary Market Area are selected based on meeting all three of the following criteria:

1. The tract is located entirely or partially within the 2.5-mile buffer area surrounding the base.
2. The tract is located entirely or partially within the 15-minute travel time contour for 2012 referenced in the 2012 Regional Coordination Committee Transportation Assessment (page 51).
3. A significant proportion of the population residing in the tract is located within the 2.5-mile buffer area. In some instances, tracts that intersect the 2.5-mile buffer area were not selected because the vast majority of residential development within those tracts is located outside of the buffer area. Including these tracts would not accurately represent the population residing within the conceived market area.

### Secondary Market

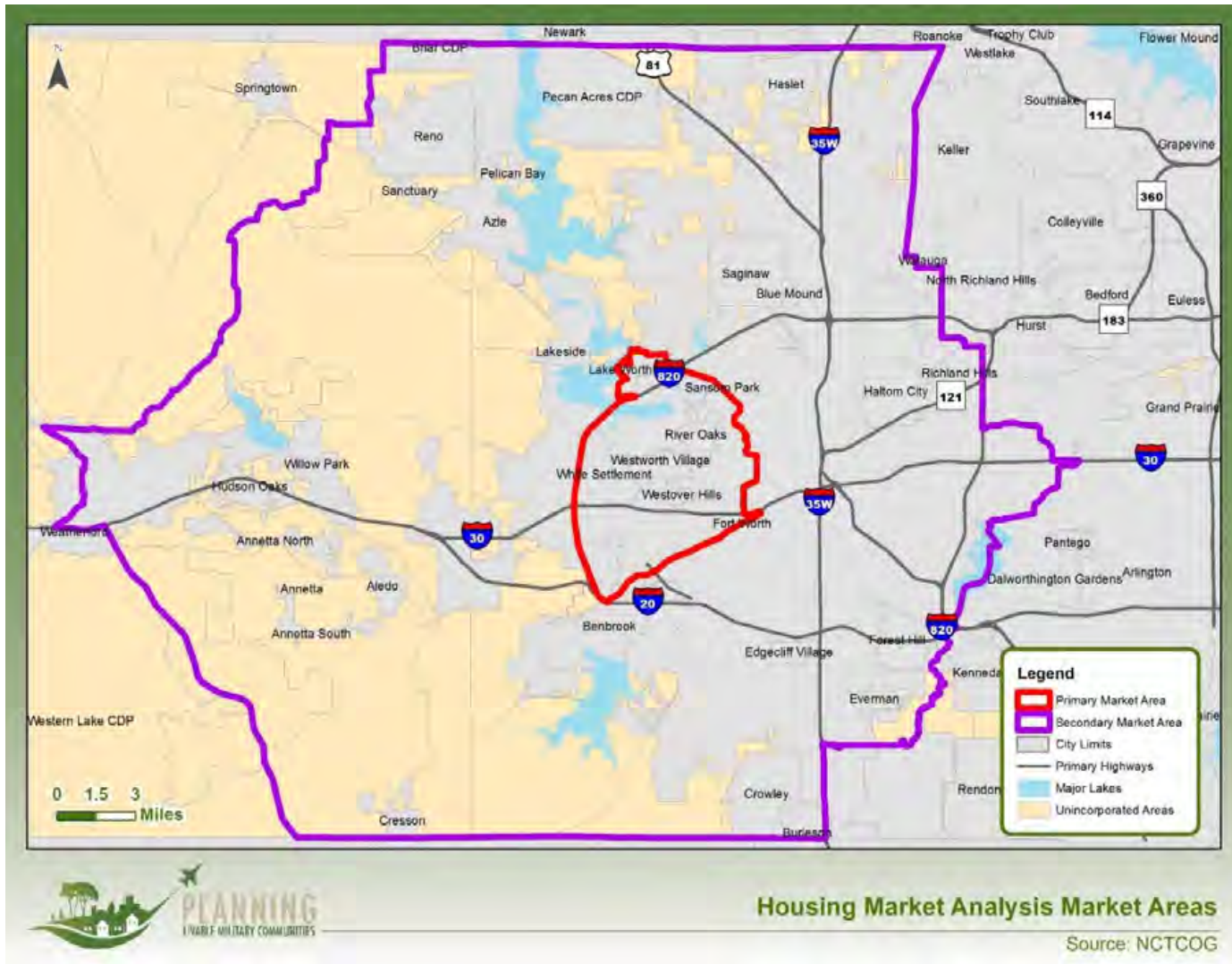
The Secondary Market Area similarly corresponds to previously established geographic boundaries and is intended to capture a broader sample of relevant data for areas surrounding the base. The selected Census tracts satisfy both of the following selection criteria:

1. The tract is located within the 15- to 30-minute travel time contour for 2012 referenced in the 2012 Regional Coordination Committee Transportation Assessment (page 51).
2. A significant proportion of the population residing in the tract is located within the 15- to 30-minute travel time contour area.

As a result of the selection criteria outlined above, the Secondary Market Area includes Census tracts located in Tarrant County and Parker County. The Secondary Market Area also includes the Census tracts within the Primary Market Area; the Secondary Market Area is not a doughnut shaped area. **Figure 1** indicates the location of the market areas.



FIGURE 1: HOUSING MARKET ANALYSIS AREAS



## A. COMMUNITY PROFILES

### DEMOGRAPHICS

The demographic analysis of the Primary and Secondary Housing Market Areas concentrates on the magnitude and composition of the population and changes that occurred between 2000 and 2010. The Census tract totals summarized in Figure 2 show that the total population for the Primary and Secondary Market Areas in 2010 were 121,381 and 1,014,509, respectively. About 73 percent of the population of the Primary Market Area was White and 9 percent was African-American. In the Secondary Market Area, almost 70 percent of the population was White and nearly 15 percent was African-American.

FIGURE 2: TOTAL POPULATION BY RACE, 2010

Race	Primary Market Area		Secondary Market Area		Tarrant County	
	Number	Percent	Number	Percent	Number	Percent
White	88,848	73.2%	678,699	66.9%	1,205,530	66.6%
African-American	10,871	9.0%	151,156	14.9%	268,983	14.9%
American Indian and Eskimo	959	0.8%	6,981	0.7%	11,827	0.7%
Asian or Pacific Islander	1,611	1.3%	33,012	3.3%	87,745	4.9%
Other race (includes two or more races)	19,092	15.7%	144,661	14.3%	234,949	13.0%
<b>Total</b>	<b>121,381</b>	<b>100.0%</b>	<b>1,014,509</b>	<b>100.0%</b>	<b>1,809,034</b>	<b>100.0%</b>

Source: 2010 US Census

The Census Bureau does not recognize Hispanic as a race, but rather an ethnicity. **Figure 3** shows that nearly 34 percent of population in the Primary Market Area and 31 percent of the population of the Secondary Market Area was Hispanic in 2010. As a comparison, in 2010, about 26 percent of the population in Tarrant County was Hispanic.

FIGURE 3: TOTAL POPULATION BY ETHNICITY, 2010

Ethnicity	Primary Market Area		Secondary Market Area		Tarrant County	
	Number	Percent	Number	Percent	Number	Percent
Hispanic	40,966	33.7%	312,964	30.8%	482,977	26.7%
Non-Hispanic	80,415	66.3%	701,545	69.2%	1,326,057	73.3%
<b>Total</b>	<b>121,381</b>	<b>100.0%</b>	<b>1,014,509</b>	<b>100.0%</b>	<b>1,809,034</b>	<b>100.0%</b>

Source: 2010 US Census

According to the Census tract-level data shown in **Figures 4 and 5**, the total population for the Primary Market Area increased by 2.4 percent between 2000 and 2010. This change included decreases of less than one percent for the White and African-American populations. Meanwhile, the total population of the Secondary Market Area increased by over 30 percent during the same decade. Both the White population and African-American population in the Secondary Market Area increased substantially (28.8 percent and 25.7 percent, respectively). **Figures 6 and 7** show that the population of Hispanics in both market areas increased significantly between 2000 and 2010. The Hispanic population increased by over 47 percent in the Primary Market Area and by 66 percent in the Secondary Market Area.

FIGURE 4: TOTAL POPULATION BY RACE FOR THE PRIMARY MARKET AREA, 2000-2010

Race	2000		2010		2000-2010 Change	
	Number	Percent	Number	Percent	Number	Percent
White	89,494	75.5%	88,848	73.2%	-646	-0.7%
African-American	10,949	9.2%	10,871	9.0%	-78	-0.7%
American Indian and Eskimo	800	0.7%	959	0.8%	159	19.9%
Asian or Pacific Islander	1,467	1.2%	1,611	1.3%	144	9.8%
Other race (includes two or more races)	15,812	13.3%	19,092	15.7%	3,280	20.7%
<b>Total</b>	<b>118,522</b>	<b>100.0%</b>	<b>121,381</b>	<b>100.0%</b>	<b>2,859</b>	<b>2.4%</b>

Source: 2010 US Census, 2000 US Census

FIGURE 5: TOTAL POPULATION BY RACE FOR THE SECONDARY MARKET AREA, 2000-2010

Race	2000		2010		2000-2010 Change	
	Number	Percent	Number	Percent	Number	Percent
White	526,909	67.7%	678,699	66.9%	151,790	28.8%
African-American	120,213	15.4%	151,156	14.9%	30,943	25.7%
American Indian and Eskimo	4,778	0.6%	6,981	0.7%	2,203	46.1%
Asian or Pacific Islander	20,014	2.6%	33,012	3.3%	12,998	64.9%
Other race (includes two or more races)	106,511	13.7%	144,661	14.3%	38,150	35.8%
<b>Total</b>	<b>778,425</b>	<b>100.0%</b>	<b>1,014,509</b>	<b>100.0%</b>	<b>236,084</b>	<b>30.3%</b>

Source: 2010 US Census, 2000 US Census

FIGURE 6: TOTAL POPULATION BY ETHNICITY FOR THE PRIMARY MARKET AREA, 2000-2010

Ethnicity	2000		2010		2000-2010 Change	
	Number	Percent	Number	Percent	Number	Percent
Hispanic	27,761	23.4%	40,966	33.7%	13,205	47.6%
Non-Hispanic	90,761	76.6%	80,415	66.3%	-10,346	-11.4%
<b>Total</b>	<b>118,522</b>	<b>100.0%</b>	<b>121,381</b>	<b>100.0%</b>	<b>2,859</b>	<b>2.4%</b>

Source: 2010 US Census, 2000 US Census

FIGURE 7: TOTAL POPULATION BY ETHNICITY FOR THE SECONDARY MARKET AREA, 2000-2010

Ethnicity	2000		2010		2000-2010 Change	
	Number	Percent	Number	Percent	Number	Percent
Hispanic	188,517	24.2%	312,964	30.8%	124,447	66.0%
Non-Hispanic	589,908	75.8%	701,545	69.2%	111,637	18.9%
<b>Total</b>	<b>778,425</b>	<b>100.0%</b>	<b>1,014,509</b>	<b>100.0%</b>	<b>236,084</b>	<b>30.3%</b>

Source: 2010 US Census, 2000 US Census

**Figure 8** shows the age distribution within the market areas. In 2010, residents aged 60 years and over constituted over 17 percent of the total population in the Primary Market Area and nearly 14 percent of the total population in the Secondary Market Area. Children below the age of 15 years made up 21 and 24 percent of the Primary and Secondary Market Area, respectively. Children aged 5 years and under constituted 8 and 8.5 percent of the total population of the Primary and Secondary Market Areas, respectively.

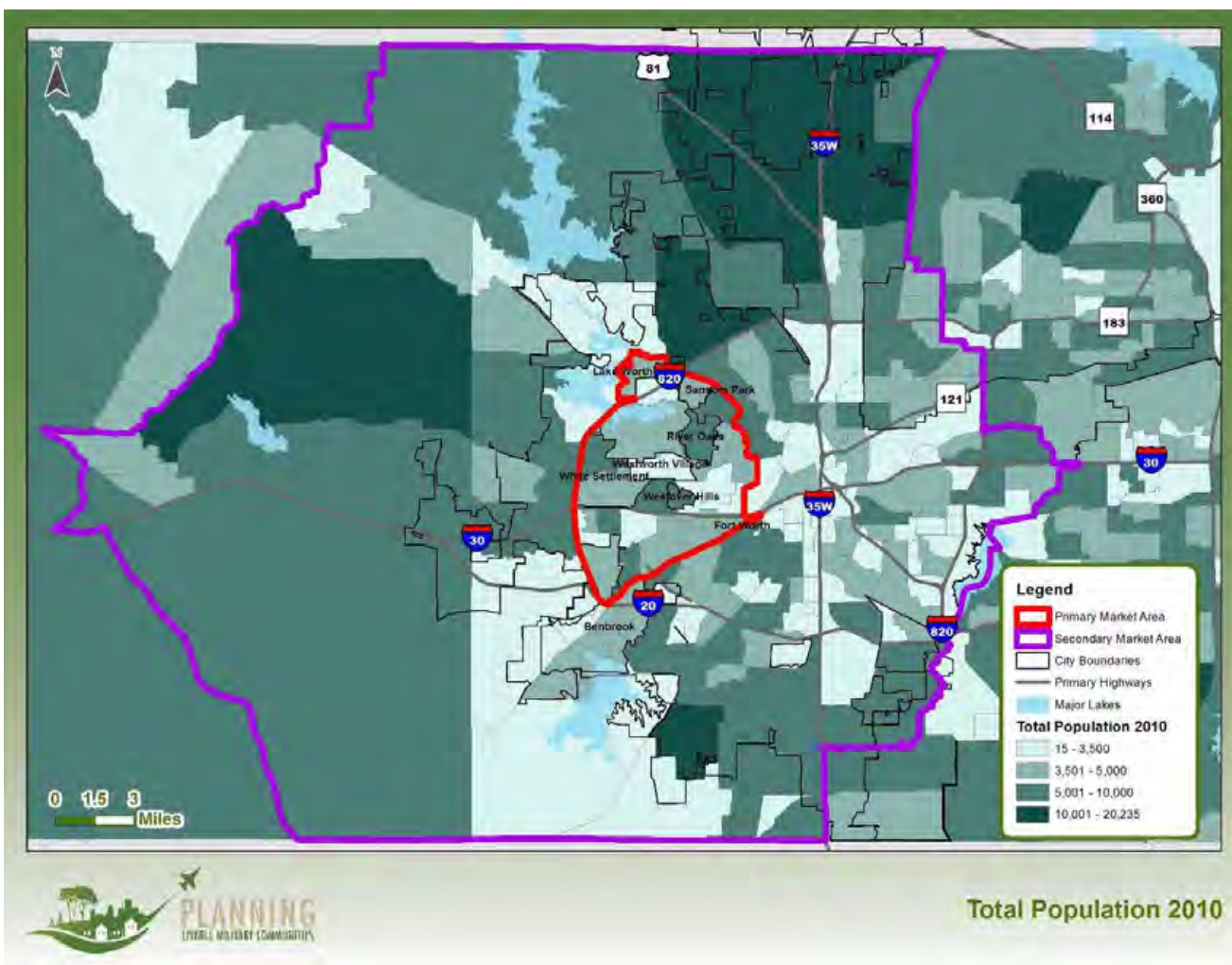
FIGURE 8: AGE DISTRIBUTION, 2010

Age	Primary Market Area		Secondary Market Area		Tarrant County	
	Number	Percent	Number	Percent	Number	Percent
Under 5 years	9,740	8.0%	85,838	8.5%	142,899	7.9%
5 to 14	16,080	13.2%	160,563	15.8%	282,973	15.6%
15 to 24	16,155	13.3%	142,409	14.0%	254,040	14.0%
25 to 59	58,482	48.2%	486,939	48.0%	887,607	49.1%
60 and over	20,924	17.2%	138,760	13.7%	241,515	13.4%
<b>Total</b>	<b>121,381</b>	<b>100.0%</b>	<b>1,014,509</b>	<b>100.0%</b>	<b>1,809,034</b>	<b>100.0%</b>

Source: 2010 US Census

For reference, **Figure 9** provides population of the Primary and Secondary Market Areas by Census tract in 2010. **Figures 10 and 11** indicate spatial concentrations of Hispanic and African-Americans within the market areas. **Figure 12** shows the median age by Census tract in the market areas. These maps are created using data from the 2010 decennial Census.

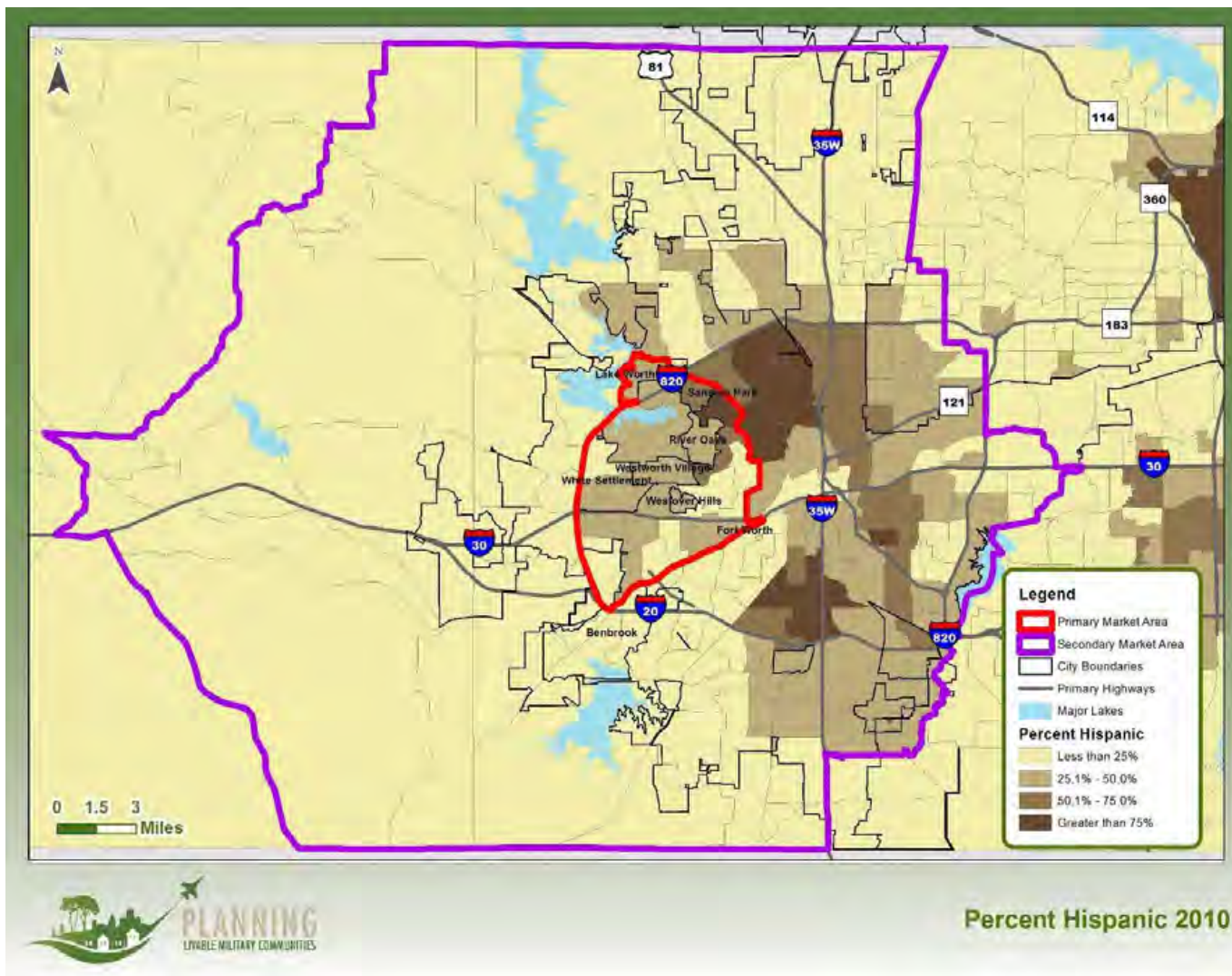
FIGURE 9: TOTAL POPULATION BY CENSUS TRACT, 2010



Source: 2010 US Census

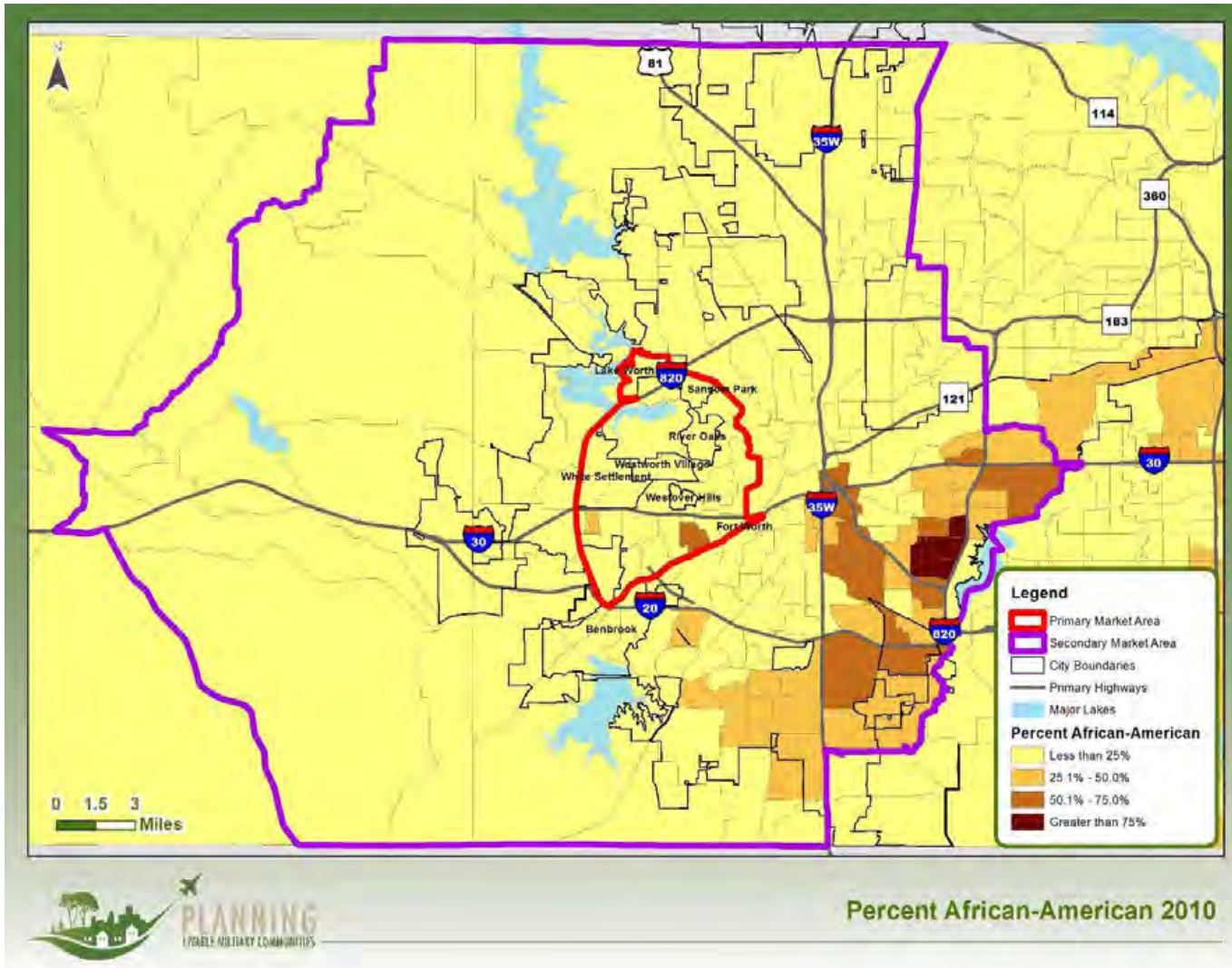


FIGURE 10: PERCENT HISPANIC BY CENSUS TRACT, 2010



Source: 2010 US Census

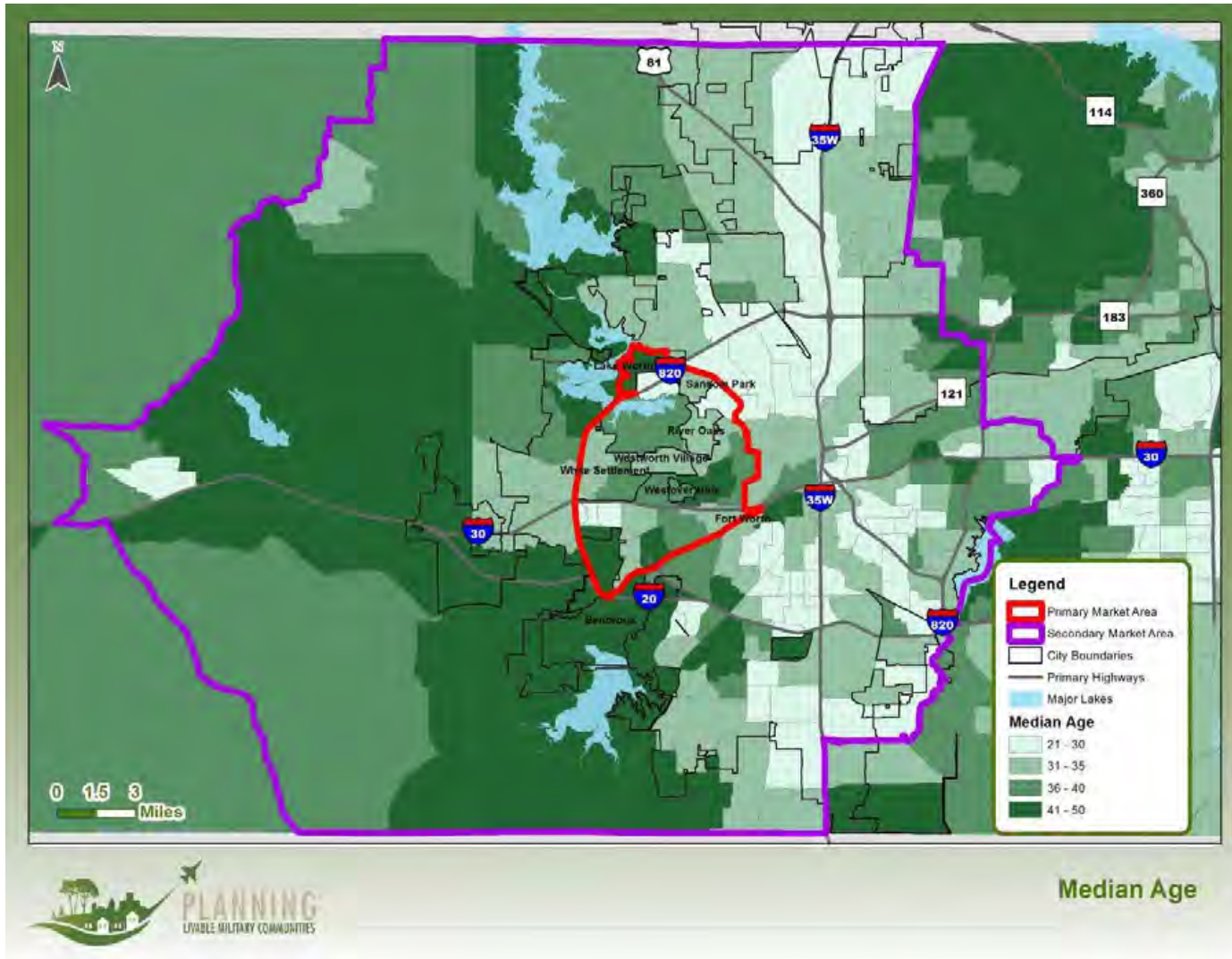
FIGURE 11: PERCENT AFRICAN-AMERICAN BY CENSUS TRACT, 2010



Source: 2010 US Census



FIGURE 12: MEDIAN AGE BY CENSUS TRACT, 2010



Source: 2010 US Census

**Figure 13** shows the household structure within the market areas in 2010. The table divides total households into two primary categories; households with children (under the age of 18) and households without children. Each of the categories is then divided into two subcategories: family households and non-family households.

FIGURE 13: HOUSEHOLD STRUCTURE, 2010

Type of Household	Primary Market Area		Secondary Market Area		Tarrant County	
	Number	Percent	Number	Percent	Number	Percent
Households with One or More People under 18 Years:	15,463	31.7%	145,349	40.3%	261,204	39.7%
<i>Family households:</i>	15,291	31.4%	144,178	40.0%	259,074	39.4%
Married-couple family	8,976	18.4%	95,526	26.5%	174,350	26.5%
Other family:	6,315	13.0%	48,652	13.5%	84,724	12.9%
Male householder, no wife present	1,639	3.4%	12,151	3.4%	20,805	3.2%
Female householder, no husband present	4,676	9.6%	36,501	10.1%	63,919	9.7%
<i>Non-family households:</i>	172	0.4%	1,171	0.3%	2,130	0.3%
Male householder	120	0.2%	854	0.2%	1,557	0.2%
Female householder	52	0.1%	317	0.1%	573	0.1%
Households with No People under 18 Years:	33,252	68.3%	215,512	59.7%	395,930	60.3%
<i>Family households:</i>	13,428	27.6%	105,950	29.4%	195,959	29.8%
Married-couple family	9,977	20.5%	82,322	22.8%	155,387	23.6%
Other family:	3,451	7.1%	23,628	6.5%	40,572	6.2%
Male householder, no wife present	1,130	2.3%	7,714	2.1%	13,545	2.1%
Female householder, no husband present	2,321	4.8%	15,914	4.4%	27,027	4.1%
<i>Non-family households:</i>	19,824	40.7%	109,562	30.4%	199,971	30.4%
Male householder	9,535	19.6%	52,481	14.5%	96,580	14.7%
Female householder	10,289	21.1%	57,081	15.8%	103,391	15.7%
<b>Total Households</b>	<b>48,715</b>	<b>100.0%</b>	<b>360,861</b>	<b>100.0%</b>	<b>657,134</b>	<b>100.0%</b>

Source: 2010 US Census

Nearly 39 percent of the households in the Primary Market Area were married couples, compared to approximately 50 percent of the households in this category in the Secondary Market Area and Tarrant County. Almost 32 percent of the households in the Primary Market Area had children under 18 years of age present, compared to approximately 40 percent of households in the Secondary Market Area and the county in this category. Forty-one percent of the households in the Primary Market Area were non-family households, compared to nearly 31 percent of the households in the Secondary Market Area and the county. About 36 percent of the total households in the Primary Market Area and 30 percent of the total households in the Secondary Market Area were headed by females, and of these, approximately 10 percent of the households with children present were headed by single mothers in both the Primary and Secondary Market Areas.

Overall, the Primary Market Area had a lower percentage of married couples and families with children, and a higher percentage of non-family households, when compared to the Secondary Market Area and Tarrant County.

## INCOME

Household income has a significant impact on the housing affordability for residents in the market areas. The data in **Figures 14 and 15** show the distribution of income across income classes in the market areas. **Figure 15** shows that the modal income class (the income class with the highest number of households) was in the \$50,000 to \$74,999 range; with 19.3 percent of the households in the Primary Market Area and 19.4 percent of households in the Secondary Market Area in this income range.

Overall, the Primary Market Area had a higher percentage of households that earned incomes less than \$35,000 at 42.7 percent, compared to 34.4 percent of households in this income group in the Secondary market Area, and 30.7 percent of households in the county. Over 15 percent and 12 percent of the households reported less than \$15,000 income in the Primary and Secondary Market Areas, respectively.

The Primary Market Area had a lower percentage of households that earned incomes of more than \$75,000 at 22.6 percent, compared to 31.8 percent of households in this income group in the Secondary Market Area, and 35.8 percent of households in the county. About 13 percent of the total households in the Primary Market Area and 19 percent of households in the Secondary Market Area reported incomes greater than \$100,000.

The average median household income in 2010 was \$43,013 for the Primary Market Area and \$49,910 for the Secondary Market Area. As a comparison, the median household income for Tarrant County was \$52,385 in 2010. **Figure 16** shows the median household income in the market areas by Census tract.

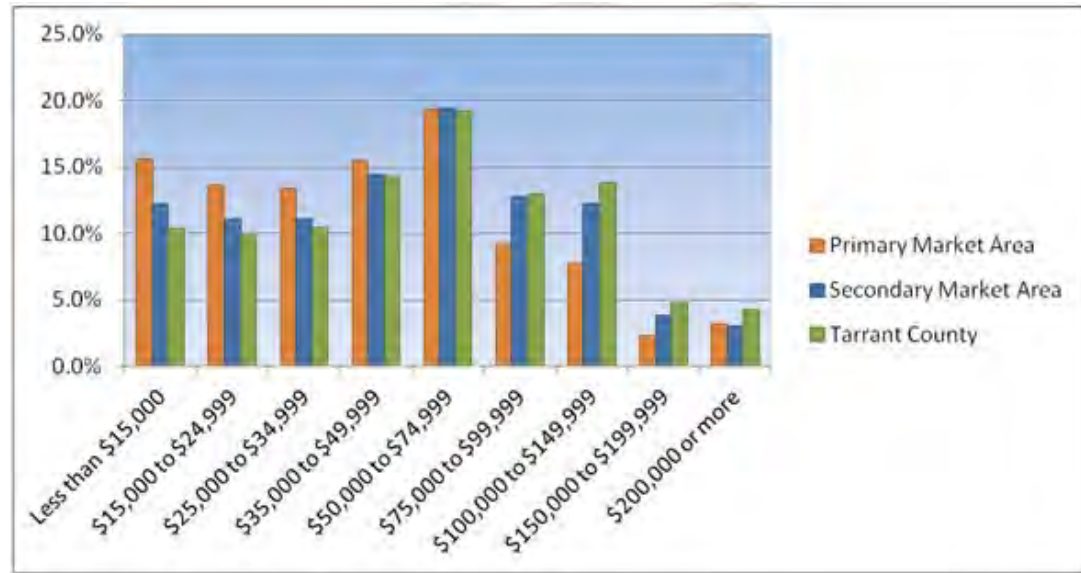


FIGURE 14: HOUSEHOLD INCOME, 2010

Income Range	Primary Market Area		Secondary Market Area		Tarrant County	
	Number	Percent	Number	Percent	Number	Percent
Less than \$15,000	7,562	15.6%	42,401	12.2%	65,334	10.3%
\$15,000 to \$24,999	6,619	13.7%	38,295	11.1%	62,493	9.9%
\$25,000 to \$34,999	6,489	13.4%	38,436	11.1%	66,203	10.5%
\$35,000 to \$49,999	7,503	15.5%	49,961	14.4%	90,335	14.3%
\$50,000 to \$74,999	9,356	19.3%	67,106	19.4%	121,443	19.2%
\$75,000 to \$99,999	4,487	9.3%	44,232	12.8%	81,958	13.0%
\$100,000 to \$149,999	3,758	7.8%	42,339	12.2%	87,577	13.8%
\$150,000 to \$199,999	1,137	2.3%	13,206	3.8%	30,417	4.8%
\$200,000 or more	1,563	3.2%	10,421	3.0%	26,758	4.2%
<b>Total Households</b>	<b>48,474</b>	<b>100.0%</b>	<b>346,397</b>	<b>100.0%</b>	<b>632,518</b>	<b>100.0%</b>

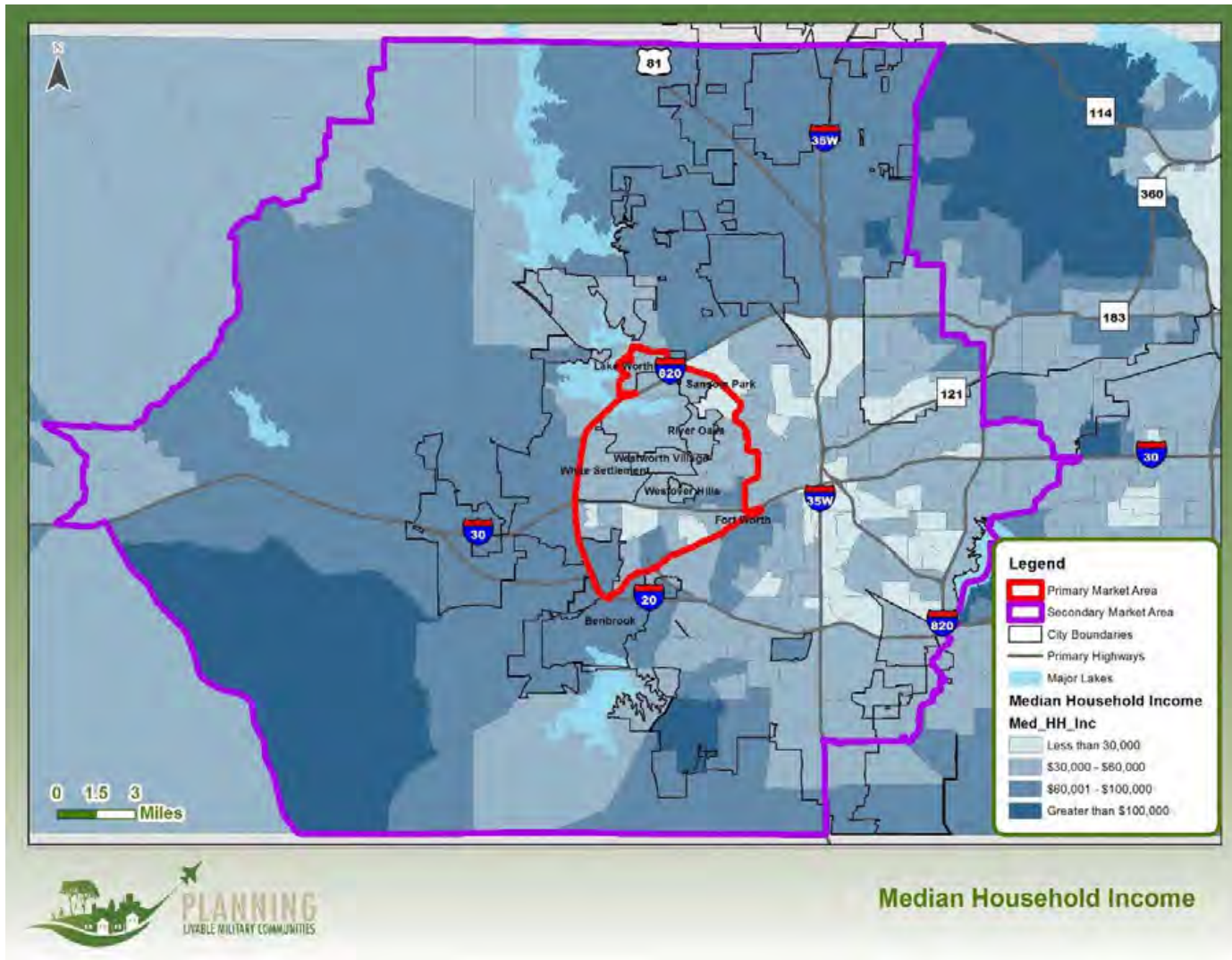
Source: US Census Bureau, 2006-2010 American Community Survey

FIGURE 15: DISTRIBUTION OF HOUSEHOLD INCOME, 2010



Source: US Census Bureau, 2006-2010 American Community Survey

FIGURE 16: MEDIAN HOUSEHOLD INCOME BY CENSUS TRACT, 2010



Source: US Census Bureau, 2006-2010 American Community Survey

The poverty data in **Figure 17** shows the population and percentage of population in the market areas that lived in poverty in 2010. The Census Bureau uses a set of income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's income threshold based on the family size as defined by the US Census Bureau, that family and every individual in it is considered in poverty. For example, in 2010, for a family size of four including two children, the income threshold was \$22,113. All individuals in the families who meet the above family size and composition and earned below the income threshold were considered to be in poverty in 2010. The official poverty thresholds do not vary geographically. The percentages 'below poverty level' are calculated out of the total population for each age group.

About 19 percent of the population in the Primary Market Area and 15 percent of the population in the Secondary Market Area lived in poverty in 2010. As a comparison, the poverty rate for Tarrant County was 13.4 percent in 2010. Approximately 7 percent of children below the age of 18 and less than 2 percent of adults aged 65 and older living in the Primary Market Area lived below the poverty level in 2010. In the Secondary Market Area, 6 percent of children and less than 1 percent of the elderly population lived below the poverty level in 2010.

FIGURE 17: POVERTY STATUS, 2010

	Primary Market Area		Secondary Market Area		Tarrant County	
	Number	Percent (of total population)	Number	Percent (of total population)	Number	Percent (of total population)
<b>Total Population</b>	<b>121,381</b>	-	<b>1,014,509</b>	-	<b>1,717,986</b>	-
Below Poverty Level						
Under 5 years	3,222	2.7%	20,649	2.0%	31,380	1.8%
5 years	309	0.3%	3,796	0.4%	5,163	0.3%
6 to 11 years	2,805	2.3%	21,006	2.1%	31,960	1.9%
12 to 17 years	2,279	1.9%	17,046	1.7%	26,581	1.5%
18 to 64 years	12,959	10.7%	79,044	7.8%	123,463	7.2%
65 to 74 years	739	0.6%	4,415	0.4%	6,336	0.4%
75 years and over	834	0.7%	4,374	0.4%	5,960	0.3%
<b>Total</b>	<b>23,147</b>	<b>19.1%</b>	<b>150,330</b>	<b>14.8%</b>	<b>230,843</b>	<b>13.4%</b>

Source: US Census Bureau, 2006-2010 American Community Survey

## EMPLOYMENT

Employment opportunities and educational levels of employees can significantly impact levels of housing affordability and the location choice of residents. The unemployment rate is defined as the percentage of civilian unemployed persons of the total civilian labor force. The data presented in **Figure 18** provides a portrait of the employment status and the unemployment rate in the market areas. In 2010, 8.9 percent of the persons aged 16 and over reported being unemployed in the Primary Market Area and 8 percent reported being unemployed in the Secondary Market Area. As a comparison, the unemployment rate for Tarrant County was 7.4 percent in 2010. Looking at the educational attainment in the market areas, 32.4 percent of persons over the age of 25 in the Primary Market Area and 29.5 percent in the Secondary Market Area had less than a high school education.

FIGURE 18: EMPLOYMENT STATUS, 2010

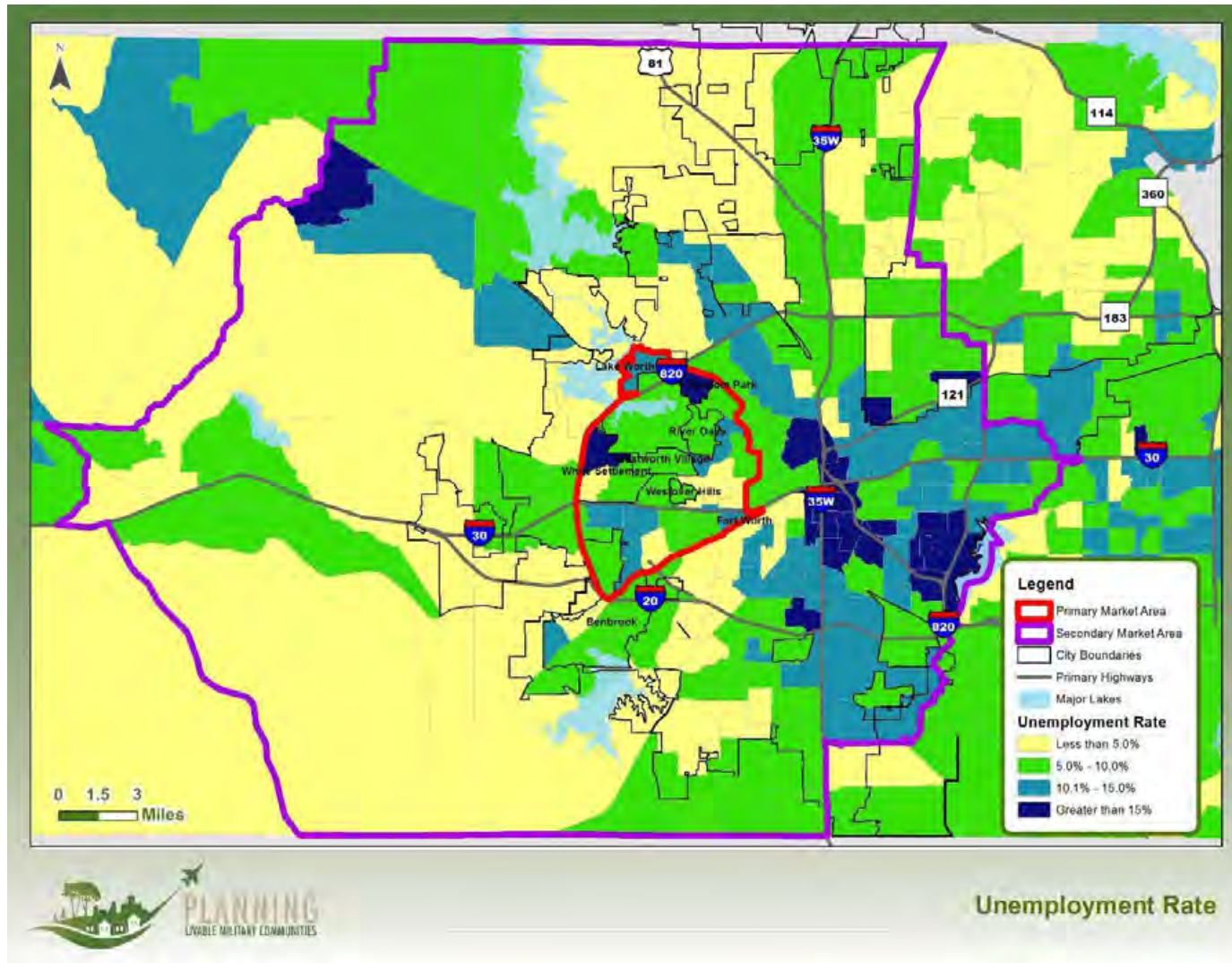
Employment Status	Primary Market Area		Secondary Market Area		Tarrant County	
	Number	Percent	Number	Percent	Number	Percent
In labor force	61,464	-	487,921	-	920,783	-
In Armed Forces	241	0.4%	1,446	0.3%	2,082	0.2%
Civilian	61,223	99.6%	486,475	99.7%	918,701	99.8%
Employed	55,781	90.8%	447,420	91.7%	850,459	92.4%
Unemployed	5,442	8.9%	39,055	8.0%	68,242	7.4%
Not in labor force	32,502	-	234,002	-	384,635	-
<b>Total</b>	<b>93,966</b>	<b>-</b>	<b>721,923</b>	<b>-</b>	<b>1,305,418</b>	<b>-</b>

Source: US Census Bureau, 2006-2010 American Community Survey

**Figure 19** shows the 2010 unemployment rates in the market areas by Census tract.



FIGURE 19: UNEMPLOYMENT RATE BY CENSUS TRACT, 2010



Source: US Census Bureau, 2006-2010 American Community Survey

## B. HOUSING SUPPLY

### TENURE AND OCCUPANCY

As presented in **Figures 20 and 21**, there were 52,307 housing units in the Primary Market Area in 2000 and 55,037 units in 2010. The Secondary Market Area had 303,504 and 396,635 housing units in 2000 and 2010, respectively. The total number of housing units increased by 5.2 percent in the Primary Market Area and by 30.7 percent in the Secondary Market Area during the ten-year period. Of the total number of housing units in the Primary Market Area in 2010, 45.7 percent were owner occupied, nearly 43 percent were renter occupied, and the remaining 11.5 percent were vacant. In the Secondary Market Area, nearly 58 percent of the housing units were owner occupied, over 33 percent were renter occupied, and 9 percent were vacant in 2010. The vacant units increased by over 57 percent in the Primary Market Area and 72 percent in the Secondary Market Area between 2000 and 2010. The number of owner-occupied units in the Secondary Market Area increased from 176,289 units to 228,482 units between 2000 and 2010, a nearly 30 percent increase. As a comparison, the percentage of owner-occupied units in Tarrant County was 57.2 percent in 2010, as shown in **Figure 22**.

FIGURE 20: TENURE FOR HOUSING IN THE PRIMARY MARKET AREA, 2000-2010

Tenure	2000		2010		2000-2010 Change	
	Number	Percent	Number	Percent	Number	Percent
Owner occupied	25,123	48.0%	25,135	45.7%	12	0.0%
Renter occupied	23,177	44.3%	23,580	42.8%	403	1.7%
<b>Total occupied (owner + renter)</b>	<b>48,300</b>	<b>92.3%</b>	<b>48,715</b>	<b>88.5%</b>	<b>415</b>	<b>0.9%</b>
Vacant	4,007	7.7%	6,322	11.5%	2,315	57.8%
<b>Total housing units</b>	<b>52,307</b>	<b>100.0%</b>	<b>55,037</b>	<b>100.0%</b>	<b>2,730</b>	<b>5.2%</b>

Source: US Census Bureau, 2010 Census and 2000 Census

FIGURE 21: TENURE FOR HOUSING IN THE SECONDARY MARKET AREA, 2000-2010

Tenure	2000		2010		2000-2010 Change	
	Number	Percent	Number	Percent	Number	Percent
Owner occupied	176,289	58.1%	228,482	57.6%	52,193	29.6%
Renter occupied	106,457	35.1%	132,379	33.4%	25,922	24.3%
<b>Total occupied (owner + renter)</b>	<b>282,746</b>	<b>93.2%</b>	<b>360,861</b>	<b>91.0%</b>	<b>78,115</b>	<b>27.6%</b>
Vacant	20,758	6.8%	35,774	9.0%	15,016	72.3%
<b>Total housing units</b>	<b>303,504</b>	<b>100.0%</b>	<b>396,635</b>	<b>100.0%</b>	<b>93,131</b>	<b>30.7%</b>

Source: US Census Bureau, 2010 Census and 2000 Census

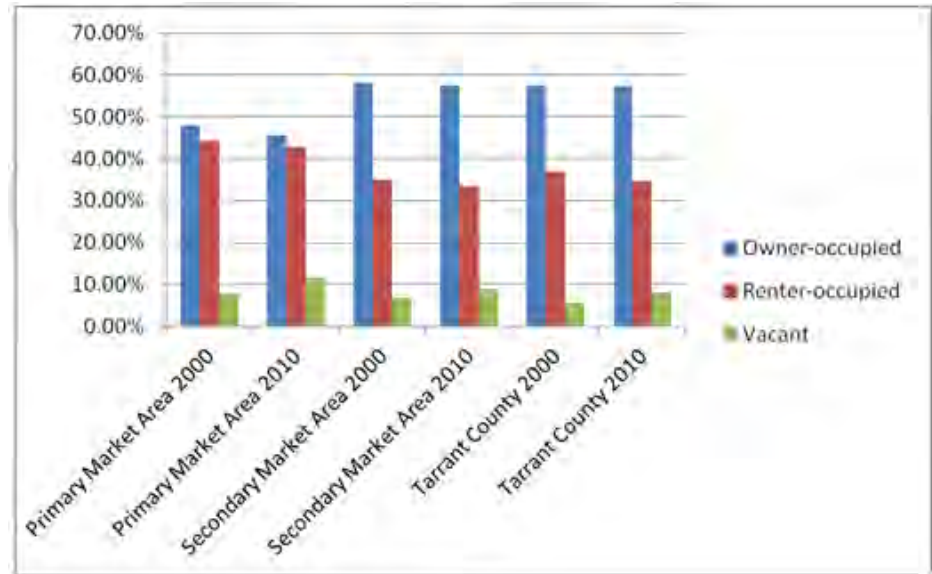
FIGURE 22: TENURE FOR HOUSING IN TARRANT COUNTY, 2000-2010

Tenure	2000		2010		2000-2010 Change	
	Number	Percent	Number	Percent	Number	Percent
Owner occupied	324,653	57.4%	408,824	57.2%	84,171	25.9%
Renter occupied	209,211	37.0%	248,310	34.7%	39,099	18.7%
<b>Total occupied (owner + renter)</b>	<b>533,864</b>	<b>94.4%</b>	<b>657,134</b>	<b>91.9%</b>	<b>123,270</b>	<b>23.1%</b>
Vacant	31,966	5.6%	57,669	8.1%	25,703	80.4%
<b>Total housing units</b>	<b>565,830</b>	<b>194.4%</b>	<b>714,803</b>	<b>100.0%</b>	<b>148,973</b>	<b>26.3%</b>

Source: US Census Bureau, 2010 Census and 2000 Census

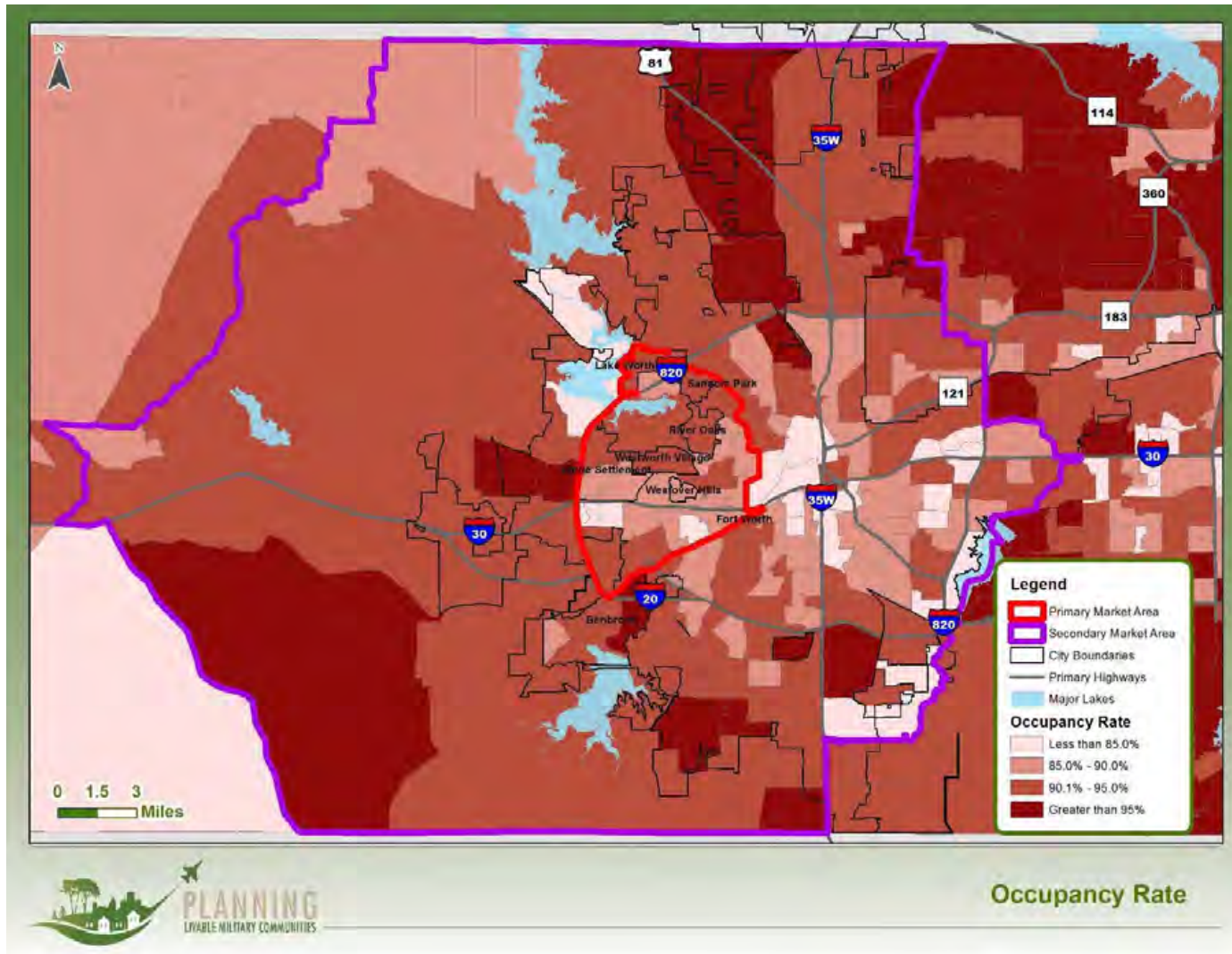
**Figure 23** shows a comparison of the percentage of owner-occupied, renter-occupied, and vacant units in the Primary and Secondary Market Areas and Tarrant County between 2000 and 2010. Vacancy rates in the Primary and Secondary Market Areas and Tarrant County increased due to the economic downturn in recent years. The homeownership rate in the Primary Market Area was ten percentage points lower than the Secondary Market Area and Tarrant County. **Figure 24** shows the spatial distribution of occupancy rates in the market areas.

FIGURE 23: TENURE FOR HOUSING, 2000 AND 2010



Source: US Census Bureau, 2010 Census and 2000 Census

FIGURE 24: OCCUPANCY RATES BY CENSUS TRACT, 2010



Source: US Census Bureau, 2010 Census



## HOUSING TYPE

**Figures 25 and 26** show that the majority of housing units in both the Primary Market Area (58.3 percent) and the Secondary Market Area (70.4 percent) in 2010 were categorized as single-family detached. While the total number of single-family detached units in the Primary Market Area increased by 1,211 units between 2000 and 2010, the percentage of single-family detached units actually declined from 59.4 percent to 58.3 percent of the total housing units in the Primary Market Area, indicating that other types of housing units grew in this area. In the Secondary Market Area, however, the number of single-family detached housing units increased from 205,272 to 270,828 units between 2000 and 2010, representing a nearly 32 percent increase. Overall, the total number of housing units in the Primary Market Area increased by 6 percent, from 52,279 to 55,391 units. The Secondary Market Area experienced more significant growth in the number of housing units from 303,640 to 384,715 total units, representing a 26.7 percent increase.

Other housing types present in the Primary Market Area in 2010 were single-family attached (3.4 percent), 2 to 4 units (9.3 percent), multifamily (27.5 percent), and mobile or other (1.4 percent). In the Secondary Market Area, other types of housing units included single-family attached (2.8 percent), 2 to 4 units (5.7 percent), multifamily (17.9 percent), and mobile home or other (3.2 percent).

FIGURE 25: HOUSING TYPE FOR THE PRIMARY MARKET AREA, 2000-2010

Units in Structure	2000		2010		2000-2010 Change	
	Number	Percent	Number	Percent	Number	Percent
Single family detached	31,065	59.4%	32,276	58.3%	1,211	3.9%
Single family attached	1,435	2.7%	1,898	3.4%	463	32.3%
2 to 4 units	4,822	9.2%	5,171	9.3%	349	7.2%
Multifamily	13,885	26.6%	15,252	27.5%	1,367	9.8%
Mobile home or other	1,072	2.1%	794	1.4%	-278	-25.9%
<b>Total</b>	<b>52,279</b>	<b>100.0%</b>	<b>55,391</b>	<b>100.0%</b>	<b>3,112</b>	<b>6.0%</b>

Source: US Census Bureau, 2000 Census and 2006-2010 American Community Survey



FIGURE 26: HOUSING TYPE FOR THE SECONDARY MARKET AREA, 2000-2010

Units in Structure	2000		2010		2000-2010 Change	
	Number	Percent	Number	Percent	Number	Percent
Single family detached	205,272	67.6%	270,828	70.4%	65,556	31.9%
Single family attached	8,586	2.8%	10,842	2.8%	2,256	26.3%
2 to 4 units	20,757	6.8%	21,843	5.7%	1,086	5.2%
Multifamily	56,663	18.7%	68,919	17.9%	12,256	21.6%
Mobile home or other	12,362	4.1%	12,283	3.2%	-79	-0.6%
<b>Total</b>	<b>303,640</b>	<b>100.0%</b>	<b>384,715</b>	<b>100.0%</b>	<b>81,075</b>	<b>26.7%</b>

Source: US Census Bureau, 2000 Census and 2006-2010 American Community Survey

Figures 27 and 28 show housing type by tenure (owner occupied or renter occupied) within the market areas in 2010. Nearly 78 percent of single-family housing units in the Primary Market Area and over 80 percent in the Secondary Market Area were owner occupied in 2010. As a comparison, Figure 29 shows that 83.3 percent of single-family housing units in Tarrant County were owner occupied in 2010.

FIGURE 27: HOUSING TYPE BY TENURE FOR THE PRIMARY MARKET AREA, 2010

Housing Type	Owner Occupied		Renter Occupied		Total
	Number	Percent	Number	Percent	Number
Single family	26,519	77.6%	7,655	22.4%	34,174
2 to 4 units	321	6.2%	4,850	93.8%	5,171
Multifamily	229	1.5%	15,023	98.5%	15,252
Mobile home or other	387	48.8%	407	51.2%	794
<b>Total</b>	<b>27,102</b>	<b>-</b>	<b>27,935</b>	<b>-</b>	<b>55,037</b>

Source: US Census Bureau, 2006-2010 American Community Survey

FIGURE 28: HOUSING TYPE BY TENURE FOR THE SECONDARY MARKET AREA, 2010

Housing Type	Owner Occupied		Renter Occupied		Total
	Number	Percent	Number	Percent	Number
Single family	218,576	77.6%	63,094	22.4%	281,670
2 to 4 units	1,354	6.2%	20,489	93.8%	21,843
Multifamily	1,034	1.5%	67,885	98.5%	68,919
Mobile home or other	5,994	48.8%	6,289	51.2%	12,283
<b>Total</b>	<b>238,878</b>	-	<b>157,757</b>	-	<b>396,635</b>

Source: US Census Bureau, 2006-2010 American Community Survey

FIGURE 29: HOUSING TYPE BY TENURE FOR TARRANT COUNTY, 2010

Housing Type	Owner Occupied		Renter Occupied		Total
	Number	Percent	Number	Percent	Number
Single family	1,124,280	83.3%	224,595	16.7%	1,348,875
2 to 4 units	3,782	4.6%	79,023	95.4%	82,805
Multifamily	2,886	1.2%	247,959	98.8%	250,845
Mobile home or other	22,869	63.6%	13,062	36.4%	35,931
<b>Total</b>	<b>1,153,817</b>	-	<b>564,639</b>	-	<b>1,718,456</b>

Source: US Census Bureau, 2006-2010 American Community Survey

## AGE OF HOUSING STOCK

**Figure 30** shows the age of the housing units as reported by the US Census Bureau in the 2006-2010 American Community Survey. As previous information related to population growth and housing trends indicates, the housing stock is generally older in the Primary Market Area versus the Secondary Market Area. Forty-three percent of all housing units in the Primary Market Area were constructed prior to 1960 and an additional 15.4 percent were built between 1960 and 1969. In the Secondary Market Area, nearly 26 percent of the total housing units were built prior to 1960. Less than 15 percent of the total housing units in the Primary Market Area were built after 1990, whereas over 35 percent of the units in the Secondary Market Area were constructed after 1990, including 9.4 percent of the total units having been built in 2005 or later.

FIGURE 30: AGE OF HOUSING STOCK, 2010

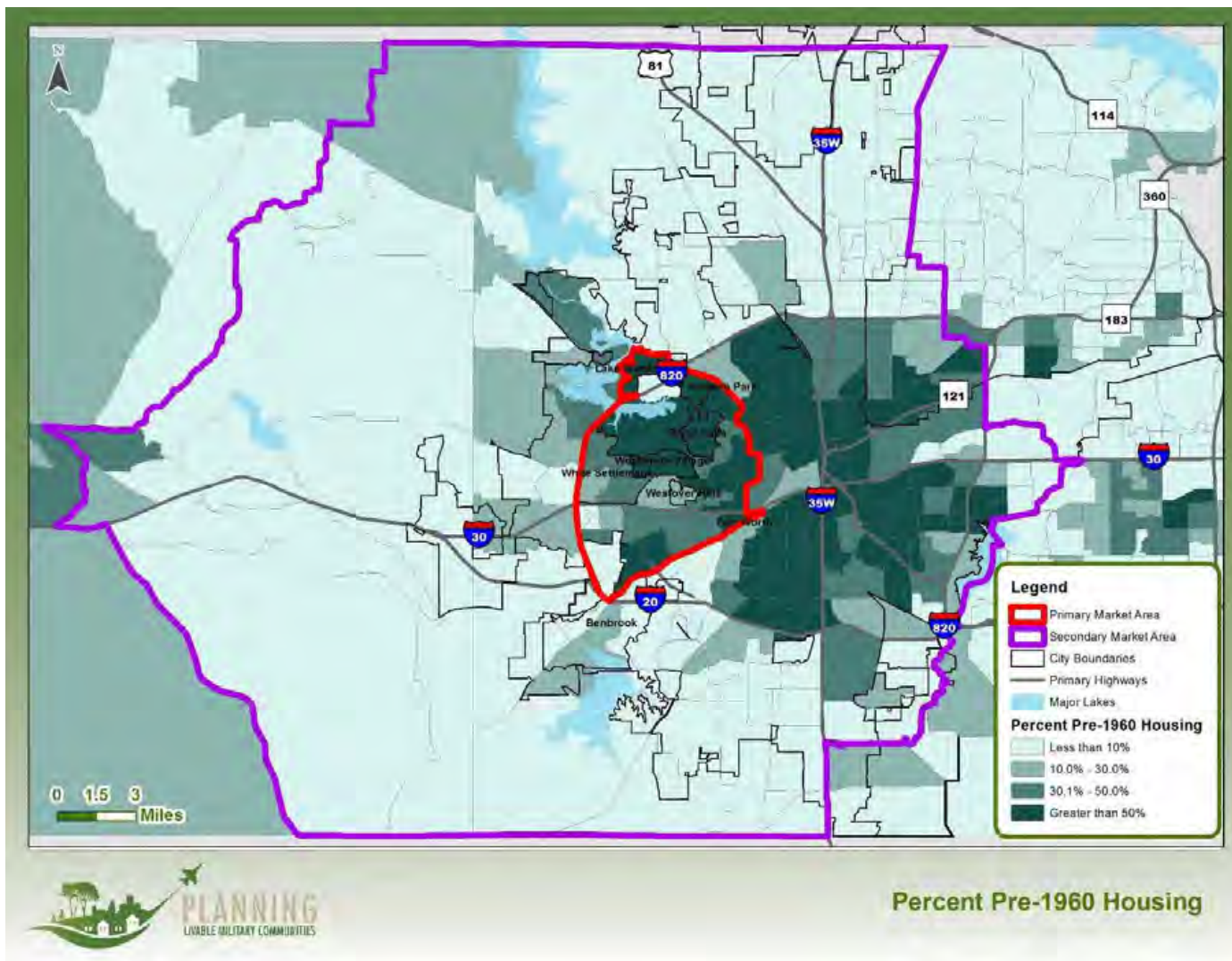
Year Structure Built	Primary Market Area		Secondary Market Area		Tarrant County	
	Number of Units	Percent of Units	Number of Units	Percent of Units	Number of Units	Percent of Units
1939 or earlier	4,510	8.1%	26,375	6.9%	27,717	4.0%
1940 to 1949	7,342	13.3%	24,434	6.4%	26,502	3.8%
1950 to 1959	11,974	21.6%	48,455	12.6%	64,723	9.3%
1960 to 1969	8,527	15.4%	40,845	10.6%	68,014	9.8%
1970 to 1979	8,265	14.9%	51,105	13.3%	110,163	15.8%
1980 to 1989	6,655	12.0%	57,565	15.0%	145,097	20.8%
1990 to 1999	2,522	4.6%	43,867	11.4%	103,785	14.9%
2000 to 2004	3,541	6.4%	56,053	14.6%	97,965	14.1%
2005 or later	2,055	3.7%	36,016	9.4%	52,590	7.6%
<b>Total</b>	<b>55,391</b>	-	<b>384,715</b>	-	<b>696,556</b>	-

Source: US Census Bureau, 2006-2010 American Community Survey

According to the 2006-2010 American Community Survey data, the median year structure built for the Primary Market Area was 1953; Secondary Market Area was 1981; and, Tarrant County was 1984. This indicates a larger percentage of older housing stock in the Primary Market Area as compared to the rest of the county.

**Figure 31** shows the percentage of pre-1960 housing stock by Census tract for the Primary and Secondary Market Areas. The areas with pre-1960 housing stock contain housing units more than 50 years old and may be in need of repairs and maintenance. The housing units built prior to 1970 may have lead-based paint issues. These areas with older housing stock may contain properties in disrepair and may be potential sites for redevelopment of housing.

FIGURE 31: PERCENTAGE OF HOUSING UNITS BUILT PRIOR TO 1960 BY CENSUS TRACT



Source: US Census Bureau, 2006-2010 American Community Survey

## HOUSING VALUE AND RENT

The average median home value for owner-occupied homes in the Primary Market Area was \$120,811, and the median contract rent was \$604. In the Secondary Market Area, the average median value for owner-occupied homes was \$120,969, and the median contract rent was \$672.

**Figure 32** shows the number of owner-occupied housing units by value range for the Primary and Secondary Market Areas. The modal housing value range in the Primary Market Area was \$70,000 to \$99,999 with nearly 29 percent of the units in this range. The modal value range was slightly higher in the Secondary Market Area with about 26 percent of the units in the \$100,000 to \$149,999 range.

FIGURE 32: VALUE OF OWNER-OCCUPIED HOUSING UNITS, 2010

Housing Value	Primary Market Area		Secondary Market Area		Tarrant County	
	Number of Units	Percent of Units	Number of Units	Percent of Units	Number of Units	Percent of Units
Less than \$50,000	2,761	10.6%	20,956	9.4%	24,220	6.0%
\$50,000 to \$69,999	3,752	14.5%	19,603	8.8%	23,693	5.9%
\$70,000 to \$99,999	7,492	28.9%	48,493	21.7%	70,966	17.7%
\$100,000 to \$149,999	4,603	17.8%	58,293	26.1%	114,920	28.7%
\$150,000 to \$199,999	2,338	9.0%	34,900	15.7%	73,320	18.3%
\$200,000 to \$299,999	2,126	8.2%	23,355	10.5%	51,286	12.8%
\$300,000 to \$399,999	1,046	4.0%	8,487	3.8%	19,564	4.9%
\$400,000 to \$499,999	456	1.8%	3,430	1.5%	9,465	2.4%
\$500,000 to \$749,999	683	2.6%	3,162	1.4%	8,060	2.0%
\$750,000 to \$999,999	210	0.8%	1,035	0.5%	2,636	0.7%
\$1,000,000 or more	464	1.8%	1,286	0.6%	2,581	0.6%
<b>Total Units</b>	<b>25,931</b>	<b>100.0%</b>	<b>223,000</b>	<b>100.0%</b>	<b>400,711</b>	<b>100.0%</b>

Source: US Census Bureau, 2006-2010 American Community Survey

**Figures 33, 34, and 35** show the number of housing units by gross rent range within the two market areas and Tarrant County in 2010. In the Primary Market Area, the modal rent range for efficiency and one-bedroom was \$500 to \$749 (61.8 percent and 55.5 percent, respectively), and the modal rent range for two-bedroom and three or more bedroom units was \$750 to \$999 (38.4 percent and 37.9 percent, respectively). **Figures 36 and 37** show the spatial representation of housing values and rents in the market area by Census tract, respectively.



FIGURE 33: GROSS RENT BY NUMBER OF BEDROOMS FOR RENTER-OCCUPIED UNITS IN THE PRIMARY MARKET AREA, 2010

Rent Range	No Bedroom		One Bedroom		Two Bedroom		Three or More Bedrooms	
	Number of Units	Percent of Units	Number of Units	Percent of Units	Number of Units	Percent of Units	Number of Units	Percent of Units
<i>With cash rent</i>	573	94.9%	7,877	99.0%	9,199	95.7%	4,071	93.1%
Less than \$200	11	1.8%	350	4.4%	87	0.9%	0	0.0%
\$200 to \$299	30	5.0%	355	4.5%	37	0.4%	6	0.1%
\$300 to \$499	141	23.3%	1,200	15.1%	224	2.3%	49	1.1%
\$500 to \$749	373	61.8%	4,419	55.5%	3,524	36.7%	518	11.8%
\$750 to \$999	18	3.0%	1,124	14.1%	3,691	38.4%	1,841	42.1%
\$1,000 or more	0	0.0%	429	5.4%	1,636	17.0%	1,657	37.9%
<i>No cash rent</i>	31	5.1%	79	1.0%	412	4.3%	301	6.9%
<b>Total</b>	<b>604</b>	<b>100.0%</b>	<b>7,956</b>	<b>100.0%</b>	<b>9,611</b>	<b>100.0%</b>	<b>4,372</b>	<b>100.0%</b>

Source: US Census Bureau, 2006-2010 American Community Survey

FIGURE 34: GROSS RENT BY NUMBER OF BEDROOMS FOR RENTER-OCCUPIED UNITS IN THE SECONDARY MARKET AREA, 2010

Rent Range	No Bedroom		One Bedroom		Two Bedroom		Three or More Bedrooms	
	Number of Units	Percent of Units	Number of Units	Percent of Units	Number of Units	Percent of Units	Number of Units	Percent of Units
<i>With cash rent</i>	2,618	98.5%	36,382	98.7%	45,204	96.1%	34,102	92.6%
Less than \$200	41	1.5%	1,224	3.3%	888	1.9%	232	0.6%
\$200 to \$299	162	6.1%	1,400	3.8%	420	0.9%	126	0.3%
\$300 to \$499	744	28.0%	4,466	12.1%	1,522	3.2%	943	2.6%
\$500 to \$749	1,093	41.1%	19,001	51.6%	13,439	28.6%	3,846	10.4%
\$750 to \$999	240	9.0%	7,636	20.7%	17,952	38.1%	9,560	26.0%
\$1,000 or more	338	12.7%	2,655	7.2%	10,983	23.3%	19,395	52.7%
<i>No cash rent</i>	41	1.5%	468	1.3%	1,858	3.9%	2,724	7.4%
<b>Total</b>	<b>2,659</b>	<b>100.0%</b>	<b>36,850</b>	<b>100.0%</b>	<b>47,062</b>	<b>100.0%</b>	<b>36,826</b>	<b>100.0%</b>

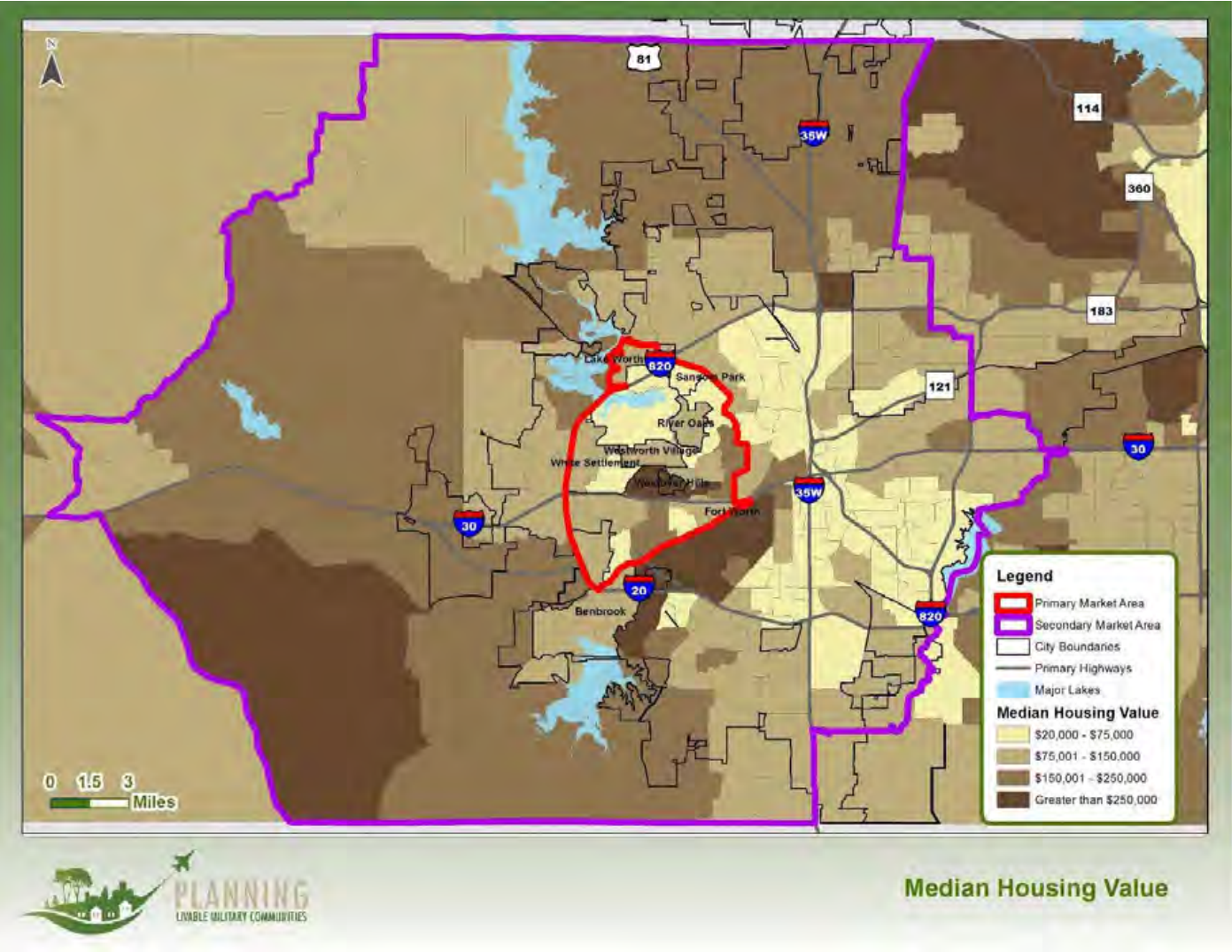
Source: US Census Bureau, 2006-2010 American Community Survey

FIGURE 35: GROSS RENT BY NUMBER OF BEDROOMS FOR RENTER-OCCUPIED UNITS IN TARRANT COUNTY, 2010

Rent Range	No Bedroom		One Bedroom		Two Bedroom		Three or More Bedrooms	
	Number of Units	Percent of Units	Number of Units	Percent of Units	Number of Units	Percent of Units	Number of Units	Percent of Units
<i>With cash rent</i>	5,151	99.2%	77,644	98.9%	85,162	97.2%	56,266	92.9%
Less than \$200	85	1.6%	1,432	1.8%	1,079	1.2%	297	0.5%
\$200 to \$299	146	2.8%	1,698	2.2%	532	0.6%	217	0.4%
\$300 to \$499	1,014	19.5%	6,618	8.4%	1,994	2.3%	1,245	2.1%
\$500 to \$749	2,300	44.3%	42,213	53.8%	20,965	23.9%	4,740	7.8%
\$750 to \$999	847	16.3%	19,996	25.5%	35,933	41.0%	13,439	22.2%
\$1,000 or more	759	14.6%	5,687	7.2%	24,659	28.2%	36,328	60.0%
<i>No cash rent</i>	41	0.8%	836	1.1%	2,427	2.8%	4,280	7.1%
<b>Total</b>	<b>5,192</b>	<b>100.0%</b>	<b>78,480</b>	<b>100.0%</b>	<b>87,589</b>	<b>100.0%</b>	<b>60,546</b>	<b>100.0%</b>

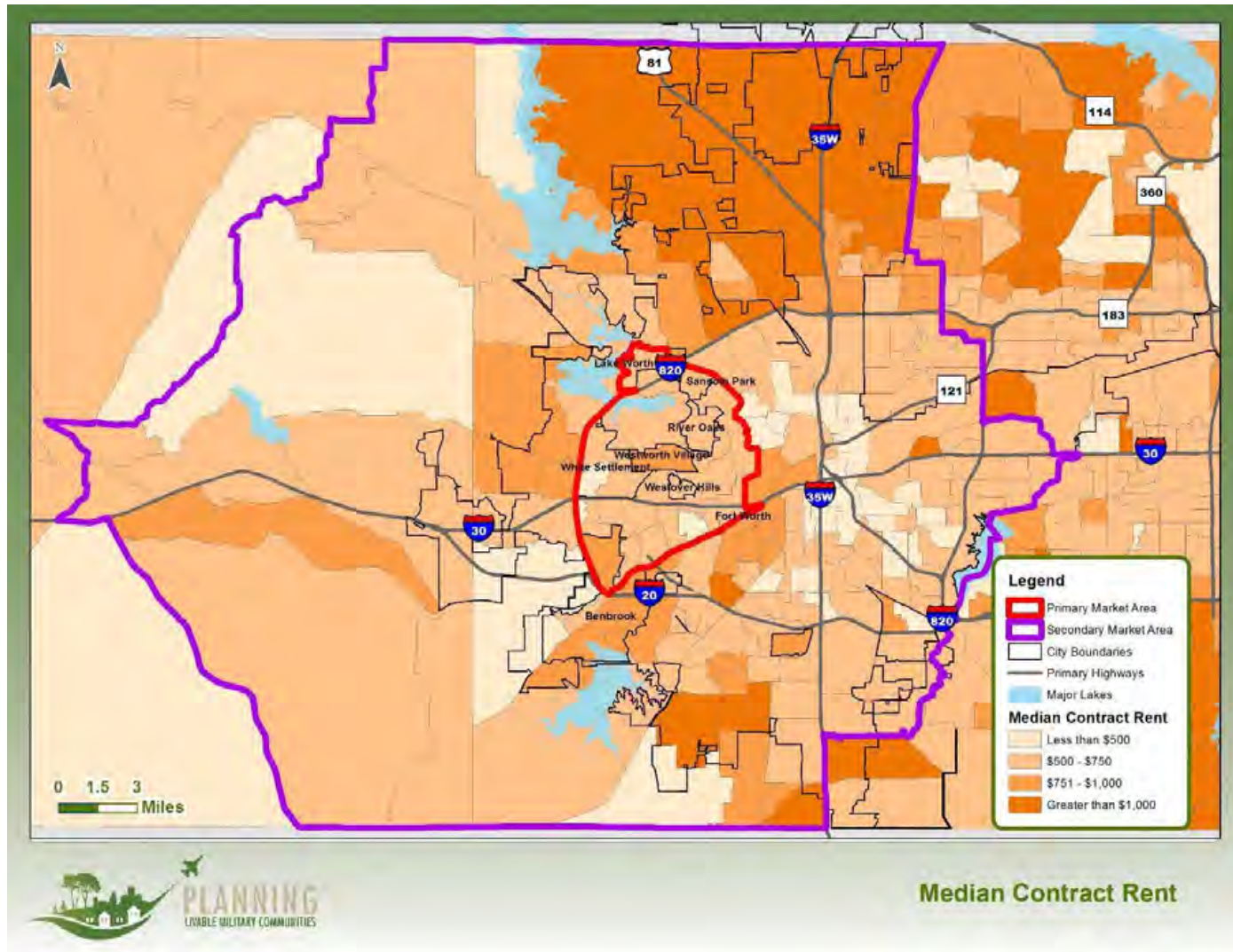
Source: US Census Bureau, 2006-2010 American Community Survey

FIGURE 36: MEDIAN HOUSING VALUE BY CENSUS TRACT, 2010



Source: US Census Bureau, 2006-2010 American Community Survey

FIGURE 37: MEDIAN CONTRACT RENT BY CENSUS TRACT, 2010



Source: US Census Bureau, 2006-2010 American Community Survey

### ***Residential Value Analysis***

The Tarrant Appraisal District keeps records of land and improvement values for each parcel in the county. Land values describe how much a site is worth, while improvement values represent the worth of any buildings or structures on the piece of land. Comparing land and improvement values of residential sites can help reveal potential sites for redevelopment or infill, as well as areas to maintain as a residential strength. For this study, a residential SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis was conducted to compare the value of residential sites in each of the study area cities to the Planning Livable Military Communities (PLMC) study area (defined as a 2.5-mile buffer around the base) and Tarrant County. This is an empirical analysis based on parcel data and does not consider intrinsic or community value that a site might possess.

The SWOT analysis compares the land and improvement values per acre for each residential parcel to the average land and improvement values per acre for all of the residential parcels in the study area and the county. In the study area, the average land value for all residential parcels is \$145,558 per acre and the average improvement value for all residential parcels is \$330,031 per acre. In Tarrant County, the average land value for all residential parcels is \$82,395 per acre and the average improvement value for all residential parcels is \$328,216 per acre. There are a few residential areas in the study area with very high property values such as Westover Hills. Property values in these areas are most likely skewing the overall average land and improvement values per acre for the study area. To determine the final SWOT designation for each parcel, the following classifications are used:

**Strength:** Higher than average land and improvement values.

**Weakness:** Lower than average land value and higher than average improvement value.

**Opportunity:** Higher than average land value and lower than average improvement value.

**Threat:** Lower than average land and improvement values.

**Figures 38 and 39** show the percentage of strengths, weaknesses, opportunities, and threats in each of the cities compared to the PLMC study area and Tarrant County, respectively. The majority of the residential parcels within each of the cities are classified as threats, which could be attributed to decreased improvement values because of the age of residential structures relative to other parts of the county. When parcel values are compared to the county, there are more opportunity sites within the study area communities, indicating that there is existing potential for residential redevelopment or infill. Additionally, when parcel values are compared to the PLMC study area, there are more parcels classified as weaknesses, indicating that residential land is worth more in other parts of the county.

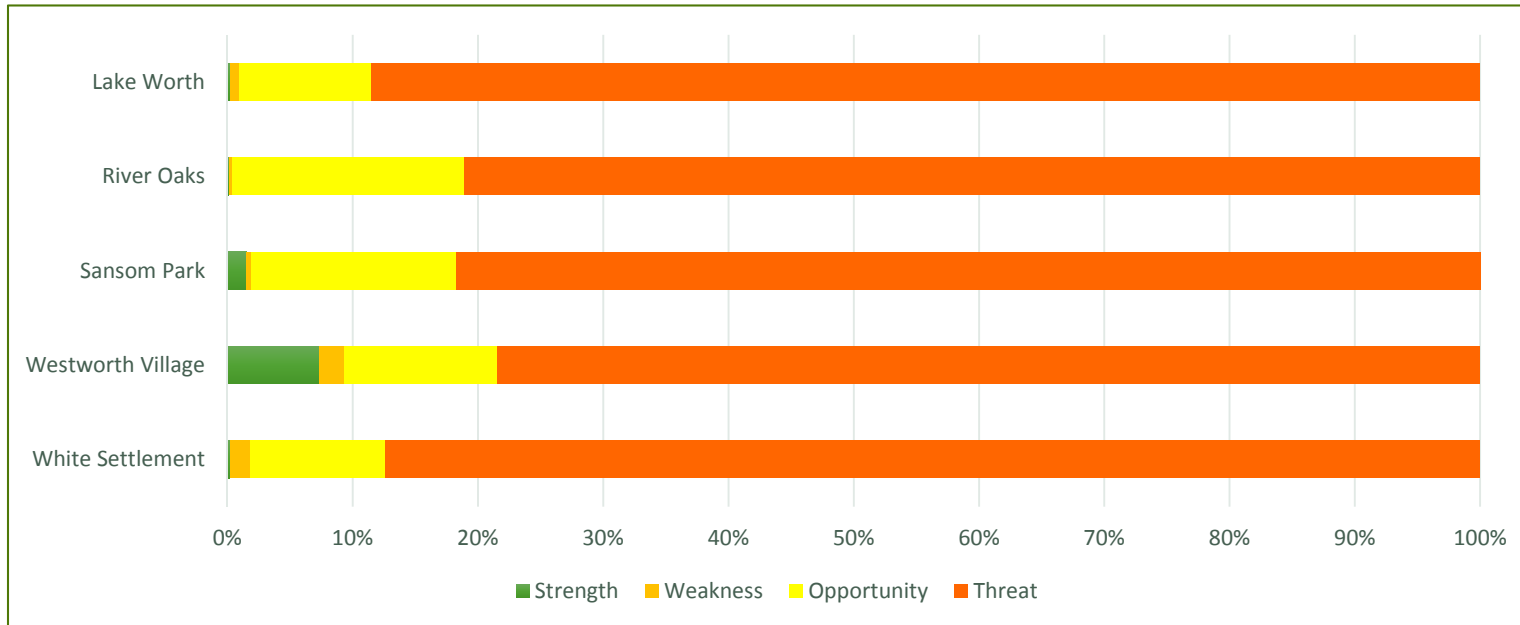


FIGURE 38: RESIDENTIAL SWOT ANALYSIS COMPARED TO PLMC STUDY AREA



Source: Tarrant Appraisal District, 2012

FIGURE 39: RESIDENTIAL SWOT ANALYSIS COMPARED TO TARRANT COUNTY



Source: Tarrant Appraisal District, 2012

## HOUSING AFFORDABILITY

A conventional measure of housing affordability compares total housing costs as a percentage of household income. Housing costs that are below 30 percent of household income are generally considered affordable. **Figure 40** summarizes data from the 2006-2010 American Community Survey to show housing costs as a percentage of household income for both market areas in 2010. Approximately 35 percent of all households (owner occupied and renter occupied) in the Primary and Secondary Market Areas reported housing costs that exceeded 30 percent of household income, indicating some measure of a lack of affordability. As a comparison, a similar percentage of households in Tarrant County (33.8 percent) reported housing costs that exceeded 30 percent of household income.

FIGURE 40: HOUSING COSTS AS A PERCENTAGE OF HOUSEHOLD INCOME, 2010

Percent of Income	Primary Market Area		Secondary Market Area		Tarrant County	
	Number	Percent	Number	Percent	Number	Percent
Owner-occupied units	25,931	53.5%	223,000	64.4%	400,711	63.4%
Less than 20%	12,437	25.7%	102,041	29.5%	183,889	29.1%
20 to 29%	5,913	12.2%	58,341	16.8%	107,795	17.0%
30% or more	7,320	15.1%	61,342	17.7%	107,068	16.9%
Households with zero or negative income	261	0.5%	1,276	0.4%	1,959	0.3%
Renter-occupied units	22,543	46.5%	123,397	35.6%	231,807	36.6%
Less than 20%	5,737	11.8%	28,827	8.3%	54,546	8.6%
20 to 29%	5,651	11.7%	29,513	8.5%	59,264	9.4%
30% or more	9,966	20.6%	58,304	16.8%	107,082	16.9%
Renters with zero or negative income	366	0.8%	1,662	0.5%	3,331	0.5%
Renters with no cash rent	823	1.7%	5,091	1.5%	7,584	1.2%
<b>Total Units</b>	<b>48,474</b>	<b>100.0%</b>	<b>346,397</b>	<b>100.0%</b>	<b>632,518</b>	<b>100.0%</b>

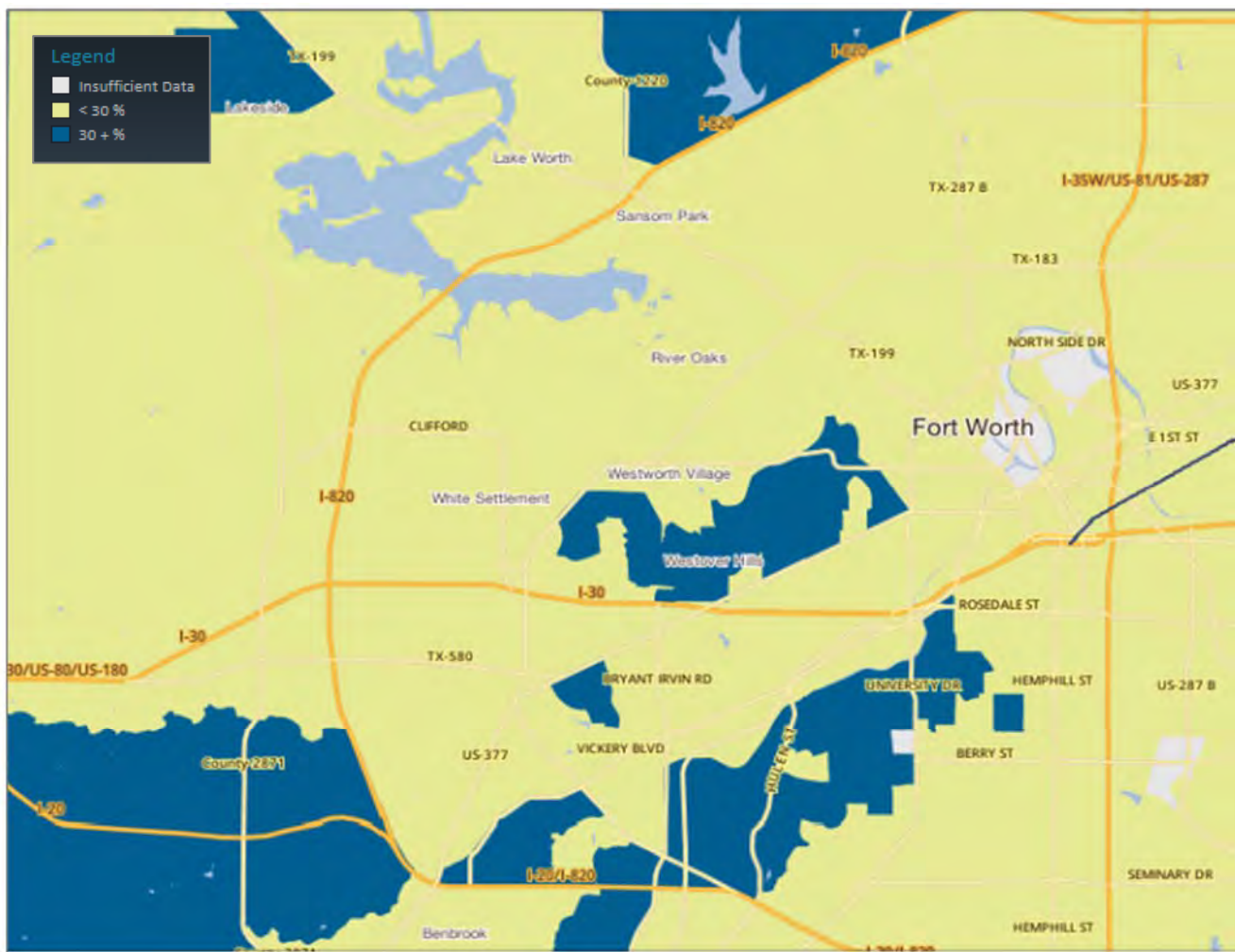
Source: US Census Bureau, 2006-2010 American Community Survey

The traditional 30 percent benchmark for housing affordability only considers housing costs. The location of housing can also impact affordability. Transportation costs are typically the second largest expense for households and these expenses depend greatly on where households are located with respect to jobs, transit accessibility, and other venues. Based on extensive analysis of transportation costs in regions throughout the country, the Center for Neighborhood Technology has proposed an affordability threshold that includes housing costs plus household transportation costs. When household transportation costs are added to traditional measures of housing costs, 45 percent of household income becomes a new threshold for assessing housing affordability, which means that households should spend less than 45 percent of household income on the total of housing and transportation costs.

**Figures 41 and 42** show a comparison of traditional housing costs versus an analysis that includes housing costs plus household transportation costs. **Figure 41** indicates that much of the area in and immediately surrounding the market areas has housing costs that are less than 30 percent of the median household income. These locations indicate housing affordability. A few Census tracts (shown in blue on the map) indicate areas where housing is not affordable indicating that housing cost is more than 30 percent of the median household income. **Figure 42** shows housing plus transportation costs as a percentage of median income. This image reveals more areas (shown as dark green to blue) as being above 45 percent of the median income, indicating less housing affordability throughout the market areas when transportation costs are included in the analysis.

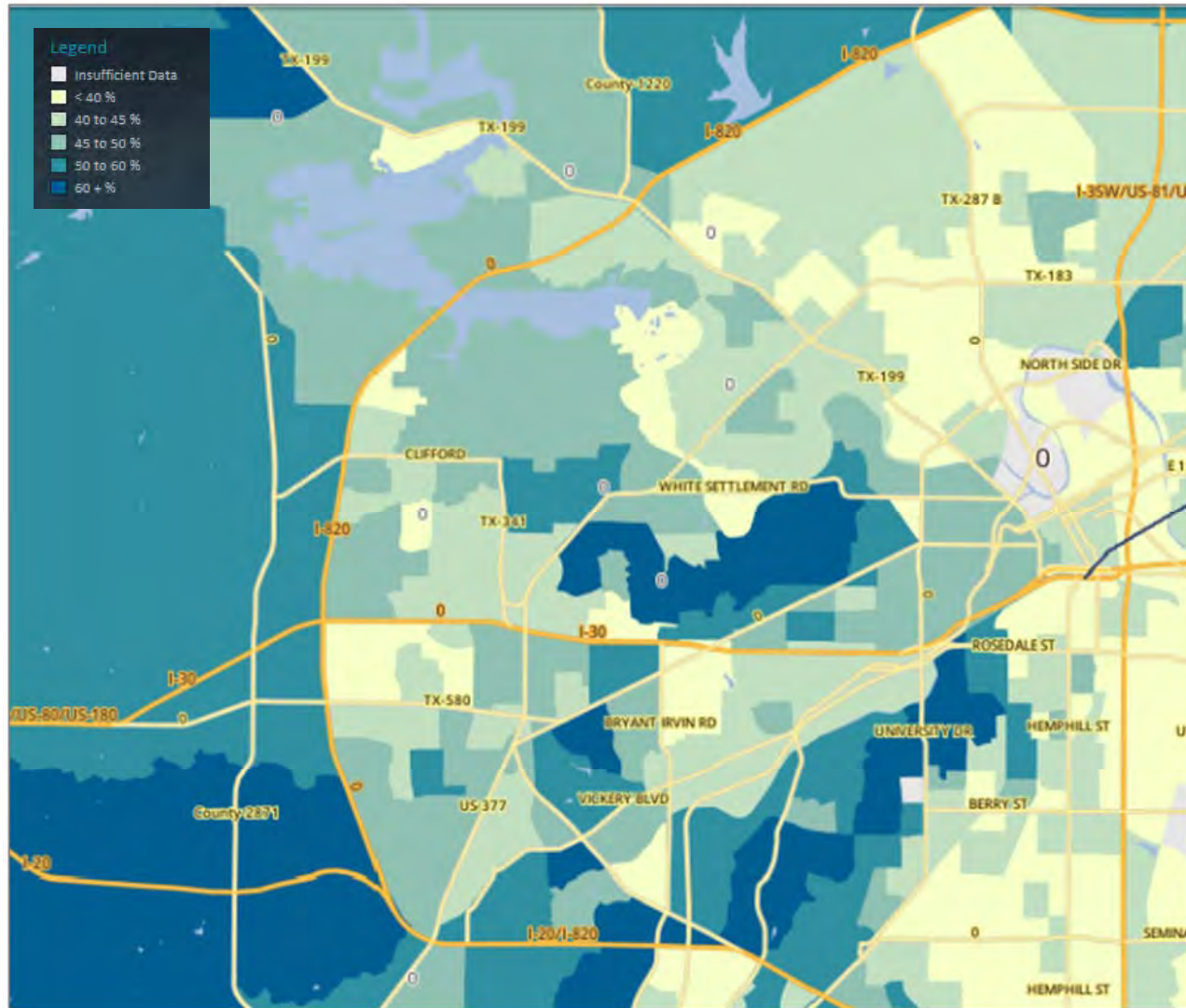
Overall, the Primary Market Area or Study Area is at an advantage with more affordable housing stock and lower transportation costs due to a central location compared to the surrounding areas. These advantages can be capitalized on by developing additional quality housing stock in the area accessible to major employers.

FIGURE 41: HOUSING COSTS AS A PERCENTAGE OF INCOME



Source: Center for Neighborhood Technology

FIGURE 42: HOUSING AND TRANSPORTATION COSTS AS A PERCENTAGE OF INCOME



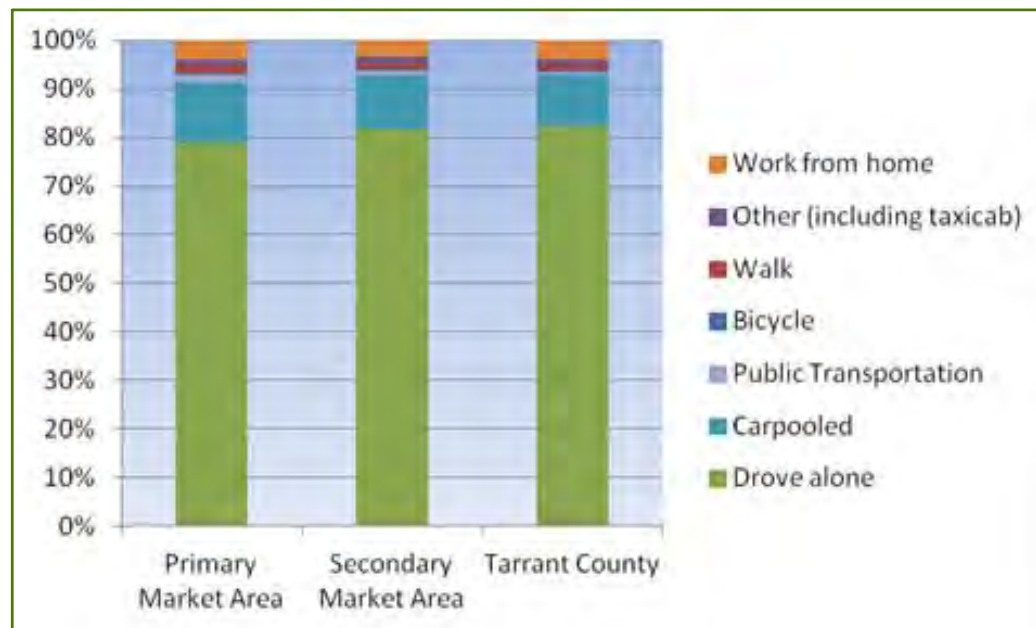
Source: Center for Neighborhood Technology



## TRAVEL TO WORK

**Figure 43** shows how residents in the Primary and Secondary Market Areas commuted to work in 2010. In both market areas, the vast majority of workers commuted by automobile. In the Primary Market Area, 91 percent of workers commuted by automobile and nearly 79 percent of those commuters drove alone. In the Secondary Market Area, nearly 93 percent of workers commuted by automobile and over 82 percent of those commuters drove alone. Slightly more than 4 percent of workers in the Primary Market Area reported working from home, and 3.4 percent of workers in the Secondary Market Area also reported working from home. The combined percentage of all other modes of transportation to work was slightly below 5 percent for the Primary Market Area and less than 4 percent for the Secondary Market Area. As a comparison, nearly 93 percent of all workers in Tarrant County commuted by automobile in 2010.

FIGURE 43: TRAVEL TO WORK MODAL SPLIT, 2010



Source: US Census Bureau, 2006-2010 American Community Survey

**Figure 44** shows the amount of time workers in the respective market areas spent commuting to work in 2010. The highest percentage of commuters reported travel times of 15 to 29 minutes for both the Primary Market Area (41.8 percent) and the Secondary Market Area (39 percent). Thirty-one percent of workers in the Primary Market Area and 23 percent in the Secondary Market Area reported spending less than 15 minutes traveling to work.

FIGURE 44: TRAVEL TIME TO WORK, 2010

Time to work	Primary Market Area		Secondary Market Area		Tarrant County	
	Number	Percent	Number	Percent	Number	Percent
Less than 15 minutes	16,393	31.1%	98,202	23.1%	183,106	22.9%
15 to 29 minutes	22,081	41.8%	165,607	39.0%	311,809	38.9%
30 to 44 minutes	8,549	16.2%	94,859	22.3%	187,051	23.4%
45 to 59 minutes	2,934	5.6%	34,695	8.2%	67,269	8.4%
60 to 89 minutes	2,156	4.1%	23,220	5.5%	38,583	4.8%
90 minutes or more	658	1.2%	7,996	1.9%	13,083	1.6%
<b>Total</b>	<b>52,771</b>	<b>100.0%</b>	<b>424,579</b>	<b>100.0%</b>	<b>800,901</b>	<b>100.0%</b>

Source: US Census Bureau, 2006-2010 American Community Survey

Based on the above analysis, lower travel times to work were noted in the Primary Market Area compared to Secondary Market Area and Tarrant County. Development of quality housing in the study area could provide an opportunity for workers to live closer to their employers and reduce travel times to work. A marginally higher percentage of persons used alternative modes of transportation in the study area. Construction of trails and sidewalks could encourage more people to use active transportation in their commute to work. Lower commute times and alternative modes of transportation can improve quality of life in the area.

## RENTAL HOUSING AND CURRENT RENTS

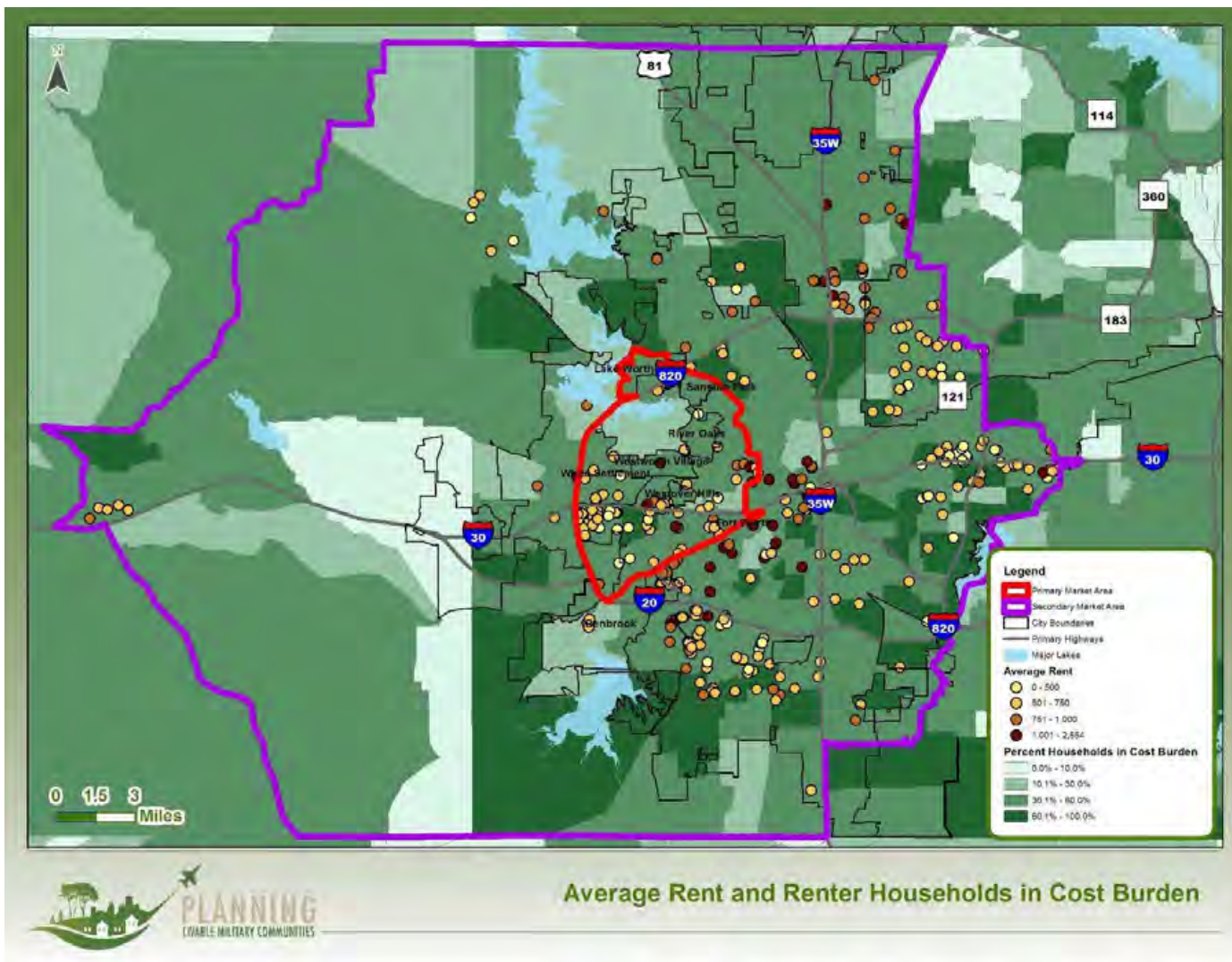
According to information from ALN Apartment Data, Inc., 371 apartment complexes exist within the market area boundaries, including approximately 68,580 multifamily rental units. The average occupancy rate of all the complexes listed was 84.9 percent as of December, 2008. **Figure 45** displays the average monthly rent for the units listed and compares rent data to the level of housing affordability by Census tract for 2010. Average rents ranged from a low of approximately \$390 per month to a high of over \$2,550 per month. This shows a wide range of quality and sizes of multifamily housing in the area. Typically older, lower quality, or smaller rental housing have lower rents. Additionally, units with higher monthly rents (greater than \$750) were spread throughout much of the two market areas. The units with lower monthly rents (less than \$500) were concentrated in the Primary Market Area and the far eastern portion of the Secondary Market Area, with a few exceptions. The map also shows the percentage of renter households under “cost burden” by Census tract between 2006 and 2010. According to HUD, a household is considered to be under cost burden if the household is spending more than 30 percent of their household income on housing expenses. The darker Census tracts show higher percentage of renter households that spent more than 30 percent of their household income on housing expenses between 2006 and 2010.

**Figure 46** displays all apartment complexes within the Primary and Secondary Market Areas, sorted by year built. Many of the older complexes (built before 1970) are located within the Primary Market Area and the eastern portion of the Secondary Market Area. Newer facilities (built after 1990) are spread throughout the two market areas.

**Figure 47** shows the apartment complexes within Primary and Secondary Market Areas classified by occupancy rates. Eighty-five of the apartment complexes exhibited occupancy rates below 85 percent, accounting for nearly 23 percent of the total complexes. Of those 85 complexes, nearly half (39) were built prior to 1970. These statistics indicate that those older apartment complexes in the area (built more than 40 years ago) may have some maintenance issues or be in need of repairs, and are less desirable to renters, which is indicated by the lower occupancy rates.

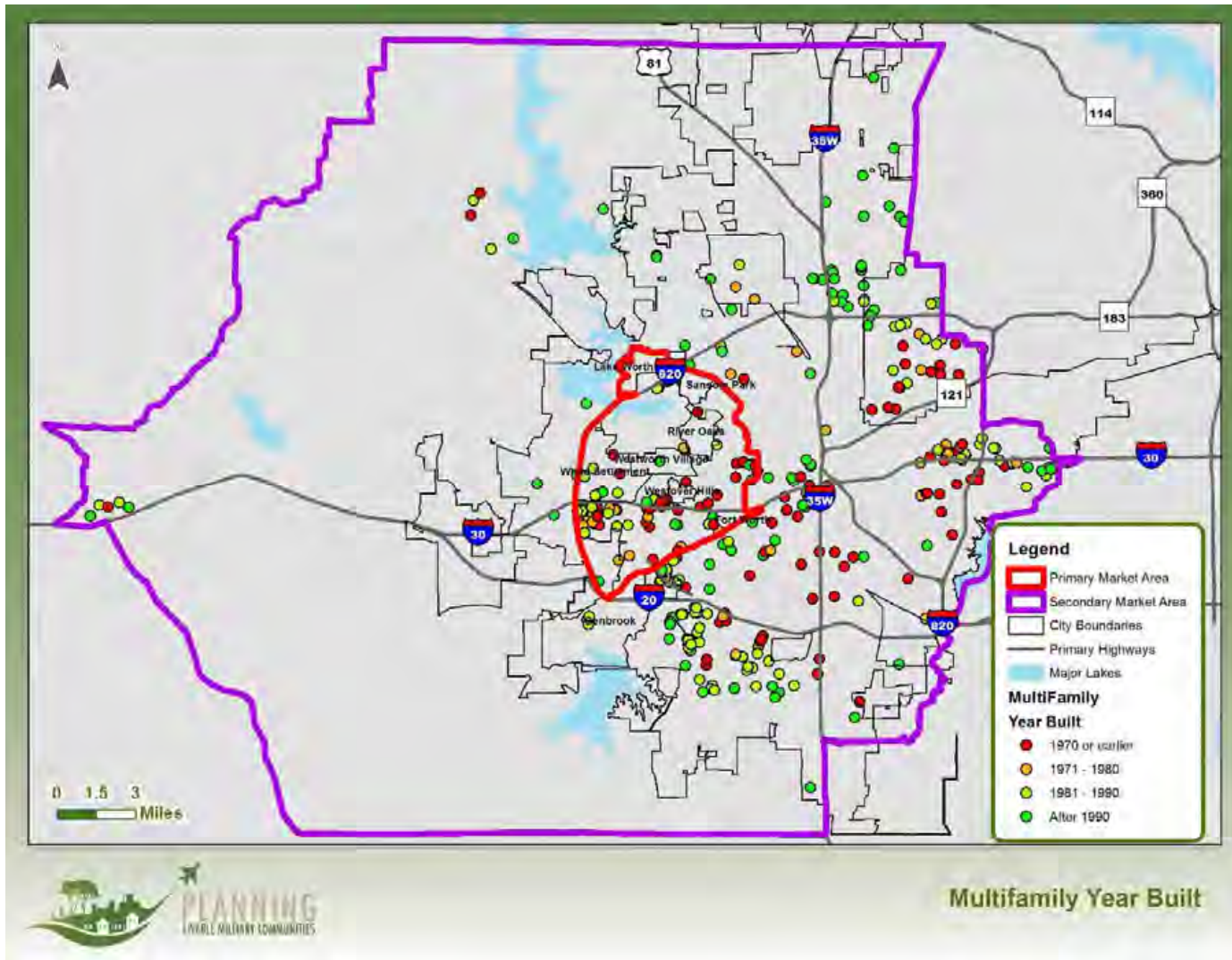
Multifamily housing in the eastern portions of the Primary Market Area showed lower rents and these developments are more than 40 years old and have relatively higher vacancy rates. Some of these developments provide redevelopment opportunities to build new, quality, and affordable multifamily housing closer to major employers.

FIGURE 45: AVERAGE MONTHLY RENT AND HOUSING AFFORDABILITY BY CENSUS TRACT, 2010



Source: US Census Bureau, 2006-2010 American Community Survey and ALN Apartment Data, Inc.

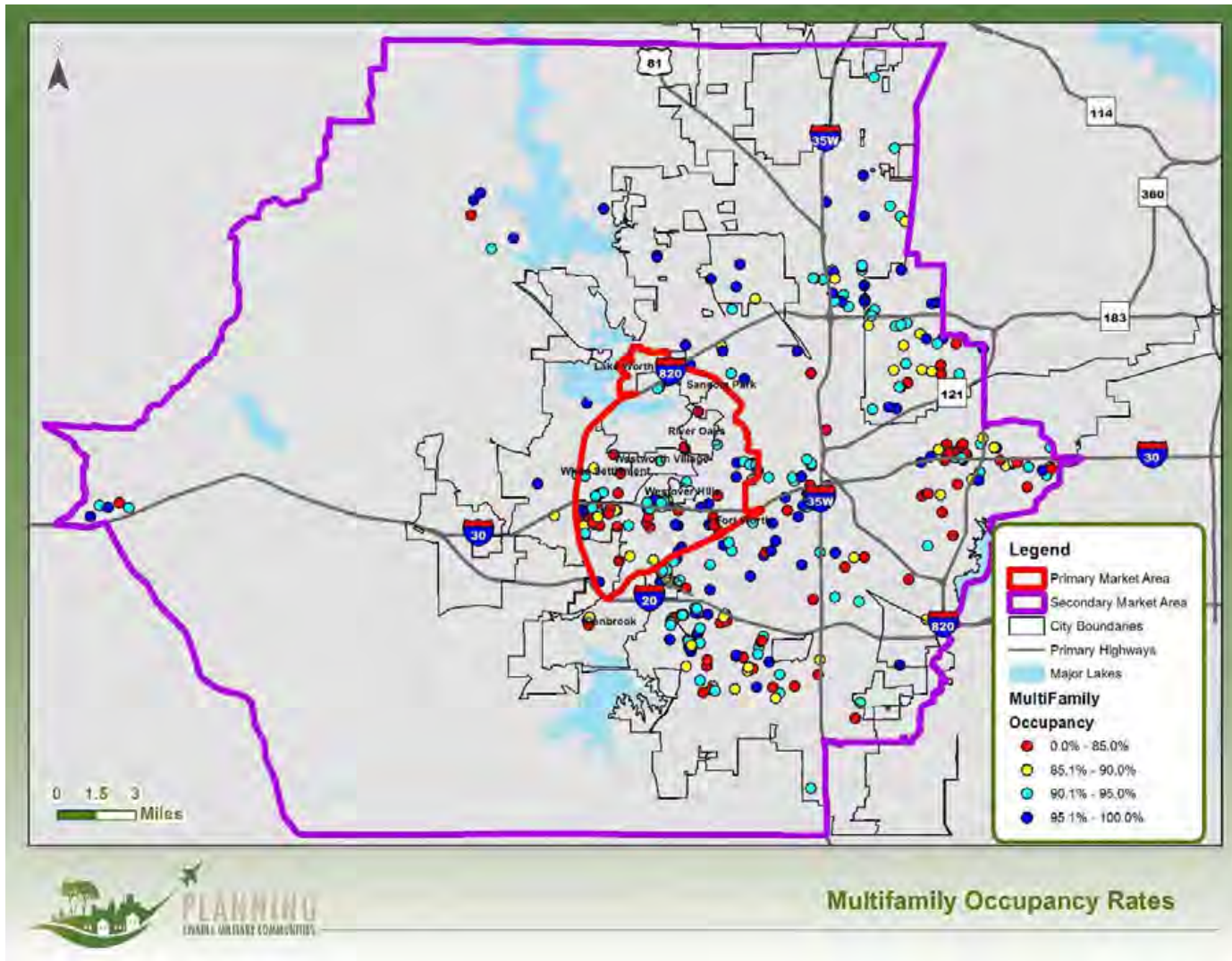
FIGURE 46: AGE OF APARTMENT COMPLEXES IN THE MARKET AREAS



Source: ALN Apartment Data, Inc.



FIGURE 47: OCCUPANCY RATES OF RENTER-OCCUPIED UNITS IN THE MARKET AREAS



Source: ALN Apartment Data, Inc.

## C. HOUSING DEMAND

### DEMOGRAPHIC PROJECTIONS

**Figure 48** shows the NCTCOG 2035 forecast estimates for total number of households, population, and employment. Forecast data is not available through the US Census Bureau. The data in the table is based on NCTCOG’s Traffic Survey Zones (TSZ) estimates. NCTCOG’s TSZ estimates are used to summarize household, population, and employment projections for the market area between 2012 and 2035. The boundaries of the TSZs do not necessarily coincide with the boundaries of the Census tracts that make up the Primary and Secondary Market Areas. Therefore, the estimates differ slightly from the values given in previous tables that use Census data as their source. Though the TSZ boundaries marginally differ from the Census tract boundaries, the NCTCOG estimates provide a general estimate of future household projections and housing demand for the project area for the next two decades.

The NCTCOG forecast estimates show increases in total households, population, and employment for both market areas. The growth in the Primary Market Area is relatively modest for a 20-year time span. The forecast data is based on historic trends and typically does not factor in redevelopment of occupied land, but only focuses on vacant property for growth. So the development potential of the area may be more than the numbers shown by the demographic forecast. The population in the Primary Market Area is projected to grow by 41,817 residents, or 29 percent. Households are projected to increase by nearly 27 percent and employment by over 22 percent. The projected growth in the Secondary Market Area is more substantial and indicates a continuation of the demographic and housing trends noted in previous sections due to the availability of more vacant land for greenfield development. The population of the Secondary Market Area is forecasted to grow by nearly 60 percent to 1,570,340 residents. The number of households is projected to grow by nearly 57 percent and employment by 55 percent by 2035.

FIGURE 48: HOUSEHOLD, POPULATION, AND EMPLOYMENT PROJECTIONS, 2012-2035

	2012	2035	% Change
<b>Primary Market Area</b>			
Households	52,641	66,674	26.7%
Population	144,103	185,920	29.0%
Employment	87,771	107,636	22.6%
<b>Secondary Market Area</b>			
Households	358,781	562,688	56.8%
Population	984,306	1,570,340	59.5%
Employment	592,876	919,014	55.0%

Source: NCTCOG 2035 Forecast Estimates

## REAL ESTATE TRENDS

In addition to the projections provided above, certain trends like real estate sales, residential building permits issued, and occupancy rates provide a snapshot of relevant housing demand indicators. Real estate sales data and building permit information are not available at the Census tract level and thus cannot be aggregated to the market areas. Real estate sales data is provided for selected cities within the Secondary Market Area, as well as Tarrant and Parker counties in **Figures 49 through 57**. The tables show sales information (including average sales price and number of days on the market) for single-family homes, townhomes, and condominiums for the years 2007 through 2011. The changes in the number of housing sales and average sales price provide a measure of housing demand in each city.

FIGURE 49: REAL ESTATE SALES DATA FOR CITY OF BENBROOK, 2007-2011

Benbrook, Texas	2007	2008	2009	2010	2011
Single Family					
Number sales	320	301	242	254	232
Average sales price	\$131,560	\$134,003	\$138,376	\$124,509	\$320,882
Median sales price	\$123,750	\$129,540	\$133,920	\$120,650	\$274,250
Average number of days on the market	75	76	64	96	103
Townhomes and Condos					
Number sales	53	15	11	17	18
Average sales price	\$105,575	\$145,950	\$103,309	\$104,079	\$124,936
Median sales price	\$103,000	\$129,950	\$91,500	\$107,000	\$111,000
Average number of days on the market	45	99	104	68	97

Source: MetroTex Association of REALTORS

FIGURE 50: REAL ESTATE SALES DATA FOR CITY OF FORT WORTH, 2007-2011

Fort Worth, Texas	2007	2008	2009	2010	2011
<b>Single Family</b>					
Number sales	9,813	8,375	7,640	7,299	7,366
Average sales price	\$148,993	\$149,924	\$147,222	\$153,669	\$152,468
Median sales price	\$128,900	\$126,490	\$125,000	\$128,750	\$125,000
Average number of days on the market	82	81	86	93	108
<b>Townhomes and Condos</b>					
Number sales	367	278	211	245	216
Average sales price	\$189,759	\$199,533	\$198,427	\$185,541	\$181,379
Median sales price	\$164,162	\$161,877	\$117,800	\$129,000	\$131,000
Average number of days on the market	98	110	126	153	146

Source: MetroTex Association of REALTORS

FIGURE 51: REAL ESTATE SALES DATA FOR CITY OF LAKE WORTH, 2007-2011

Lake Worth, Texas	2007	2008	2009	2010	2011
<b>Single Family</b>					
Number sales	79	61	58	30	48
Average sales price	\$85,205	\$89,439	\$60,736	\$60,656	\$43,076
Median sales price	\$86,000	\$78,500	\$45,500	\$56,750	\$70,500
Average number of days on the market	56	72	66	81	97
<b>Townhomes and Condos</b>					
Number sales	0	0	0	0	0
Average sales price	\$0	\$0	\$0	\$0	\$0
Median sales price	\$0	\$0	\$0	\$0	\$0
Average number of days on the market	0	0	0	0	0

Source: MetroTex Association of REALTORS

FIGURE 52: REAL ESTATE SALES DATA FOR CITY OF RIVER OAKS, 2007-2011

River Oaks, Texas	2007	2008	2009	2010	2011
<b>Single Family</b>					
Number sales	95	77	65	63	56
Average sales price	\$70,485	\$64,190	\$68,447	\$65,423	\$62,321
Median sales price	\$68,000	\$61,850	\$65,000	\$57,500	\$50,650
Average number of days on the market	72	84	82	96	111
<b>Townhomes and Condos</b>					
Number sales	5	0	0	0	1
Average sales price	\$132,142	\$0	\$0	\$0	\$137,000
Median sales price	\$159,900	\$0	\$0	\$0	\$137,000
Average number of days on the market	59	0	0	0	214

Source: MetroTex Association of REALTORS

FIGURE 53: REAL ESTATE SALES DATA FOR CITY OF SANSOM PARK, 2007-2011

Sansom Park, Texas	2007	2008	2009	2010	2011
<b>Single Family</b>					
Number sales	42	32	20	21	30
Average sales price	\$66,537	\$61,171	\$54,993	\$50,025	\$5,443
Median sales price	\$65,500	\$69,450	\$53,250	\$50,000	\$48,350
Average number of days on the market	63	108	94	96	124
<b>Townhomes and Condos</b>					
Number sales	0	0	0	0	0
Average sales price	\$0	\$0	\$0	\$0	\$0
Median sales price	\$0	\$0	\$0	\$0	\$0
Average number of days on the market	0	0	0	0	0

Source: MetroTex Association of REALTORS



FIGURE 54: REAL ESTATE SALES DATA FOR CITY OF WESTWORTH VILLAGE, 2007-2011

Westworth Village, Texas	2007	2008	2009	2010	2011
<b>Single Family</b>					
Number sales	9	17	13	19	10
Average sales price	\$347,578	\$83,622	\$193,715	\$262,714	\$318,707
Median sales price	\$112,500	\$73,000	\$90,000	\$74,000	\$62,000
Average number of days on the market	97	111	109	166	155
<b>Townhomes and Condos</b>					
Number sales	0	0	0	0	0
Average sales price	\$0	\$0	\$0	\$0	\$0
Median sales price	\$0	\$0	\$0	\$0	\$0
Average number of days on the market	0	0	0	0	0

Source: MetroTex Association of REALTORS

FIGURE 55: REAL ESTATE SALES DATA FOR CITY OF WHITE SETTLEMENT, 2007-2011

White Settlement, Texas	2007	2008	2009	2010	2011
<b>Single Family</b>					
Number sales	151	148	122	112	108
Average sales price	\$74,247	\$69,149	\$72,509	\$69,966	\$63,412
Median sales price	\$74,000	\$62,500	\$66,500	\$62,600	\$57,450
Average number of days on the market	78	78	83	90	106
<b>Townhomes and Condos</b>					
Number sales	2	0	0	0	2
Average sales price	\$62,449	\$0	\$0	\$0	\$81,650
Median sales price	\$57,450	\$0	\$0	\$0	\$81,650
Average number of days on the market	41	0	0	0	20

Source: MetroTex Association of REALTORS

FIGURE 56: REAL ESTATE SALES DATA FOR TARRANT COUNTY, 2007-2011

Tarrant County, Texas	2007	2008	2009	2010	2011
Single Family					
Number sales	24,182	21,348	17,140	16,984	16,808
Average sales price	\$177,907	\$177,024	\$171,739	\$176,853	\$176,972
Median sales price	\$135,000	\$135,000	\$133,950	\$136,000	\$134,500
Average number of days on the market	74	78	83	91	104
Townhomes and Condos					
Number sales	867	648	532	543	553
Average sales price	\$150,172	\$155,133	\$154,700	\$146,489	\$131,869
Median sales price	\$108,000	\$114,084	\$105,000	\$108,000	\$97,000
Average number of days on the market	92	98	124	133	138

Source: MetroTex Association of REALTORS

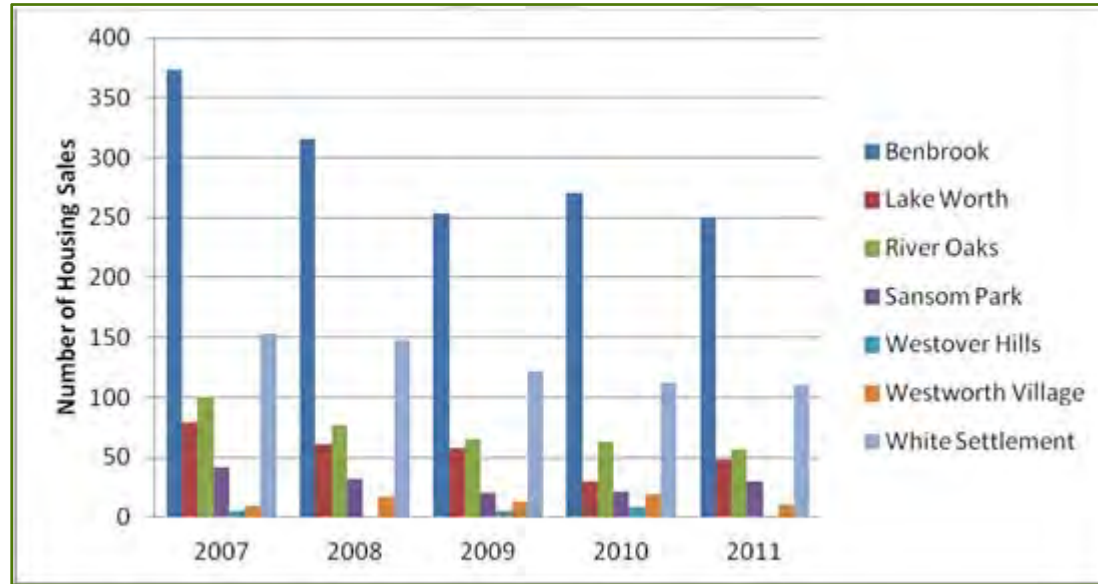
FIGURE 57: REAL ESTATE SALES DATA FOR PARKER COUNTY, 2007-2011

Parker County, Texas	2007	2008	2009	2010	2011
Single Family					
Number sales	1,650	1,513	1,293	1,241	1,331
Average sales price	\$180,745	\$188,198	\$173,861	\$170,075	\$177,955
Median sales price	\$156,313	\$163,000	\$154,000	\$148,000	\$159,694
Average number of days on the market	91	101	107	119	130
Townhomes and Condos					
Number sales	9	6	2	11	9
Average sales price	\$90,461	\$185,233	\$126,497	\$138,234	\$59,444
Median sales price	\$72,500	\$138,700	\$111,500	\$139,000	\$71,500
Average number of days on the market	94	33	106	247	138

Source: MetroTex Association of REALTORS

**Figure 58** indicates that the total number of housing sales (single-family homes, plus townhomes and condos) declined for most of the selected cities between 2007 and 2011 (Note: **Figure 58** does not include Fort Worth, as the magnitude of data, in terms of absolute values, for this city is too dissimilar from the other examples to display appropriately. However, the trend of housing sales in Fort Worth closely matched that of the combined cities displayed in the chart). The median sales price for housing units for the selected cities fluctuated in a very narrow interval from 2007 to 2011. For example, the median sales price of a single-family home in Fort Worth ranged from \$128,900 in 2007 to \$125,000 in 2011. The median sales price in Tarrant County ranged from \$108,000 in 2007 to \$97,000 in 2011.

FIGURE 58: HOUSING SALES DATA FOR SELECTED CITIES, 2007-2011



Source: MetroTex Association of REALTORS

## RESIDENTIAL BUILDING PERMITS

The US Census Bureau provides citywide information on the number and value of residential building permits issued during a given year. **Figure 59** shows the number of residential building permits issued (including the estimated construction costs associated with those permits) by year from 2007 to 2011. The data is broken down by housing type (e.g., single-family, townhome/condo units, and multifamily). The building permit data shows the amount of construction activity and housing demand in each city during the five year period.

Only 69 percent of total building permits in Tarrant County were issued in Fort Worth between 2007 and 2011. With the exception of Benbrook and White Settlement, other cities in the study area issued very few building permits.

FIGURE 59: RESIDENTIAL BUILDING PERMITS ISSUED BETWEEN 2007 AND 2011

	Benbrook			Fort Worth			Lake Worth		
Housing Type	Buildings	Units	Total Construction Cost	Buildings	Units	Total Construction Cost	Buildings	Units	Total Construction Cost
Single Family	306	306	\$62,507,422	17,714	17,714	\$2,604,839,983	12	12	\$1,853,483
2 to 4 Units	0	0	\$0	213	488	\$6,064,653	0	0	\$0
Multifamily	0	0	\$0	422	8,413	\$113,995,261	0	0	\$0
<b>Total</b>	<b>306</b>	<b>306</b>	<b>\$62,507,422</b>	<b>18,349</b>	<b>26,615</b>	<b>\$2,724,899,897</b>	<b>12</b>	<b>12</b>	<b>\$1,853,483</b>
	River Oaks			Sansom Park			Westworth Village		
Housing Type	Buildings	Units	Total Construction Cost	Buildings	Units	Total Construction Cost	Buildings	Units	Total Construction Cost
Single Family	21	21	\$2,365,700	9	9	\$1,039,735	34	34	\$19,418,542
2 to 4 Units	0	0	\$0	0	0	\$0	0	0	\$0
Multifamily	0	0	\$0	0	0	\$0	0	0	\$0
<b>Total</b>	<b>21</b>	<b>21</b>	<b>\$2,365,700</b>	<b>9</b>	<b>9</b>	<b>\$1,039,735</b>	<b>34</b>	<b>34</b>	<b>\$19,418,542</b>
	White Settlement			Tarrant County			Parker County		
Housing Type	Buildings	Units	Total Construction Cost	Buildings	Units	Total Construction Cost	Buildings	Units	Total Construction Cost
Single Family	153	153	\$18,248,216	25,845	25,845	\$4,583,496,109	1,376	1,376	\$227,955,228
2 to 4 Units	0	0	\$0	233	532	\$6,960,462	40	138	\$2,151,669
Multifamily	0	0	\$0	450	10067	\$142,005,209	3	49	\$308,639
<b>Total</b>	<b>153</b>	<b>153</b>	<b>\$18,248,216</b>	<b>26,528</b>	<b>36,444</b>	<b>\$4,732,461,779</b>	<b>1,419</b>	<b>1,563</b>	<b>\$230,415,537</b>

Source: US Census Bureau

HOME LOAN ORIGINATION

Figure 60 includes home loan origination activity for Tarrant County occurring between 2005 and 2009.

FIGURE 60: HOME LOAN ORIGINATION DATA FOR TARRANT COUNTY, 2005-2009

Loan Originated	Number	Average Value
FHA, FSA/RHS & VA - Home Purchase Loans	38,170	\$131,345
Conventional - Home Purchase Loans	149,947	\$137,637
Refinancing	79,419	\$142,259
Home Improvement Loans	16,327	\$49,969
Loans on Dwellings for 5+ Families	459	\$4,796,255
Non-occupant Loans on < 5 Family Dwellings	31,083	\$97,403
Loans on Manufactured Home Dwelling	1,046	\$44,801
<b>Total</b>	<b>316,451</b>	<b>-</b>
Applications Approved, Not Accepted by the Applicant	Number	Average Value
FHA, FSA/RHS & VA - Home Purchase Loans	2,095	\$128,049
Conventional - Home Purchase Loans	18,269	\$135,350
Refinancing	12,851	\$138,871
Home Improvement Loans	4,350	\$40,731
Loans on Dwellings for 5+ Families	16	\$5,026,600
Non-occupant Loans on < 5 Family Dwellings	3,891	\$97,596
Loans on Manufactured Home Dwelling	825	\$48,307
<b>Total</b>	<b>42,297</b>	<b>-</b>
Applications Denied	Number	Average Value
FHA, FSA/RHS & VA - Home Purchase Loans	7,11	\$125,977
Conventional - Home Purchase Loans	34,254	\$120,688
Refinancing	68,113	\$123,599
Home Improvement Loans	24,345	\$33,244
Loans on Dwellings for 5+ Families	56	\$4,927,495
Non-Occupant Loans on < 5 Family Dwellings	11,504	\$89,798
Loans on Manufactured Home Dwellings	2,232	\$45,191
<b>Total</b>	<b>147,615</b>	<b>-</b>



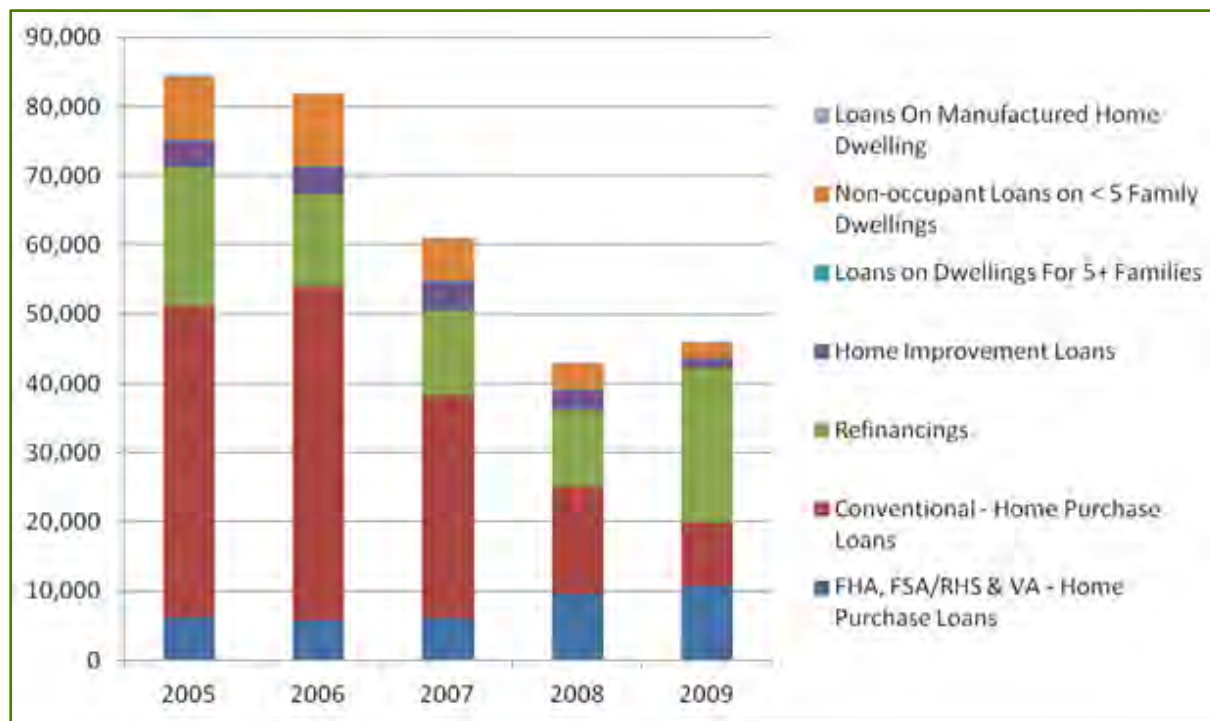
<b>Applications Withdrawn</b>		
FHA, FSA/RHS & VA - Home Purchase Loans	5,710	\$132,897
Conventional - Home Purchase Loans	21,844	\$143,613
Refinancing	38,426	\$134,938
Home Improvement Loans	4,684	\$82,079
Loans on Dwellings for 5+ Families	41	\$3,187,009
Non-occupant Loans on < 5 Family Dwellings	5,433	\$99,030
Loans on Manufactured Home Dwelling	161	\$54,806
<b>Total</b>	<b>76,299</b>	<b>-</b>
<b>Files Closed for Incompleteness</b>		
FHA, FSA/RHS & VA - Home Purchase Loans	800	\$119,962
Conventional - Home Purchase Loans	5,014	\$148,281
Refinancing	14,593	\$138,910
Home Improvement Loans	1,014	\$52,617
Loans on Dwellings for 5+ Families	9	\$1,862,100
Non-occupant Loans on < 5 Family Dwellings	1,395	\$104,657
Loans on Manufactured Home Dwelling	42	\$51,126
<b>Total</b>	<b>22,867</b>	<b>-</b>

Source: Financial Institutions Examination Council and City-Data.com  
(Home Mortgage Disclosure Act Data - Aggregated Statistics)

**Figure 61** displays the different types of home loans which were originated in Tarrant County between 2005 and 2009. The chart shows a steady decline in the total amount of loans originated between 2005 and 2008. In 2009, the number of loans originated increased slightly from 43,002 in 2008 to 45,936 in 2009. Refinancing accounted for the most growth between 2008 and 2009. The number of refinanced loans doubled from 11,136 in 2008 to 22,434 in 2009. Overall, the amount of home loans of all types originating in Tarrant County decreased by more than 45 percent between 2005 and 2009.

These findings reflect the nationwide trends in lending activity. Overall, the number of home loans decreased in the recent years due to economic downturn. Lower interest rates provided opportunities for borrowers to buy housing or refinance existing higher interest loans.

FIGURE 61: HOME LOAN ORIGINATIONS FOR TARRANT COUNTY, 2005-2009



Source: City-Data.com (Home Mortgage Disclosure Act Aggregated Statistics)

### NAS FORT WORTH, JRB - HOUSING DEMAND

In 2010, NAS Fort Worth, JRB conducted a Housing Requirement Market Analysis Update to forecast the housing supply and demand to the year 2014 for both military families and unaccompanied military personnel stationed at the base. Based on the study, NAS Fort Worth, JRB projected to have a housing need of 172 units by 2014.

As of July 2013, the housing need for incoming families and unaccompanied personnel is not as great due to a robust outreach program called the Rental Partnership Program. This program has alleviated some of the housing shortage, but it is still important to consider the need for affordable housing options closer to the base due to a variety of reasons such as military readiness, reduction of commute times for existing employees, and provision of quality housing stock with amenities desirable to military personnel.

## D. COMMUNITY INPUT

Various public outreach activities were conducted for the Planning Livable Military Communities Project. These activities included interviews with key stakeholders, Open House meetings, Visual Preference and Questionnaire surveys, Corridor Charrettes, Housing and Bicycle/Pedestrian Public meetings, and input provided by Regional Coordination Committee members. The following section provides a summary of major ideas and concepts provided by key stakeholders and residents, and outcomes of public outreach activities related to housing. Some ideas or opinions may have conflicted, but consistent themes were heard and are summarized in the following section.

### INTERVIEWS

Interviews were conducted during March and October 2012 with staff members from various cities in the project area; NAS Fort Worth, JRB; major employers; and other key stakeholders in the project area. The following housing and development challenges and potential solutions were identified:

#### **Study Area Housing Challenges Noted by Interviewees:**

##### ***Military Housing Needs and Considerations***

###### *On-Base Housing Supply*

- Limited supply of on-base housing units for military personnel
- There are occasional waiting lists for families and unaccompanied personnel, often due to lack of supply of appropriate housing in communities that meet military standards (i.e., within one-hour commute, within Basic Allowance for Housing (BAH), minimum bedrooms, etc.).
- Demand for housing for military families and personnel is really greater than what is demonstrated by the waiting list because many new military residents do not check in with the NAS Fort Worth, JRB housing office, but instead rely on word of mouth to find a suitable housing location.

###### *Location and Homeownership Decisions*

- The large percentage of reservists' (approximately 60 percent as of March 2013) impacts housing in a unique way in that many reservists or their family members will have a full-time job outside of the base that may require them to reside in a location close to their jobs.
- Adjacency to the base, schools, and commercial areas is also important for some families because many younger personnel with families only have access to one vehicle. This limits the ability of the family to live further away from the base, and also supports the need for public transportation and enhanced amenities closer to the base.
- The civilian population is more likely to reside in areas that complement their family needs and offer desired amenities. These two demographics are rooted in the communities and region differently than the 2,500 active duty personnel.
- Active duty personnel often have more temporary assignments in a location and will reside in a community or on-base for a short amount of time before being stationed someplace else or deployed.

- Housing needs for active duty personnel are shaped by the fact that owning a single-family home is probably not something to consider due to the short period of time they will reside in the area.
- Military members' housing needs and desires tend to be different depending on rank (Enlisted Personnel versus Officers).
- The Fort Worth area is a popular retirement location for military; however, retirees usually do not choose to retire in the study area communities but instead choose to reside outside of a four- to five-mile radius from the base.

#### *Community Amenities*

- Community amenities are very important to military personnel when choosing where to locate their families. Unreliable utilities and a mismatch of service providers in some local governments are some challenges identified in the study area communities.
- Desirable daycare facilities, improved and more accessible medical facilities, and improved attractiveness and infrastructure such as sidewalks and enhanced curb appeal are other desired amenities.
- Open space and recreation opportunities are also desired by military personnel.
- The quality of schools in the area was a large factor in determining where personnel with children would reside. Indications that some elementary schools are good quality, but the high schools are not, was an important consideration for some of the families.

#### *Security*

- Military personnel seek out communities where they feel secure, that have a variety of amenities, and provide convenience for their families.
- Typically, living near other personnel who are of the same rank is desired

#### *Housing Needs of Major Employers*

- Lockheed and NAS Fort Worth, JRB employees need additional housing options closer to where they work.
- Currently, many employees commute long distances.
- Many younger Lockheed Martin employees that relocate to the region move to apartments south of Lockheed, reside in the Benbrook area or downtown Fort Worth. Many employees also live in the mid-cities area of the region (Bedford, Euless, Southlake, Colleyville, North Richland Hills, Hurst, etc.).
- Many Lockheed Martin executive-level employees live in Parker County and Northeast Tarrant County (Keller, Colleyville, Southlake).
- Improving housing choices in the area at different price points should be considered.

#### **Noise Concerns Associated with Airfield Operations at NAS Fort Worth, JRB**

- Many residents have resided in the area for many years and have become accustomed to the noise from aircraft.
- As the population shifts, however, and new residents move to the area, there is a potential for new complaints.
- There are no real estate disclosure requirements in Texas; homeowners may not know they are under a flight path until they start living in the area.

#### **Housing Choice**

- Some interviewees identified the need for more housing options in the area.

- Some interviewees stated that communities are not open to diversity of housing options and second story apartments.
- White Settlement, River Oaks, and Westworth Village need additional rental housing, commercial and residential mixed use, with more convenience stores in walkable distance.
- There is a need to improve the quality of housing stock.

***Multifamily, Senior Living, and Rental Properties***

- Multifamily housing in the study area was pointed out to be in substandard condition.
- Homeownership has declined in the area and rentals are increasing.
- Some interviewees identified a need for senior living options and multifamily housing in the area.

***Development Constraints***

- Existing development in the Accident Potential Zones (APZ) is an issue that needs to be addressed to avoid future development in these zones. Housing units in the higher noise contours may have to be improved through noise insulation.
- Drainage was identified as an issue for the developments along SH 199 (Jacksboro Highway).
- Most of the communities in the study area are landlocked with little expansion opportunities.
- The study area is perceived to have limited undeveloped areas for new development, but there are suitable redevelopment areas.
- Vacant and deteriorated mobile homes in the area provide redevelopment opportunities.
- Cities such as Samson Park have limited opportunities for growth and a lack of funding to incentivize new projects, which impedes new development.
- The Community Development Block Grant (CDBG) funding is too modest to make major improvements in the area.
- The city of Fort Worth has adopted an Urban Village strategy for revitalization and some interviewees pointed out that the city has not designated any urban villages within the study area.

***Demographic Shifts***

- Need to attract new and younger families for service industries.
- The area is experiencing a change in demographics and has attracted an increasing number of lower income households in the study area’s older housing stock, creating unique challenges for communities.



### ***Education Influence on Housing Location Preferences***

- Some interviewees pointed out that the quality of the schools could be a negative factor for attracting young families with children. Residents drive longer distances to desirable school districts in Southlake, Keller, Aledo, and other areas of Parker and Tarrant counties.
- Some interviewees mentioned that communities in the project area have some quality elementary schools, but high schools need improvement.
- Perception of lack of quality school districts and limited housing choices makes it difficult to attract senior management to live in the study area communities.
- Aledo is the desired community for many affluent households due to perceptions of higher quality schools and contemporary housing choices. The drive time to Aledo is typically 30 to 45 minutes from NAS Fort Worth, JRB or Lockheed Martin.

### **City-Specific Challenges Noted by Interviewees:**

- **Benbrook:** The average house size has decreased in the past ten years in the city and other older communities in the area. The city added more housing units as compared to the household and population growth.
- **Lake Worth:** Lake Worth staff stated that their city has some younger residents and some transient population (those who rent and move on) in the southwest part of the city. There is also an older, more established demographic in parts of the city, particularly north of SH 199 (Jacksboro Highway). The city is diversifying in demographics with Hispanics making up about 20 to 30 percent of the city's population. Lake Worth has a significant retired population and also desires to see an influx of younger residents and more military families. The school system influences the influx of new residents, and the city has quality schools, which is attracting many new residents to the city.
- **River Oaks:** River Oaks used to be a big retirement community but the demographics have changed in recent years. River Oaks has about 7,000 residents and a fair concentration of Lockheed employees. There is a growing Hispanic population and the school system is about 70 percent Hispanic. The city's population is split about 50/50, Hispanic/white.
  - The River Oaks Land Use Plan is intended to support redevelopment including town homes and multifamily housing. River Oaks has less than one percent undeveloped land and most of it is Camp Carter YMCA.
  - The city provides emphasis on code enforcement. The city is split down the middle by River Oaks Boulevard – small, two bedroom homes mostly on one side and larger homes on the other. The River Oaks Land Use Plan was completed in 2004 and amended in 2006. Residents were concerned that homes would be taken by eminent domain since the property was zoned multifamily, so the city amended many areas back to single-family residential that were formerly zoned multifamily.
  - Challenges and issues in River Oaks include the need to update building codes, zoning and land use compatibility with other communities, attracting quality housing, vacant homes, a lack of adequate attractiveness to housing stock, maintenance of existing housing, and lack of development of mixed uses along the River Oaks Boulevard corridor.
- **Sansom Park:** Sansom Park staff stated most of their city is built-out residential, but there are 40 acres of undeveloped land. Hispanic population has grown dramatically in the past decade; over 50 percent of the children in the city are Hispanic.

Building and shaping neighborhoods that have dining, commercial, and civic uses in a central and walkable location is desirable to the city. Much of the housing growth in Sansom Park has occurred over the past ten years as many subdivisions were built, but the growth slowed down, then stopped in 2006. More growth is likely to occur when the economy picks up again.

- **Westworth Village:** Staff mentioned that the much of the growth that has occurred in the past decade has been high-end development. After Carswell Air Force Base closed, Westworth Village received over 400 acres from the base; however, process to take the land and redevelop it has been a long one. There are approximately 150 acres of undeveloped land in Westworth Village. Land assembly of several parcels is underway; staff indicated that high-end housing will likely be developed in these larger parcels because of the city's proximity to downtown Fort Worth.

The Westworth Village City Council has amended ordinances to make it more difficult to develop new apartments. Not much land in the city is currently zoned for multifamily or townhomes. Some townhouses might appear in planned development contexts, but multifamily apartments in general may be difficult to develop in Westworth Village.

- **White Settlement:** White Settlement's housing stock is 30 years old and is in need of maintenance. Another challenge in the community is the proximity of industrial development to other uses. Flooding and the need for stormwater infrastructure improvements were also mentioned as challenges for the community. Finally, White Settlement staff indicated that the city needs more quality commercial development to meet the retail needs of their residents.

### **Possible Solutions Noted by Interviewees:**

#### ***Outreach to New Residents***

- It is essential to educate and assist the growing Hispanic and aging populations with their housing options and Fair Housing rights.
- Outreach to new residents who may not be aware of NAS Fort Worth, JRB and the established flight paths is required. This could be achieved by coordinating with real estate professionals in the area.

#### ***Land Use Compatibility with NAS Fort Worth, JRB***

- Compatibility of future development can be improved through modifications to zoning codes and development regulations. Since the base does not have any authority over adjacent land-use development, cities should continue to coordinate and work towards amending development regulations for areas in the noise contours and safety zones.
- The existing development in the Accident Potential Zone should be addressed through amendments to ordinances and building regulations.

#### ***Development Opportunities and Action Steps***

- Improving the perception of local schools may attract more base and Lockheed Martin employees to live in the area.
- Cities need to improve tax bases, invest in amenities, and improve transportation access to attract and retain new residents.
- Housing and retail needs of the base should be evaluated, including opportunities for public/private partnerships.
- Cities need updated Comprehensive Plans.
- The success of the base will influence successful redevelopment in some areas.
- Cities and NAS Fort Worth, JRB may partner with developers to redevelop and make improvements to older housing stock in the area.
- There are aging demographics inside IH 820 (the Loop).
- Development opportunities need to be attractive to young entrepreneurs with technology skills.

- Urban Village concepts could be utilized inside the IH 820 loop for redevelopment.
- Potential development areas include vacant land to the west of IH 820 near Lake Worth and the Casino Beach area in Fort Worth.
- Walsh Ranch is a 7,000+ acre master planned community near the intersection of IH 20 and IH 30. Commercial development may start within a year and housing costs in the development will range from \$200,000 to \$2,000,000. This development could help to meet the housing and retail needs of employees in future.
- The Trinity River Vision Authority is planning trail and recreational facilities on the West Fork of the Trinity River which will serve this area and is a great plan to enhance neighborhoods and quality of life.
- Lake Worth should become a recreational amenity for the region, with stronger pedestrian connections to the lake and a more established pedestrian waterfront.
- There is a need for multifamily development for military, but not every community would support conventional multifamily development. River Oaks would be one of the best candidates for multifamily development in the area, since this city has supported diverse residential development in the past.
- The city of Fort Worth does not possess any major land holdings in the study area, but some of the interviewees believed that there are private land holdings along the west side of IH 820 that could be utilized.

***Coordination in Planning Efforts and Funding Assistance***

- Some interviewees suggested developing a consortium of agencies in the form of a redevelopment agency to spur development. The city of Fort Worth’s expertise with Tax Increment Financing (TIF) as a development tool could be used to foster development in other communities. The development in Lake Worth, the Ridgmar Mall area, and Benbrook has been increasing.
- The cities could pursue joint funding assistance such as Community Development Block Grants or other funds for infrastructure improvements and construction of recreational amenities to attract development.

PUBLIC MEETINGS AND SURVEY RESULTS

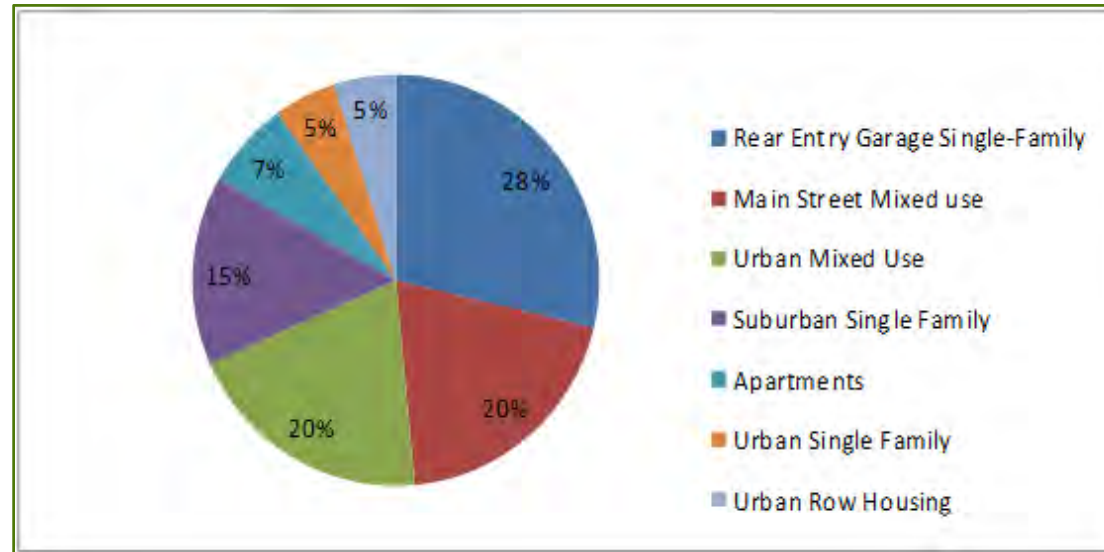
A visual preference survey of various housing options was conducted through open house meetings in June 2012 to gauge the preference of area residents towards types of housing. **Figures 62 and 63** show the visuals included in the survey and results.

FIGURE 62: VISUAL PREFERENCE SURVEY



Source: NCTCOG

FIGURE 63: RESULTS OF VISUAL PREFERENCE SURVEY



Source: NCTCOG

## HOUSING QUESTIONNAIRE SURVEY RESULTS

A housing survey was distributed at open house meetings in June 2012 and was made available on-line. The following description provides a summary of the survey results:

### **Survey Respondent Characteristics:**

- 31 percent lived in the area, 26 percent worked in the area, 26 percent both lived and worked in the area, and 15 percent do not live or work in the area.
- 38 percent of respondents live in the 76108 ZIP code; work ZIP codes are widely distributed.
- 53 percent are four-person households and 42 percent have two children, 40 percent have no children.
- 50 percent had incomes \$50,000 to \$100,000 and 25 percent had less than \$50,000.
- 25 percent of the respondents' family members work in the military.
- 4 percent of respondents live in military housing.



### **Owner or Renter Responses:**

- 60 percent of owners have mortgage payments between \$500 and \$1,000, and 85 percent responded that their homes are affordable.
- 60 percent plan to purchase an existing home and only four percent would like to purchase a new home.
- 38 percent of respondents have rents from \$500 to \$750, which was the most frequent rent category.

### **Housing Location, Access, and Type Preferences:**

- Top location characteristic preferences – easy access to work, quality schools, and affordable price.
- Suburban (single family in small cities) and town center mixed-use and walkable neighborhoods are the most preferable options. 65 percent had 'single-family home 0.5-1.5 acres' as top choice, and 30 percent had mixed use as top choice.
- 45 percent prefer to have three and four bedrooms and 60 percent prefer to have two bathrooms.
- 68 percent prefer to have a two-car garage.
- 45 percent moderately agree that there is good assortment of housing options.
- Lack of access to retail, to work, and to quality schools are three top reasons for not living in the area.

Additionally, in September 2012, a corridor charrette, or workshop, was conducted to define community visions and specific design concepts for SH 183 (Alta Mere/River Oaks Boulevard) and SH 199 (Jacksboro Highway).

The following guiding themes were established at the beginning of the charrette:

- **Vision:** The corridors should be transformed to a regional destination with mixed-use nodes and business variety connected by bicycle/pedestrian facilities.
- **Values:** Proximity, accessibility, and cultural character are the values emphasized by many participants to meet the above vision for the corridors.
- **Challenges:** Land use or business type, road design, and aesthetics are the key challenges pointed out by the attendees to attain the above Values and Vision.

Some of the challenges pertaining to housing identified by attendees included: no sense of place in various neighborhoods, the need for neighborhood identity, aging housing stock, and, lack of desirable conditions for new development.

Some of the housing opportunities and development concepts identified by attendees included vibrant destination communities that are multipurpose and include residential, commercial, parks, recreation, and entertainment. Participants also expressed a desire for developments to be linked by automobile, transit, and bicycle/pedestrian connections. Finally, vacant land along SH 183 and SH 199 could be areas for potential mixed-use development.

## E. KEY CHALLENGES AND RECOMMENDATIONS

Based on the input from the housing supply and demand analysis, interviews, surveys, and an examination of other planning documents related to the study area, the following two major themes of housing challenges and needs were identified:

### **Real Estate Challenges**

1. Limited land available for new development.
2. Land use compatibility by land use type and proximity to NAS Fort Worth, JRB.
3. Single-family and multifamily housing conditions.

### **Housing Choice Challenges**

1. Housing options for young families.
2. Housing options for aging populations.
3. Housing options for military personnel.
4. Supply of high-value housing.
5. Fair housing education for minority populations.

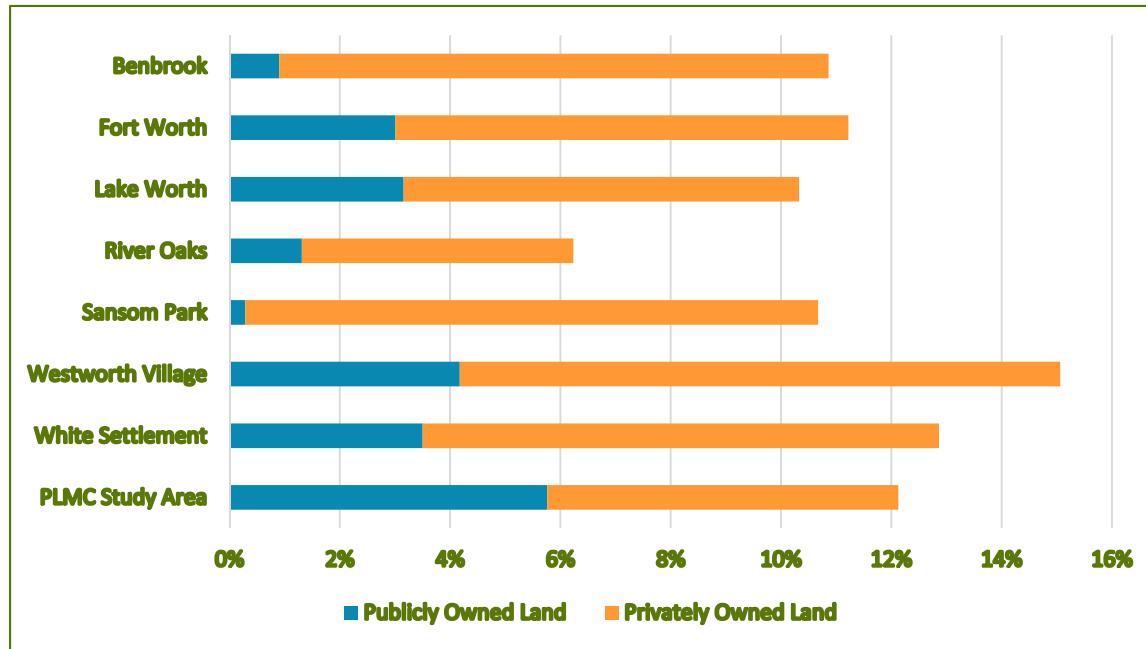
The following section presents discussion on each challenge and need, and provides specific policy alternatives addressing housing issues in the study area. Some of the policy alternatives may address specific areas of the market, while others are broad in their possible applications. Case study examples and funding sources are provided as applicable.

### **Real Estate Challenges**

#### ***Limited Land Available for New Development***

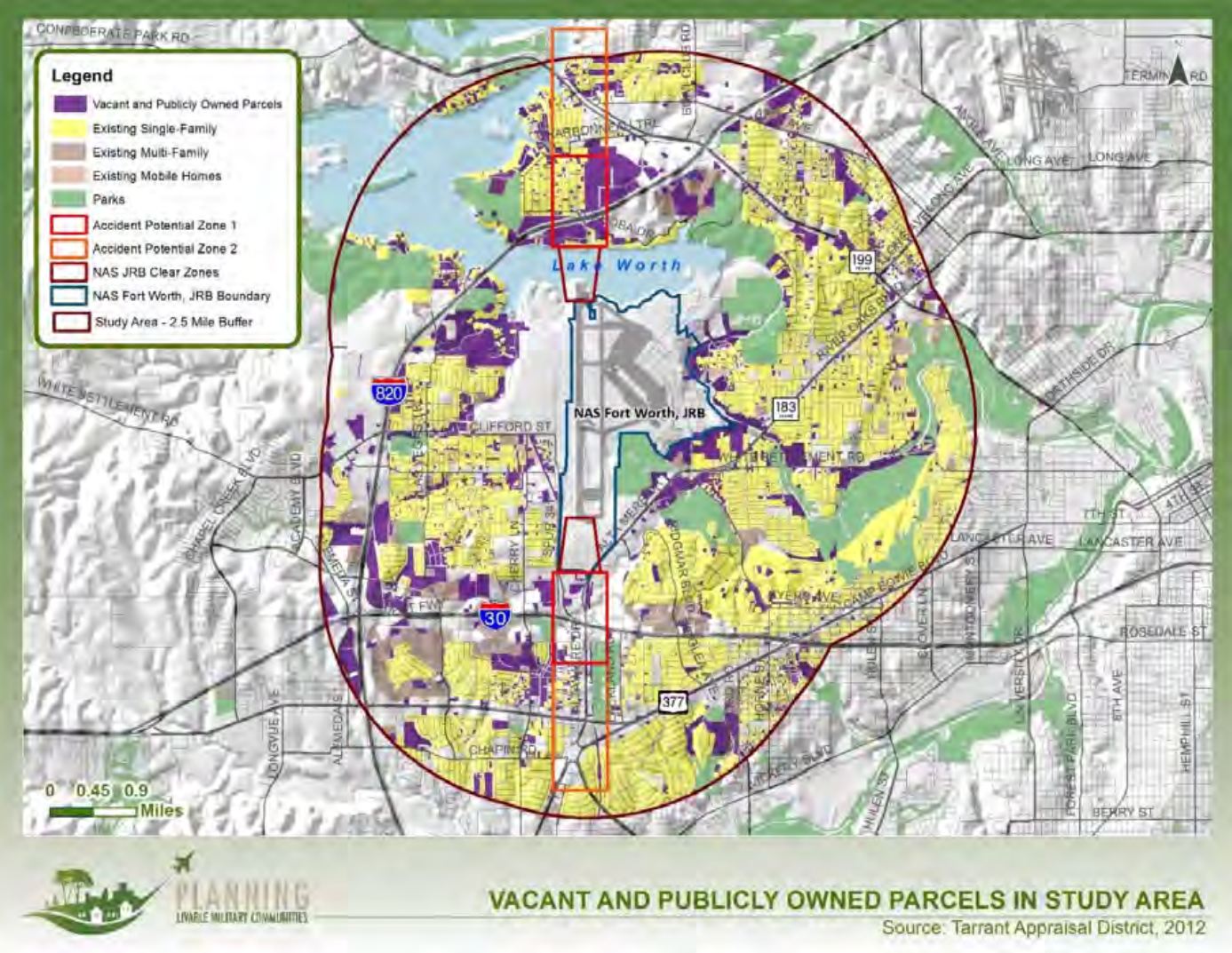
Limited vacant land for new development is a major constraint in most of the study area communities. **Figure 64** shows the percentage of vacant land in each study area community based on data from the Tarrant Appraisal District. In 2012, the study area had just under six percent of vacant and publicly owned land. **Figure 65** shows the location of vacant and publicly-owned land in the study area. Publicly-owned land includes land owned by local governments, Tarrant County, school districts, water districts, economic development corporations, and the Texas Department of Transportation. While there is limited vacant land for new development in most cities, these areas represent opportunities to use the land to maximize housing, economic development, and employment options. There may be additional vacant land that is privately held and could present opportunities for public-private partnerships to expand development/redevelopment opportunities. There are several strategies that local governments could use to improve future development/redevelopment potential.

FIGURE 64: VACANT LAND IN STUDY AREA COMMUNITIES



Source: Tarrant County Appraisal District, 2012

FIGURE 65: VACANT LAND IN STUDY AREA COMMUNITIES, 2012



## ***Infill Housing Development***

Incentives for mixed-income infill development may be appropriate as a part of the overall strategy to improve redevelopment options in existing neighborhoods. Infill development places new housing on scattered vacant or underutilized lots in established neighborhoods or in an area within a neighborhood which had previously been left undeveloped. Cities can partner with area nonprofit agencies, such as Habitat for Humanity, to promote infill development in neighborhoods that have unmet housing needs.

Mixed-income infill development refers to infill development that does not necessarily focus on low to moderate-income housing. Rather, mixed-income infill looks to create a broad range of infill housing types and values. This type of development does not necessarily mean a one-for-one replacement of residential stock on currently vacant lots, but typically accommodates higher densities and different housing options, including townhome and duplex development, where appropriate. Density bonus is a zoning tool that permits developers to build denser development than typically allowed. These could include more housing units, taller structures, or more floor space in exchange for provision of a defined public benefit, such as building at a certain location, building a certain type of development, or including a specified percentage of affordable units. Increasing area density through density bonuses or re-zoning is one possible component of a mixed-income infill strategy. Other components may include:

### *Generating Developer Interest*

- Developers may be hesitant to initiate an infill project if their experience in this area is limited. A training program or seminar on infill development and showcasing city incentives (e.g., expedited permitting, density bonus, tax abatement, etc.) for this type of development may provide developers with the tools to start infill activities.
- Cities should identify infill priority areas and create a list of available infill sites. This list can be made available to developers through city Websites.
- Cities can provide developers with examples of successful infill projects.

### *Reducing Development Costs*

- Examine the reduction or waiving of development fees for infill development.
- Often infill redevelopment is difficult because doing so involves a lengthier review and approval process not associated with other development. This process may involve soliciting variances from side-yard set-backs and other restrictions which may not be granted. Review the process required to create infill housing for ways to make the process more streamlined and efficient. One way to reduce development costs may include 'fast tracking' permitting and variance processes for infill status projects.
- Developing one lot is more costly than developing a number of contiguous lots. One strategy includes creating a land write-down program to generate larger impacts than piecemeal development. A land write-down program is an incentive to promote redevelopment by offering land at lower than market value. The lowering of land price occurs when the city or redevelopment agency assumes part of the acquisition, demolition, and improvement costs to encourage redevelopment.
- Examine the appropriateness of financial assistance to spur infill development through loan guarantees, tax abatements, and below-market financing.



- **Loan guarantees:** Loan guarantees promote redevelopment, providing the initial resources or assurance that private developers may need to invest in distressed areas. HUD's Section 108 Loan Guarantee Program is an example of local governments' borrowing funds guaranteed by Section 108 and pledging their current and future CDBG allocations to cover the loan amount as security for the loan.
- **Tax abatements:** Local governments may offer waiver or reduction in property tax to stimulate redevelopment.
- **Below-market financing:** This is a type of incentive provided to developers to encourage redevelopment in exchange for below-market rate or lower interest rate loans to developers.

#### *Generating Market Awareness*

- An infill strategy will be less likely to be successful if no one is aware of it. Consider a publicity campaign targeting builders, real estate professionals, and lenders, encouraging them to take advantage of the infill incentives.
- Provide information on infill development through planning, zoning and permitting offices, and distribute materials explaining the new program through builders associations and the boards of realtors.
- Minimize opposition by lenders to finance infill development projects, with which they may be unfamiliar, by providing information on successful infill development projects.

#### ***New Construction and Land Availability***

An issue discussed at the open house meetings and interviews was the limited availability of land for new construction. Vacant land in the more established areas of the city is typically small individual lots, which may need clearing and are more costly to develop. One strategy already presented to address this issue is infill development. Other strategies are through land acquisition and an infill housing parade of homes.

#### ***Land Assembly***

Land acquisition and land assembly aim to produce contiguous parcels for redevelopment. Often the plans of organizations involved in redevelopment are not coordinated and work is done in a piecemeal, less cost-effective manner. Redevelopment plans are often stymied by difficulties in acquiring critical parcels or acreage to make a project feasible. The cities in the study area should facilitate the process as a land assembly agent and have the responsibility of receiving and maintaining property for future redevelopment in targeted areas. These parcels could then be sold to nonprofit corporations, community development corporations, or market rate developers. The cities, in cooperation with the newly-created land bank authority, could work to be the land assembly agents to spur change. The advantages of a citywide Land Assembly Program are:

- Removes blighted conditions and halts further proliferation of such conditions.
- Provides active and responsible ownership interest for troubled and abandoned property until redevelopment can occur.
- Facilitates land assembly that allows projects that otherwise could not move forward due to an inability to acquire critical parcels.
- Provides a supply of lots for infill housing construction that can be coordinated with other efforts or projects.
- Maintains an inventory of developable lots available to community partners, such as community development corporations, faith-based institutions, and others engaged in community revitalization.

### ***Parade of Homes***

The Parade of Homes is an event organized by local governments and nonprofit organizations to bring together the right mix of developers, available land, banking, and buyers. A Parade of Homes event could be established to facilitate the development and sale of infill housing. A Parade of Homes has five phases:

- 1. Site selection:** A neighborhood assessment and action plan are completed, determining where the Parade of Homes will take place. Lots are acquired to be made available to builders.
- 2. Pre-development:** Work is coordinated with a local neighborhood association and code enforcement to schedule neighborhood clean-ups, rehabilitation, public safety, and code enforcement projects. In this phase the city recruits builders, bankers, mortgage companies, insurance companies, and nonprofit and community organizations to participate in the Parade of Homes.
- 3. Development:** The development phase entails completion of necessary environmental reviews, demolition and relocation, addressing infrastructure needs, lot sales, and construction.
- 4. Homebuyer acquisition:** This phase includes pre-purchase homebuyer programs, loan applications, and financing for prospective homebuyers. At this step, the housing units can be entered into a Rental Partnership Program to make those available to the b employees, or can be marketed to other major employers in the area.
- 5. Parade event/home sales:** This final phase includes the pre-parade advertising and marketing, the event and home tours, home purchases/closings, and post-purchase homebuyer activities.

### ***Intergovernmental Coordination***

A consortium of agencies in the form of a redevelopment agency could be established to spur development/redevelopment in the area. Technical assistance can be provided and redevelopment experiences can be shared among local governments to improve development activity and economic vitality in the study area. Some of Fort Worth's experiences with establishing Tax Increment Financing Districts and revitalizing Urban Villages can be shared with other communities in the area. An example of such intergovernmental collaboration in the area is a consortium of cities for the Tarrant County Consolidated Planning process within the county but outside the city limits of Fort Worth, Arlington, and Grand Prairie, including 29 member cities. The cities of Benbrook, Lake Worth, River Oaks, Sansom Park, Westworth Village, and White Settlement are part of this consortium.

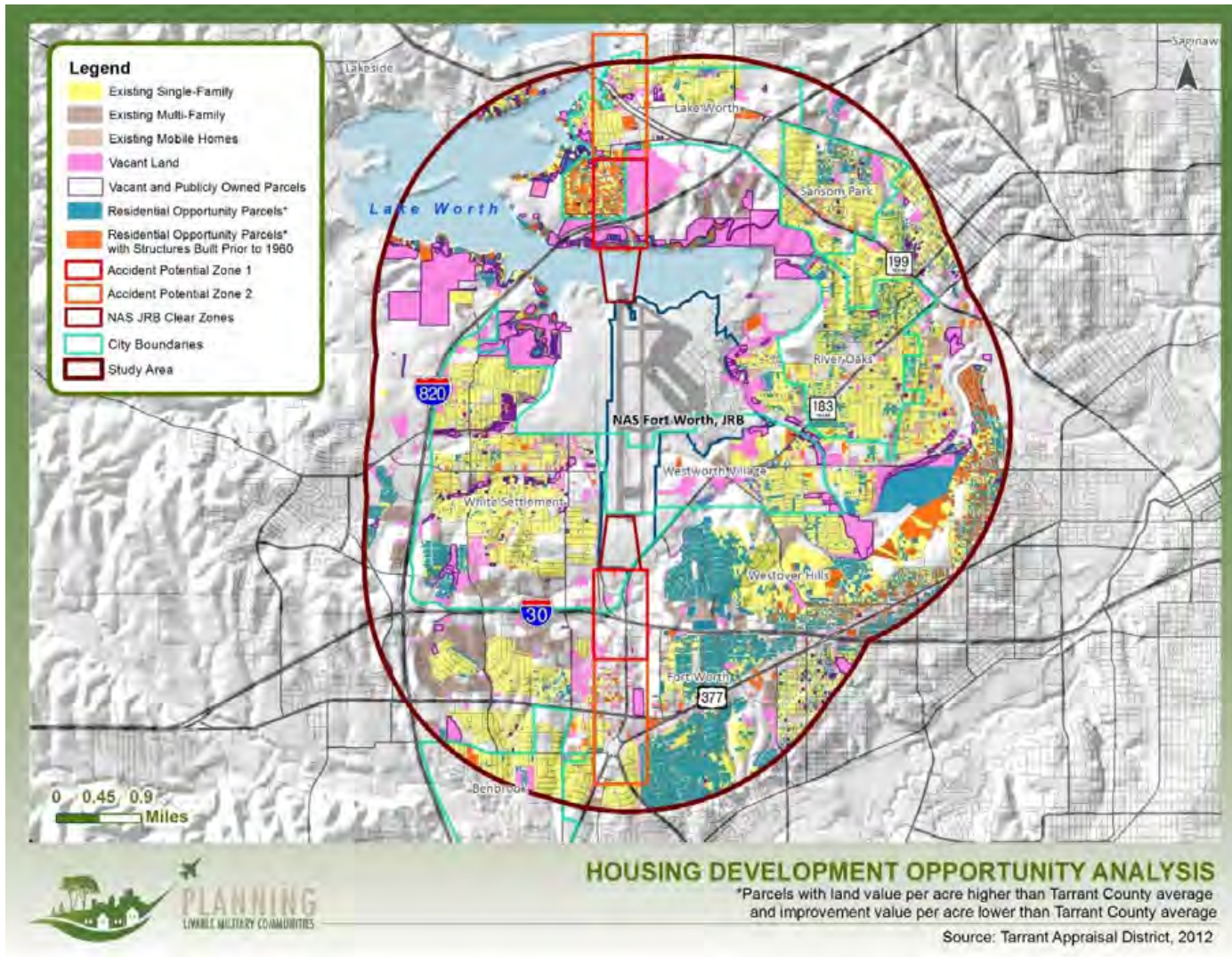
### ***Opportunity Areas***

**Figure 66** shows opportunity areas for housing development or redevelopment. The pink sites are vacant according to 2012 Tarrant Appraisal District data, and are potential sites for new development. The blue sites are residential parcels that have higher land values than the average for Tarrant County, but lower improvement/structure values than the county average. These sites could potentially be redeveloped in the long-term to capitalize on the high land values and increase the improvement values. The properties denoted by the orange color meet the following two criteria based on the 2012 Tarrant County Appraisal data and are priority sites for potential redevelopment:

- Parcels with structures that are more than 50 years old.
- Land value is more than the improvement value.

The vacant land, combined with parcels suitable for redevelopment, can provide contiguous parcels that are viable for mixed-use and housing development/redevelopment in the study area. These vacant parcels could be the priority areas for cities to evaluate when considering locations suitable for development and could serve as catalyst sites for future development. The previous strategies, such as land assembly, could be used to prepare the site and then cities could partner with the private/nonprofit sector to develop these opportunity areas with housing or other land uses that are consistent and compatible with the local government's vision of the surrounding neighborhood or district. Any new housing development should consider compatibility with NAS Fort Worth, JRB operations and be consistent with AICUZ noise and safety guidelines.

FIGURE 66: HOUSING DEVELOPMENT OPPORTUNITY AREAS



\*Any new housing development should consider compatibility with NAS Fort Worth, JRB operations.



Other opportunity areas were also analyzed when University of Pennsylvania students conducted a design studio for the city of Fort Worth in 2011. The class project created the following prototypical illustration for an opportunity area to create a mixed-use development on a 443 acre site southeast of the main entrance to the base. **Figure 67** shows the prototypical illustrations for a catalyst site near the main gate of NAS Fort Worth, JRB.

FIGURE 67: CONCEPT PLAN AT WESTWORTH BOULEVARD AND ROARING SPRINGS ROAD

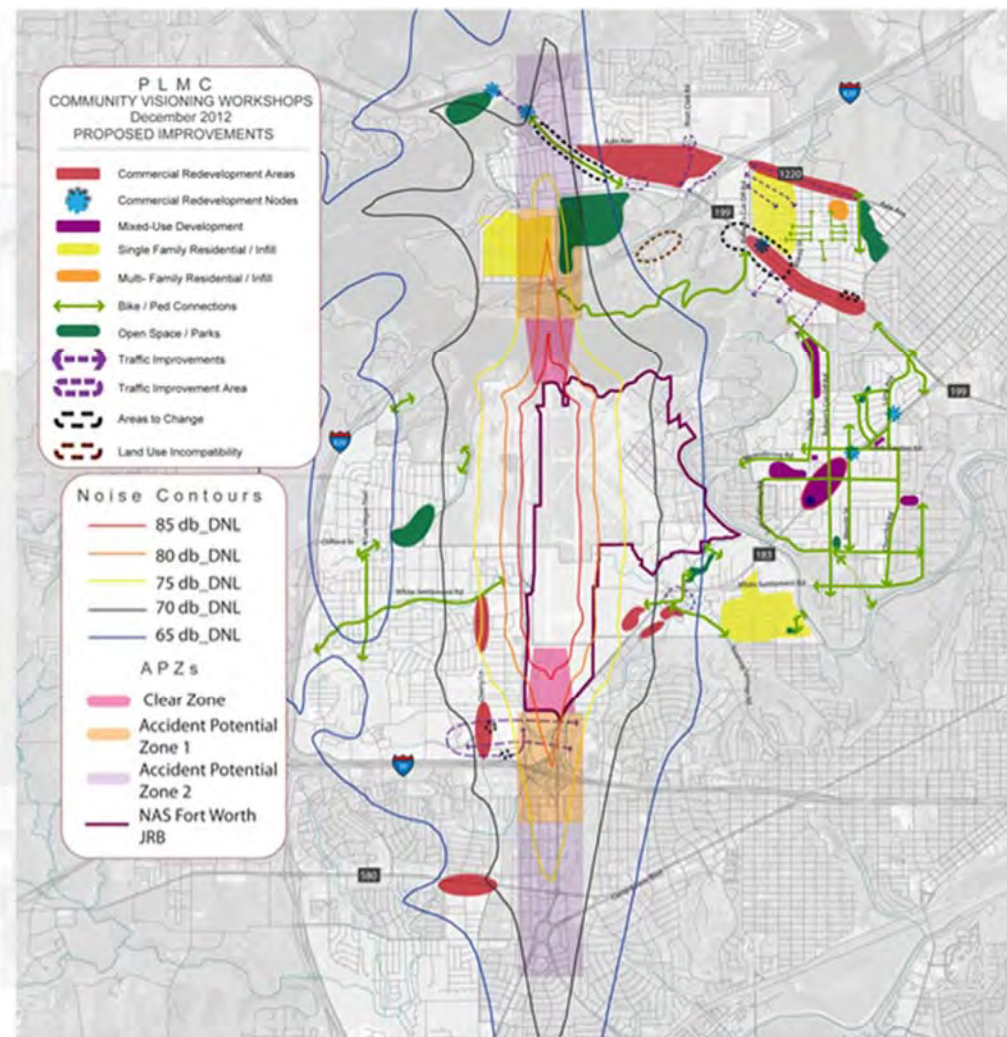


Source: University of Pennsylvania

Additional public input on areas where housing development could occur or is needed were identified in the Comprehensive Planning Workshops conducted in December 2012. **Figure 68** illustrates those potential redevelopment opportunities.



FIGURE 68: COMPREHENSIVE PLAN WORKSHOP VISIONING EXERCISE



\*Any new housing development should consider compatibility with NAS Fort Worth, JRB operations.

Source: NCTCOG

### ***Land Use Compatibility by Land Use Type***

One land-use challenge noted through public involvement and site visits was that there are some areas with inappropriate land uses or with incompatible adjacent land uses. The study area has a variety of land-use compatibility concerns which include:

- Commercial adjacency/encroachment into neighborhoods.
- Presence of residential development on highways without adequate buffer.
- Isolation of smaller neighborhood areas.
- Vacant residential structures along highways or major arterials.

Instances of residential proximity to commercial uses are seen along SH 183. **Figure 69** shows the proximity of existing residential to SH 183 and to commercial uses without an adequate buffer. Encroachment of commercial uses has affected the adjoining neighborhoods in two ways. The first effect has been the conversion of some single-family homes in the adjoining neighborhood to commercial uses. Not all instances of these conversions have had serious negative effects. While these conversions do not necessarily result in a change of the character of the adjoining neighborhoods, elements such as adequate buffering, vegetative or other enhanced visual screening, and careful design of traffic flow could minimize the impact a commercial building has on residential uses in the area. Coordination with the Texas Department of Transportation to address right-of-way encroachment and traffic flow issues in the specific areas of need is recommended.

FIGURE 69: INCOMPATIBLE LAND USES IN THE STUDY AREA



The second effect is the impact of the commercial uses in the residential areas, particularly at entrances to neighborhoods. The lack of adequate transitions between high impact uses, such as automotive uses, and adjacent residential buildings has created challenges for these properties. Poor conditions and vacant properties observed through site visits provide evidence of the incompatible nature of residential uses in close proximity to commercial areas that do not provide buffers or screenings.

The cities should examine site-specific measures and compatibility of land uses along major corridors. In areas with encroachment and adjacency problems, the cities should study the appropriateness of residential uses adjacent to commercial uses, determining if the lot sizes provide for adequate buffering and screening between the uses, or if a transitional use is more appropriate on the residential lot. Future land-use maps or current zoning in some of the cities in the study area address these issues in their long-term vision along major transportation corridors. Cities should conduct special area studies to determine appropriate land uses and if residential character is desired, identify strategies to enhance the long-term viability of the area as a neighborhood, and identify strategies to reduce the negative effects from adjoining non-residential uses. The area studies should also identify what potential uses and zoning categories may be appropriate for the areas that should transition from residential uses. Following each area study, the cities should complete zoning changes to facilitate the transition from residential.

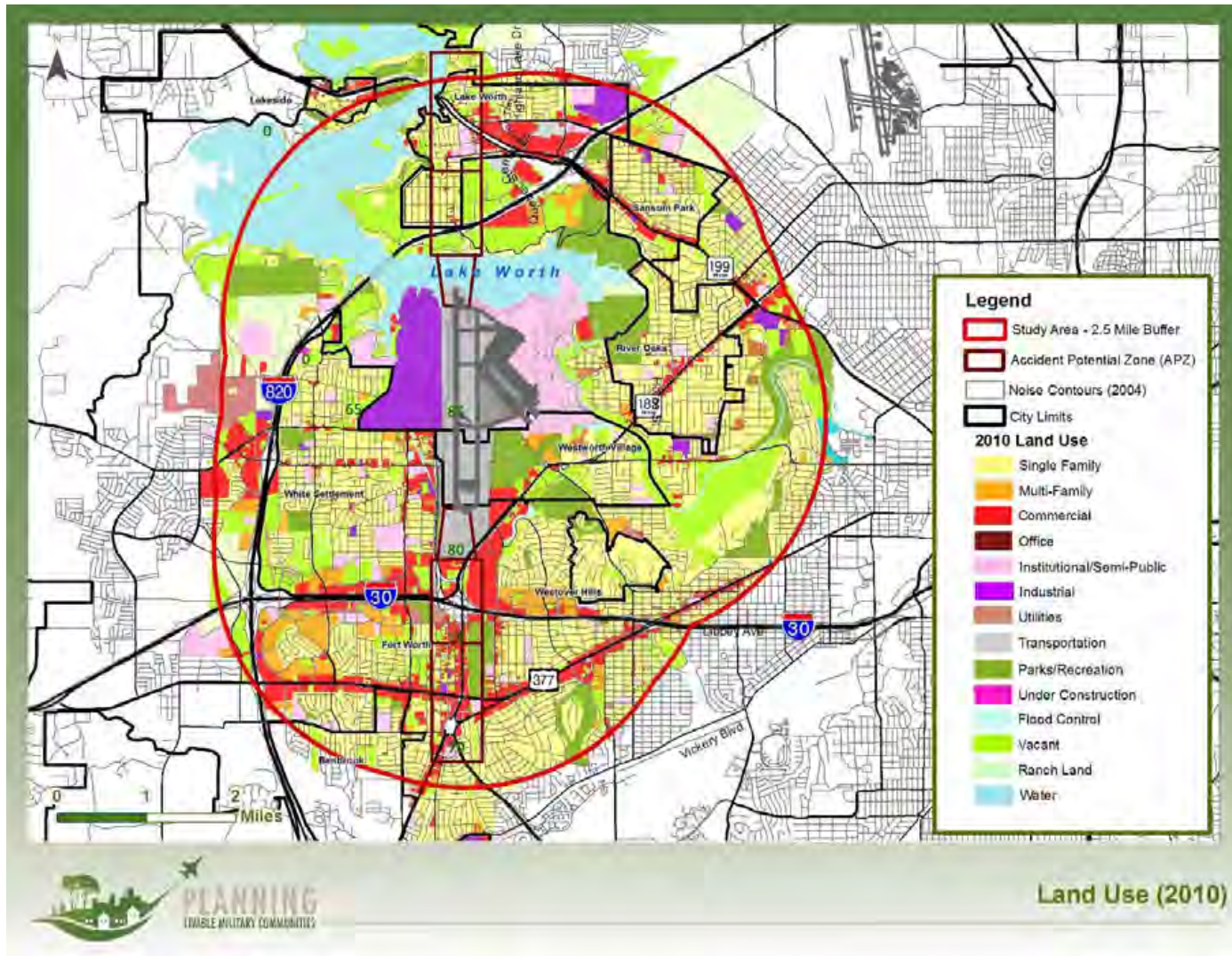
#### ***Land Use Compatibility due to Proximity to NAS Fort Worth, JRB***

Another example of incompatible land use is the existence of residential areas inside the Accident Potential Zones. Additionally, residential areas within noise contours should be evaluated to plan for necessary changes in land uses or make improvements to housing to attenuate noise from aircraft.

**Figure 70** shows the existing land uses in the project area from NCTCOG's 2010 Land Use data. Local governments can achieve compatible land uses with NAS Fort Worth, JRB by making zoning changes and altering building codes. One of the recommendations from the 2008 Joint Land Use Study was to track land use compatibility, which prompted the Regional Coordination Committee to create the Development Review Tool. This voluntary Web tool provides a platform for local governments to communicate about proposed zoning changes, site plan applications, height obstructions, etc. Compatibility performance for future land uses in the study area are important to measure because they give a good indication of how effectively the base will be able to operate and how safe the surrounding residents will be in future years. In an effort to track compatibility, changes to parcels discussed on the Review Tool forum will be entered into a Geographic Information System (GIS) database to check for changes in compatibility performance measures.



FIGURE 70: STUDY AREA LAND USE, 2010



Source: NCTCOG

### ***Single-Family Housing Conditions***

A common challenge discussed during public involvement was the state of housing in the study area. Housing conditions are stable in the study area; generally most neighborhoods are well maintained and provide housing options that differ from modern housing trends. While many neighborhoods are vibrant, there are areas that could use investment.

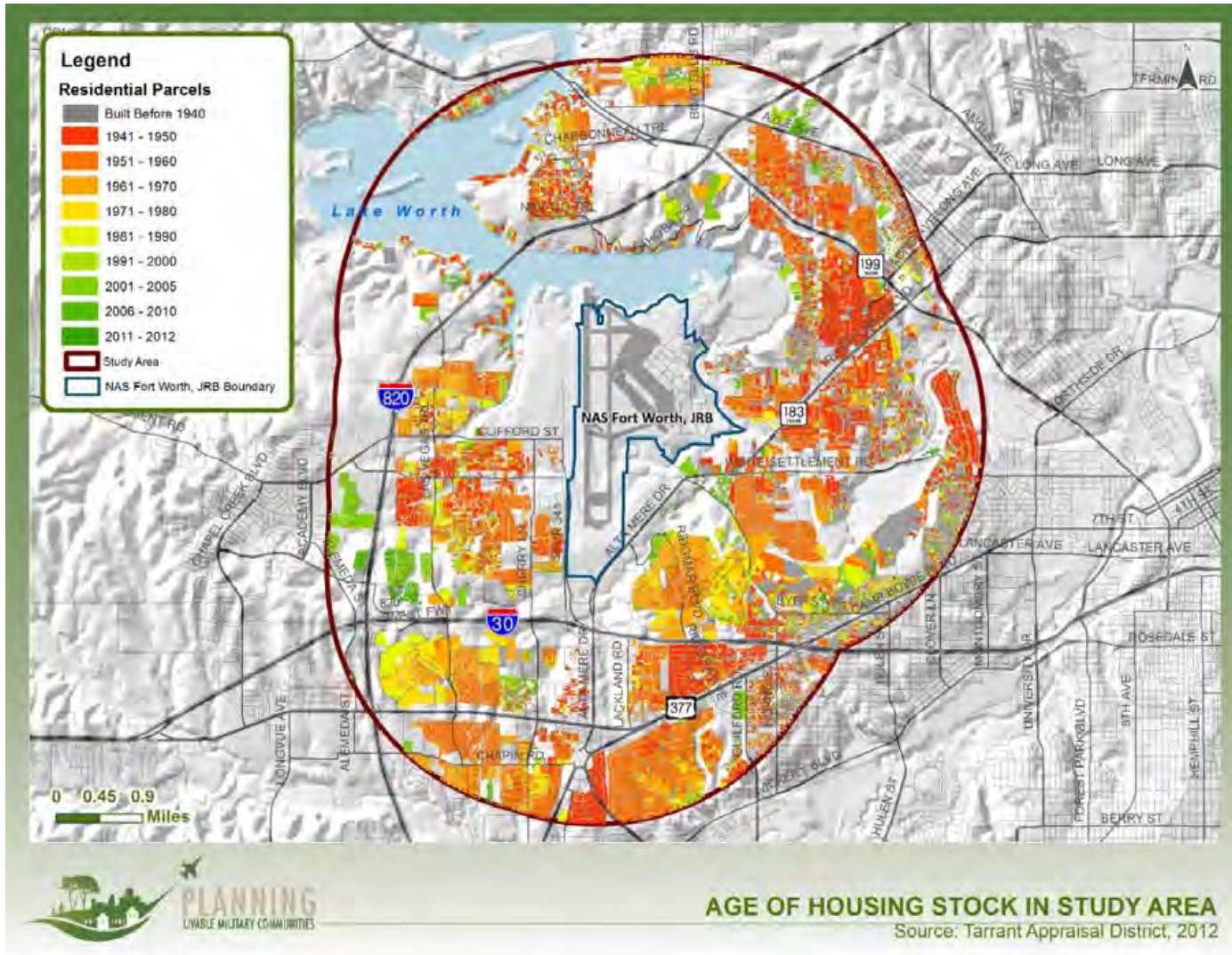
The pre-1960 housing stock and median housing values provide a relative indication of the housing conditions in the study area. Forty-three percent of housing units in the Primary Market Area were constructed prior to 1960, compared to 26 percent in the Secondary Market Area. Almost 60 percent of housing units in the Primary Market Area were built prior to 1969, indicating that a large percentage of homes are at least 40 years old. **Figure 71** shows the age of housing by decade in the study area. There are several concerns associated with housing of this age including potential lead-based paint, compliance with modern fire and structural codes, and concerns about noise associated with NAS Fort Worth, JRB flight operations. Strategies to facilitate rehabilitation or improvement of older homes/neighborhoods in need of investment are provided below.

### ***Neighborhood Improvement Plans***

Cities with active neighborhood groups should work to develop small-scale neighborhood improvement plans that include goals and objectives for desired improvements. The focus of these plans can be at a block-by-block level or focus on one or two streets. The cities should be actively involved or lead development of neighborhood improvement plans to identify potential public/private partnership opportunities for housing revitalization activities. These may range from civic groups for neighborhood litter pickup to specific contractual relationships with entities that are involved in housing rehabilitation or development. The city could sponsor the planning process for development of these plans or partner with nonprofits such as Better Block ([www.betterblock.org](http://www.betterblock.org)) that can assist communities in developing plans for walkable, vibrant neighborhoods and revitalization strategies.



FIGURE 71: AGE OF HOUSING STOCK IN STUDY AREA



### *Small Area Improvement Plans*

Small area improvement plans provide a way to identify improvements that are needed for specific areas. Small area plans are larger than neighborhood plans and may encompass a planning area such as a district, corridor, or other defined portion of the city such as town center or larger neighborhoods. Local conditions and detailed recommendations for a number of properties are developed to help guide short- and long-term actions by multiple partners to improve the area. Based on the comprehensive plan, small area plans provide greater detail to address the specific needs and opportunities of the area. Plans include elements such as physical improvements to support reinvestment such as urban design amenities, traffic controls, or street closures; neighborhood self-help initiatives such as clean-up campaigns and plantings in medians or parkways; public safety initiatives such as crime watch, bicycle patrols, and crime prevention workshops; and social and civic support services by neighborhood associations and social service providers. The development of area improvement plans brings participants together around a shared vision for the neighborhood, identifies specific strategies and tools to be used to improve the area, and identifies the community-wide actions that support and facilitate revitalization activities. Area improvement plans must be developed in coordination with citizens and neighborhood groups, other stakeholders in the communities, and should involve and could be prepared by city staff or via consultants or in partnership with universities.

### *Strengthening Neighborhood Identity*

Creating a strong identity for a neighborhood increases the pride residents have and engenders a feeling of commitment to its future. Residents will be more willing to invest in the maintenance and improvement of their homes and aid in marketing new infill housing developed on vacant lots if a sense of place and identity can be fostered. Many times the difference between vibrant neighborhoods and neighborhoods in decline is an established sense of place or identity. Some neighborhoods in the study area may benefit from focusing on improving or establishing an identity.

As shown in **Figure 72**, the following design features and concepts can contribute to creating stronger neighborhood identity:

- Neighborhood gateway and entrance treatments with signs.
- Internal neighborhood identification such as distinctive street signage and other streetscape fixtures.
- Consistent landscape features among properties within a city.
- A street sign-topper or yard-flag program to promote neighborhood cohesiveness.
- Promoting neighborhood associations and neighborhood planning council involvement.
- Providing grants or fee waivers for association and/or council block-parties and events if city resources allow for incentives.

### *Proactive Code Enforcement*

Revitalizing older neighborhoods requires a comprehensive approach involving residents, neighborhood organizations, and the city government. The communities should enhance their working relationship with the residents, property owners, neighborhood associations, and community organizations. Code enforcement staff need to have a proactive presence in each community. Most of the communities have a complaint-driven code enforcement system in which enforcement officers may respond to calls from citizens related to code enforcement issues. Proactive code enforcement policies can focus on areas that are not maintained to code and allows repeat violators to be addressed.

### *Single-Family Rental Properties*

Single-family housing issues discussed at numerous sessions included the perception that many of the single-family homes that are rented in the area are in poor condition. According to the 2006-2010 American Community Survey data, 22 percent of single-family housing in the Primary Market Area and 20 percent of single-family housing in the Secondary Market Area were occupied by renters. The availability of decent and affordable rental housing, both single-family and multifamily, is an important lower-cost housing option for residents not ready or wishing to move to homeownership. Rental housing also serves housing demand for unique housing needs such as military personnel from NAS Fort Worth, JRB. A concentration of single-family rental units in poor conditions, however, is a cause for concern. Data also indicates that concentrations of renter-occupied single-family homes in the study area are older single-family homes. Strategies to improve the condition of single-family rental homes include the creation of a housing rehabilitation program focusing on rental units and a strengthened citation process for repeat building code violators.

### *Rehabilitation of Renter-Occupied Housing*

The local governments should consider implementing a program to improve quality of rental units available to tenants. The US Department of Housing and Urban Development provides funding for programs that are operated like homeowner rehabilitation home loan programs, although in coordination with landlords instead of homeowner-occupants. Rental rehabilitation programs provide a financial incentive through a forgivable loan for a portion of rehabilitation costs up to a certain dollar amount per residential rental unit. Landlords then provide the remainder of the rehabilitation costs to bring the buildings up to code. If certain conditions are not met over the life of the loan, such as rents remaining affordable or code violations noted, the loan loses its forgivable status and loan payments become due.

FIGURE 72: EXAMPLE OF DISTINCTIVE NEIGHBORHOOD STREET SIGNAGE



Source: NCTCOG

### *Rental Registration Program Development*

To combat the deterioration of renter-owned, single-family housing stock, local governments should consider a rental registration and inspection program. Registration of all rental property with the city should work to ensure that minimum property maintenance standards are met by landlords. The communities in the area should create a complete registry of rental properties. One way to do this is to mine existing property data to examining properties not receiving homeowner exemptions or unmatched owner and utility bill information. A more complete registration list will ensure that persons with the responsibility and authority to maintain buildings can be easily located and, if necessary, served with legal notices, expediting compliance and enforcement actions. Tenants also benefit from being able to readily locate those responsible for maintaining their homes.

There are several rental registration programs in operation around the nation to serve as best practices. The city of Fort Worth currently has a Rental Registration Program administered by the Code Compliance Division. The division ensures landlords provide suitable, safe, and sanitary conditions to families living in multifamily communities throughout the city. There are two registrations applicable to single-family housing under this program: (1) voluntary registration and (2) mandatory registration. Voluntary registration is available to one- and two-family rentals that have no violations. It also requires out of state property owners to designate a local agent to accept legal service and contact for local emergencies. There is an online registration process for properties under the Voluntary Registration Program. The mandatory registration is for one- and two-family rentals that have code violations. There is an annual fee for each unit and it also requires out of state property owners to designate a local agent. The city of Fort Worth also provides tenant and housing assistance through the Fort Worth Human Relations Unit. This unit can provide information to tenants on the eviction process, repairs, health and safety issues, and terminating tenancy, lockouts, and accommodation and modification requests for persons with disabilities.

### ***Multifamily Housing Conditions***

According to 2006-2010 American Community Survey data, the study area consisted of 15,252 (27.5 percent) multifamily units in complexes of five or more units. From 2000 to 2010, multifamily housing in the study area increased by 1,367 units or ten percent. As a comparison, the percentage of multifamily housing in Tarrant County was 15 percent. Older multifamily units, such as those built prior to 1970, could be good candidates for repairs and rehabilitation leading to more energy efficient and accessible properties. As shown in **Figure 45**, most of the multifamily housing is concentrated along IH 30 in the Primary Market Area with average rents ranging between \$500 and \$750.

### *Attractiveness of Multifamily Units*

Open house participants and interviewees stated that the attractiveness of some multifamily housing developments in the area is a challenge. The age, aesthetics, design, maintenance, and rents were all factors provided by stakeholders to account for degraded multifamily housing in the area and for a high lack of acceptance of new multifamily housing. Development of small-scale, multifamily housing including good quality apartments, duplex units, cottage style housing, townhomes, and condominiums in appropriate areas where the single-family rental rates are high could shift some renter households to multifamily units.



### *Enhancing Zoning Ordinances to Support Desired Multifamily Living Options*

Based on the interviewees, some cities in the area have discouraged the development of multifamily housing through zoning regulations. To ensure quality multifamily development, the local governments in the area should encourage and enhance their multifamily site development requirements within their zoning ordinances to require desirable amenities in new development. Items found in other ordinances include building design elements, enhanced signage and lighting requirements, and play areas. The construction of newer and energy efficient units, with amenities not found in older single-family rental housing, could increase demand for multifamily and attract those living in single-family rental housing. In downtown areas, as discussed in the recommendations for downtown housing and loft rental housing, special amenities for seniors can accommodate baby boomers, empty nesters, and young adults. Improved design in new units and accessibility modifications in older multifamily stock are important elements to accommodate elderly and special needs populations.

Many design elements identified in Universal Design, discussed later with regard to senior and special needs populations, not only benefit these populations, but enhance housing for everyone. Newer multifamily housing stock with enhanced streetscape and design elements could alleviate community resistance to multifamily housing in some communities. Proactive code enforcement can require landlords to maintain multifamily housing properties to local government standards. **Figure 73** shows some examples of good quality multifamily housing stock, including townhomes and apartments.

FIGURE 73: EXAMPLES OF MULTIFAMILY HOUSING STOCK





## **Housing Choice Challenges**

### ***Housing Options for Young Families***

According to the 2006-2010 American Community Survey data, nearly 35 percent of the total population in the Primary Market Area was under 25 years of age. Various interviewees pointed out the need to attract younger populations in their cities to provide a workforce for service employment. Forty percent of the Housing Visual Preference Survey participants preferred to see Main Street or Urban Mixed Use Housing in their communities. Thirty percent of Housing Questionnaire Survey participants would like to live in mixed-use housing.

#### *Downtown Mixed-Use Housing*

Downtown, city center, and main street living is associated with a thriving city where the downtown is more than just a place to conduct business. Downtowns and city centers have re-emerged as a center for restaurants, entertainment, and a vibrant street life. People who choose to live in downtowns are willing to give up some of the advantages that suburban living offers such as a back yard and sometimes better schools. Making this exchange is simple for demographics which have no children, including young professionals, students, empty nesters, boomers, and retirees.

As the young, single professional portion of this population seeks housing, they will look at a variety of housing options. Main Street and downtown living in several communities in the study area would provide unique shopping and entertainment opportunities, as well as proximity to offices and business sites for young professionals. Without the burdens of a large home to maintain and lawn to mow, those with smaller households can take advantage of the compact residential options in downtown. School choice is typically not a consideration for empty nesters that may choose to live downtown. Downtown living offers the opportunity for developments with retail on the ground floor and housing on the upper floors. This environment can connect these target groups to the energy and community living of downtown or town center, leading to vibrant and lively environment at all times. If some communities do not have a defined downtown or town center, a collaborative effort with residents and stakeholders is recommended to explore the feasibility of defining a future downtown, town center, city center, main street, or activity node as a first step towards the efforts to encourage this type of development.

As first steps towards development of downtown housing, an initial phase or rental housing such as loft apartments on upper floors with ground floor retail, in both low-rise and high-rise buildings would be recommended. **Figure 74** shows an example of mixed-use housing in downtown Grapevine, Texas. Depending on the success and feasibility of downtown rental housing, owner-occupied housing could be encouraged in later

FIGURE 74: EXAMPLES OF MIXED-USE DEVELOPMENT



From Top: Mixed-Use Development in Grapevine, Southlake, and Garland, Texas. Source: NCTCOG

phases. Buyers are more hesitant than renters in an unproven market, so by starting with rental units, momentum will begin to build in the downtown market, allaying the fears of potential buyers.

Development of streetscape plans to improve the attractiveness of the downtown area is another opportunity to engage the public and developers on the concept of a downtown and increase excitement around future development opportunities. Several funding sources that can be used for streetscape plans include Community Development Block Grant funds for infrastructure improvements, Tax Increment Financing for streetscaping, State Historic Preservation Office Tax Credits for re-use of historic structures, and Brownfield Incentives for rehabilitation of buildings.

### ***Housing Options for Aging Populations***

One notable demographic trend for Primary Market Area is that the population of residents aged 60 years and over constitutes over 17 percent of the total population in the Primary Market Area and nearly 14 percent of the total population in the Secondary Market Area in 2010. Over the next 20 to 30 years, the cohort currently aged 25 to 59 (48 percent of the Primary Market Area in 2010) will move to the over 60 age cohort. For this expected increase in the older population and to provide the amenities this population will require to age in place, the area's housing stock will need to change to meet their demands or lose them to other areas that have adequate housing options and amenities for seniors.

#### *Livable Communities for Successful Aging*

A 2005 American Association of Retired Persons' (AARP) report entitled "Beyond 50-A Report to the Nation on Livable Communities: Creating Environments for Successful Aging", identified three recommendations and policy actions to create quality and affordable housing opportunities for an aging population. The following strategies can promote housing options for seniors within the study area:

- Local governments should promote universal design through incentives to both the public and private sectors to explore new and innovative approaches to home design.
- Communities should develop a clearinghouse through their area agencies on aging, community services departments, or centers for independent living for information on suitable home modifications, construction agencies, and potential funding sources to improve accessibility of housing.
- Cities should review local plans and zoning requirements periodically to assess their impact on the availability of affordable and diverse housing options for older people, and work towards removing zoning barriers to accessory dwelling units and shared apartments.

In terms of housing, while many boomers desire to remain in their own homes in retirement, an almost equal number would like to see the development of new housing options. Various housing options for seniors can include smaller homes in planned communities, condominium living, and downtown housing opportunities. As discussed in the downtown housing section, both rental and ownership opportunities should be pursued.

#### *Universal Design*

One way to impact housing accessibility is the adoption of a Universal Design Ordinance, requiring developers to incorporate accessibility provisions into all or a certain percentage of new housing units. With the aging population, the need for accessible housing will become increasingly important. The cities in

the study area should investigate the feasibility of adopting a Universal Design Ordinance to guarantee that future development will provide a ready supply of accessible housing, reducing the cost of accessibility through incorporation into development costs rather than through adaptation of a property.

A Universal Design Ordinance is an important step toward providing appropriate housing for a range of residents. As the area's population ages, demands in the marketplace for accessible housing are going to increase. Universal Design features will help create more accessible homes for people of all ages. Homebuilders in the area can also lower the cost of converting a home to be fully wheelchair accessible by planning their construction process to anticipate the possibility of these future conversions. Doorways can be framed with longer headers to allow wider doors to be installed easily, if and when needed. Blocking for safety bars can be installed in walls for showers and toilets, eliminating the need to demolish the wall to install blocking later. Obstacles can be avoided in the design and construction process to eliminate the need for ramps.

The costs associated with planning for the eventual conversion to accessibility are relatively minor, especially when compared to the cost of retrofitting a home where no provisions for accessibility were made. Converting a home that was built according to standard (non-accessible) practices to allow room to maneuver a wheelchair can be very expensive, involving widening doorways and rebuilding bathrooms. Cost estimates of incorporating Universal Design into new construction show the addition of \$370 to \$670 per unit, compared to \$3,300 to \$5,300 for remodeling to meet the same accessibility provisions. The inclusion of Universal Design features could be a marketing opportunity for retirement-focused communities.

### *Cottage Housing*

The cottage housing concept combines a group support setting with individual units that provide some degree of privacy and self reliance. Housing units would be small, accessible, and efficient. The group setting would allow support organizations the ability to meet the needs of several individuals in one trip and provide a sense of community for the occupants. Developments could be managed by nonprofit organizations that rent units to eligible individuals or caretakers could purchase units for their family, members, while the nonprofit provides support services and maintains the common areas along the lines of a townhouse model.

As housing for the elderly, cottage housing could replace a large family home with a smaller unit that is more manageable and in an environment where there is a support network and opportunities to socialize with others in a similar age group. **Figure 75** shows examples of cottage housing.

FIGURE 75: EXAMPLES OF COTTAGE HOUSING



Source: [www.pocket-neighborhoods.net](http://www.pocket-neighborhoods.net)



Source: <http://www.easttexasseniorliving.com/tyler/cottage>

### ***Housing Options for Military Personnel***

NAS Fort Worth, JRB has limited on-base housing options. Over 400 on-base housing units and land were transferred to Westworth Village as a result of a Base Realignment and Closure requirement and the subsequent downsizing of the base in 1993. Currently, 83 government quarters are available on-base for residential living and are operated and maintained by Balfour Beatty Communities. Military members living off base in private sector/community housing receive a Basic Allowance for Housing (BAH) based on a number of factors including family structure, rank, and local civilian housing markets. Military members living in government-owned military housing (on base) do not receive BAH. Because of the limited housing options for military members being stationed or already stationed on base, many choose to live off base in a rental unit or by purchasing a single-family home. Over the past few years, there has been a shortage of rental units available in the region that meet the basic allowance for housing thresholds. This fact was established originally in a 2010 Housing Study conducted by NAS Fort Worth, JRB that projected a housing deficit of 172 units by 2014. **Figure 76** shows an example of an on-base single-family home at NAS Fort Worth, JRB.

FIGURE 76: EXAMPLE OF EXISTING NAS FORT WORTH, JRB ON-BASE SINGLE-FAMILY DETACHED HOUSING



Source: NAS Fort Worth, JRB

Because of this projected deficit, in 2011, the base initiated implementation of a Rental Partnership Program (RPP). This program has been very successful at meeting the housing needs of military personnel. This program operates by providing property owners outside of the base the opportunity to rent their homes or other appropriate property to military personnel. As part of this program, property owners are afforded the benefit of renting to a tenant that has completed government background and credit checks and a guaranteed monthly check based on the tenants basic allowance for housing. In return, the tenant receives a rental unit that has been pre-screened by the base housing office to ensure that it meets the necessary living requirements for military

members. As of 2013, the RPP currently has 300 homeowners who have partnered with the base to provide housing and the base has reduced the projected deficit of housing. Because of partnerships with the community through programs such as the RPP, military renters have been connected to available housing stock and, as of July 2013, the housing wait lists are greatly diminished from what they were.

The RPP has demonstrated that innovative partnerships can result in positive outcomes for military personnel, families, and support community development and growth. For those personnel yet to move here, there are still important considerations the study area communities should understand about military personnel housing desires. Improving community aspects that military families' desire will encourage a greater number of families to reside in the communities near the base versus choosing communities further away that offer the amenities they seek.

### *Military Personnel Housing Considerations*

While the RPP has alleviated a substantial portion of the military housing shortage, it is still important to consider and assess the need for quality, affordable housing options and amenities closer to the base due to a variety of reasons such as military readiness and reduction of commute times for the existing employees. Stakeholder interviews with base leadership from all service branches discussed several factors that influence their decisions on where to live in the region. Several important factors to consider include providing amenities such as parks and open space, reliable utilities, safe and secure neighborhoods, good transportation options, and good schools.

### *Providing Quality Options to Attract Military Personnel*

As addressed in this study, providing future amenities and housing options that cater to military personnel of different ranks and incomes is similar to catering to the general population that will want to reside in an area. While military personnel indicate preferences for some unique amenities and have some unique housing needs, most want the same amenities that the general population desires. In addition to military personnel, Lockheed Martin is another major employer in the area with approximately 14,000 employees. These manufacturing and engineering jobs are high paying and provide large economic benefits to the surrounding communities. Stakeholders recommended enhancing Lockheed Martin's involvement to determine what these employees housing needs might be and plan for housing choices that could better accommodate their needs and desires.

Actions by the cities and county to encourage improvement in amenities and infrastructure, access to needed facilities, and the development or redevelopment of new and quality housing options is key to marketing the area to military personnel and retirees. The cities should work with the school districts and chambers of commerce to assess opportunities to engage the major employers in the area and provide improvements in the academic ratings of the schools. Providing housing options such as those mentioned elsewhere (mixed use, cottage housing, lively entertainment/recreation centers, and vibrant neighborhoods with identities), coupled with improved school district perceptions, could lead to long-term growth in military personnel wanting to reside in the adjacent communities.



There are several national examples of military housing needs spawning development and redevelopment in communities. The Department of Defense (DOD) has moved from building and providing housing for military members to partnering with the private sector to build and renovate military housing. One example is Fort Bliss, El Paso, Texas, where the needs for military housing have created partnerships with the private sector that have helped spur large development initiatives (shown in **Figure 77**). Pre-construction agreements allow military bases to enter into agreements with developers for future housing stock that may meet military needs. These public/private partnerships are intended to provide risk mitigation to DOD.

Furthermore, several bases around the nation have moved services off base and into the communities to provide services to retirees and current military members. Examples of this include pharmacy annexes and medical clinics, and privatized housing. NAS Oceana, Virginia, and NAS Whiting Field, Florida, are two examples of bases that have located key retail operations off base.

NAS Oceana located the Navy Exchange (NEX) and Commissary on Navy property but separately fenced it with entry prior to the main gate. In the current NAS Fort Worth, JRB Master Plan, published in 2010, there is a proposed project to construct a new Exchange outside the perimeter fence on Navy property prior to the main gate entrance. This future proposed movement of the Exchange could serve as a catalyst for future small-scale town center development and mixed use housing options.

### ***Supply of High-Value Housing***

Another issue discussed in the interviews was the perceived lack of high-valued housing<sup>1</sup> and the need for new high-end housing development to attract officers and executives from the base and Lockheed Martin, the two largest employers in the study area. The public and interviewees indicated that high-value housing was available in larger quantities in surrounding areas and that high-end development was occurring in larger quantities outside of the study area or within a one-hour commute from the major employers. Commonly mentioned areas where this type of development is occurring included the cities of Southlake, Colleyville, Keller, and Aledo. It was felt that when locating in the area, executives passed over the cities within the study area in favor of these and similar communities. This issue relates to a perception of a lack of competitiveness of the housing within the study area. The other factors mentioned related to the housing location choice were the desire for quality schools, more amenities, or the preference towards larger and high-end homes that are perceived to be not available in the study area.

### ***Study Area Housing Values***

2006-2010 American Community Survey data demonstrates that the study area (Primary Market Area) has a lower average housing value than the Secondary Market Area and the county. The modal price range for single-family units in the study area was \$70,000 to \$99,000, compared to \$100,000 to

FIGURE 77: DOD PRIVATE SECTOR PARTNERSHIP HOUSING, FORT BLISS, EL PASO, TX



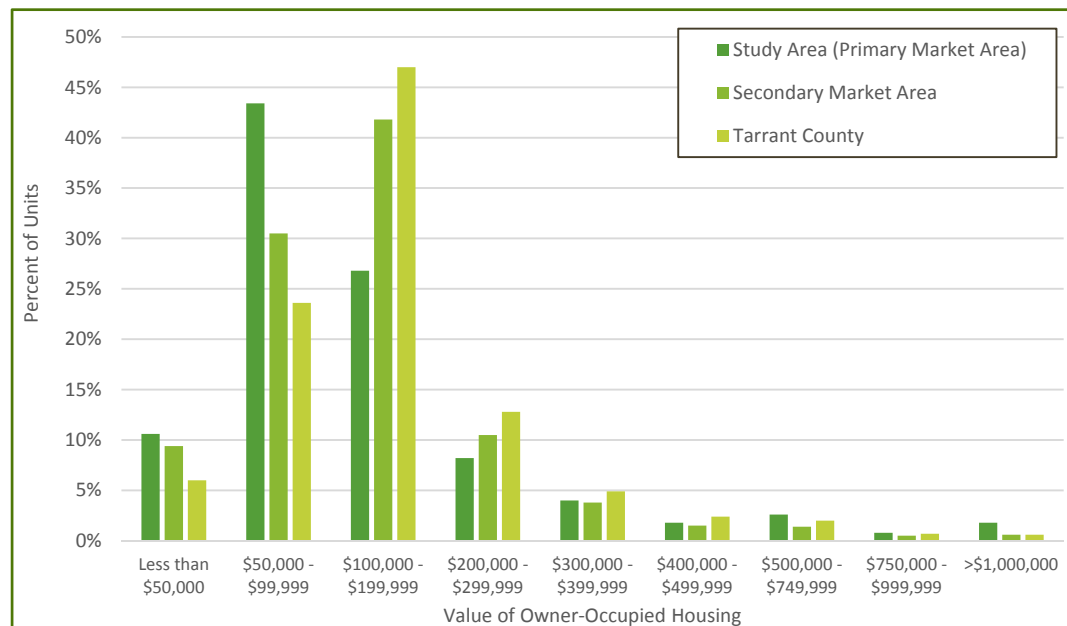
Fort Bliss La Noria Neighborhood offering 3 to 4 bedroom townhomes. Source: <http://www.ftblissfamilyhousing.com/>

<sup>1</sup> High-end housing for this study refers to housing values greater than \$300,000.

\$149,000 for the Secondary Market Area and Tarrant County. However, the study area and Tarrant County had 11 percent of single-family housing with values of over \$300,000, compared to 8 percent in the Secondary Market Area. This means that while the modal price range is lower in the study area, it contains a comparable proportion of high-valued housing (>\$300,000). The study area has higher percentages of housing valued \$500,000 to \$749,999; \$750,000 to \$999,999; and greater than \$1,000,000 than both the Secondary Market Area and Tarrant County.

The study area, however, does lag in single-family units priced \$100,000 to \$299,999, particularly the \$100,000 to \$199,999 range when compared to the Secondary Market Area and the county. Providing additional housing options and greater housing stock in these ranges could attract additional residents that are priced out of the \$300,000 and greater market but can afford more than a \$99,000 home. **Figure 78** summarizes the percentage of units in owner-occupied value categories for the three market areas.

FIGURE 78: PERCENT OF HOUSING UNITS BY HOUSING VALUE, 2010



Source: 2006-2010 American Community Survey Estimates

### *Attracting High-Value Housing*

The following strategies may be useful in strengthening competitiveness and perception of housing in this sector and to promote additional housing development:

- One impediment to development noted is the shortage of large, consolidated areas specified for residential housing. The communities in the area could take on leadership for land assembly or identify large tracts of land appropriate for housing development identified as the greatest need for the area and in their individual communities.
- Communities could work with developers and Tarrant County to determine other impediments they see to the creation of high-end housing in the area.
- Communities could work with realtors to determine city amenities that are influencing purchasers of high-end homes and market city and neighborhood amenities more effectively.
- Work with NAS Fort Worth, JRB; Lockheed Martin; and other major employers in the area to provide incentives to executives who reside within shorter commuting distance from their employers.

### ***Fair Housing Education for Minority Populations***

2010 Census data showed nearly 34 percent of the population in the Primary Market Area and 31 percent in the Secondary Market Area was Hispanic. As a comparison, in 2010, about 26 percent of the population in Tarrant County was Hispanic. Homeownership rates for Hispanics was 26 percent compared to 46 percent for the overall population in the Primary Market Area. Hispanics lag far behind Whites in obtaining housing of their choice in the category of homeownership. Various interviewees mentioned the rapid growth of the Hispanic population in their communities and the need to educate minority groups on housing options and fair housing rights.

Tarrant County conducts a yearly fair housing forum to disseminate information. There is a need for cities to distribute fair housing information in their communities. Public awareness of fair housing rights can be promoted through newsletter articles, posters, brochures and other media campaigns in English and/or Spanish in the areas with higher populations of Limited English Proficiency speakers. Fair housing education can be imparted through adequate training and awareness programs. Training programs may be conducted at schools and through various community organizations. Tarrant County funds nonprofit organizations to conduct fair housing education and outreach for a larger region and cities should work with nonprofit organizations to conduct fair housing outreach within their communities.

According to interviewees, schools in various cities have high Hispanic attendance. The communities in the area should work with local school systems to institute a course in the high schools that provides financial literacy education for teenagers. Local lending institutions and real estate professionals should be recruited to assist in curriculum development and to provide instructors for the classes. The county and/or cities could sponsor a pilot program in CDBG eligible Census tracts with the use of entitlement funds as a means of launching and demonstrating such an initiative.

## F. IMPLEMENTATION

### INTERGOVERNMENTAL COORDINATION AND LEVERAGING EFFORTS

A number of regional planning and implementation efforts for real estate development and infrastructure construction are underway that will have an impact on the study area. Some of the major projects include expansion of IH 35, in collaboration between TxDOT and North Tarrant Express Mobility Partners, construction of the Chisolm Trail Parkway between Fort Worth and Cleburne, the Lake Worth Vision Plan, the Trinity Uptown Project, and the Walsh Ranch Development. Local governments in the study area should collaborate to strategically gain benefits from these regional projects.

A consortium of agencies could be developed to implement the regional strategies outlined in the study. Technical assistance and experiences can be shared among local governments to improve development activity and economic vitality of the region. Some of Fort Worth's experiences with establishing TIF Districts and revitalizing Urban Villages can be shared with other communities in the area. An example of such intergovernmental collaboration in the area is a consortium of cities for the Tarrant County Consolidated Planning process within the county but outside the city limits of Fort Worth, Arlington, and Grand Prairie including 29 member cities. The cities of Benbrook, Lake Worth, River Oaks, Sansom Park, Westworth Village, and White Settlement are part of this consortium.

### PUBLIC-PRIVATE PARTNERSHIPS

As the lead agency for HUD's Consolidated Planning process, Tarrant County administers Community Development Block Grants, HOME Investment Partnerships, and Emergency Solutions Grants. The county also funds both local governments and nonprofit organizations in the implementation of housing development, infrastructure construction, and housing education and outreach activities. The funded projects include, but are not limited to, housing development, redevelopment, housing repair, homebuyer education, fair housing education, and infrastructure improvements that meet HUD Program guidelines. Local governments in the study area should work with nonprofit organizations to identify project opportunities and collaborate with Tarrant County to seek funding for redevelopment projects.

The study area has various active nonprofit organizations that provide services in housing and community development. Trinity Habitat for Humanity is an example of a housing nonprofit organization that works with various local governments in the area to redevelop housing. Other examples of such organizations include Tarrant County Housing Partnership, Neighborhood Housing Services of Fort Worth and Tarrant County, Accessible Homes, Neighborhood Housing Services of North Texas, and the United Way.

### SUMMARY OF RECOMMENDATIONS AND ACTION STEPS

**Figure 79** provides policies and associated recommendations, immediate action steps, timelines, and potential funding sources to improve housing conditions in the study area. The timeline of short term refers to 0 to 5 years, midterm refers to 5 to 10 years, and long term refers to 10 years or more. The table also provides cost estimates ranging from low, medium, or high for each recommendation.

FIGURE 79: HOUSING CHALLENGES, RECOMMENDATIONS, AND ACTION STEPS

RECOMMENDED ACTIONS: HOUSING				
Project/Initiative	Time	Cost	Responsible Agency	Other Key Participants
<b>POLICY: INCREASE LAND AVAILABILITY FOR NEW DEVELOPMENT</b>				
<b>Infill development on vacant lots or redevelopment</b> <ul style="list-style-type: none"> <li>Cities can partner with area nonprofit agencies or developers to develop housing</li> <li>Research requirements/seek housing funding sources from Tarrant County and HUD</li> </ul>	Long Term	High	Cities	Tarrant County, Developers
<b>Generate developer interest</b> <ul style="list-style-type: none"> <li>Create development incentives</li> <li>Prepare list of available infill sites</li> <li>Event to showcase city incentives and developments/marketing</li> </ul>	Mid Term	Medium	Cities	Developers
<b>Land acquisition and land assembly</b> <ul style="list-style-type: none"> <li>Prepare list of available infill sites</li> <li>Purchase land and work with developers</li> </ul>	Mid Term	High	Cities	Developers
<b>Infill development for base housing or near other major employers</b> Register developments in Rental Partnership Program or market to major employers	Long Term	Low	Cities	Developers and Base
<b>Intergovernmental Coordination</b> Explore options to create a consortium of governments	Short Term	Low	Tarrant County	Cities
<b>POLICY: ENHANCE LAND USE COMPATABILITY BY LAND USE TYPE</b>				
<b>Set standards for adequate buffering and screening</b> <ul style="list-style-type: none"> <li>Collect examples of comparable community ordinances and best practices</li> <li>Evaluate city standards for buffering between incompatible land uses</li> <li>Amend zoning ordinance</li> </ul>	Short Term	Low	Cities	None
<b>Conduct specific area studies</b> <ul style="list-style-type: none"> <li>Identify neighborhoods in need of a study</li> <li>Conduct specific area studies to alleviate land use incompatibility</li> </ul>	Mid Term	Medium	Cities	Neighborhood Organizations
<b>Establish future land uses in long-term vision plan</b> Update Future Land Use Map	Mid Term	Low	Cities	None
<b>Make zoning changes to match long-term vision</b> Update Zoning Ordinance	Mid Term	Low	Cities	None



RECOMMENDED ACTIONS: HOUSING				
Project/Initiative	Time	Cost	Responsible Agency	Other Key Participants
<b>POLICY: MAINTAIN, ENHANCE, OR IMPROVE LAND USE COMPATABILITY BY BASE PROXIMITY</b>				
<b>Track land use compatibility</b> Utilize the RCC's Development Review Tool	Short Term	Low	Cities	None
<b>Establish future land uses in long-term vision plan</b> Update Future Land Use Map	Mid Term	Low	Cities	None
<b>Make zoning changes to match long-term vision</b> <ul style="list-style-type: none"> <li>Update Zoning Ordinance</li> <li>Limit residential development within the 65+ dB DNL noise contour</li> </ul>	Mid Term	Low	Cities	None
<b>Make building improvements for noise attenuation</b> <ul style="list-style-type: none"> <li>Identify noise attenuation measures</li> <li>Incorporate in building codes</li> <li>Code enforcement</li> </ul>	Long Term	Medium	Cities	Building Owners and Developers
<b>POLICY: ENHANCE SINGLE-FAMILY HOUSING CONDITIONS</b>				
<b>Create Neighborhood Plans</b> <ul style="list-style-type: none"> <li>Identify areas with housing in need of repairs</li> <li>Work with community organizations to create neighborhood plans</li> </ul>	Mid Term	Medium	Cities	Neighborhood Organizations
<b>Housing rehabilitation</b> <ul style="list-style-type: none"> <li>Research requirements/seek housing funding sources from Tarrant County and HUD</li> <li>Code enforcement</li> <li>Provide financial assistance to homeowners for repairs</li> <li>Fund nonprofit agencies for housing rehabilitation</li> </ul>	Long Term	High	Cities ..	Tarrant County and Developers
<b>Create neighborhood identity</b> <ul style="list-style-type: none"> <li>Create plans for consistent signage and landscape improvements</li> <li>Provide technical assistance to neighborhoods to make improvements</li> </ul>	Mid Term	High	Cities	Developers and Neighborhood Organizations
<b>Create rental registration program</b> <ul style="list-style-type: none"> <li>Create inventory of rental housing</li> <li>Document housing conditions</li> <li>Code enforcement</li> </ul>	Short Term	Low	Cities	None
<b>POLICY: ENHANCE MULTIFAMILY HOUSING CONDITIONS</b>				
<b>Enhance multifamily site development requirements</b> <ul style="list-style-type: none"> <li>Identify improvements to multifamily site development requirements</li> <li>Update development regulations</li> </ul>	Mid Term	Low	Cities	Tarrant County Apartment Association
<b>Proactive code enforcement</b> Evaluate housing conditions	Short Term	Low	Cities	None
<b>Infrastructure improvements to attract development</b> <ul style="list-style-type: none"> <li>Identify infrastructure improvement needs</li> <li>Seek CDBG or other funding sources to create amenities to attract development</li> </ul>	Long Term	High	Cities	Tarrant County

RECOMMENDED ACTIONS: HOUSING				
Project/Initiative	Time	Cost	Responsible Agency	Other Key Participants
<b>POLICY: EXPAND HOUSING OPTIONS FOR YOUNG FAMILIES</b>				
<b>Develop downtown mixed-use housing</b> <ul style="list-style-type: none"> <li>Identify sites for mixed-use housing</li> <li>Zoning updates to remove barriers for mixed-use development</li> <li>Incentivize mixed-use development</li> </ul>	Long Term	High	Cities	Developers
<b>POLICY: EXPAND SUPPLY OF MID- AND HIGH-VALUE HOUSING</b>				
<b>Land assembly</b> Identify land appropriate for mid-range and high-value housing development	Midterm	High	Cities	Developers
<b>Improve development climate</b> Identify impediments for the creation of mid-range and high-value housing	Short Term	Low	Cities	None
<b>Construct amenities</b> Identify infrastructure improvements	Long Term	High	Cities	None
<b>Create employer incentives</b> Work with the base, Lockheed Martin, and other major employers on employee incentives	Mid Term	Medium	Cities	Major Employers
<b>POLICY: IMPROVE AND EXPAND HOUSING OPTIONS FOR AGING POPULATIONS</b>				
<b>Promote universal design through incentives</b> <ul style="list-style-type: none"> <li>Review local plans and zoning requirements</li> <li>Explore options to create incentive programs for the development of housing options for aging populations</li> </ul>	Mid Term	Low	Cities	Housing Developers for Seniors
<b>Provide information for accessibility improvements</b> <ul style="list-style-type: none"> <li>Collect information on area agencies related to aging and accessibility improvements</li> <li>Develop a clearinghouse</li> </ul>	Short Term	Low	Cities	Housing Agencies Related to Aging
<b>Update ordinances to make them suitable for senior housing</b> Review local plans and zoning requirements to remove barriers to housing for senior population	Mid Term	Medium	Cities	None
<b>POLICY: ENHANCE FAIR HOUSING EDUCATION FOR MINORITY POPULATIONS</b>				
<b>Promote fair housing outreach</b> <ul style="list-style-type: none"> <li>Coordinate with Tarrant County and nonprofit fair housing education providers</li> <li>Create publications - newsletter articles and posters</li> </ul>	Short Term	Low	Cities	Tarrant County, Nonprofit Housing Education Providers
<b>Training programs may be conducted at schools and through various community organizations</b> <ul style="list-style-type: none"> <li>Identify schools with higher minority populations</li> <li>Conduct credit classes, finance management, and fair housing education for minorities</li> </ul>	Mid Term	Medium	Cities, Schools Districts	Tarrant County, Nonprofit Housing Education Providers, School Districts

The following section provides examples of financing tools and programs to implement the strategies.

## FINANCIAL INCENTIVES, TOOLS, AND FUNDING SOURCES

Examples of development incentives, tools, and funding sources that can be utilized to spur development in the study area and to implement the strategies outlined in the previous section are described below.

**Business Improvement District (BID):** A BID is an organization of property owners in a commercial district who tax themselves to raise money for neighborhood improvement. Core functions usually include keeping sidewalks and curbs clean, removing graffiti, and patrolling the streets. Once a BID is formed, the assessment is mandatory, collected by the city like any other tax. Unlike other taxes, the city returns the assessment to BID management for use in the district. There are approximately 1,000 to 2,000 such districts nationwide including districts in various cities.

**Community Development Block Grant (CDBG) Program:** The CDBG Program was created by Title 1 of the Housing and Community Development Act of 1974 and continues to the present time under various amendments. Block grants provide federal funding for neighborhood improvement projects that are locally initiated. The primary objective of the Block Grant Program is to develop viable urban communities through decent housing, suitable living environment, and expanded economic opportunities. Households eligible for CDBG funds are low- and moderate-income households as defined by HUD. The boundaries are based on 2000 Census data. The basic categories for CDBG-funded programs are housing, land use, economic development, public improvements, and public services. For more details, visit: <http://www.hud.gov/offices/cpd/communitydevelopment/programs/index.cfm>

**Economic Development Grants/Loans:** Grants and loans that are available for economic development related projects at the city and county level. For more information regarding national programs, visit: <http://www.eda.gov/grants.htm>

**Employer-Assisted Housing:** Private companies and public organizations that help lower the housing and transportation cost burdens of their employees through direct assistance for housing via their employee benefits programs. This trend follows passage of US Congressional Legislation in April 1990, lifting prohibitions on bargaining for housing benefits during labor negotiations. Housing benefits extracted during labor negotiations may include: (1) grants for down payments, closing costs, interest rate buy downs and mortgage subsidy, (2) repayable loans at low or no interest and loans for credit-risky borrowers, (3) deferred-payment loans and forgivable loans where the interest and/or portions of the principal payment are forgiven over a specified period of time or deferred and paid through an appreciation sharing agreement, (4) monthly mortgage payment subsidy, and (5) loan guarantees. For example, the details of the Employer Assisted Housing Program of Case Western Reserve University can be viewed at the following website: <http://www.cwru.edu/finadmin/humres/benefits/ehp.html>

**Federal Transportation Funds:** Funds NCTCOG receives from the federal government (for example, Surface Transportation Program-Metropolitan Mobility, Congestion Mitigation and Air Quality), as well as funds received through TxDOT (such as Category 2, Category 12, State Transportation Enhancement Program). These funds can provide assistance for a variety of roadway and associated improvements.

**Federal Transit Administration (FTA):** The FTA is one of ten modal administrations within the US Department of Transportation. The FTA provides financial assistance to develop new transit systems and to improve, maintain, and operate existing systems. The FTA oversees thousands of grants to hundreds of state and local transit providers, primarily through its regional and metropolitan offices. These grantees are responsible for managing their programs in accordance with federal requirements, and the FTA is responsible for ensuring that grantees follow federal mandates along with statutory and administrative requirements. For more information, please visit the Federal Transit Administration's website: [www.fta.gov](http://www.fta.gov)

**HOME Investment Partnership Program:** HOME funds can be a very important source of capital for acquiring, rehabilitating, or constructing supportive housing and transitional housing projects. HOME can also be used as a project-based rental subsidy. HUD distributes the funds through block grant formulas to participating jurisdictions. Priorities for the use of funds are outlined in the Consolidated Plan. Eligible target populations include: (1) rental housing and rental assistance; at least 90 percent of benefiting families must have incomes that are no more than 60 percent of the HUD-adjusted median family income for the area, (2) rental projects with five or more assisted units; at least 20 percent of the units must be occupied by families with incomes that do not exceed 50 percent of the HUD-adjusted median, and (3) incomes of households receiving HUD assistance must not exceed 80 percent of the area median. Eligible projects and programs include Transitional Housing, Permanent Supportive Housing, Affordable Rental Housing, and Homeownership Units. For more details, visit: <http://www.hud.gov/offices/cpd/affordablehousing/programs/home/index.cfm>

**Increase Tax Base:** There are a variety of ways in which a community can increase its tax base. Some of the available tools include: Local Enterprise Zones, Municipal Management Districts, Neighborhood Empowerment Zones, Public Improvement Districts, Reinvestment Zones, and Tax Increment Financing Districts. These tools are described below.

**Local Enterprise Zone:** An economic development tool for local communities to partner with the state of Texas to promote job creation and capital investment in economically distressed areas of the state. Local communities must nominate a company as an Enterprise Project to be eligible to participate in the Enterprise Zone Program. Legislation limits allocations to the state and local communities per biennium. The state accepts applications quarterly for projects. For more information, visit: [http://www.window.state.tx.us/taxinfo/enterprise\\_zone/ez\\_program.html](http://www.window.state.tx.us/taxinfo/enterprise_zone/ez_program.html)

**Municipal Management District (MMD):** A statutory vehicle that allows commercial property owners to enhance a defined business area. The districts, also called downtown management districts, are created within an existing commercial area to finance facilities, infrastructure, and services beyond those already provided by individual property owners or by the municipality. The improvements may be paid for by a combination of self-imposed property taxes, special assessments, and impact fees, or by other charges against property owners within the district. The district has the power to levy an ad valorem property tax, and wastewater, drainage, road, or mass transit improvements that are located inside and outside the district. The district is created to supplement, not to replace, the municipal services provided by the city. A district may include the extraterritorial jurisdiction of a city, if the city has a population of at least 25,000 and if the area has an assessed valuation of \$500 million or more.

**Neighborhood Empowerment Zone:** An initiative designed to promote economic development in distressed communities by using tax incentives as catalysts for private investment. Businesses located within the empowerment zone are eligible to take advantage of federal tax incentives to

hire residents and to expand or improve their business operations. Increased business development within the zone affects job opportunities for residents and improves access to goods and services, promoting long-term community revitalization.

**Public Improvement District (PID):** Cities occasionally need to make certain improvements to their infrastructure to help economic growth within an area. New businesses may not locate in cities where the streets are inadequate, the utility service is substandard, or the public facilities and services are inferior. It is also difficult for existing businesses to prosper in areas that have poor public infrastructure. Texas law provides a number of ways to finance needed public improvements including the use of special assessments. A city may undertake such a project through the creation of a Public Improvement District. The Public Improvement District Assessment Act allows any city to levy and collect special assessments on property that is within the city or within the city's extraterritorial jurisdiction. The statute authorizing the creation of a Public Improvement District is found in Chapter 372 of the Local Government Code. A Public Improvement District may be formed to perform any of the following improvements:

- Water, wastewater, health and sanitation, or drainage improvements.
- Street and sidewalk improvements.
- Mass transit improvements.
- Parking improvements.
- Library improvements.
- Park, recreation, and cultural improvements.
- Landscaping and other aesthetic improvements.
- Art installation.
- Creation of pedestrian malls.
- Similar improvements.
- Supplemental safety services for the improvement of the district, including public safety and security services.
- Supplemental business-related services for the improvement of the district.

**Reinvestment Zone:** Local governments often use tax abatement to attract new industry and commercial enterprises, and to encourage the retention and development of existing businesses. Incorporated cities, counties, and special districts (school districts excluded) are allowed to enter into tax abatement agreements. Which governmental body initiates the process depends on the location of the property that would be subject to the tax abatement. If the property subject to abatement is located within the city limits, the city would be the lead party in the tax abatement. If the property to be abated is located within the extraterritorial jurisdiction of the city, either the city or the county may serve as the lead party. If the property is located outside the city's boundaries and outside the city's extraterritorial jurisdiction, the county must serve as the lead party for tax abatement. The statutes governing reinvestment zones and tax abatements are located in Chapter 312 of the Texas Tax Code.

**Tax Increment Financing (TIF):** Tax increment financing is used to publicly finance needed public improvements and enhanced infrastructure in a defined area. TIFs are typically implemented in areas of unimproved or blighted land by dedicating the real estate property taxes to be generated by the built project to a TIF fund for payment of the principal and interest on the bonds. Under a TIF, the property owner pays taxes on the full



value of the property, and the taxing entities pay into the TIF fund the taxes attributed to the added value of the land due to the new development. TIF bonds may be issued for a maximum of 20 years and may be used to pay for public improvements associated with a development including, but not limited to, parking, infrastructure, land acquisition, and utilities. The intended purpose is to promote the viability of existing businesses, and attract new commercial enterprises. The statutes governing tax increment financing are located in Chapter 311 of the Texas Tax Code. The cost of improvements to the area is repaid by the contributions of future tax revenues by each participating taxing unit that levies taxes against the property. Each taxing unit can choose to dedicate all, a portion of, or none of the tax revenue that is attributable to the increase in property values due to the improvements within the reinvestment zone. The additional tax revenue that is received from the affected properties is referred to as the tax increment. Each taxing unit determines what percentage of its tax increment, if any, it will commit to repayment of the cost of financing the public improvements. More information regarding tax increment financing in Tarrant County is located at the following Website:

<http://www.tarrantcounty.com/egov/cwp/view.asp?A=704&Q=425113>

**Loan Guaranty and Irrevocable Letter of Credit:** Loan guaranties and irrevocable letters of credit are two means of stabilizing the financial prospects of a development project that can be used to attract further financial participation from potential partners. Letters of credit and loan guaranties are commonly used to reduce credit risk. These instruments substitute the bank's credit worthiness for that of the agent and provide an indication that the project has serious financial backing, as well as a genuine chance of moving forward. They are often required in applications for Low Income Housing Tax Credits and other programs that offer assistance with housing finance. For more details, visit:

<http://www.hud.gov/offices/cpd/affordablehousing/training/lihtc/basics/index.cfm>

**Multibank Community Development Corporation (CDC):** A CDC is most often chartered as a local entity and organized to address long-term community revitalization problems, including housing, small business development, and general disinvestment. Multibank CDCs are often organized as collaborative partnerships between financial institutions and city governments and sometimes include other investors such as public utilities and business investors.

The Office of the Comptroller of Currency, the regulatory agency for national banks, allows banks to make direct equity and other investments in CDCs, business ventures, and/or community development projects serving predominately a civic, community, or public purpose. Under the Office of the Comptroller of Currency Program, national banks may (1) establish wholly-owned bank subsidiary CDCs, (2) create and capitalize multibank CDCs, and (3) invest in existing CDCs or their projects through joint ventures or limited partnerships.

**Property Tax Abatement:** A tax abatement agreement under Texas Tax Code Chapter 312 may not exceed ten years. A taxing entity may not grant tax abatement for property that previously received a ten-year tax abatement. Tax Code Chapter 312 neither precludes nor authorizes a Commissioners Court agreement to pay county funds to a private company that are equivalent of an abatement of real property taxes. Local Government Code Chapter 381, Section 381.004 neither authorizes nor prevents a Commissioners Court from entering into such an agreement. The legislature history indicates that the legislature did not intend that Section 381.004 authorize county economic development loans and grants.

**Section 108 Loan Guarantee:** Private market loans that are backed by the jurisdiction's Community Development Block Grant allocation. A jurisdiction may apply to HUD for up to five times their yearly CDBG allocation, though HUD may limit any jurisdiction's guarantee to \$35 million (\$7 million for non-

entitlement public entities). When approved, HUD does a private offering to raise the funds. Loan repayment has a maximum of 20 years and can be made either through program income or from the yearly CDBG allocation. For guarantees with a repayment of more than ten years, HUD may require additional collateral for the loan. The loans may be used for any eligible CDBG activity. For more details, visit:

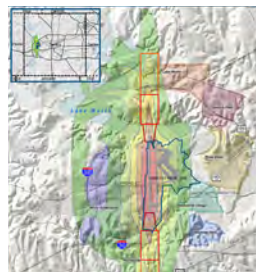
<http://www.hud.gov/offices/cpd/communitydevelopment/programs/108/index.cfm>

**Special Assessment Districts:** Separate units of government that manage specific resources within defined boundaries. Special Assessment Districts vary in size, encompassing single cities or several counties. They can be established by local governments or by voter initiative, depending on state laws and regulations. As self-financing legal entities, they have the ability to raise a predictable stream of money, such as taxes, user fees or bonds, directly from the people who benefit from the services.

**Sustainable Development Funding Program:** NCTCOG's Sustainable Development Funding Program provides infrastructure and planning funding to mixed-use, downtown redevelopment, and transit-oriented development projects. For more information, visit:

<http://www.nctcog.org/trans/sustdev/landuse/funding/>

# APPENDIX I | ORDINANCE COMPATIBILITY REVIEW



## EXISTING CONDITIONS

### BACKGROUND

The Naval Air Station Fort Worth, Joint Reserve Base (NAS Fort Worth, JRB) is located in an urban area and while many residences were built prior to the installation forming, development near the base continues. Residences located in close proximity to military air installations may experience adverse effects to noise exposure, such as interrupted daily activities like sleeping, watching television, and talking on the phone. In order to mitigate these effects, there are certain construction techniques that insulate building interiors from noise associated with military flight. Many techniques to mitigate noise overlap with measures that increase the energy efficiency of a building, which can reduce electricity costs and increase the value of one's home. The purpose of this ordinance review is to compile measures from existing codes that increase sound attenuation and energy efficiency that the local governments surrounding NAS Fort Worth, JRB can adopt to amend and or/update their existing residential codes.

An Air Installation Compatible Use Zone (AICUZ) study is conducted in order to measure the noise impacts surrounding military airfields. The resulting noise contours are measured in Day-Night Average Sound Levels (DNL), which is a measure of the average noise environment over a 24-hour period. The most recent noise contours for NAS Fort Worth, JRB are shown in **Figure 1**.

While most of the area around NAS Fort Worth, JRB is built out, there is still some vacant land that could potentially be developed. **Figure 2** shows the location of vacant and publicly owned land in the study area in relation to the AICUZ noise contours. Vacant and publicly owned parcels are prime parcels to be assembled by local governments and sold to developers. Residential development is not recommended in areas of high noise (65+ DNL noise contours), so future development of these parcels should take the noise impacts into consideration.

FIGURE 1: NOISE AND SAFETY CONSIDERATIONS AROUND NAS FORT WORTH, JRB

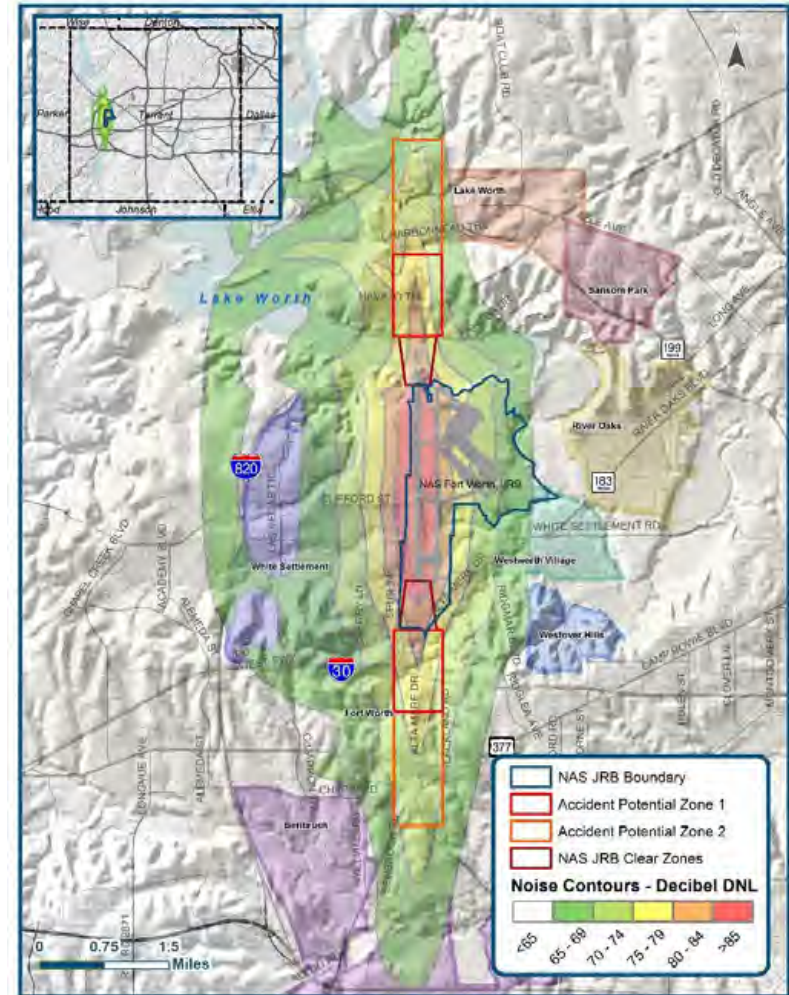
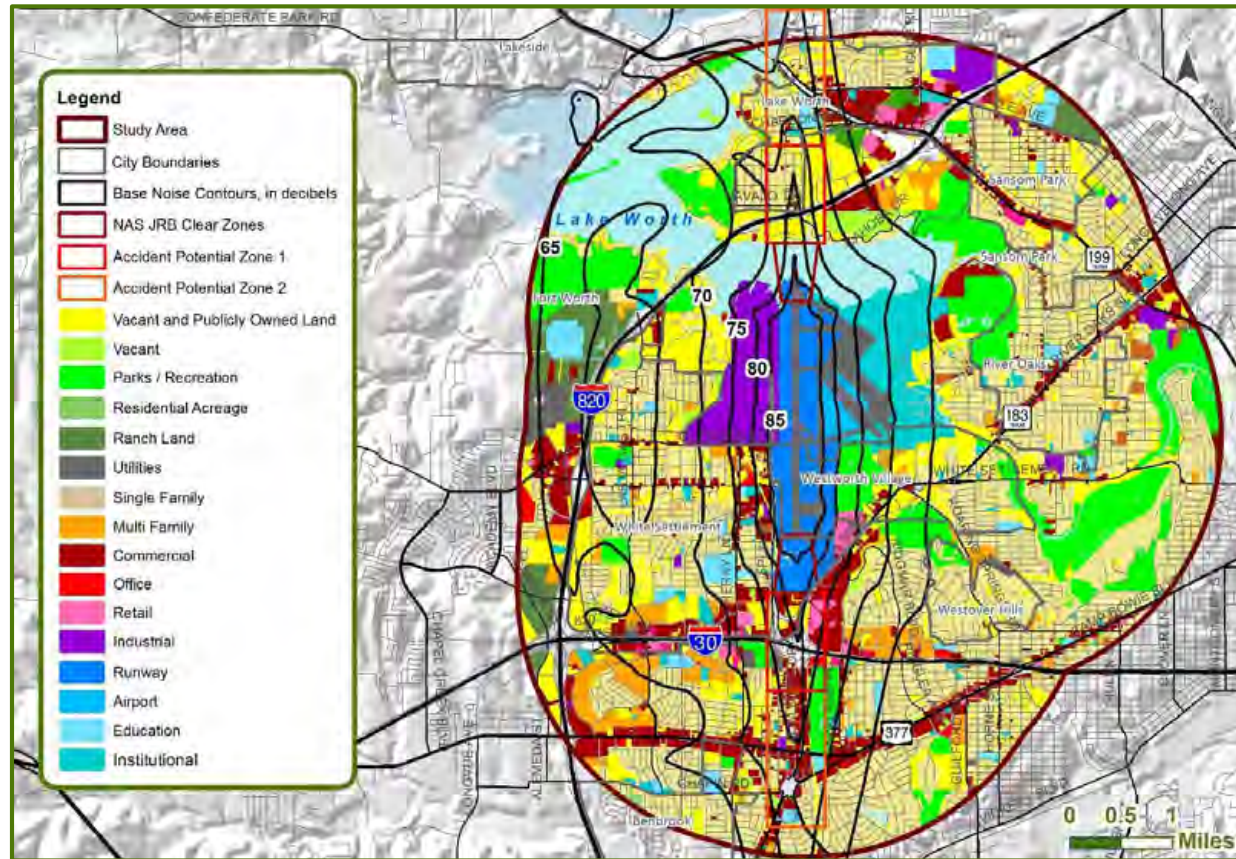




FIGURE 2: LAND USE AND VACANT LAND IN THE STUDY AREA



## BUILDING CODES

Every three years the International Code Council releases building standards for commercial buildings and residences, as well as codes for energy efficiency, plumbing, and many other standards. The International Residential Code (IRC) establishes minimum regulations for one and two-family dwellings, as well as townhouses. The International Energy Conservation Code (IECC) establishes minimum regulations for energy efficient performance-related provisions for residential buildings three stories or less in height. The most recent code versions for both the IRC and the IECC are from 2012.



Many of the study area local governments have outdated versions of both the residential and energy conservation codes. Formally updating and following these codes would be the first step to enhance noise mitigation and increase energy efficiency in new residences. Although the focus of this review is on new residential uses, there are resources for mitigating noise in existing residences as well.

Within the study area, the cities of Benbrook and Fort Worth have existing ordinances to mitigate aircraft noise. These ordinances are summarized in **Figure 3** below and the full ordinance text is included in the Additional Information Section.

FIGURE 3: EXISTING LOCAL ORDINANCES TO MITIGATE NOISE

City	Ordinance	Adoption Date	Description
Benbrook	Ch. 17.78 of Zoning Code	2008	Created a NAS Overlay District which places restrictions on structures built in noise contours. Minimum 30 decibel Noise Level Reduction (NLR) for single-family residences and minimum 25 decibel NLR for multi-family dwellings, schools, religious institutions, and cultural uses.
Fort Worth	17680 and 17681	2007	Noise mitigation construction techniques by noise contour for residential and certain noise-sensitive non-residential buildings. In the future, an updated ordinance will cover transient lodgings, libraries, religious facilities, auditoriums/amphitheaters, concert halls, offices, and commercial uses.

## JOINT LAND USE STUDY

The Joint Land Use Study (JLUS) is a cooperative planning initiative between NAS Fort Worth, JRB and the surrounding cities that was conducted from 2006 to 2008. The goal of the study was to promote compatible community growth that supports the installation mission. The study resulted in recommendations for the local governments and the base to adopt, as well as recommended land uses by noise contour that are compatible with the sound and safety guidelines of the base. The JLUS recommended residential land uses are shown in **Figure 4**. The JLUS recommendations for all land uses for both the noise and safety AICUZ contours are included in the Additional Information Section. The entire JLUS report can be viewed at:

<http://www.nctcog.org/trans/aviation/jlus/FinalJLUSReportMarch2008.pdf>.

FIGURE 4: JOINT LAND USE STDY RECOMMENDED RESIDENTIAL LAND USES

Land Use	Noise Contour (Day-Night Average Sound Levels)						
	<55	55-64	65-69	70-74	75-79	80-84	85+
Single Units: Detached	Compatible	Compatible with appropriate sound attenuation	Incompatible, should have sound attenuation*	Incompatible, should have sound attenuation*	Incompatible	Incompatible	Incompatible
Single Units: Semi-detached	Compatible	Compatible with appropriate sound attenuation	Incompatible, should have sound attenuation*	Incompatible, should have sound attenuation*	Incompatible	Incompatible	Incompatible
Single Units: Attached Row	Compatible	Compatible with appropriate sound attenuation	Incompatible, should have sound attenuation*	Incompatible, should have sound attenuation*	Incompatible	Incompatible	Incompatible
Two Units: Side-by-Side	Compatible	Compatible with appropriate sound attenuation	Incompatible, should have sound attenuation*	Incompatible, should have sound attenuation*	Incompatible	Incompatible	Incompatible
Two Units: One Above the Other	Compatible	Compatible with appropriate sound attenuation	Incompatible, should have sound attenuation*	Incompatible, should have sound attenuation*	Incompatible	Incompatible	Incompatible
Apartments: Walk-Up	Compatible	Compatible with appropriate sound attenuation	Incompatible, should have sound attenuation*	Incompatible, should have sound attenuation*	Incompatible	Incompatible	Incompatible
Group Quarters	Compatible	Compatible with appropriate sound attenuation	Incompatible, should have sound attenuation*	Incompatible, should have sound attenuation*	Incompatible	Incompatible	Incompatible
Residential Hotels	Compatible	Compatible with appropriate sound attenuation	Incompatible, should have sound attenuation*	Incompatible, should have sound attenuation*	Incompatible	Incompatible	Incompatible
Mobile Home Parks or Courts	Compatible	Compatible with appropriate sound attenuation	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible
Transient Lodgings	Compatible	Compatible with appropriate sound attenuation	Incompatible, should have sound attenuation*	Incompatible, should have sound attenuation*	Incompatible	Incompatible	Incompatible
Other Residential	Compatible	Compatible with appropriate sound attenuation	Incompatible, should have sound attenuation*	Incompatible, should have sound attenuation*	Incompatible	Incompatible	Incompatible

- = Compatible
- = Compatible with appropriate sound attenuation
- = Incompatible, should have sound attenuation\*
- = Incompatible

\*The Department of Defense strongly discourages residential uses in the 65-69 DNL and greater noise contours. If a community determines that a residential use must be built in these zones, sound attenuation should be incorporated into the residential structures.

The participating cities adopted resolutions in support of the various recommendations that were developed through the JLUS. Several of the resolutions adopted by the local governments are related to safety and mitigating noise, including considering zoning changes and appropriate amendments to building codes to comply with AICUZ-recommended compatible land use standards.

Finally, all of the cities participate in a voluntary online development review tool, as shown in **Figure 5**. City staff can upload proposed development projects to the tool and Regional Coordination Committee (RCC) members and their designated staff can make comments on the project based on the land use compatibility. As of September 2013, 52 projects have been uploaded to the web tool. The web tool is located at:

[http://www.nctcog.org/trans/aviation/rcc\\_review/overview.asp](http://www.nctcog.org/trans/aviation/rcc_review/overview.asp).

FIGURE 5: RCC DEVELOPMENT REVIEW WEB TOOL



## BUILDING CODE REVIEW PROCESS

According to the JLUS recommendations, permanent residential uses are incompatible in any area that falls within the 65-69 DNL noise contour or higher. However, if local governments determine that there is a demonstrated community need for residential uses in the 65-69 DNL and 70-74 DNL noise contours, then sound attenuation should be incorporated into the residential development. Additionally, AICUZ guidelines state that a housing needs evaluation should be conducted and viable alternative development options should be considered before approving residential development in areas of high noise. Generally, 20-35 decibels of noise mitigation techniques are feasible for residences. This building code review process focuses on noise level reduction strategies to meet a target indoor noise level of 45 decibels for areas falling within the 55-64, 65-69, and 70-74 DNL noise contours. The noise mitigation strategies reviewed do not include techniques for the 75+ DNL noise contours because JLUS guidelines discourages residential uses in these zones without exception. The recommended noise level reduction for each noise contour is depicted in **Figure 6**.

FIGURE 6: RECOMMENDED NOISE LEVEL REDUCTION BY NOISE CONTOUR

Noise Contour	JLUS Recommended Residential Compatibility	Recommended Noise Level Reduction (NLR)	Target decibel (dB) level
55-64 DNL	Compatible with appropriate sound attenuation	20 dB	45 dB
65-69 DNL	Incompatible, but should have sound attenuation if built	25 dB	45 dB
70-74 DNL	Incompatible, but should have sound attenuation if built	30 dB	45 dB
75+ DNL	Incompatible	35 dB*	45 dB

\*Sound attenuation techniques for 35 dB of noise level reduction are not included in the building code review but can be viewed in the *Guidelines for Sound Insulation of Residences Exposed to Aircraft Operations* report (<http://www.nctcog.org/trans/aviation/jlus/Sound%20Insulation%>).

## BUILDING ELEMENTS

The residential code comparison is focused on the following building elements:

- Exterior Walls
- Roof-Ceiling Assembly
- Windows
- Floor, Foundation, and Basements
- Doors
- Ventilation and Wall Penetrations

## CODE COMPARISON

In order to establish recommendations that both mitigate noise and increase energy efficiency, existing standards were compared. The ordinances and codes described below are already in effect.

**Navy Model Ordinance:** In 2005, the Department of the Navy published guidelines for incorporating sound insulation techniques for new and existing residences located near military air installations. These guidelines include a model building code that incorporates noise level reduction design requirements. Many of the sound insulation construction techniques also improve energy efficiency. The full *Guidelines for Sound Insulation of Residences Exposed to Aircraft Operations* report can be located here: <http://www.nctcog.org/trans/aviation/jlus/Sound%20Insulation%20Report.pdf>.

**Fort Worth Ordinance 17681:** In 2007, the city of Fort Worth adopted an ordinance amending the then current residential building code. The standards outlined in the ordinance are mandatory for new residential construction in areas of the city that fall within the 65-69 DNL noise contour or higher. Many of the design standards overlap with the recommendations provided in the Navy Model Ordinance.

**International Energy Conservation Code:** The International Code Council produces building standards to increase energy efficiency. The standards outlined in the IECC meet the requirements of the International Residential Code and the International Building Code (IBC). As of this report publication, the State Energy Conservation Office (SECO) has not adopted the 2012 IECC, so Texas local governments are required to adopt the 2009 IECC.

**NCTCOG Regional Amendments:** The Regional Codes Coordinating Committee of the North Central Texas Council of Governments (NCTCOG) develops regional amendments to the International Code Council's code versions in an effort to simplify the construction process, reduce training costs, and enhance the safety of building systems in the region. This ordinance review focuses on the NCTCOG regional amendments for the 2012 IRC and IECC. The 2012 regional amendments were officially adopted in April 2012.

The matrices comparing standards for common building elements based on the above codes and ordinances is included on pages 20-57 in the Additional Information section. Both conflicting and matching requirements are highlighted in the matrix. **Figure 7** describes how the different codes were compared.



FIGURE 7: CODE COMPARISON MATRIX EXPLANATION

25 dB Noise Level Reduction for 65-69 DNL Noise Contour

EXTERIOR WALLS			
Navy Model Ordinance	Fort Worth Ordinance 17681	2012 IECC	Strictest Standards from Comparison
<p>Interior surface shall be at least <b>½" thick</b></p> <p>framed walls, fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be <b>installed continuously and completely throughout the stud cavity</b>. Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.</p>	<p>Interior wall finish shall be at least <b>5/8"</b> gypsum wallboard or plaster.</p> <p>Highlighted items are similar requirements between at least two of the codes.</p> <p>or equal and shall be <b>installed continuously throughout the stud space</b>. Foam insulation shall be</p>	<p>Underlined items are the strictest requirements from the code comparison. These are not necessarily recommended measures that individual cities should adopt, but can serve as a baseline to compare to current building code standards.</p> <p><i>remains in place, insulation batts installed in walls shall be totally secured by an enclosure on all sides consisting of framing lumber, gypsum, sheathing, wood structural panel sheathing, netting or other equivalent material approved by the building official.</i></p>	<p><u>Exterior wall interior surface should be at least 5/8" thick.</u></p> <p><u>Wall insulation shall be at least R-13 glass fiber or mineral wool or equal and shall be installed continuously throughout the stud space. Foam insulation shall be accepted provided it solidifies to a spongy state and not solid or rigid.</u></p>

Bold items are conflicting requirements between at least two of the codes.

Highlighted items are similar requirements between at least two of the codes.

Underlined items are the strictest requirements from the code comparison. These are not necessarily recommended measures that individual cities should adopt, but can serve as a baseline to compare to current building code standards.

Italicized items are standards from the 2012 NCTCOG Regional Amendments to the IRC or IECC.

## CODE COMPARISON MAJOR FINDINGS

- Ordinance 17681 is based on the 2006 IRC standards and although the 2012 IRC includes more stringent requirements than the 2006 version, Ordinance 17681 includes additional sound attenuation measures that are not included in the 2012 basic residential code.
- Ordinance 17681 includes default components for each of the building elements that could be used when other measures are not feasible or cost prohibitive.
- The Navy Model Ordinance represents more basic requirements to attenuate noise, while Ordinance 17681 expands on these requirements.
- Some of the requirements to increase energy efficiency outlined in the 2012 IECC align with sound attenuation requirements.
- When conflicting requirements exist, staff recommendation would be to follow the stricter guidelines.
- The NCTCOG Regional Amendments to the 2012 IECC and IRC are intended to be discretionary and each city is to determine what additional amendments to include.
- The 2012 IRC Amendments include elements related to sound attenuation such as changes to opening requirements between garages and residences and enclosures for water heaters. The 2012 IECC Amendments include elements related to sound attenuation such as changes to alternative compliance measures, glazing area, and wall insulation.
- Noise transmission enters a residence through gaps and cracks, windows and doors, and walls and roof, in that order<sup>1</sup>. Therefore, a generalized approach for acoustic treatment would be to:
  - Eliminate all openings and flanking
  - Improve all windows and doors
  - Improve walls and ceilings
  - Add mechanical ventilation or central air conditioning
  - Treat attic spaces and/or roof structures

Selected building element techniques from the code comparison are summarized in **Figure 8**. These measures represent only the most basic requirements that would increase sound attenuation. The entire code comparison matrix is found on pages 20-57 in the Additional Information section.

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<sup>1</sup> Transportation Research Board, ACRP Report 15, p. 107

FIGURE 8: PRIORITY BUILDING ELEMENT MEASURES TO INCREASE SOUND ATTENUATION

Building Element	20 decibel NLR	25 decibel NLR	30 decibel NLR
<b>Exterior Walls</b>	Interior walls should be at least 1/2" thick.	Interior walls should be at least 5/8" thick.	
	Insulation batts should be totally secured by an enclosure on all sides.		
<b>Windows</b>	All openable windows in exterior walls should be at least STC 30 dB.	All openable windows in exterior walls should be at least STC 35 dB.	All openable windows in exterior walls should be at least STC 40 dB.
<b>Doors</b>	Exterior, sliding glass, or doors to the garage should have a rating of at least STC 30 dB.	Exterior and sliding glass doors should have a rating of at least STC 35 dB, while access doors to the garage should have a rating of at least STC 30 dB.	Exterior and sliding glass doors should have a rating of at least STC 40 dB, while access doors to the garage should have a rating of at least STC 30 dB.
<b>Roof-Ceiling Assembly</b>	Ceilings should be finished with gypsum board at least 5/8" thick. Attic insulation should be batt or blown-in glass fiber or mineral wool with a minimum R-30 rating applied between the ceiling joints.		
<b>Floors and Foundations</b>	Air barrier should be installed at any exposed edge of the insulation.		
<b>Ventilation and Wall and Roof Penetrations</b>	Window and/or through-the-wall ventilation or AC units should not be used.		

## STAKEHOLDER FEEDBACK

In order to determine the feasibility of the residential building code review process, a discussion was held with local government building code officials and city managers. During this discussion, the stakeholders discussed the feasibility of requiring additional noise mitigation measures in areas of high noise like the cities of Fort Worth and Benbrook have done. The general consensus among the local governments is that a more feasible option would be to adopt the 2012 IRC and 2012 IECC at a minimum. In addition to the more recent code versions, local governments could adopt additional measures to attenuate

sound that are not outlined in the 2012 IRC and IECC or the NCTCOG Regional Amendments. At a minimum, the cities could compare their current building standards to the priority building elements to increase sound attenuation outlined in **Figure 8**.

## NOISE MITIGATION BEST PRACTICES

There are several local, regional, and state examples of addressing sound attenuation at the city level. The local governments in these examples have adopted ordinances to amend their existing building codes or to create a new zoning district. These actions may become political in nature and should be considered before local governments commit to making similar changes.

### City of Benbrook

*NAS Overlay District:* The City of Benbrook added the overlay district to their zoning code in 2008. The district covers all areas of the city that fall within the 65-69 DNL noise contour and places additional requirements on new structures built. These additional requirements include minimum 30 decibel noise level reduction (NLR) for single-family residences and minimum 25 decibel NLR for multi-family dwellings, schools, religious institutions, and cultural uses.

### City of Fort Worth

*Ordinance 17681:* The City of Fort Worth adopted Appendix K, “Sound Insulation Requirements for Noise”, that was added to the IRC requirements adopted by the city. The requirements apply to new residential buildings and new noise-sensitive non-residential buildings (nursing homes, hospitals, child day care centers, and schools) that are within the 65-69 DNL noise contours or greater. The requirements include construction techniques by noise contour for certain building elements, including exterior walls, windows, doors, roof/ceiling construction, floors, ventilation, fireplaces, and wall and ceiling openings. In the future, an updated ordinance will cover transient lodgings, libraries, religious facilities, auditoriums/ amphitheatres, concert halls, offices, and commercial uses.

*Airport Overlay Zones:* As of September 2013, the city has adopted airport overlay zones in the Accident Potential Zones of NAS Fort Worth, JRB to restrict additional incompatible development. Moving forward, the city will likely work to adopt an airport overlay zone for the entire noise footprint of the base, which would prevent additional noise-sensitive uses from being built in areas of high noise.

### City of Lake Worth

*2012 IRC and IECC:* In June 2013, the City of Lake Worth was the first of the study area communities to adopt the 2012 International Residential Code and the International Energy Conservation Code. In addition, the Council adopted the NCTCOG Regional Amendments for both of these codes.

### City of San Antonio

*Military Sound Attenuation Overlay Zoning District:* In 2010, the City of San Antonio adopted a zoning overlay in response to the Camp Bullis Joint Land Use Study. City staff worked with a stakeholder committee comprised of industry experts and representatives from the military to develop the standards and regulations for the overlay district and a public hearing was held prior to adoption by the City Council. The district specifies using construction materials with a minimum sound transmission class (STC) rating of 40 and gives specific construction techniques for walls, roof/ceiling assemblies, windows, doors,

and mechanical systems. This example provides sample ordinance language for cities that are interested in adopting an overlay zone for areas that fall within the noise or safety contours.

## ENERGY EFFICIENCY RESOURCES

In addition to the building codes reviewed for sound insulation, the 2012 International Energy Conservation Code was also included in the code comparison. The major similarities between the measures to mitigate noise and the IECC are listed below. These measures can simultaneously increase sound attenuation and increase energy efficiency.

- Wall insulation should be installed continuously throughout the stud space
- HVAC components should not penetrate building thermal envelope
- Insulation should be included in crawlspace walls

There are several efforts that residents and local government staff can undergo to increase the energy efficiency of residences and other buildings. **Figure 9** includes a brief overview of several resources, responsible entities, and links to further information.

FIGURE 9: ENERGY EFFICIENCY RESOURCES

Resource	Description	Website
<b>RESOURCES FOR HOMEOWNERS</b>		
Department of Energy Insulation Guide	Provides insulation tips for homes based on what region of the United States you live in.	<a href="http://energy.gov/energysaver/articles/tips-insulation">http://energy.gov/energysaver/articles/tips-insulation</a>
Department of Energy Insulation Calculator	Suggests most cost-efficient insulation type and level for new or existing homes based on your home zip code.	<a href="http://www.ornl.gov/~roofs/Zip/ZipHome.html">http://www.ornl.gov/~roofs/Zip/ZipHome.html</a>
Residential Renewable Energy Tax Credit	Information on a personal tax credit for a 30% rebate on savings for solar-electric technologies.	<a href="http://energy.gov/savings/residential-renewable-energy-tax-credit">http://energy.gov/savings/residential-renewable-energy-tax-credit</a>
Energy Star Products	Showcases Energy Star products that can help make your home more energy efficient.	<a href="http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_index">http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_index</a>
Tarrant County Weatherization Assistance Program	Helps low-income homeowners in Tarrant County reduce their utility bill costs by weather-proofing their homes.	<a href="http://fortworthtexas.gov/pacs/info/default.aspx?id=5426">http://fortworthtexas.gov/pacs/info/default.aspx?id=5426</a>



Resource	Description	Website
<b>RESOURCES FOR LOCAL GOVERNMENTS</b>		
Community Energy Strategic Plan	Information on how to develop a Community Energy Strategic Plan to set goals to reduce energy in a community.	<a href="http://www.nrel.gov/tech_deployment/state_local_activities/pdfs/tap_webinar_20110512.pdf">http://www.nrel.gov/tech_deployment/state_local_activities/pdfs/tap_webinar_20110512.pdf</a>
U.S. Department of Energy Grant Programs	Resources for federal technical assistance such as the Weatherization Assistance Program and the Energy Efficiency and Conservation Block Grant.	<a href="http://www1.eere.energy.gov/wip/assistance.html">http://www1.eere.energy.gov/wip/assistance.html</a>
ICLEI Energy Efficiency Resources	Provides resources for local governments to more effectively promote energy efficiency at the city-level.	<a href="http://www.icleiusa.org/climate_and_energy/energy-efficiency-resources-1">http://www.icleiusa.org/climate_and_energy/energy-efficiency-resources-1</a>
<b>ADDITIONAL RESOURCES</b>		
Take A Load Off, Texas Initiative	Energy efficiency incentive program through electricity service providers.	<a href="http://www.takealoadofftexas.com/">http://www.takealoadofftexas.com/</a>
South-Central Partnership for Energy Efficiency as a Resource (SPEER)	Provides resources for how residential, commercial, and industrial uses in Texas and Oklahoma can become more energy efficient.	<a href="http://eepartnership.org/">http://eepartnership.org/</a>

## RECOMMENDATIONS

Implementing sound attenuation measures requires coordination between elected officials, city staff, local government building officials, and the development community. The cities of Benbrook and Fort Worth have already adopted sound attenuation measures that could serve as examples for other cities located within the noise contours of the base, including the cities of Lake Worth, Westworth Village, and White Settlement. **Figure 10** includes recommendations that all of the study area local governments can participate in, as well as recommendations specific to the cities that fall within the noise and safety contours of the base. The recommendations are listed in order from anticipated timeframe for implementation and then by expected general cost.

FIGURE 10: IMPLEMENTATION MATRIX FOR INCREASED RESIDENTIAL SOUND ATTENUATION AND ENERGY EFFICIENCY

<b>Recommended Actions: Energy Efficiency/Noise Mitigation Ordinance Review</b>				
<b>Project/Initiative</b>	<b>Time</b>	<b>Cost</b>	<b>Responsible Entity</b>	<b>Participants</b>
<b>Policy: Promote future compatible development to avoid high noise impacts</b>				
Continue entering proposed development projects onto the RCC Development Review Tool for city staff to review and consider land use compatibility for proposed development projects.	Short Term	Low	Cities	RCC Members
Coordinate with the Community Plans and Liaison Officer at NAS Fort Worth, JRB on new development projects that are within the noise contours.	Short Term	Low	Developers	Cities; NAS Fort Worth, JRB
Work with the real estate community to disclose aircraft noise to potential commercial/residential buyers.	Long Term	Medium	Real Estate Agents; Texas Legislators	Cities; NAS Fort Worth, JRB
<b>Policy: Modify local level building codes to increase sound attenuation</b>				
Adopt and follow the 2012 International Residential Code and the 2012 International Energy Efficiency Code, as well as the accompanying NCTCOG Regional Amendments.	Mid Term	Medium	Cities	Local Government Code Officials; Development Community
Consider incorporating sound attenuation elements beyond the 2012 residential code from the code comparison matrix for new residential units.	Mid Term	High	Development Community; Local Government Code Officials; Texas Legislators	Homeowners
Adopt measures to increase sound attenuation in new construction non-residential buildings.	Mid Term	High	Cities	
Update noise mitigation requirements if and when noise contours are modified.	Long Term	Medium	Cities	NAS Fort Worth, JRB
Determine feasibility of adopting a noise mitigation overlay for areas that fall within the noise contours of the base.	Long Term	High	Cities	Development Community

<b>Recommended Actions: Energy Efficiency/Noise Mitigation Ordinance Review</b>				
<b>Project/Initiative</b>	<b>Time</b>	<b>Cost</b>	<b>Responsible Entity</b>	<b>Participants</b>
Consider adopting the Green Construction Code for additional energy efficiency measures in residential development.	Long Term	High	Cities	
<b>Policy: Encourage energy efficient construction and practices</b>				
Provide resources to residential, commercial, and industrial developers and builders on residential energy efficiency.	Mid Term	Low	Cities	Homeowners
Apply for weatherization program grants to insulate existing residences from aircraft noise.	Mid Term	Medium	Homeowners	Cities
Encourage new commercial development to adopt Leadership in Energy and Environmental Design (LEED) standards.	Long Term	High	Development Community	
<b>Policy: Collaborate with other local governments to share best practices on sound attenuation and energy efficiency</b>				
Create a subcommittee from the Regional Coordination Committee comprised of area building officials to meet periodically on noise mitigation and energy efficiency issues.	Short Term	Low	RCC Members	Local Government Code Officials

\*Generally, Short Term = 0 -2 years; Mid Term = 2-5 years; Long Term = 5+ years

\*\*Costs are relative to other recommendations on the list.

## SUMMARY

Residences surrounding NAS Fort Worth, JRB are exposed to aircraft noise that supports the continued military mission of the installation. In order to mitigate these noise impacts, some cities around the base are already taking proactive measures to ensure that future development incorporates greater sound attenuation. At a minimum, all local governments around the base should consider adopting the 2012 International Residential Code, 2012 International Energy Conservation Code, and the corresponding NCTCOG Regional Amendments to increase the minimum requirements for sound attenuation and energy efficiency. For existing residences, local governments should provide homeowners with information to apply for weatherization funds to insulate existing homes.

Since cities have local discretion to adopt the international version of the codes and any local additions, the local governments around the base are encouraged to reference the code comparison matrix when updating their residential codes. This would ensure that any recommended sound attenuation

measures from the Navy Model Building Code not covered in the 2012 IRC, IECC, or the NCTCOG Regional Amendments would be addressed in future residential codes.

In addition to increasing sound mitigation, local governments should also encourage more energy efficient development in their cities by encouraging new development to achieve LEED certification and educating residents about Energy Star programs.

## ADDITIONAL INFORMATION

### COMMON TERMS

*Air Installation Compatible Use Zones (AICUZ):* Department of Defense program that defines zones of high noise and accident potential for airfields throughout the military as well as nationally-utilized recommendations related to land use compatibility in these zones.

*Building Envelope:* the physical barrier between the interior and exterior of the home.

*Decibel (dB):* unit used to measure sound.

*Day-Night Average Sound Level (DNL):* represents average sound level over a 24-hour period and provides an assessment of the actual sound impacts of flight operations in a community.

*Joint Land Use Study (JLUS):* cooperative planning initiative between the Naval Air Station Fort Worth, Joint Reserve Base and the surrounding communities.

*Noise:* any sound that is undesirable or that interferes with general hearing.

*Noise Level Reduction (NLR):* amount of outdoor-to-indoor noise level reduction achieved by a certain sound insulation technique.

### EXISTING CITY CODES, AS OF JUNE 2013

City	Existing Residential Code Year	Existing Energy Code Year
Benbrook	2009 IRC w/ amendments	2009 IECC w/ amendments
Fort Worth	2009 IRC w/ amendments	2009 IECC w/ amendments
Lake Worth	2012 IRC w/ amendments	2012 IECC w/ amendments
River Oaks	2003 IRC	2000 IECC
Sansom Park	2006 IRC	Working on officially adopting 2009 IECC
Westworth Village	2009 IRC w/ amendments	2009 IECC w/ amendments
White Settlement	2006 IRC w/ amendments	2006 IECC w/ amendments

Source: Local Government Codes of Ordinances



## ENERGY EFFICIENCY AND SOUND ATTENUATION RESOURCES

- City of Fort Worth Better Buildings Challenge: Initiative in the City of Fort Worth to make buildings 20 percent more energy efficient by the year 2020.  
<http://fortworthtexas.gov/mayor/message.aspx?id=105276>
- Lincoln Military Housing Resident Energy Conservation Program: Department of Defense initiative to increase residential energy conservation through the Lincoln Military Housing Program.  
[http://lincolnrecp.com/?utm\\_source=LMH&utm\\_medium=Website&utm\\_campaign=LMHRECP](http://lincolnrecp.com/?utm_source=LMH&utm_medium=Website&utm_campaign=LMHRECP)
- North Central Texas Council of Governments Regional Codes Coordinating Committee: Committee administered by the NCTCOG Environment and Development Department to recommend region-wide amendments to the International Code Council building codes in order to simplify the construction process, advance the safety of building systems, and promote common code interpretation.  
<http://www.nctcog.org/envir/committees/rccc/index.asp>
- Oncor “Take a Load Off, Texas” Initiative: Energy efficiency incentive programs through electricity service providers.  
<http://www.takealoadofftexas.com/>
- South-Central Partnership for Energy Efficiency as a Resource (SPEER): Provides resources for how residential, commercial, and industrial uses in Texas and Oklahoma can become more energy efficient.  
<http://eepartnership.org/>
- State Energy Conservation Office: Provides resources for how residential consumers and businesses can save on energy costs by conserving more.  
<http://www.seco.cpa.state.tx.us/energy-efficiency/>

### ***Resources Specific to Residents***

- Department of Energy Insulation Calculator by Zip Code: Suggests most cost-efficient insulation type and level for new or existing homes based on your home zip code.  
<http://www.ornl.gov/~roofs/Zip/ZipHome.html>
- Energy.gov Insulation Guide: Provides insulation tips for homes based on what region of the United States you live in.  
<http://energy.gov/energysaver/articles/tips-insulation>

- Energy Star Home Improvement: Showcases Energy Star products that can help make your home more energy efficient.  
[http://www.energystar.gov/index.cfm?c=home\\_improvement.hm\\_improvement\\_index](http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_index)
- Residential Renewable Energy Tax Credit Information: Information on a personal tax credit for a 30% rebate on savings for solar-electric technologies.  
<http://energy.gov/savings/residential-renewable-energy-tax-credit>
- Tarrant County Weatherization Assistance Program: Helps low-income homeowners in Tarrant County reduce their utility bill costs by weather-proofing their homes. Coordinated through the Community Action Partners program.  
<http://fortworthtexas.gov/pacs/info/default.aspx?id=5426>

***Resources Specific to Local Government Staff***

- ICLEI Energy Efficiency Resources: Provides resources for local governments to more effectively promote energy efficiency at the city-level.  
[http://www.icleiusa.org/climate\\_and\\_energy/energy-efficiency-resources-1](http://www.icleiusa.org/climate_and_energy/energy-efficiency-resources-1)
- U.S. Department of Energy Community Energy Strategic Planning: Information on how to develop a Community Energy Strategic Plan to set goals to reduce energy in a community.  
[http://www.nrel.gov/tech\\_deployment/state\\_local\\_activities/pdfs/tap\\_webinar\\_20110512.pdf](http://www.nrel.gov/tech_deployment/state_local_activities/pdfs/tap_webinar_20110512.pdf)
- U.S. Department of Energy Weatherization & Intergovernmental Program: Resources for federal technical assistance such as the Weatherization Assistance Program and the Energy Efficiency and Conservation Block Grant.  
<http://www1.eere.energy.gov/wip/assistance.html>

EXTERIOR WALLS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC**	Strictest Standards from Comparison
Exterior wall interior surface should be at least 1/2" thick.	Interior wall finish shall be at least 1/2" gypsum wallboard.		<u>Exterior wall interior surface should be at least 1/2" thick.</u>
For wood-framed walls, fiberglass, mineral fiber, or cellulose batt or blanket insulation shall be installed continuously and completely throughout the stud cavity.	Wall insulation shall be at least R-13 glass fiber, or mineral wool or equal and shall be installed continuously throughout the stud space. Foam insulation shall be accepted provided it solidifies to a spongy state and not solid or rigid.	Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.  <i>To ensure that insulation remains in place, insulation batts installed in walls shall be totally secured by an enclosure on all sides consisting of framing lumber, gypsum, sheathing, wood structural panel sheathing, netting or other equivalent material approved by the building official.</i>	<u>Wall insulation shall be at least R-13 glass fiber, or mineral wool or equal and shall be installed continuously throughout the stud space. Foam insulation shall be accepted provided it solidifies to a spongy state and not solid or rigid. To ensure that insulation remains in place, insulation batts installed in walls shall be totally secured by an enclosure on all sides consisting of framing lumber, gypsum, sheathing, wood structural panel sheathing, netting or other equivalent material approved by the building official.</u>
	Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, min. 7/8" thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal, or cementitious fiber siding shall be installed over 1/2" solid sheathing.	Wood Frame Wall minimum R-Value: 20 or 13+5^h	<u>Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, min. 7/8" thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal, or cementitious fiber siding shall be installed over 1/2" solid sheathing.</u>

Planning Livable Military Communities Ordinance Compatibility Review

20 decibel Noise Level Reduction for 55-64 Day-Night Average Noise Level (DNL) Contour

Key: **Similar requirements**; **Conflicting requirements**; *NCTCOG Amendment standards*; Strictest Standards from Comparison

Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.	Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall	Mass Wall minimum R-Value: 8/13	<u>Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall or shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.</u>
		Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed.	<u>Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed.</u>
		Knee walls shall be sealed.	<u>Knee walls shall be sealed.</u>
		The junction of the top plate and top of exterior walls shall be sealed.	<u>The junction of the top plate and top of exterior walls shall be sealed.</u>
	Or, it is permitted to use any wall designated in the default components*** with a default STC value of 25 or greater.		<u>Or, it is permitted to use any wall designated in the default components*** with a default STC value of 25 or greater.</u>

WINDOWS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC**	Strictest Standards from Comparison
In rooms that have at least one wood-framed exterior wall, windows shall be at least <b>STC 28 dB</b>	All openable windows in the exterior walls shall be at least <b>STC 30 dB</b> .		<u>All openable windows in the exterior walls shall be at least STC 30 dB</u>
In rooms that have all ICF exterior walls, if the exterior windows and doors together comprise 75% or more of the Total Exterior Wall Area the windows shall be at least <b>STC 28 dB</b> .			
	All fixed windows in the exterior walls shall be at least ¼” thick and shall be set in non-hardening glazing materials; or, shall be double thermopane windows meeting the requirements of the Energy Code		<u>All fixed windows in the exterior walls shall be at least ¼” thick and shall be set in non-hardening glazing materials; or, shall be double thermopane windows meeting the requirements of the Energy Code</u>
	The total area of glazing in rooms used for sleeping shall not exceed 20 percent of the floor area	<i>Total area of glazed fenestration measured using the rough opening and including sash, curbing or other framing elements that enclose conditioned space. Glazing area includes the area of glazed fenestration assemblies in walls bounding conditioned</i>	<u>The total area of glazing in rooms used for sleeping shall not exceed 20 percent of the floor area</u>



Planning Livable Military Communities Ordinance Compatibility Review

20 decibel Noise Level Reduction for 55-64 Day-Night Average Noise Level (DNL) Contour

Key: **Similar requirements**; **Conflicting requirements**; *NCTCOG Amendment standards*; Strictest Standards from Comparison

		<i>basements. For doors where the daylight opening area is less than 50 percent of the door area, the glazing area is the daylight opening area. For all other doors, the glazing area is the rough opening area for the door including the door and the frame.</i>	
		The space between window/door jambs and framing and skylights and framing shall be sealed.	<u>The space between window/door jambs and framing and skylights and framing shall be sealed.</u>
	Or, it is permitted to use any window designated in the default components*** with a default STC value of 25 or greater.	Fenestration U-factor is 0.35 Glazed Fenestration SHGC: 0.25 Skylight U-Factor: 0.55	<u>Or, it is permitted to use any window designated in the default components*** with a default STC value of 25 or greater.</u>

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Key: **Similar requirements**; **Conflicting requirements**; *NCTCOG Amendment standards*; Strictest Standards from Comparison

DOORS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC**	Strictest Standards from Comparison
Exterior doors, and interior doors between occupied spaces and attached garages, unfinished attics, and other non-habitable spaces with an exterior wall or ceiling, shall be fully weatherstripped.	Exterior hinged doors: a door and edge seal assembly that has a laboratory sound transmission class rating of at least STC 30 dB; or a door that complies with the Energy Code; or any door installed with a storm door; or doors installed as part of a vestibule		<u>Exterior hinged doors: a door and edge seal assembly that has a laboratory sound transmission class rating of at least STC 30 dB; or a door that complies with the Energy Code; or any door installed with a storm door; or doors installed as part of a vestibule</u>
	Sliding Glass Doors: glass with rating of at least STC 30 dB; or shall be a door that complies with the Energy Code.		<u>Sliding Glass Doors: glass with rating of at least STC 30 dB; or shall be a door that complies with the Energy Code.</u>
	Access door from a garage to a room within a dwelling: shall have a rating of at least STC 30 dB; or, shall comply with the Energy Code as a door in the exterior envelope.		<u>Access door from a garage to a room within a dwelling: shall have a rating of at least STC 30 dB; or, shall comply with the Energy Code as a door in the exterior envelope.</u>
		The space between window/door jambs and framing and skylights and framing shall be sealed.	<u>The space between window/door jambs and framing and skylights and framing shall be sealed.</u>
	Or, it is permitted to use any door designated in the default components*** with a default STC value of 25 or greater.		<u>Or, it is permitted to use any door designated in the default components*** with a default STC value of 25 or greater.</u>

ROOF-CEILING ASSEMBLY			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC**	Strictest Standards from Comparison
	Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with ½” solid sheathing and any roof covering allowed by this code.		<u>Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with ½” solid sheathing and any roof covering allowed by this code.</u>
	Commercial type flat roofs are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two.		<u>Commercial type flat roofs are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two.</u>
	Cathedral ceilings are discouraged, but if installed, must have enough space to install the insulation, with a minimum of 6” air space between the insulation and the roof deck.		<u>Cathedral ceilings are discouraged, but if installed, must have enough space to install the insulation, with a minimum of 6” air space between the insulation and the roof deck.</u>
Gypsum board ceilings at least ½” <b>thick</b> shall be provided at top floor. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations.	Ceilings shall be finished with gypsum board or plaster that is at least <b>5/8” thick</b>	Ceiling R-Value: 38	<u>Ceilings shall be finished with gypsum board or plaster that is at least 5/8” thick. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations.</u>
Fiberglass, <b>mineral fiber</b> , or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches. Batt or blanket insulation shall be	Attic insulation shall be batt or blown-in glass <b>fiber</b> or mineral wool with a minimum R-30 rating applied between the ceiling joints.	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed.	<u>Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-30 rating applied between the ceiling joints. Any gaps in the air barrier shall be sealed. Batt or blanket insulation should be secured in place to prevent sagging.</u>

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used at sloped ceilings.			
Roof framing members shall be at least 14" deep for their entire span.			<u>Roof framing members shall be at least 14" deep for their entire span.</u>
Attic access panels shall be constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals. Pull-down attic stairs shall have continuous neoprene perimeter bulb seals.		Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	<u>Attic access panels shall be constructed of 3/4" thick plywood and shall be sealed.</u>
	Attic ventilation shall be fitted with a 1/2" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent so that the panel is at least six inches longer than the vent on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced. Or, attic ventilation shall be eave vents that are located under the roof overhang.		<u>Attic ventilation shall be fitted with a 1/2" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent so that the panel is at least six inches longer than the vent on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced. Or, attic ventilation shall be eave vents that are located under the roof overhang.</u>
<b>Skylights shall not be provided.</b>	<b>Skylights allowed</b> with secondary glazing panel with at 3/16" thick plastic, tempered or laminated glass. The total size of skylights shall be no more than 20 percent of the roof area of the room.		<u>Skylights shall not be provided.</u>

FLOORS AND FOUNDATIONS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC**	Strictest Standards from Comparison
For houses elevated on pylons, use plywood or OSB at least 1/2" thick at the underside of the floor joists with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.	The floor of the lowest occupied rooms shall be slab on fill, below grade, or over a fully enclosed basement or crawlspace. All doors and window openings in the fully enclosed basement shall be tightly fitted.	Slab R-Value and Depth: 0 Floor R-Value: 19 Crawl Space Wall R-Value: 5/13	<u>The floor of the lowest occupied rooms shall be slab on fill, below grade, or over a fully enclosed basement or crawlspace. All doors and window openings in the fully enclosed basement shall be tightly fitted.</u>
If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with 3/4" <b>pressure-treated plywood</b> on each side may be used, as long as the joints between the plywood are covered with batten strips.	All crawlspace vents must be fitted with a <b>1/2" plywood panel</b> , with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced.	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.	<u>All crawlspace vents must be fitted with a 1/2" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced.</u>
		Insulation shall be installed to maintain permanent contact with underside of subfloor decking.	<u>Insulation shall be installed to maintain permanent contact with underside of subfloor decking.</u>
		The air barrier shall be installed at any exposed edge of insulation.	<u>The air barrier shall be installed at any exposed edge of insulation.</u>



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VENTILATION AND WALL AND ROOF PENETRATIONS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC**	Strictest Standards from Comparison
In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.	Window and/or through-the-wall ventilation or air-conditioning units shall not be used.	HVAC register boots that penetrate building thermal envelope shall be sealed to the sub-floor or drywall.	<u>Window and/or through-the-wall ventilation or air-conditioning units shall not be used.</u>
Through-the wall/door mailboxes or mail slots shall not be used.			<u>Through-the wall/door mailboxes or mail slots shall not be used.</u>
A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.	A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.		<u>A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.</u>
Gravity vent openings in attics shall not exceed the code minimum in number and size.			<u>Gravity vent openings in attics shall not exceed the code minimum in number and size.</u>
If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.			<u>If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.</u>

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<p>All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain <b>at least two 90° bends, or one 90° bend and a total length of at least 20 feet</b> (or the maximum length allowed by the dryer manufacturer).</p>	<p>All vent ducts connecting the interior space to the outdoors shall contain at least a <b>ten-foot</b> length of internal sound-absorbing duct lining. Each duct shall be provided with a <b>ninety-degree bend</b> in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross section</p>	<p>Duct shafts, utility penetrations, and flue shafts opening to the exterior or unconditioned space shall be sealed.</p>	<p><u>All vent ducts connecting the interior space to the outdoors shall contain at least a ten-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a ninety-degree bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross section.</u></p>
<p>Vented domestic range fans shall not be used.</p>	<p>Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.</p>		<p><u>Vented domestic range fans with a ducted connection to the exterior shall not be used.</u></p>
<p>Vented wood stoves shall not be used. Where vented fireplaces or vented gas-powered prefabricated units are used provide acoustical chimney top dampers and use tight-fitting ¼" double-wall sheet metal construction.</p>			<p><u>Vented wood stoves shall not be used. Where vented fireplaces or vented gas-powered prefabricated units are used provide acoustical chimney top dampers and use tight-fitting ¼" double-wall sheet metal construction.</u></p>
<p>Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics)</p>			<p><u>Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have</u></p>

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shall have double-wall sheet metal construction.			<u>double-wall sheet metal construction.</u>
Whole-house fans shall not be provided.			<u>Whole-house fans shall not be provided.</u>
All ducts in attics shall be rigid metal.			<u>All ducts in attics shall be rigid metal.</u>
Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.			<u>Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.</u>

**\*Fort Worth Ordinance 17681 is based on 2006 International Residential Code standards**

**\*\*2012 IECC – minimum requirements are those required for Climate Zone 3 (at least 4 months with mean temperatures over 50 degrees) and Warm-humid zones (moist locations where wet-bulb conditions occur during the warmest six consecutive months of the year).**

**\*\*\*Fort Worth Ordinance Default Components:**

**60-64 DNL:** The sound enclosure must be comprised of all components, wall, window, doors and roof that each have a default STC rating of 25 or higher. Since STC ratings may overstate the actual attenuation provided by as much as 3 decibels, therefore, all STC rating requirements are upgraded by 5.

**Sources:**

Wyle Acoustics Group (2005). *Guidelines for Sound Insulation of Residences Exposed to Aircraft Operations.*

<http://www.nctcog.org/trans/aviation/jlus/Sound%20Insulation%20Report.pdf>

City of Fort Worth (2007). *Ordinance 17681: Sound Insulation Requirements for Noise.*

International Code Council (2012). *International Energy Conservation Code.*

North Central Texas Council of Governments (2013). *Recommended Amendments to the 2012 International Energy Conservation Code.*

EXTERIOR WALLS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
Exterior wall interior surface should be at least <b>1/2" thick</b> .	Interior wall finish shall be at least <b>5/8" gypsum wallboard or plaster</b> .		<u>Exterior wall interior surface should be at least 5/8" inches thick.</u>
For wood-framed walls, fiberglass, <b>mineral fiber</b> , or cellulose batt or blanket insulation shall be <b>installed continuously and completely throughout the stud cavity</b> . Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.	Wall insulation shall be at least R-13 glass <b>fiber</b> , or mineral wool or equal and shall be <b>installed continuously throughout the stud space</b> . Foam insulation shall be accepted provided it solidifies to a spongy state and not solid or rigid.	Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and <b>continuous alignment with the air barrier</b> .  <i>To ensure that insulation remains in place, insulation batts installed in walls shall be totally secured by an enclosure on all sides consisting of framing lumber, gypsum, sheathing, wood structural panel sheathing, netting or other equivalent material approved by the building official.</i>	<u>Wall insulation shall be at least R-13 glass fiber, or mineral wool or equal and shall be installed continuously throughout the stud space. Foam insulation shall be accepted provided it solidifies to a spongy state and not solid or rigid. To ensure that insulation remains in place, insulation batts installed in walls shall be totally secured by an enclosure on all sides consisting of framing lumber, gypsum, sheathing, wood structural panel sheathing, netting or other equivalent material approved by the building official.</u>
	Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, min. 7/8 inch thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal, or cementitious fiber siding shall be installed over 1/2-inch solid sheathing.		<u>Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, min. 7/8 inch thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal, or cementitious fiber siding shall be installed over 1/2-inch solid sheathing.</u>

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Key: **Similar requirements**; **Conflicting requirements**; (NCTCOG Amendment Standards); Strictest Standards from Comparison

<p>Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.</p>	<p>Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall</p>		<p><u>Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall or shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.</u></p>
		<p>Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed.</p>	<p><u>Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed.</u></p>
		<p>Knee walls shall be sealed.</p>	<p><u>Knee walls shall be sealed.</u></p>
		<p>The junction of the top plate and top of exterior walls shall be sealed.</p>	<p><u>The junction of the top plate and top of exterior walls shall be sealed.</u></p>
	<p>Or, it is permitted to use any wall designated in the default components** with a default STC value of 30 or greater. When using door/window opening with a default STC value of less than 30 STC but not less than 25 STC, the STC of the wall shall be downrated by 20%.</p>		<p><u>Or, it is permitted to use any wall designated in the default components** with a default STC value of 30 or greater. When using door/window opening with a default STC value of less than 30 STC but not less than 25 STC, the STC of the wall shall be downrated by 20%.</u></p>



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WINDOWS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
<p>Wood framed Walls:</p> <p>A. If there is only one exterior wood-framed wall:</p> <p>i. If the exterior windows and doors together comprise less than 25% of the Total Exterior Wall Area the windows shall have a rating of at least <b>STC 26</b>.</p> <p>ii. If the exterior windows and doors together comprise 25-40% of the Total Exterior Wall Area the windows shall have a rating of at least <b>STC 28</b>.</p> <p>iii. If If the exterior windows and doors together comprise more than 40% of the Total Exterior Wall Area the windows shall have a rating of at least <b>STC 30</b>.</p> <p>B. If there are two are more wood-framed walls:</p> <p>i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a rating of at least <b>STC 28</b>.</p> <p>ii. If the exterior windows and doors together comprise 20-35% of the Total Exterior Wall Area the windows shall have a rating</p>	<p>All operable windows in the exterior walls shall be at least <b>STC 35 dB</b> and shall have air infiltration rate of no more than 0.5 cubic feet per minute.</p>	<p>The space between window/door jambs and framing and skylights and framing shall be sealed.</p>	<p><u>All operable windows in the exterior walls shall be at least STC 35 dB. The space between window/door jambs and framing, as well as between skylights and framing shall be sealed.</u></p>

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of at least <b>STC 30</b> .			
		<p><i>Total area of glazed fenestration measured using the rough opening and including sash, curbing or other framing elements that enclose conditioned space. Glazing area includes the area of glazed fenestration assemblies in walls bounding conditioned basements.</i></p> <p><i>For doors where the daylight opening area is less than 50 percent of the door area, the glazing area is the daylight opening area. For all other doors, the glazing area is the rough opening area for the door including the door and the frame.</i></p>	
	<p>Or, it is permitted to use any window designated in the default components** with a default STC of 30 or greater.</p>		<p><u>Or, it is permitted to use any window designated in the default components** with a default STC of 30 or greater.</u></p>

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DOORS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
<p>Wood Framed Walls:</p> <p>A. If there is only one wood-framed exterior wall and the windows and doors together comprise more than 40% of the Total Exterior Wall Area the doors shall have a rating of at least STC 29.</p> <p>B. If there are more than one exterior wood-framed exterior walls and the windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a rating of at least STC 29.</p>	<p>Exterior Doors: a door and edge seal assembly that has a laboratory sound transmission class rating of at least <b>STC 35 dB</b>; or a door, other than a hollow core wood door, that complies with the Energy Code; or any door installed with a storm door; or doors installed as part of a vestibule</p>	<p>The space between window/door jambs and framing and skylights and framing shall be sealed.</p>	<p><u>Exterior doors require a door and edge seal assembly that has a laboratory sound transmission class rating of at least STC 35 db; or a door, other than a hollow core wood door, that complies with the Energy Code; or any door installed with a storm door; or doors installed as part of a vestibule. The space between window/door jambs and framing, as well as between skylights and framing shall be sealed.</u></p>
<p>ICF Walls:</p> <p>A. If there is only one exterior wall and the exterior windows and doors together comprise 40% or more of the Total Exterior Wall Area the doors shall have a rating of at least STC 29.</p> <p>B. If there are more than one exterior wall and the exterior windows and doors together comprise 30% or more of the Total Exterior Wall Area the doors shall have a rating of at least STC 29.</p>			

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	Sliding Glass Doors: glass with rating of at least STC 35 dB		<u>Sliding Glass Doors: glass with rating of at least STC 35 dB</u>
<b>Interior doors between occupied spaces and attached garages, unfinished attics, or other nonhabitable spaces</b> with an exterior wall or ceiling shall have a laboratory sound transmission class rating of <b>at least STC 23.</b>	<b>Access door from a garage to a room within a dwelling: shall have a rating of at least STC 30 dB;</b> or, shall comply with the Energy Code as a door in the exterior envelope.		<u>Access door from a garage to a room within a dwelling: shall have a rating of at least STC 30 dB; or, shall comply with the Energy Code as a door in the exterior envelope.</u>
	Or, it is permitted to use any door designated in the default components** with a default STC value of 30 or greater.		<u>Or, it is permitted to use any door designated in the default components** with a default STC value of 30 or greater.</u>

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ROOF-CEILING ASSEMBLY			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
	Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with 1/2-inch solid sheathing and any roof covering allowed by this code.		<u>Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with 1/2-inch solid sheathing and any roof covering allowed by this code.</u>
	Commercial type flat roofs are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two.		<u>Commercial type flat roofs are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two.</u>
	Cathedral ceilings are discouraged, but if installed, must have ¾-inch solid decking above, enough space to install the insulation, with a minimum of 6" air space between the insulation and the roof deck.		<u>Cathedral ceilings are discouraged, but if installed, must have ¾-inch solid decking above, enough space to install the insulation, with a minimum of 6" air space between the insulation and the roof deck.</u>
Gypsum board ceilings at least <b>1/2 inch</b> thick shall be provided at top floor. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations. Where recessed lights are used in top-floor ceilings provided a gypsum board enclosure around the lighting fixture and seal the gypsum board joints	Ceilings shall be finished with gypsum board that is at least <b>5/8-inch thick</b>		<u>Ceilings shall be finished with gypsum board that is at least 5/8 inches thick. Ceilings at top floor shall be substantially airtight with a minimum number of penetrations.</u>

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with caulk or joint compound.			
Fiberglass, <b>mineral fiber</b> , or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches.	Attic insulation shall be batt or blown-in glass <b>fiber</b> or mineral wool with a minimum R-30 rating applied between the ceiling joints.	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed.	<u>Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-30 rating applied between the ceiling joints. Any gaps in the air barrier shall be sealed. Batt or blanket insulation should be secured in place to prevent sagging.</u>
Roof framing members shall be at least 14" deep for their entire span.			<u>Roof framing members shall be at least 14" deep for their entire span.</u>
Attic access panels shall be constructed of <b>3/4" thick plywood</b> and shall have continuous neoprene perimeter bulb seals.	Attic ventilation shall be fitted with a <b>1/2-inch plywood panel</b> , with 1" semi-rigid insulation attached to the surface facing the vent so that the panel is at least six inches longer than the vent on all sides and is attached to prevent direct line-of-site perpendicular to the vent.	Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	<u>Attic ventilation shall be fitted with a 1/2-inch plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent so that the panel is at least six inches longer than the vent on all sides and is attached to prevent direct line-of-site perpendicular to the vent.</u>
Pull-down attic stairs shall have moveable or operable covers constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals.			<u>Pull-down attic stairs shall have moveable or operable covers constructed of 3/4" thick plywood and shall have continuous neoprene perimeter bulb seals.</u>



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<p><b>Skylights shall not be provided.</b></p>	<p><b>Skylights allowed</b> if they penetrate the ceiling by means of a completely enclosed light well that extends from the roof opening to the ceiling opening. A secondary openable glazing panel shall be mounted at the ceiling line or at a point that provides at least a 4-inch space between the skylight glazing and the secondary glazing and shall be gazed with at least 3/16" plastic or laminated glass. The total size of skylights shall be no more than 20 percent of the roof area of the room.</p>		<p><u>Skylights shall not be provided.</u></p>
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FLOORS AND FOUNDATIONS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	<u>Strictest Standards from Comparison</u>
<p>For houses elevated on pylons, use plywood or OSB at least 1/2" thick at the underside of the floor joists with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.</p>	<p>The floor of the lowest occupied rooms shall be slab on fill, below grade, or over a fully enclosed basement or crawlspace. All doors and window openings in the fully enclosed basement shall be tightly fitted.</p>		<p><u>The floor of the lowest occupied rooms shall be slab on fill, below grade, or over a fully enclosed basement or crawlspace. All doors and window openings in the fully enclosed basement shall be tightly fitted.</u></p>
<p>If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier</p>	<p>All crawlspace vents must be fitted with a <b>1/2" plywood panel</b>, with 1" semi-rigid insulation attached to the surface so that the panel is at least six inches longer than the vent on all sides and is attached to prevent direct line-</p>	<p>Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered</p>	<p><u>All crawlspace vents must be fitted with a 1/2" plywood panel, with 1" semi-rigid insulation attached to the surface so that the panel is at least six inches longer than</u></p>

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<p>skirts. Alternatively, 2x4 pressure-treated wood studs with 3/4" <b>pressure-treated plywood</b> on each side may be used, as long as the joints between the plywood are covered with batten strips.</p>	<p>of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced.</p>	<p>with a Class I vapor retarder with overlapping joints taped.</p>	<p><u>the vent on all sides and is attached to prevent direct line-of-site perpendicular to the vent. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.</u></p>
		<p>Insulation shall be installed to maintain permanent contact with underside of subfloor decking.</p>	<p><u>Insulation shall be installed to maintain permanent contact with underside of subfloor decking.</u></p>
		<p>The air barrier shall be installed at any exposed edge of insulation.</p>	<p><u>The air barrier shall be installed at any exposed edge of insulation.</u></p>

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VENTILATION AND WALL AND ROOF PENETRATIONS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.	Window and/or through-the-wall ventilation or air-conditioning units shall not be used.	HVAC register boots that penetrate building thermal envelope shall be sealed to the sub-floor or drywall.	<u>Window and/or through-the-wall ventilation or air-conditioning units shall not be used.</u>
Through-the-wall/door mailboxes or mail slots shall not be used.			<u>Through-the-wall/door mailboxes or mail slots shall not be used.</u>
A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.	A ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.		<u>A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.</u>
Gravity vent openings in attics shall not exceed the code minimum in number and size.			<u>Gravity vent openings in attics shall not exceed the code minimum in number and size.</u>
If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90°			<u>If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90°</u>

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bend.			<u>bend.</u>
<p>All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain <b>at least two 90° bends</b>, or one 90° bend and a total length of at least <b>20 feet</b> (or the maximum length allowed by the dryer manufacturer).</p>	<p>All vent ducts connecting the interior space to the outdoors shall contain at least a <b>ten-foot length</b> of internal sound-absorbing duct lining. Each duct shall be provided with a <b>ninety-degree bend</b> in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross section. Residential bathroom vents discharging at an eave vent need only to have two ninety-degree (right angle) bends.</p>	<p>Duct shafts, utility penetrations, and flue shafts opening to the exterior or unconditioned space shall be sealed.</p>	<p><u>All vent ducts connecting the interior space to the outdoors shall contain at least a ten-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a ninety-degree bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross section.</u></p>
<p>Vented domestic range fans shall be not used.</p>	<p>Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.</p>		<p><u>Vented domestic range fans with a ducted connection to the exterior shall not be used.</u></p>
<p>Vented wood stoves shall not be used. Where vented fireplaces or vented gas-powered prefabricated units are used provide acoustical chimney top dampers and use tight-fitting 1/4" tempered glass fireplace doors.</p>			<p><u>Vented wood stoves shall not be used. Where vented fireplaces or vented gas-powered prefabricated units are used provide acoustical chimney top dampers and use tight-fitting 1/4" tempered glass fireplace doors.</u></p>
<p>Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g, kitchens,</p>			<p><u>Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g, kitchens,</u></p>

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living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.			<u>living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.</u>
Whole-house fans shall not be provided			<u>Whole-house fans shall not be provided</u>
All ducts in attics shall be rigid metal			<u>All ducts in attics shall be rigid metal</u>
Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.			<u>Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.</u>

**\*Fort Worth Ordinance 17681 is based on 2006 International Residential Code standards**

**\*\*Fort Worth Ordinance Default Components:**

**65-69 DNL:** The sound enclosure must be comprised of all components, wall, window, doors and roof that each have a default STC rating of 30 or higher. Since STC ratings may overstate the actual attenuation provided by as much as 3 decibels, therefore, all STC rating requirements are upgraded by 5. It is permitted to use windows and doors of less than 30 STC but not less than 25 STC rating, provided the wall STC shall be downrated by 20% and the non-compliant window/door area shall not exceed 20% of the floor area per room.

**Sources:**

City of Fort Worth (2007). *Ordinance 17681: Sound Insulation Requirements for Noise.*

International Code Council (2012). *International Energy Conservation Code.*

North Central Texas Council of Governments (2013). *Recommended Amendments to the 2012 International Energy Conservation Code.*

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Key: **Similar requirements**; **Conflicting requirements**; (NCTCOG Amendment Standards); Strictest Standards from Comparison

Wyle Acoustics Group (2005). *Guidelines for Sound Insulation of Residences Exposed to Aircraft Operations*.

<http://www.nctcog.org/trans/aviation/jlus/Sound%20Insulation%20Report.pdf>



EXTERIOR WALLS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
Exterior wall interior surface should be at least <b>1/2" thick</b> .	Interior wall finish shall be at least <b>5/8"</b> gypsum wallboard or plaster.		<u>Exterior wall interior finish shall be at least 5/8" inch thick.</u>
For wood-framed walls, fiberglass, <b>mineral fiber</b> , or cellulose batt or blanket insulation shall be <b>installed continuously and completely throughout the stud cavity</b> . Batts or blankets should be held firmly in place between the studs, with fasteners if necessary, to prevent sagging; however, packing the insulation such that it is compressed may slightly reduce its acoustical (and thermal) performance.	Wall insulation shall be at least R-13 glass <b>fiber</b> , or mineral wool or equal and shall be <b>installed continuously throughout the stud space</b> . Foam insulation shall be accepted provided it solidifies to a spongy state and not solid or rigid.	Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.  <i>To ensure that insulation remains in place, insulation batts installed in walls shall be totally secured by an enclosure on all sides consisting of framing lumber, gypsum, sheathing, wood structural panel sheathing, netting or other equivalent material approved by the building official.</i>	<u>Wall insulation shall be at least R-13 glass fiber, or mineral wool or equal and shall be installed continuously throughout the stud space. To ensure that insulation remains in place, insulation batts installed in walls shall be totally secured by an enclosure on all sides consisting of framing lumber, gypsum, sheathing, wood structural panel sheathing, netting or other equivalent material approved by the building official.</u>
Wood-framed walls: if there is only one exterior wall and the exterior windows and doors together comprise 30% or more of the Total Exterior Wall Area, single-leaf resilient channels shall be used between the studs and gypsum board. If there are two or more exterior walls single-leaf resilient channels shall be used between the studs and gypsum	Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, min. 7/8 inch thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal, or cementitious fiber siding shall be installed over 3/4-inch solid sheathing.		<u>Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, min. 7/8 inch thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal, or cementitious fiber siding shall</u>

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board.			<u>be installed over 3/4-inch solid sheathing.</u>
Insulated concrete form (ICF) or masonry walls, where present, shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.	Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall.		<u>Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall or shall contain at least 4" thick normal weight concrete or masonry throughout the surface of the wall.</u>
		Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed.	<u>Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed.</u>
		Knee walls shall be sealed.	<u>Knee walls shall be sealed.</u>
		The junction of the top plate and top of exterior walls shall be sealed.	<u>The junction of the top plate and top of exterior walls shall be sealed.</u>
	Or, it is permitted to use any wall designated in the default components** with a default STC value of 35 or greater. When using door/window openings with a default STC value of less than 35 STC but not less than 30 STC, the STC of the wall shall be downrated		<u>Or, it is permitted to use any wall designated in the default components** with a default STC value of 35 or greater. When using door/window openings with a default STC value of less than 35 STC but not less</u>

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	by 20%.		<u>than 30 STC, the STC of the wall shall be downrated by 20%.</u>
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WINDOWS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
<p>Wood framed Walls:</p> <p>A. If there is only one exterior wood-framed wall:</p> <p>i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a rating of at least STC 32.</p> <p>ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the windows shall have a rating of at least STC 34.</p> <p>iii. If the exterior windows and doors together comprise 30-50% of the Total Exterior Wall Area the windows shall have a rating of at least STC 32.</p> <p>iv. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a rating of at least STC 34.</p> <p>B. If there are two exterior wood-framed walls, the windows shall have a rating of at least STC 34.</p>	<p>All openable windows in the exterior walls shall be at least <b>STC 40 dB</b> and shall have air infiltration rate of no more than 0.5 cubic feet per minute when tested.</p>	<p>Wood framed Walls:</p> <p>A. If there is only one exterior wood-framed wall:</p> <p>i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the windows shall have a rating of at least STC 32.</p> <p>ii. If the exterior windows and doors together comprise 20-30% of the Total Exterior Wall Area the windows shall have a rating of at least STC 34.</p> <p>iii. If the exterior windows and doors together comprise 30-50% of the Total Exterior Wall Area the windows shall have a rating of at least STC 32.</p> <p>iv. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the windows shall have a rating of at least STC 34.</p>	<p>All openable windows in the exterior walls shall be at least <b>STC 40 dB</b> and shall have air infiltration rate of no more than 0.5 cubic feet per minute when tested.</p>

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<p>C. If there are three or more wood-framed walls:</p> <p>i. If the exterior windows and doors together comprise less than 70% of the Total Exterior Wall Area the windows shall have a rating of at least STC 34.</p> <p>ii. If the exterior windows and doors together comprise more than 70% of the Total Exterior Wall Area the windows shall have a rating of at least STC 36.</p>		<p>B. If there are two exterior wood-framed walls, the windows shall have a rating of at least STC 34.</p> <p>C. If there are three or more wood-framed walls:</p> <p>i. If the exterior windows and doors together comprise less than 70% of the Total Exterior Wall Area the windows shall have a rating of at least STC 34.</p> <p>ii. If the exterior windows and doors together comprise more than 70% of the Total Exterior Wall Area the windows shall have a rating of at least STC 36.</p>	
		<p><i>Total area of glazed fenestration measured using the rough opening and including sash, curbing or other framing elements that enclose conditioned space. Glazing area includes the area of glazed fenestration assemblies in walls bounding conditioned basements. For doors where the daylight opening area is less than 50 percent of the door area, the glazing area is the daylight opening area. For all other doors, the glazing area is the rough opening area for the door including the door and the</i></p>	<p><u>Total area of glazed fenestration measured using the rough opening and including sash, curbing or other framing elements that enclose conditioned space. Glazing area includes the area of glazed fenestration assemblies in walls bounding conditioned basements. For doors where the daylight opening area is less than 50 percent of the door area, the glazing area is the daylight opening area. For all other doors, the glazing area is</u></p>

		<i>frame.</i>	<u>the rough opening area for the door including the door and the frame.</u>
	Or, it is permitted to use any window designated in the default components**with a default STC value of 25 or greater.		<u>Or, it is permitted to use any window designated in the default components**with a default STC value of 25 or greater.</u>

DOORS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
<p>Wood Framed Walls:</p> <p>A. If there is only one wood-framed exterior wall:</p> <p>i. If the windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a rating of at least STC 31.</p> <p>ii. If the windows and doors together comprise 20-30% of the Total Exterior Wall Area the doors shall have a rating of at least STC 34.</p> <p>iii. If the exterior windows and doors together comprise 30-50% of the Total Exterior Wall Area the doors shall have a rating of at least STC 31.</p> <p>iv. If the exterior windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a rating of at least STC 34.</p>	<p>Exterior Doors: a door and edge seal assembly that has a laboratory sound transmission class rating of <b>at least STC 40 dB</b>; or a solid-core or wood insulated metal door at least one inch thick separated by an airspace of at least four inches from another door, which can be a storm door; or doors installed as part of a vestibule</p>	<p>The space between window/door jambs and framing and skylights and framing shall be sealed.</p>	<p><u>Exterior Doors: a door and edge seal assembly that has a laboratory sound transmission class rating of at least STC 40 dB; or a solid-core or wood insulated metal door at least one inch thick separated by an airspace of at least four inches from another door, which can be a storm door; or doors installed as part of a vestibule. The space between window/door jambs and framing, as well as between skylights and framing, shall be sealed.</u></p>

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<p>B. If there are two exterior wood-framed walls:</p> <ul style="list-style-type: none"> <li>i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a rating of at least STC 31.</li> <li>ii. If the exterior windows and doors together comprise more than 20% of the Total Exterior Wall Area the doors shall have a rating of at least STC 34.</li> </ul> <p>C. If there are three or more exterior wood-framed exterior walls:</p> <ul style="list-style-type: none"> <li>i. If the windows and doors together comprise 20% or more of the Total Exterior Wall Area the doors shall have a rating of at least STC 31.</li> <li>ii. If the windows and doors together comprise more than 20% of the Total Exterior Wall Area the doors shall have a rating of at least STC 34.</li> </ul>			
<p>ICF Walls:</p> <p>A. If there is only one exterior wall:</p> <ul style="list-style-type: none"> <li>i. If the windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a rating of at least STC 29.</li> <li>ii. If the windows and doors together comprise 20-50% of the Total Exterior Wall Area the doors shall have a rating of at least STC 31.</li> <li>iii. If the windows and doors together comprise more than 50% of the Total Exterior Wall Area the doors shall have a</li> </ul>			



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<p>rating of at least STC 34.</p> <p>B. If there are two exterior walls:</p> <p>i. If the windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a rating of at least STC 31.</p> <p>ii. If the windows and doors together comprise more than 20% of the Total Exterior Wall Area the doors shall have a rating of at least STC 34.</p> <p>C. If there are more than one exterior walls:</p> <p>i. If the exterior windows and doors together comprise less than 20% of the Total Exterior Wall Area the doors shall have a rating of at least STC 31.</p> <p>ii. If the exterior windows and doors together comprise more than 20% of the Total Exterior Wall Area the doors shall have a rating of at least STC 34.</p>			
	<p>Sliding Glass Doors: glass with rating of at least STC 40 dB; or a double sliding glass door, separated by a minimum four-inch airspace. Glass shall be at least 3/16" thick but not equal in thickness between the two doors, and tempered or laminated.</p>		<p><u>Sliding Glass Doors: glass with rating of at least STC 40 dB; or a double sliding glass door, separated by a minimum four-inch airspace. Glass shall be at least 3/16 inches thick but not equal in thickness between the two doors, and tempered or laminated.</u></p>
<p><b>Interior doors between occupied spaces and attached garages, unfinished attics, or other nonhabitable spaces</b> with an exterior wall or ceiling shall have a laboratory sound transmission class rating of at least <b>STC 29</b>.</p>	<p><b>Access door from a garage to a room within a dwelling:</b> shall have a rating of at least <b>STC 30 dB</b>; or, shall comply with the Energy Code as a door in the exterior envelope.</p>		<p><u>Access door from a garage to a room within a dwelling: shall have a rating of at least STC 30 dB; or, shall comply with the Energy Code as a door in the exterior envelope.</u></p>

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	The joint between the wall opening and the door frame shall be continuously filled with glass fiber insulation and the exterior cover trim shall be continuously caulked to seal the joint.		<u>The joint between the wall opening and the door frame shall be continuously filled with glass fiber insulation and the exterior cover trim shall be continuously caulked to seal the joint.</u>
	Or, it is permitted to use any door designated in the default components** with a default STC value of 35 or greater.		<u>Or, it is permitted to use any door designated in the default components** with a default STC value of 35 or greater.</u>

ROOF-CEILING ASSEMBLY			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
	Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with ½” solid sheathing and any roof covering allowed by this code.		<u>Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with ½” solid sheathing and any roof covering allowed by this code.</u>
	Commercial type flat roofs are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two.		<u>Commercial type flat roofs are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two.</u>
	Cathedral ceilings are discouraged, but if installed, must have 1 inch solid decking above, enough space to install the insulation, with a minimum of 6" air space between the insulation and the		<u>Cathedral ceilings are discouraged, but if installed, must have 1 inch solid decking above, enough space to install the insulation, with a minimum</u>

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	roof deck.		<u>of 6" air space between the insulation and the roof deck.</u>
Gypsum board ceilings at least ½" thick shall be provided at top floor. Ceilings a top floor shall be substantially airtight with a minimum number of penetrations. Where recessed lights are used in top-floor ceilings provide a gypsum board enclosure around the lighting fixture and seal the gypsum board joints with caulk or joint compound.	Ceilings shall be finished with gypsum board that is at least <b>5/8" thick</b> .		<u>Ceilings shall be finished with gypsum board that is at least 5/8-inch thick. Ceilings at the top floor shall be substantially airtight with a minimum number of penetrations.</u>
Fiberglass, mineral <b>fiber</b> , or cellulose insulation shall be installed continuously and completely throughout the ceiling joist cavity to a depth of at least 10 inches. Batt or blanket insulation shall be used at sloped ceilings.	Attic insulation shall be batt or blown-in glass <b>fiber</b> or mineral wool with a minimum R-30 rating applied between the ceiling joints.	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed.	<u>Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-30 rating applied between the ceiling joints. Batt or blanket insulation should be secured in place to prevent sagging.</u>
Roof framing members shall be at least 14" deep for their entire span.			<u>Roof framing members shall be at least 14" deep for their entire span.</u>
Attic access panels shall be constructed of <b>3/4" thick plywood</b> and shall have continuous neoprene perimeter bulb seals.	Attic ventilation shall be fitted with a ½" <b>plywood panel</b> , with 1" semi-rigid insulation attached to the surface facing the vent so that the panel is at least six inches longer than the vent on all sides and is attached to prevent direct line-of-site perpendicular to the vent.	Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	<u>Attic ventilation shall be fitted with a 1/2-inch plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent so that the panel is at least six inches longer than the vent on all sides and is attached to prevent direct line-of-site perpendicular to the vent.</u>

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Key: **Similar requirements**; **Conflicting requirements**; *NCTCOG Amendment Updates*; Strictest Standards from Comparison

<p><b>Skylights shall not be provided.</b></p>	<p><b>Skylights allowed</b> if they penetrate the ceiling by means of a completely enclosed light well that extends from the roof opening to the ceiling opening. A secondary openable glazing panel shall be mounted at the ceiling line or at a point that provides at least a 4-inch space between the skylight glazing and the secondary glazing and shall be glazed with at least 3/16" plastic or laminated glass. The total size of skylights shall be no more than 20 percent of the roof area of the room.</p>		<p><u>Skylights shall not be provided.</u></p>
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FLOORS AND FOUNDATIONS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
<p>For houses elevated on pylons, use plywood or OSB at least 1/2" thick at the underside of the floor joists that are at least 14" deep with at least 10" thick fiberglass, mineral fiber, or cellulose insulation.</p>	<p>The floor of the lowest occupied rooms shall be slab on fill, below grade, or over a fully enclosed basement or crawlspace. All doors and window openings in the fully enclosed basement shall be tightly fitted.</p>		<p><u>The floor of the lowest occupied rooms shall be slab on fill, below grade, or over a fully enclosed basement or crawlspace. All doors and window openings in the fully enclosed basement shall be tightly fitted.</u></p>

Planning Livable Military Communities Ordinance Compatibility Review

30 decibel Noise Level Reduction for 70-74 Day-Night Average Noise Level (DNL) Contour

Key: **Similar requirements**; **Conflicting requirements**; *NCTCOG Amendment Updates*; Strictest Standards from Comparison

<p>If crawl spaces do not have masonry walls, a massive barrier panel must be used as a skirt connecting the bottom of the walls to the ground. 2" thick precast concrete panels are ideal barrier skirts. Alternatively, 2x4 pressure-treated wood studs with ¾" <b>pressure-treated plywood</b> on each side may be used, as long as the joints between the plywood are covered with batten strips. Use acoustical louvers for all vents.</p>	<p>All crawlspace vents must be fitted with a <b>1/2" plywood panel</b>, with 1" semi-rigid insulation attached to the surface so that the panel is at least six inches longer than the vent on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced.</p>	<p>Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.</p>	<p><u>All crawlspace vents must be fitted with a 1/2" plywood panel, with 1" semi-rigid insulation attached to the surface so that the panel is at least six inches longer than the vent on all sides and is attached to prevent direct line-of-site perpendicular to the vent. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.</u></p>
		<p>Insulation shall be installed to maintain permanent contact with underside of subfloor decking.</p>	<p><u>Insulation shall be installed to maintain permanent contact with underside of subfloor decking.</u></p>
		<p>The air barrier shall be installed at any exposed edge of insulation.</p>	<p><u>The air barrier shall be installed at any exposed edge of insulation.</u></p>

Planning Livable Military Communities Ordinance Compatibility Review

30 decibel Noise Level Reduction for 70-74 Day-Night Average Noise Level (DNL) Contour

Key: **Similar requirements**; **Conflicting requirements**; *NCTCOG Amendment Updates*; Strictest Standards from Comparison

VENTILATION AND WALL AND ROOF PENETRATIONS			
Navy Model Ordinance	Fort Worth Ordinance 17681*	2012 IECC	Strictest Standards from Comparison
In-window, through-wall, or through-floor air-conditioning, ventilating, or heating units shall not be used.	Window and/or through-the-wall ventilation or air-conditioning units shall not be used.	HVAC register boots that penetrate building thermal envelope shall be sealed to the sub-floor or drywall.	<u>Window and/or through-the-wall ventilation or air-conditioning units shall not be used.</u>
Through-the-wall/door mailboxes or mail slots shall not be used.			<u>Through-the-wall/door mailboxes or mail slots shall not be used.</u>
A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.	A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.		<u>A mechanical ventilation system shall be installed that will provide the minimum air circulation and fresh air supply requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.</u>
Gravity vent openings in attics shall not exceed the code minimum in number and size.			<u>Gravity vent openings in attics shall not exceed the code minimum in number and size.</u>
If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.			<u>If an attic fan is used for forced ventilation, the attic inlet and discharge openings shall be fitted with sheet metal transfer ducts of at least 20 gauge steel at least 5 feet long with at least one 90° bend.</u>



Planning Livable Military Communities Ordinance Compatibility Review

30 decibel Noise Level Reduction for 70-74 Day-Night Average Noise Level (DNL) Contour

Key: **Similar requirements**; **Conflicting requirements**; *NCTCOG Amendment Updates*; Strictest Standards from Comparison

<p>All vent ducts, including those for bathroom exhaust fans and dryers, connecting the interior space to the outdoors shall be rigid metal and contain <b>at least two 90° bends</b>, or one 90° bend and a total length of at least <b>20 feet</b> (or the maximum length allowed by the dryer manufacturer).</p>	<p>All vent ducts connecting the interior space to the outdoors shall contain at least a <b>ten-foot length</b> of internal sound-absorbing duct lining. Each duct shall be provided with a <b>ninety-degree bend</b> in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross section. Residential bathroom vents discharging at an eave vent need only to have two ninety-degree angles.</p>	<p>Duct shafts, utility penetrations, and flue shafts opening to the exterior or unconditioned space shall be sealed.</p>	<p><u>All vent ducts connecting the interior space to the outdoors shall contain at least a ten-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a ninety-degree bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross section. Residential bathroom vents discharging at an eave vent need only to have two ninety-degree angles.</u></p>
<p>Vented domestic range fans shall be not used.</p>	<p>Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.</p>		<p><u>Vented domestic range fans with a ducted connection to the exterior shall not be used.</u></p>
<p>Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.</p>			<p><u>Vented fireplaces, wood stoves, or gas-powered prefabricated units shall not be used.</u></p>
<p>Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.</p>			<p><u>Vented fuel-burning appliances (e.g., gas dryers, gas fireplaces, oil or gas furnaces, and gas water heaters) shall not be located in habitable spaces (e.g, kitchens, living rooms, bedrooms, etc.). Vent ducts for fuel-burning appliances in non-habitable spaces (e.g., closets and attics) shall have double-wall sheet metal construction.</u></p>
<p>Whole-house fans shall not be provided</p>			<p><u>Whole-house fans shall not be provided</u></p>

Planning Livable Military Communities Ordinance Compatibility Review

30 decibel Noise Level Reduction for 70-74 Day-Night Average Noise Level (DNL) Contour

Key: **Similar requirements**; **Conflicting requirements**; *NCTCOG Amendment Updates*; Strictest Standards from Comparison

All ducts in attics shall be rigid metal			<u>All ducts in attics shall be rigid metal</u>
Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.			<u>Dryers shall be located in closets or other non-habitable spaces. Dryer ducts shall be rigid metal.</u>

**\*Fort Worth Ordinance 17681 is based on 2006 International Residential Code standards**

**\*\*Fort Worth Ordinance Default Components:**

**70-74 DNL:** The sound enclosure must be comprised of all components, wall, window, doors and roof that each have a default STC rating of 35 or higher. STC ratings may overstate the actual attenuation provided by as much as 3 decibels, therefore, all STC rating requirements are upgraded by 5. It is permitted to use windows and doors of less than 35 STC but not less than 30 STC rating, provided the wall STC shall be downrated by 20% and the non-compliant window/door area shall not exceed 20% of the floor area per room.

**Sources:**

City of Fort Worth (2007). *Ordinance 17681: Sound Insulation Requirements for Noise.*

International Code Council (2012). *International Energy Conservation Code.*

North Central Texas Council of Governments (2013). *Recommended Amendments to the 2012 International Energy Conservation Code.*

Wyle Acoustics Group (2005). *Guidelines for Sound Insulation of Residences Exposed to Aircraft Operations.*

<http://www.nctcog.org/trans/aviation/ilus/Sound%20Insulation%20Report.pdf>

## LIST OF ATTACHMENTS

- 1) NCTCOG Recommended Amendments to the 2012 International Residential Code
- 2) NCTCOG Recommended Amendments to the 2012 International Energy Conservation Code
- 3) Fort Worth Ordinance 17681: Sound Insulation Requirements for Noise
- 4) Benbrook Ch. 17.78 Zoning: NAS Overlay District
- 5) San Antonio Ordinance 2010-06-24-0640: "MSAO" Military Sound Attenuation Overlay District
- 6) AICUZ Land Use Compatibility Tables by Noise Zone and Accident Potential Zones (from 2008 Joint Land Use Study)
- 7) City of Fort Worth Ordinance 20898: Airport/Airfield Overlay District

**Recommended Amendments to the  
2012 International Residential Code**  
North Central Texas Council of Governments region

The following sections, paragraphs, and sentences of the *2012 International Residential Code* are hereby amended as follows: Standard type is text from the IRC. Underlined type is text inserted. ~~Lined through type is deleted text from IRC.~~ A double asterisk at the beginning of a section identifies an amendment carried over from the 2009 edition of the code and a triple asterisk identifies a new or revised amendment with the 2012 code.

Note: Historically NCTCOG has limited Chapter 1 amendments in order to allow each city to insert their local policies and procedures. We now have suggested certain items to be brought to the attention of cities considering adoption of the code that may be of concern to several jurisdictions. **It is still intended to be discretionary to each city to determine which Chapter 1 amendments to include.**

The energy provisions in Chapter 11 of the International Residential Code (IRC) now mirror the requirements of the International Energy Conservation Code (IECC). As such, there is no difference between Chapter 11 of the 2012 IRC and the 2012 IECC. **Reference the 2012 IECC for NCTCOG recommended amendments to that code.**

**\*\*Section R102.4; change to read as follows:**

**R102.4 Referenced codes and standards.** *The codes, when specifically adopted, and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections R102.4.1 and R102.4.2. Whenever amendments have been adopted to the referenced codes and standards, each reference to said code and standard shall be considered to reference the amendments as well. Any reference made to NFPA 70 or the Electrical Code shall mean the Electrical Code as adopted.*

*(Reason: Legal wording to recognize locally adopted codes and amendments adopted with referenced codes. Note: the former ICC Electrical Code is now Appendix K of the IBC, but no longer called by that name. If adopting in that location, be sure to include language that includes structures under IRC and IBC.)*

**\*\*Section R110 (R110.1 through R110.5); delete the section.**

*(Reason: Issuing CO's for residences is not a common practice in the area.)*

**\*\*Section R112.2.1 & R112.2.2; delete the sections.**

*(Reason: Floodplain provisions are addressed locally.)*

**\*\*Section R202; change definition of "Townhouse" to read as follows:**

**TOWNHOUSE.** A single-family dwelling unit constructed in a group of three or more attached units separated by property lines in which each unit extends from foundation to roof and with a *yard* or *public way* on at least two sides.

*(Reason: Consistent with terminology commonly used in this region.)*

\*\*\*Table R301.2(1); fill in as follows:

GROUND SNOW LOAD	WIND DESIGN		SEISMIC DESIGN CATEGORY <sup>f</sup>
	SPEED <sup>d</sup> (mph)	Topographic Effects <sup>k</sup>	
<u>5 lb/ft<sup>2</sup></u>	<u>90 (3-sec-gust)/76 fastest mile</u>	<u>No</u>	<u>A</u>

SUBJECT TO DAMAGE FROM		
Weathering <sup>a</sup>	Frost line depth <sup>b</sup>	Termite <sup>c</sup>
<u>moderate</u>	<u>6"</u>	<u>very heavy</u>

WINTER DESIGN TEMP <sup>e</sup>	ICE BARRIER UNDER-LAYMENT REQUIRED <sup>h</sup>	FLOOD HAZARDS <sup>g</sup>	AIR FREEZING INDEX <sup>i</sup>	MEAN ANNUAL TEMP <sup>j</sup>
<u>22°F</u>	<u>No</u>	<u>local code</u>	<u>150</u>	<u>64.9°F</u>

{No change to footnotes}

(Reason: To promote regional uniformity.)

\*\*Section R302.1; add exception #6 to read as follows:

**Exceptions:** {previous exceptions unchanged}

6. Open non-combustible carport structures may be constructed when also approved within adopted ordinances.

(Reason: Refers to other ordinances, such as zoning ordinances.)

\*\*\*Section R302.2, Exception; change to read as follows:

**Exception:** A common two-hour fire-resistance-rated wall assembly, or one-hour fire-resistance-rated wall assembly when equipped with a sprinkler system... {remainder unchanged}

(Reason: Consistent with regional practice.)

\*\*\*Section R302.2.4, Exception 5; change to read as follows:

**Exception:** {previous exceptions unchanged}

5. Townhouses separated by a common ~~4-hour~~ fire-resistance-rated wall as provided in Section R302.2.

(Reason: Consistent with regional practice.)

\*\*\*Section R302.3; add Exception #3 to read as follows:

**Exceptions:**

1. {existing text unchanged}
2. {existing text unchanged}
3. Two-family dwelling units that are also divided by a property line through the structure shall be separated as required for townhouses.

(Reason: Provide guidance for a common construction method in this area. Correlates with amendment to IRC Section R202 Townhouse definition.)

**\*\*\*Section R302.5.1; change to read as follows:**

**R302.5.1 Opening protection.** Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 13/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 13/8 inches (35 mm) thick, or 20-minute fire-rated doors ~~equipped with a self-closing device.~~

(Reason: Consistent with common local practice. Absence of data linking self-closing devices to increased safety. Self-closing devices often fail to close the door entirely.)

**\*\*\*Section R303.3, Exception; amend to read as follows:**

**Exception:** The glazed areas {remainder unchanged} unless the space contains only a water closet, a lavatory, or water closet and a lavatory may be ventilated with an approved mechanical recirculating fan or similar device designed to remove odors from the air.

(Reason: Consistent with common local practice.)

**\*\*\*R303.4 Mechanical Ventilation; change to read as follows:**

Where the air infiltration rate of a dwelling unit is ~~less than~~ 5 air changes per hour ~~or less~~ when tested with a blower door at a pressure of 0.2 inch w.c. (50 Pa) in accordance with Section N1102.4.1.2, the dwelling unit shall be provided with whole-house mechanical ventilation in accordance with Section M1507.3.

(Reason: See IECC change to performance testing. Whole-house ventilation is recognized as necessary.)

**\*\*\*Section R315.3, amend and add exceptions as follows:**

**Where required in existing dwellings.** Where work requiring a *permit* for an addition or an alteration that occurs in existing dwellings, that have attached garages or in existing dwellings within which fuel-fired appliances exist, carbon monoxide alarms shall be provided in accordance with Section R315.1:

**Exceptions:**

1. Work involving the exterior surfaces of *dwellings*, such as the replacement of roofing or siding, or the *addition* or replacement of windows or doors, or the *addition* of a porch or deck, are exempt from the requirements of this section.
2. Installation, *alteration* or repairs of plumbing or mechanical systems are exempt from the requirements of this section.

(Reason: Consistent with exceptions in Section R314.3.1)

**\*\*\*Section R401.2, amended by adding a new paragraph following the existing paragraph to read as follows.**

**Section R401.2. Requirements.** {existing text unchanged} ...

Every foundation and/or footing, or any size addition to an existing post-tension foundation, regulated by this code shall be designed and sealed by a Texas-registered engineer.

(Reason: reflects regional practice.)

**\*\*Section 602.6.1; amend the following:**

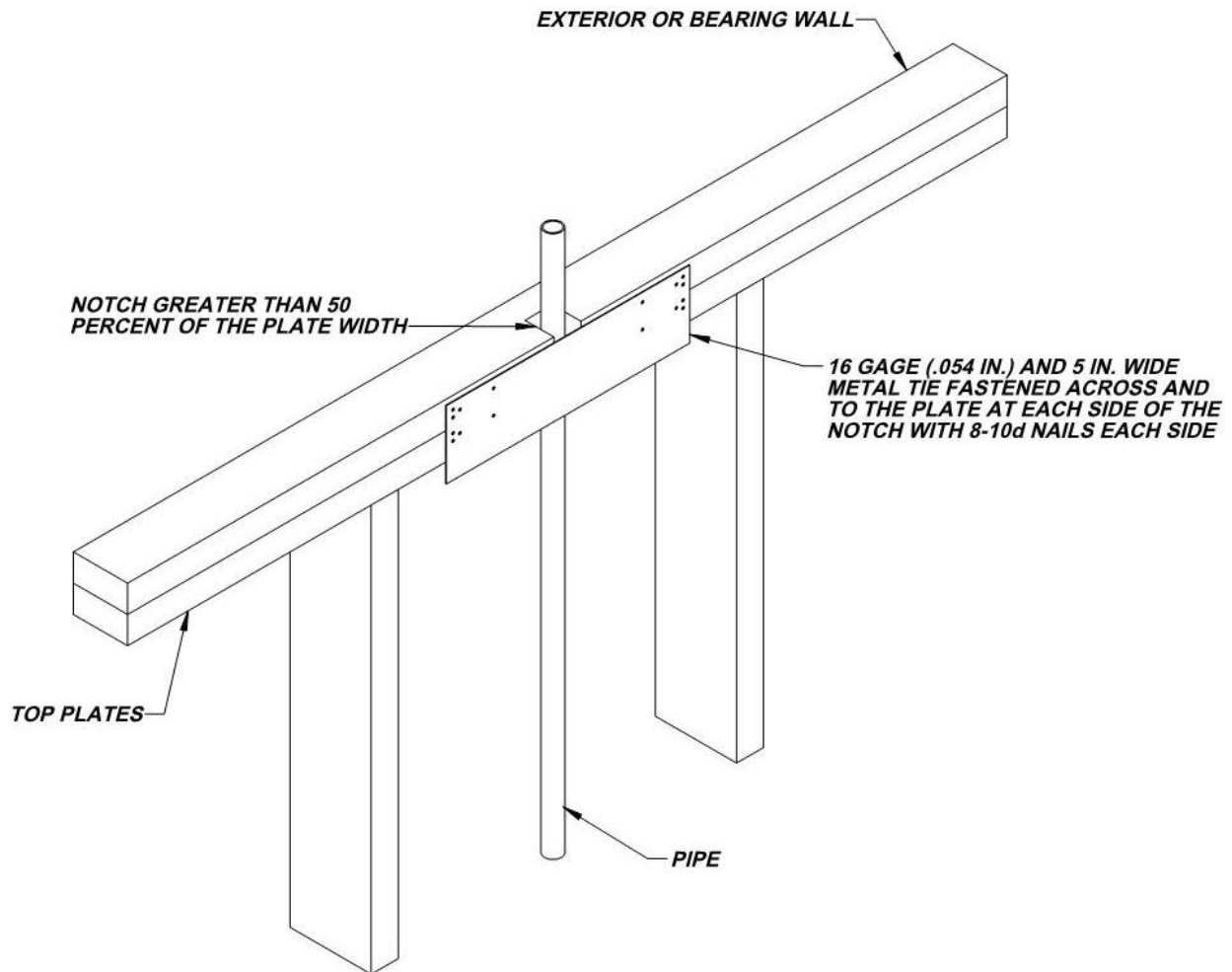
**R602.6.1 Drilling and notching of top plate.** When piping or ductwork is placed in or partly in an exterior wall or interior load-bearing wall, necessitating cutting, drilling or notching of the top plate by more



than 50 percent of its width, a galvanized metal tie not less than 0.054 inch thick (1.37 mm) (16 Ga) and 4 ½ inches (38 mm) 5 inches (127 mm) wide shall be fastened across and to the plate at each side of the opening with not less than eight 10d (0.148 inch diameter) having a minimum length of 1 ½ inches (38 mm) at each side or equivalent. Fasteners will be offset to prevent splitting of the top plate material. The metal tie must extend a minimum of 6 inches past the opening. See figure R602.6.1. {remainder unchanged}

*(Reason: reflects regional practice and to comply with P2603.2.1. Also provides additional assurance of maintaining the integrity of the framing by spreading the nailing pattern.)*

**\*\*Figure R602.6.1; delete the figure and insert the following figure:**



*(Reason: reflects regional practice and to comply with P2603.2.1. Also provides additional assurance of maintaining the integrity of the framing by spreading the nailing pattern.)*

**\*\*Section R703.7.4.1; add a second paragraph to read as follows:**

In stud framed exterior walls, all ties shall be anchored to studs as follows:

1. When studs are 16 in (407 mm) o.c., stud ties shall be spaced no further apart than 24 in (737 mm) vertically starting approximately 12 in (381 mm) from the foundation; or

2. When studs are 24 in (610 mm) o.c., stud ties shall be spaced no further apart than 16 in (483 mm) vertically starting approximately 8 in (254 mm) from the foundation.

*(Reason: Provide easy to install and inspect dimensions to clarify how to anchor and to distinguish “studs” from other types of construction.)*

**\*\*Section R902.1; Amend and add exception #3 to read as follows:**

**R902.1 Roofing covering materials.** Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B, or C roofing shall be installed in areas designated by law as requiring their use or when the edge of the roof is less than 3 feet from a lot line. *{remainder unchanged}*

**Exceptions:**

1. *{text unchanged}*
2. *{text unchanged}*
3. *{text unchanged}*
4. Non-classified roof coverings shall be permitted on one-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed (area defined by jurisdiction).

*(Reason: Consistent with regional practice. Language fits better in this section. Aligned the area and description of the building to be consistent with the item #1 to Section R105.2)*

**Part IV – Energy Conservation - Chapter 11 [RE] \*\*\* insert text to read as follows:**

Residential Provisions for Energy Efficiency

*(Reason: To remain consistent with IECC residential provisions.)*

**\*\*\*Section M1305.1.3; change to read as follows:**

**M1305.1.3 Appliances in attics.** Attics containing appliances requiring access shall be provided . . . *{bulk of paragraph unchanged}* . . . sides of the appliance where access is required. The clear access opening dimensions shall be a minimum of 20 inches by 30 inches (508 mm by 762 mm), or larger and large enough to allow removal of the largest appliance. A walkway to an appliance shall be rated as a floor as approved by the building official. As a minimum, for access to the attic space, provide one of the following:

1. A permanent stair.
2. A pull down stair with a minimum 300 lb (136 kg) capacity.
3. An access door from an upper floor level.
4. ~~Access Panel may be used in lieu of items 1, 2, and 3 with prior approval of the code official due to building conditions.~~

**Exceptions:**

1. The passageway and level service space are not required where the appliance can be serviced and removed through the required opening.
2. Where the passageway is unobstructed...*{remaining text unchanged}*

(Reason: To provide a safe means of accessibility to appliances in attics and to allow for different types of construction limitations. Consistent with regional amendment to IFGC and IMC 306.3.)

**\*\*Section M1411.3; change to read as follows:**

**M1411.3 Condensate disposal.** Condensate from all cooling coils or evaporators shall be conveyed from the drain pan outlet to ~~an approved place of disposal~~ a sanitary sewer through a trap, by means of a direct or indirect drain. {remaining text unchanged}

(Reason: Reflects regional practice and to reduce excessive runoff into storm drains.)

**\*\*Section M1411.3.1, Items 3 and 4; add text to read as follows:**

**M1411.3.1 Auxiliary and secondary drain systems.** {bulk of paragraph unchanged}

1. {text unchanged}
2. {text unchanged}
3. An auxiliary drain pan... {bulk of text unchanged}... with Item 1 of this section. A water level detection device may be installed only with prior approval of the building official.
4. A water level detection device... {bulk of text unchanged}... overflow rim of such pan. A water level detection device may be installed only with prior approval of the building official.

(Reason: Reflects standard practice in this area.)

**\*\*Section M1411.3.1.1; add text to read as follows:**

**M1411.3.1.1 Water-level monitoring devices.** On down-flow units ... {bulk of text unchanged}... installed in the drain line. A water level detection device may be installed only with prior approval of the building official.

(Reason: Reflects standard practice in this area.)

**\*\*\*M1503.4 Makeup Air Required Amend and add exception as follows:**

**M1503.4 Makeup air required.** Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m<sup>3</sup>/s) shall be provided with makeup air at a rate approximately equal to the difference between the exhaust air rate and 400 cubic feet per minute. Such makeup air systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

Exception: Where all appliances in the house are of sealed combustion, power-vent, unvented, or electric, the exhaust hood system shall be permitted to exhaust up to 600 cubic feet per minute (0.28 m<sup>3</sup>/s) without providing makeup air. Exhaust hood systems capable of exhausting in excess of 600 cubic feet per minute (0.28 m<sup>3</sup>/s) shall be provided with a makeup air at a rate approximately equal to the difference between the exhaust air rate and 600 cubic feet per minute.

(Reason:

*Exception requires makeup air equaling the amount above and beyond 400 cfm for larger fan which will address concerns related to "fresh" air from the outdoors in hot humid climates creating a burden on HVAC equipment and negative efficiency impacts from backdrafting and wasted energy.*

**\*\*Section M2005.2; change to read as follows:**

**M2005.2 Prohibited locations.** Fuel-fired water heaters shall not be installed in a room used as a storage closet. Water heaters located in a bedroom or bathroom shall be installed in a sealed enclosure so that *combustion air* will not be taken from the living space. Access to such enclosure may be from the bedroom or bathroom when through a solid door, weather-stripped in accordance with the exterior door air leakage requirements of the *International Energy Conservation Code* and equipped with an *approved self-closing device*. Installation of direct-vent water heaters within an enclosure is not required.

*(Reason: Corresponds with the provisions of IFGC Section 303, exception #5.)*

**c**

**\*\*Section G2408.3 (305.5); delete.**

**Reason: This provision does not reflect standard practice in this area.)**

**\*\*Section G2415.2.1 (404.2.1); add a second paragraph to read as follows:**

Both ends of each section of medium pressure gas piping shall identify its operating gas pressure with an *approved tag*. The tags are to be composed of aluminum or stainless steel and the following wording shall be stamped into the tag:

"WARNING  
1/2 to 5 psi gas pressure  
Do Not Remove"

*(Reason: To protect homeowners and plumbers.)*

**\*\*Section G2415.2.2 (404.2.2); add an exception to read as follows:**

**Exception:** Corrugated stainless steel tubing (CSST) shall be a minimum of 1/2" (18 EDH).

*(Reason: Pipe less than 1/2" has a history in this region of causing whistling.)*

**\*\*Section G2415.12 (404.12); change to read as follows:**

**G2415.12 (404.12) Minimum burial depth.** Underground *pipng systems* shall be installed a minimum depth of ~~42 inches (305 mm)~~ 18 inches (457 mm) below grade, except as provided for in Section G2415.12.1.

*(Reason: To provide increased protection to piping systems.)*

**\*\*\*Section G2415.12.1 (404.12.1); change to read as follows:**

**G2415.12.1) Individual outside appliances.** Individual lines to outside lights, grills or other appliances shall be installed a minimum of ~~8-12~~ inches (203 mm) below finished grade.... Rest unchanged.

*(Reason: To provide increased protection to piping systems.)*

**\*\*Section G2417.1 (406.1); change to read as follows:**

**G2417.1 (406.1) General.** Prior to acceptance and initial operation, all *pipng* installations shall be inspected and *pressure tested* to determine that the materials, design, fabrication, and installation practices comply with the requirements of this code. The permit holder shall make the applicable tests prescribed in Sections 2417.1.1 through 2417.1.5 to determine compliance with the provisions of this code. The permit holder shall give reasonable advance notice to the building official when the pipng system is ready for testing. The equipment, material, power and labor necessary for the inspections and test shall be furnished by the permit holder and the permit holder shall be responsible for determining that the work will withstand the test pressure prescribed in the following tests.

*(Reason: To utilize language used in the IPC regarding who is responsible for testing procedures.)*

**\*\*Section G2417.4; change to read as follows:**

**G2417.4 (406.4) Test pressure measurement.** Test pressure shall be measured with a manometer or with a pressure-measuring device designed and calibrated to read, record, or indicate a pressure loss caused by leakage during the *pressure test* period. The source of pressure shall be isolated before the *pressure tests* are made. ~~Mechanical gauges~~ Gauges used to measure... *{remainder unchanged}*

*(Reason: To require the use of more accurate diaphragm gauges. Spring gauges do not provide accurate measurement below approximately 17 psig.)*

**\*\*Section G2417.4.1; change to read as follows:**

**G2417.4.1 (406.4.1) Test pressure.** The test pressure to be used shall be not less than ~~one and one-half times the proposed maximum working pressure, but not less than 3 psig (20 kPa gauge), or at the discretion of the Building Official, the pipng and valves may be tested at a pressure of at least six (6) inches (152 mm) of mercury, measured with a manometer or slope gauge. irrespective of design pressure. Where the test pressure exceeds 125 psig (862 kPa gauge), the test pressure shall not exceed a value that produces a hoop stress in the pipng greater than 50 percent of the specified minimum yield strength of the pipe.~~ For tests requiring a pressure of 3 psig, mechanical gauges used to measure test pressures shall utilize a dial with a minimum diaphragm diameter of three and one half inches (3 1/2"), a set hand, 1/10 pound incrementation and pressure range not to exceed 6 psi for tests requiring a pressure of 3 psig. For tests requiring a pressure of 10 psig, mechanical diaphragm gauges shall utilize a dial with a minimum diameter of three and one-half inches (3 1/2"), a set hand, a minimum of 2/10 pound incrementation and a pressure range not to exceed 20 psi. ~~have a range such that the highest end of the scale is not greater than five times the test pressure.~~

For welded pipng, and for pipng carrying gas at pressures in excess of fourteen (14) inches water column pressure (3.48 kPa) (1/2 psi) and less than 200 inches of water column pressure (52.2 kPa) (7.5 psi), the test pressure shall not be less than ten (10) pounds per square inch (69.6 kPa). For pipng carrying gas at a pressure that exceeds 200 inches of water column (52.2 kPa) (7.5 psi), the test pressure shall be not less than one and one-half times the proposed maximum working pressure.

*(Reason: To provide for lesser pressures to coordinate with the use of more accurate diaphragm gauges.)*

**\*\*Section G2417.4.2; change to read as follows:**

**G2417.4.2 (406.4.2) Test duration.** The test duration shall be held for a length of time satisfactory to the Building Official, but in no case for be not less than 10-fifteen (15) minutes. ~~For welded pipng, and for pipng carrying gas at pressures in excess of fourteen (14) inches water column pressure (3.48 kPa), the~~

test duration shall be held for a length of time satisfactory to the *Building Official*, but in no case for less than thirty (30) minutes.

(Reason: To comply with accepted regional practices.)

**\*\*Section G2420.1 (406.1); add Section G2420.1.4 to read as follows:**

**G2420.1.4 Valves in CSST installations.** Shutoff *valves* installed with corrugated stainless steel (CSST) *pipng systems* shall be supported with an approved termination fitting, or equivalent support, suitable for the size of the *valves*, of adequate strength and quality, and located at intervals so as to prevent or damp out excessive vibration but in no case greater than 12-inches from the center of the *valve*. Supports shall be installed so as not to interfere with the free expansion and contraction of the system's *pipng*, fittings, and *valves* between anchors. All *valves* and supports shall be designed and installed so they will not be disengaged by movement of the supporting *pipng*.

(Reason: To provide proper security to CSST valves. These standards were established in this region in 1999 when CSST was an emerging technology.)

**\*\*\*Section G2420.5.1 (409.5.1); add text to read as follows:**

**G2420.5.1 (409.5.1) Located within the same room.** The shutoff valve ... {bulk of paragraph unchanged}... in accordance with the appliance manufacturer's instructions. A secondary shutoff valve must be installed within 3 feet (914 mm) of the firebox if appliance shutoff is located in the firebox.

(Reason: Reflects regional practice and provides an additional measure of safety.)

**\*\*Section G2421.1 (410.1); add text and Exception to read as follows:**

**G2421.1 (410.1) Pressure regulators.** A line *pressure regulator* shall be ... {bulk of paragraph unchanged}... approved for outdoor installation. Access to regulators shall comply with the requirements for access to appliances as specified in Section M1305.

**Exception:** A passageway or level service space is not required when the *regulator* is capable of being serviced and removed through the required *attic* opening.

(Reason: To require adequate access to regulators.)

**\*\*Section G2422.1.2.3 (411.1.3.3); delete Exception 1 and Exception 4.**

(Reason: To comply with accepted regional practices.)

**\*\*Section G2445.2 (621.2); add Exception to read as follows:**

**G2445.2 (621.2) Prohibited use.** One or more *unvented room heaters* shall not be used as the sole source of comfort heating in a *dwelling unit*.

**Exception:** Existing *approved unvented room heaters* may continue to be used in *dwelling units*, in accordance with the *code* provisions in effect when installed, when *approved* by the *Building Official* unless an unsafe condition is determined to exist as described in *International Fuel Gas Code* Section 108.7 of the Fuel Gas Code.



(Reason: Gives code official discretion)

**\*\*Section G2448.1.1 (624.1.1); change to read as follows:**

**G2448.1.1 (624.1.1) Installation requirements.** The requirements for *water heaters* relative to access, sizing, *relief valves*, drain pans and scald protection shall be in accordance with this code.

(Reason: To clarify installation requirements. Also corresponds with amendments regarding water heater access.)

**\*\*Section P2801.6; add Exception to read as follows:**

**Exceptions:**

1. Electric Water Heater.

(Reason: To coordinate with Section 2408.2 of the IRC, which recognizes this exception.)

**\*\*Section P2902.5.3; change to read as follows:**

**P2902.5.3 Lawn irrigation systems.** The potable water supply to lawn irrigation systems shall be protected against backflow by an atmospheric-type vacuum breaker, a pressure-type vacuum breaker, a double-check assembly or a reduced pressure principle backflow preventer. A valve shall not be installed downstream from an atmospheric vacuum breaker. Where chemicals are introduced into the system, the potable water supply shall be protected against backflow by a reduced pressure principle backflow preventer.

(Reason: To provide clarity.)

**\*\*Section P3005.2.6; change to read as follows:**

**P3005.2.6 ~~Base of stacks~~ Upper Terminal.** ~~A cleanout shall be provided at the base of each waste or soil stack.~~ Each horizontal drain shall be provided with a cleanout at its upper terminal.

**Exception:** Cleanouts may be omitted on a horizontal drain less than five (5) feet (1524 mm) in length unless such line is serving sinks or urinals.

(Reason: To eliminate the requirement for excessive cleanouts.)

**\*\*Section P3111; delete.**

(Reason: A combination waste and vent system is not approved for use in residential construction.)

**\*\*Section P3112.2; delete and replace with the following:**

**P3112.2 Installation.** Traps for island sinks and similar equipment shall be roughed in above the floor and may be vented by extending the vent as high as possible, but not less than the drainboard height and

then returning it downward and connecting it to the horizontal sink drain immediately downstream from the vertical fixture drain. The return vent shall be connected to the horizontal drain through a wye-branch fitting and shall, in addition, be provided with a foot vent taken off the vertical fixture vent by means of a wye-branch immediately below the floor and extending to the nearest partition and then through the roof to the open air or may be connected to other vents at a point not less than six (6) inches (152 mm) above the flood level rim of the fixtures served. Drainage fittings shall be used on all parts of the vent below the floor level and a minimum slope of one-quarter (1/4) inch per foot (20.9 mm/m) back to the drain shall be maintained. The return bend used under the drainboard shall be a one (1) piece fitting or an assembly of a forty-five (45) degree (0.79 radius), a ninety (90) degree (1.6 radius) and a forty-five (45) degree (0.79 radius) elbow in the order named. Pipe sizing shall be as elsewhere required in this Code. The island sink drain, upstream of the return vent, shall serve no other fixtures. An accessible cleanout shall be installed in the vertical portion of the foot vent.

*(Reason: To clarify the installation of island venting and to provide a regional guideline on a standard installation method for this region.)*

**END**

**Recommended Amendments to the  
2012 International Energy Conservation Code**  
North Central Texas Council of Governments Region  
(Climate Zone 3 of the IECC)

The following sections, paragraphs, and sentences of the *2012 International Energy Conservation Code* (IECC) are hereby amended as follows: Standard type is text from the IECC. Underlined type is text inserted. ~~Lined through type is deleted text from IECC.~~ A double (\*\*) asterisk at the beginning of a section identifies an amendment carried over from the 2009 edition of the code and a triple (\*\*\*) asterisk identifies a new or revised amendment with the 2009 code.

**Note:** Historically NCTCOG has limited Chapter 1 amendments in order to allow each city to insert their local policies and procedures. We now have suggested certain items to be brought to the attention of cities considering adoption of the code that may be of concern to several jurisdictions. **It is still intended to be discretionary to each city to determine which Chapter 1 amendments to include.**

The 2012 IECC contains separate provisions for commercial buildings (preceded by “C” for Commercial) and for residential buildings (preceded by “R” for residential buildings) 3 stories or less. Each set of provisions are separately applied to buildings within their respective scope. Each set of provisions also contains a Scope and Administration chapter, a Definitions chapter, a General Requirements chapter and a chapter containing energy efficiency requirements applicable to building within their respective scope.

Recommended amendments that match sections in each of the respective provisions (“C” and “R”) are written to represent both sections rather than duplicating the recommended amendment in this document.

Sections N1101.2 through N1105 of the 2012 *International Residential Code* (IRC) are noted to be extracted from the 2012 IECC. The Building and Residential Advisory Board (BRAB) recommends amending Chapter 11 [RE] ENERGY EFFICIENCY of the 2012 IRC to refer to the residential provisions of the 2012 IECC.

As of the date of the recommendations the State Energy Conservation Office (SECO) has not adopted the 2012 IECC. Consequently the recommended amendments to the 2012 IECC have been analyzed for stringency with the current Texas Building Energy Performance Standards (TBEPS) which is the 2009 Edition of the IECC and the energy provisions of the IRC. Some amendments below are noted that if/when SECO does by rule adopt the 2012 IECC as the TBEPS, the proposed amendment would be deemed less stringent and therefore would not be considered a recommended amendment.

**\*\*Section C101.4.2 and R101.4.2; change to read as follows:**

**C101.4.2/R101.4.2 Historic Buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of

Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer of the Keeper of the National Register of Historic Places, ~~are exempt from~~ shall comply with all of the provisions of this code.

**Exception:** Whenever a provision or provisions shall invalidate or jeopardize the historical designation or listing, that provision or provisions may be exempted.

*(Reason: This is less restrictive than the legislative mandates. It is reasonable to expect compliance with duct sealing, replacement lighting and the installation of insulation, for example, when possible.)*

**\*\*Section C102/R102; add Section C102.1.2 and R102.1.2 to read as follows:**

**C102.1.2/R102.1.2 Alternative compliance.** A building certified by a national, state, or local accredited energy efficiency program and determined by the Energy Systems Laboratory to be in compliance with the energy efficiency requirements of this section may, at the option of the Code Official, be considered in compliance. The United States Environmental Protection Agency's Energy Star Program certification of energy code equivalency shall be considered in compliance.

*(Reason: this amendment is added to allow alternative compliance in accordance with Texas HB 1365, 78<sup>th</sup> Legislature.)*

**\*\*Section C202 and R202; add the following definition:**

**GLAZING AREA.** Total area of the glazed fenestration measured using the rough opening and including sash, curbing or other framing elements that enclose conditioned space. Glazing area includes the area of glazed fenestration assemblies in walls bounding conditioned basements. For doors where the daylight opening area is less than 50 percent of the door area, the glazing area is the daylight opening area. For all other doors, the glazing area is the rough opening area for the door including the door and the frame.

*(Reason: Since the window to floor area ratios have been added to the prescriptive tables, it is necessary to define glazing area.)*

**\*\*\*Section R402.2.2; amend the section to read as follows:**

**R402.2.2 Ceilings without attic spaces.** Where Section R402.1.1 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section R402.1.1 shall be limited to 500 square feet (46 m<sup>2</sup>) ~~or 20 percent of the total insulated ceiling area, whichever is less.~~ This reduction shall not apply to the U-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

*(Reason: Retains the current 2009 language to eliminate confusion and limit the area to 500 square feet maximum)*

**\*\*\* Table R402.1.1 INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT; Amend by changing the WOOD FRAME WALL R-VALUE for CLIMATE ZONE 3 to read as follows:**

**13**

*(Reason: Retain the values in the 2009 code.)*

If/when SECO does by rule adopt the 2012 IECC, this proposed amendment would be deemed less stringent and therefore would not be considered a recommended amendment.

**\*\*\* Table R402.1.3 EQUIVALENT U-FACTORS; Amend by changing the WOOD FRAME WALL U-FACTOR for CLIMATE ZONE 3 to read as follows:**

0.082

*(Reason: Retain the values in the 2009 code.)*

If/when SECO does by rule adopt the 2012 IECC, this proposed amendment would be deemed less stringent and therefore would not be considered a recommended amendment.

**\*\*\*R402.4.1.2 Testing; Add a last paragraph to read as follows:**

Testing may only be performed by individuals that are certified HERS Raters or Rating Field Inspectors by RESNET or Performance Verification Technicians certified by Texas HERO, or other certifications as may be approved by the building official. The certified individuals must be an independent third-party entity, and may not be employed; or have any financial interest in the company that constructs the structure.

*(Reason: The 2012 International Residential Code (IRC) and International Energy Conservation Code (IECC) include enhanced emphasis on envelope infiltration and duct leakage. Significant changes in the residential energy requirements include more frequent requirement of performance testing for leakage. Residential Duct systems must be tested unless all ducts and equipment are located within the conditioned space. Envelope testing is required to demonstrate compliance with maximum allowable leakage rate unless a detailed air barrier and insulation inspection has been performed to field verify component criteria. This language puts the regulatory authority on notice that the testing requires specialized credentials and establishes a conflict of interest baseline).*

**\*\*\*Section R402.4.1.2 Testing; modify the first paragraph to read as follows:**

R402.4.1.2 Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. {Remainder of text unchanged}

*(Reason: The 2012 IECC will require mandatory door blower testing on each dwelling unit. The visual inspection is no longer an option to performance testing. This change will give some time for those builders not currently using a performance approach to adapt construction practices.)*

If/when SECO does by rule adopt the 2012 IECC, this proposed amendment would be deemed less stringent and therefore would not be considered a recommended amendment.

**\*\*\*R403.2.2 Sealing (Mandatory); Add a last paragraph to read as follows:**

Testing may only be performed by individuals that are certified HERS Raters or Rating Field Inspectors by RESNET or Performance Verification Technicians certified by Texas HERO, or other certifications as may be approved by the building official. The certified individuals must be an independent third-party entity, and may not be employed; or have any financial interest in the company that installed the duct system.

*(Reason: The 2012 International Residential Code (IRC) and International Energy Conservation Code (IECC) include enhanced emphasis on envelope infiltration and duct leakage. Significant changes in the residential energy requirements include more frequent requirement of performance testing for leakage. Residential Duct systems must be tested unless all ducts and equipment are located within the conditioned space. Envelope testing is required to demonstrate compliance with maximum allowable leakage rate unless a detailed air barrier and insulation inspection has been performed to field verify component criteria. This language puts the regulatory authority on notice that the testing requires specialized credentials and establishes a conflict of interest baseline).*

**\*\*\* Section R403.2.2; Amend to read as follows:**

R403.2.3 Building cavities (Mandatory). Building framing cavities shall not be used as supply ducts and plenums. Building framing wall cavities in the exterior thermal envelope shall not be used as return ducts

*(Reason: Continue the practice in the regions and to insure that the building thermal envelope is not compromised.)*

**\*\*Section C402.2.9/R402.2; Add Section C402.2.9 and R402.2.13 to read as follows:**

**Section C402.2.9/R402.2 Insulation installed in walls.** To insure that insulation remains in place, insulation batts installed in walls shall be totally secured by an enclosure on all sides consisting of framing lumber, gypsum, sheathing, wood structural panel sheathing, netting or other equivalent material approved by the building official.

*(Reason: This will increase the performance of the insulation by ensuring that the batt insulation stays in place.)*

**\*\*\*Section R405.6.2; add the following sentence to the end of paragraph:**

Acceptable performance software simulation tools may include, but are not limited to, REM Rate™, Energy Gauge and IC3. Other performance software programs accredited by RESNET BESTEST and having the ability to provide a report as outlined in R405.4.2 may also be deemed acceptable performance simulation programs and may be considered by the building official.

*(Reason: These performance software tools are accredited by RESNET at the time of recommendation.)*

**\*\*\*Section C101.4.3 Additions, alterations, renovations or repairs; add exception #9 to read as follows:**

9. Replacement of existing fenestration, provided, however, that the area of the replacement fenestration does not exceed 25% of the total fenestration area of an existing building and that the U-factor and SHGC will be equal to or lower than before the fenestration replacement.

*(Reason: Provide some level of consideration for existing buildings, matches ASHRAE 90.1-2010 Exception "g" to Section 5.1.3.)*



If/when SECO does by rule adopt the 2012 IECC, this proposed amendment would be deemed less stringent and therefore would not be considered a recommended amendment.

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***END***

**ORDINANCE NUMBER 17681-08-2007**

**AN ORDINANCE AMENDING THE FORT WORTH RESIDENTIAL CODE, BY PROVIDING FOR SOUND ATTENUATION CONSTRUCTION REQUIREMENTS NEAR THE NAVAL AIR STATION JOINT RESERVE BASE; PROVIDING PENALTIES FOR THE VIOLATION THEREOF; PROVIDING THAT THIS ORDINANCE SHALL BE CUMULATIVE; PROVIDING A SEVERABILITY CLAUSE; PROVIDING A SAVINGS CLAUSE; PROVIDING FOR PUBLICATION IN PAMPHLET FORM; PROVIDING FOR PUBLICATION IN THE OFFICIAL NEWSPAPER; AND PROVIDING AN EFFECTIVE DATE.**

**WHEREAS**, the City of Fort Worth has determined that it is appropriate to protect persons within designated noise sensitive buildings from excessive exterior noise near airports through regulations of design and construction of such new buildings in the vicinity of the designated airports;

**NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF FORT WORTH, TEXAS, AS FOLLOWS:**

**SECTION 1.**

Section 7-61 (b) of the Code of the City of Fort Worth (1986) is amended to read as follows:

(b) The following provisions of the Appendix to the 2003 International Residential Code are hereby specifically adopted as amended as part of the Residential Code of the City of Fort Worth:

Appendix Chapter G, Swimming Pools, Spas and Hot Tubs  
Appendix Chapter J, Existing Buildings and Structures  
Appendix Chapter K, Sound Transmission

**SECTION 2.**

Section 7-62 of the Code of the City of Fort Worth (1986) is amended by adding a new Appendix K as follows:

**APPENDIX K**

**SOUND INSULATION REQUIREMENTS FOR NOISE**

## SENSITIVE USES NEAR AIRPORTS

### SECTION AK101 GENERAL

**AK101.1 Scope.** The regulations and requirements shall apply to all new residential buildings and new noise-sensitive non-residential buildings, as defined herein, that are located wholly or partially within the boundaries of the 65 DNL or greater noise contours as designated in Figure AK101.1(1).

The term “new” shall apply to new detached buildings built after the effective date of this ordinance, and shall include later additions or modifications to those same buildings. The term shall also include a Change of Occupancy in existing buildings from a non-protected occupancy to one of the protected occupancies listed herein.

Buildings in existence prior to the effective date, and additions to or modifications of those same buildings, shall not be required to comply, except when a Change of Occupancy from a non-protected occupancy to one of the protected uses is involved.

### SECTION AK102 DEFINITIONS

**AK102.1 General.** The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

**Aircraft noise** – is generally expressed in terms of its A-weighted sound level, in units called “decibels.” Strictly speaking, the decibel unit should be abbreviated only by “dB”; however, for clarity “dBA” and “dB(A)” are often used to highlight the fact that the sound level measurement has been A-weighted.

**Noise exposure** – in areas around airports is expressed in terms of the Day-Night Average Sound Level, which is abbreviated by “DNL” in text and “ $L_{dn}$ ” in equations.

#### **NOISE-SENSITIVE NON-RESIDENTIAL BUILDINGS –**

1. Nursing homes and hospitals, generally classified as Group I; and
2. Child day care centers, Adult day care centers and schools, generally classified as Group E and Group I-4.

**RESIDENTIAL STRUCTURES:** Single-family, Two-family, Townhouse, Multi-family, and Assisted Living uses, generally classified as Group R, whether in a single occupancy or mixed occupancy.

**Sound insulation properties** – of building construction materials are described by Sound Transmission Loss (TL) or Sound Transmission Class (STC). The higher the TL or STC value, the less sound will be transmitted through the building material.

### **SECTION AK103 PURPOSE**

**AK103.1 General.** All buildings and structures with protective uses, as applicable under this chapter, shall be required to have minimum sound insulation standards and requirements to protect the persons within designated noise sensitive buildings from excessive exterior noise through regulation of design, construction and modification of such buildings. After proper sound insulation measures are taken, the interior sound level, attributable to exterior sources, shall not exceed 45 dB.

With the request for a building permit application, or Change of Use permit application, submitted plans shall show evidence of compliance with the sound insulation requirements. Compliance shall consist of submittal of an acoustical analysis report as follows:

1. In accordance with the prescriptive requirements of Section AK104 or the default ratings of Section AK105; or
2. Any qualified design prepared under by a person experienced in the field of acoustical engineering or a registered architect.

### **SECTION AK104 BUILDING REQUIREMENTS**

**AK104.1 General.** Compliance with the following prescriptive provisions shall be deemed to be in compliance with this chapter.

**AK104.2 Building requirements for construction in the 65 dB zone.**

**1. Exterior Walls.**

Walls that form the exterior envelope may be as listed below and shall be constructed as follows:

- a. Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, minimum 7/8-inch thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal or cementitious fiber siding shall be installed over ½-inch solid sheathing.

Wall insulation shall be at least R-13 glass fiber, or mineral wool or equal and shall be installed continuously throughout the stud space. Foam insulation, as permitted by this code, shall be accepted provided it solidifies to a spongy state and not solid or rigid.

Interior wall finish shall be at least ½” gypsum wallboard

- b. Masonry or concrete load bearing walls. Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall that is finished as required by Item a above.
- c. Or, it is permitted to use any wall designated in Section AK105 with a default STC value of 25\* or greater.

## **2. Exterior Windows**

Windows in the exterior envelope shall be constructed as follows:

- a. All operable windows in the exterior walls shall have a laboratory sound transmission class rating of at least STC 30 dB and shall have air infiltration rate of no more than 0.5 cubic feet per minute when tested according to ASTM E-283; or, shall be double thermopane windows meeting the requirements of the Energy Code.
- b. All fixed windows in the exterior walls shall be at least ¼-inch thick and shall be set in non-hardening glazing materials; or, shall be double thermopane windows meeting the requirements of the Energy Code.
- c. Or, it is permitted to use any window designated in Section AK105 with a default STC value of 25\* or greater.
- d. The total area of glazing in rooms used for sleeping shall not exceed 20 percent of the floor area.

## **3. Exterior Doors**

- a. Exterior hinged doors shall be as follows:
  - 1. a door and edge seal assembly that has a laboratory sound transmission class rating of at least STC 30 dB; or
  - 2. a door, other than a hollow core wood door, that complies with the Energy Code; or,
  - 3. any door installed with a storm door; or,
  - 4. doors installed as part of a vestibule.
- b. Sliding glass doors shall have glass that has a laboratory sound transmission class rating of at least STC 30 dB; or, shall be a sliding glass door that complies with the Energy Code.
- c. Access doors from a garage to a room within a dwelling shall have a laboratory sound transmission rating of at least STC 30 dB; or, shall comply with the Energy Code as a door in the exterior envelope.
- d. Or, it is permitted to use any door designated in Section AK105 with a default STC value of 25\* or greater.
- e. View windows in doors and sidelights shall comply with item 2 above, unless used in a door as listed in 3a above.

## **4. Roof/Ceiling Construction**

- a. Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with ½-inch solid sheathing and any roof covering allowed by this code. An accessible attic space shall be provided above rooms on the uppermost level of Group R buildings.
- b. Commercial type flat roofs are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two.
- c. Cathedral ceilings are discouraged but, if installed, must have enough space to install the insulation of Item d below, with a minimum of 6" air space between the insulation and the roof deck.
- d. Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-30 rating applied between the ceiling joists.
- e. Attic ventilation, when installed, shall be:
  - 1. Gable vents or other attic vents that penetrate the attic enclosure shall be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced. Or,
  - 2. Eave vents that are located under the roof overhang.
- f. Ceilings shall be finished with gypsum board or plaster that is at least 5/8-inch thick;
  - or,
  - ½" gypsum board on resilient channels (RC) installed 16" o.c. perpendicular to the joists. Gypsum screws into the RC shall not be long enough to penetrate the wood stud by more than ¼" if occurring over the stud location;
  - or,
  - a lay-in ceiling with an airspace.
- g. Skylights shall penetrate the ceiling by means of a completely enclosed light well that extends from the roof opening to the ceiling opening. A secondary openable glazing panel shall be mounted at the ceiling line and shall be glazed with at least 3/16-inch plastic, tempered or laminated glass. The weather-side skylight shall be any type that is permitted by this code. The total size of skylights shall be no more than 20 percent of the roof area of the room.

## 5. Floors

The floor of the lowest occupied rooms shall be slab on fill, below grade or over a fully enclosed basement or crawlspace. All door and window openings in the fully enclosed basement shall be tightly fitted. All crawlspace vents must be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced.

## 6. Ventilation

- a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of the Mechanical Code, in each



room without opening any windows, door or other opening to the exterior. Openable windows or doors will not be counted for compliance with the fresh air provisions. Fresh air must be brought in through the HVAC system.

- b. Window and/or through-the-wall ventilation or air-conditioning units shall not be used.
- c. All vent ducts connecting the interior space to the outdoors shall contain at least a ten-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a ninety-degree (right angle) bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross-section. Residential bathroom vents discharging at an eave vent need only to have two ninety-degree (right angle) bends.
- d. Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.

#### **7. Fireplaces**

Each fireplace constructed of masonry units shall be fitted with a spark arrestor, a damper as required by code and shall have glass doors across the front of the firebox.

#### **8. Wall and Ceiling Openings**

Openings in the exterior that degrades its ability to achieve an interior rating of 45 dB or less when all doors and windows are closed are prohibited. Any access panels, pet doors, mail delivery drops, air conditioning, or other openings must be designed to maintain the 45 dB or less standard in the room to which they provide access.

At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked at the pipe duct or conduit or filled with mortar to the wall.

\*STC ratings may overstate the actual attenuation provided by as much as 3 dB, therefore, 25 STC rating in lieu of 20 is mandated.

### **AK104.3 Building requirements for construction in the 70 dB zone.**

#### **1. Exterior Walls**

Walls that form the exterior envelope may be as listed below and shall be constructed as follows:

- a. Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, minimum 7/8-inch thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal or cementitious fiber siding shall be installed over 1/2-inch solid sheathing.

Wall insulation shall be at least R-13 glass fiber, or mineral wool or equal and shall be installed continuously throughout the stud space. Foam insulation, as permitted by this code, shall be accepted provided it solidifies to a spongy state and not solid or rigid.

Interior wall finish shall be at least 5/8-inch gypsum wallboard or plaster;  
or,  
1/2" gypsum wallboard installed on resilient channels (RC) installed 16" o.c.  
perpendicular to the studs. Gypsum screws into the RC shall not be long enough  
to penetrate the wood stud by more than 1/4" if occurring over the stud location.

- b. Masonry or concrete load bearing walls. Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall that is finished as required by Item a above.
- c. Or, it is permitted to use any wall designated in Section AK105 with a default STC value of 30\* or greater. When using door/window openings with a default STC value of less than 30 STC but not less than 25 STC, the STC of the wall shall be downrated by 20%.

## 2. Exterior Windows

Windows in the exterior envelope shall be constructed as follows:

- a. All operable windows in the exterior walls shall have a laboratory sound transmission class rating of at least STC 35 dB and shall have air infiltration rate of no more than 0.5 cubic feet per minute when tested according to ASTM E-283.
- b. All fixed windows in the exterior walls of rooms shall:
  - 1. Have a laboratory sound transmission class rating of at least STC 35 db, or
  - 2. Be 5/8-inch laminated glass with a laboratory sound transmission class rating of at least STC 35 db and shall be set in non-hardening glazing materials, or
  - 3. Be glass block at least 3-1/2 inches thick.
- c. Or, it is permitted to use any window designated in Section AK105 with a default STC value of 30\* or greater.
- d. The total area of glazing in rooms used for sleeping shall not exceed 20 percent of the floor area.

## 3. Exterior Doors

- a. Exterior hinged doors shall be as follows:
  - 1. a door and edge seal assembly that has a laboratory sound transmission class rating of at least STC 35 dB; or
  - 2. a door, other than a hollow core wood door, that complies with the Energy Code and installed with a storm door; or,
  - 3. doors installed as part of a vestibule.
- b. Sliding glass doors shall have glass that has a laboratory sound transmission class rating of at least STC 35 dB.
- c. Access doors from a garage to a room within a dwelling shall have a laboratory sound transmission rating of at least STC 30 dB; or, shall comply with the Energy Code as a door in the exterior envelope.
- d. Or, it is permitted to use any door designated in Section AK105 with a default STC value of 30\* or greater.
- e. View windows in doors and sidelights shall comply with item 2 above, unless used in a door as listed in 3a above.

#### 4. Roof/Ceiling Construction

- a. Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with ½-inch solid sheathing and any roof covering allowed by this code. An accessible attic space shall be provided above rooms on the uppermost level of Group R buildings.
- b. Commercial type flat roofs are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two.
- c. Cathedral ceilings are discouraged but, if installed, must have ¾" solid decking above, enough space to install the insulation of Item d below, with a minimum of 6" air space between the insulation and the roof deck.
- d. Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-30 rating applied between the ceiling joists.
- e. Attic ventilation, when installed, shall be:
  1. Gable vents or other attic vents that penetrate the attic enclosure shall be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced. Or,
  2. Eave vents that are located under the roof overhang.
- f. Ceilings shall be finished with gypsum board or plaster that is at least 5/8-inch thick. Ceiling materials shall be mounted on resilient channels;  
or,  
a lay-in ceiling with an airspace.
- g. Skylights shall penetrate the ceiling by means of a completely enclosed light well that extends from the roof opening to the ceiling opening. A secondary openable glazing panel shall be mounted at the ceiling line or at a point that provides at least a 4-inch space between the skylight glazing and the secondary glazing and shall be glazed with at least 3/16-inch plastic or laminated glass. The weather-side skylight shall be any type that is permitted by this code. The total size of skylights shall be no more than 20 percent of the roof area of the room.

#### 5. Floors

The floor of the lowest occupied rooms shall be slab on fill, below grade or over a fully enclosed basement or crawlspace. All door and window openings in the fully enclosed basement shall be tightly fitted. All crawlspace vents must be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced.

#### 6. Ventilation

- a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of the Mechanical Code, in each

room without opening any windows, door or other opening to the exterior.

Openable windows or doors will not be counted for compliance with the fresh air provisions. Fresh air must be brought in through the HVAC system.

- b. Window and/or through-the-wall ventilation or air-conditioning units shall not be used.
- c. All vent ducts connecting the interior space to the outdoors shall contain at least a ten-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a ninety-degree (right angle) bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross-section. Residential bathroom vents discharging at an eave vent need only to have two ninety-degree (right angle) bends.
- d. Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.

#### **7. Fireplaces**

Each fireplace constructed of masonry units shall be fitted with a spark arrestor, a damper as required by code and shall have glass doors across the front of the firebox.

#### **8. Wall and Ceiling Openings**

Openings in the exterior that degrades its ability to achieve an interior rating of 45 dB or less when all doors and windows are closed are prohibited. Any access panels, pet doors, mail delivery drops, air conditioning, or other openings must be designed to maintain the 45 dB or less standard in the room to which they provide access.

At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked at the pipe duct or conduit or filled with mortar to the wall.

\*STC ratings may overstate the actual attenuation provided by as much as 3 dB, therefore, 30 STC rating in lieu of 25 is mandated.

### **AK104.4 Building requirements for construction in the 75 dB or greater areas.**

#### **1. Exterior Walls**

Walls that form the exterior envelope may be as listed below and shall be constructed as follows:

- a. Wood walls with studs at least 4 inches in nominal depth. Exterior finish shall be stucco, minimum 7/8-inch thickness, brick veneer, masonry, or any siding material allowed by this code. Wood, metal or cementitious fiber siding shall be installed over 3/4-inch solid sheathing.

Wall insulation shall be at least R-13 glass fiber, or mineral wool or equal and shall be installed continuously throughout the stud space. Foam insulation, as permitted by this code, shall be accepted provided it solidifies to a spongy state and not solid or rigid.

Interior wall finish shall be at least 5/8-inch gypsum wallboard installed on resilient channels (RC) installed 16" o.c. perpendicular to the studs. Gypsum screws into the RC shall not be long enough to penetrate the wood stud by more than 1/4" if occurring over the stud location.

- b. Masonry or concrete load bearing walls. Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall that is finished as required by Item a above.
- c. Or, it is permitted to use any wall designated in Section AK105 with a default STC value of 35\* or greater. When using door/window openings with a default STC value of less than 35 STC but not less than 30 STC, the STC of the wall shall be downrated by 20%.

## 2. Exterior Windows

Windows in the exterior envelope shall be constructed as follows:

- a. All operable windows in the exterior walls shall have a laboratory sound transmission class rating of at least STC 40 dB and shall have air infiltration rate of no more than 0.5 cubic feet per minute when tested according to ASTM E-283.
- b. All fixed windows in the exterior walls of rooms shall:
  - 1. Have a laboratory sound transmission class rating of at least STC 40 db, or
  - 2. Be 5/8-inch laminated glass with a laboratory sound transmission class rating of at least STC 40 db and shall be set in non-hardening glazing materials, or
  - 3. Be glass block at least 3-1/2 inches thick.
- c. Or, it is permitted to use any window designated in Section AK105 with a default STC value of 35\* or greater.
- d. The total area of windows and doors in rooms used for sleeping shall not exceed 20 percent of the floor area.

## 3. Exterior Doors

- a. Exterior hinged doors shall be as follows:
  - 1. a door and edge seal assembly that has a laboratory sound transmission class rating of at least STC 40 dB; or
  - 2. a solid-core wood or insulated metal door at least one (1) inch thick separated by an airspace of at least four (4) inches from another door, which can be a storm door. Both doors shall be tightly fitted and weather-stripped; or,
  - 3. doors installed as part of a vestibule.
- b. Sliding glass doors shall have glass that has a laboratory sound transmission class rating of at least STC 40 dB;  
or,  
a double sliding glass door, separated by a minimum four-inch airspace. Each door shall comply with the air leakage rate of the Energy Code. Glass shall be at least three-sixteenths (3/16) inch thick but not equal in thickness between the two doors, and tempered or laminated.

- c. Access doors from a garage to a room within a dwelling shall have a laboratory sound transmission rating of at least STC 30 dB; or, shall comply with the Energy Code as a door in the exterior envelope.
- d. Or, it is permitted to use any door designated in Section AK105 with a default STC value of 35\* or greater.
- e. View windows in doors and sidelights shall comply with item 2 above, unless used in a door as listed in 3a above.
- f. The joint between the wall opening and the door frame shall be continuously filled with glass fiber insulation and the exterior cover trim shall be continuously caulked to seal the joint.

#### **4. Roof/Ceiling Construction**

- a. Roof rafters shall have a minimum slope of 4:12 and shall be covered on their top surface with ½-inch solid sheathing and any roof covering allowed by this code. An accessible attic space shall be provided above rooms on the uppermost level of Group R buildings.
- b. Commercial type flat roofs are permitted if insulated as required by the Energy Code and a separate lay-in ceiling is added below with an airspace between the two.
- c. Cathedral ceilings are discouraged but, if installed, must have 1" solid decking above, have enough space to install the insulation of Item d below, with a minimum of 6" air space between the insulation and the roof deck. Structural information shall be provided confirming adequate support of the decking.
- d. Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-30 rating applied between the ceiling joists.
- e. Attic ventilation, when installed, shall be:
  - 1. Gable vents or other attic vents that penetrate the attic enclosure shall be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced. Or,
  - 2. Eave vents that are located under the roof overhang.
- f. Ceilings shall be finished with gypsum board or plaster that is at least 5/8-inch thick. Ceiling materials shall be mounted on resilient channels;  
or,  
a lay-in ceiling with an airspace.
- g. Skylights shall penetrate the ceiling by means of a completely enclosed light well that extends from the roof opening to the ceiling opening. A secondary openable glazing panel shall be mounted at the ceiling line or at a point that provides at least a 4-inch space between the skylight glazing and the secondary glazing and shall be glazed with at least 3/16-inch plastic or laminated glass. The weather-side skylight shall be any type that is permitted by this code. The total size of skylights shall be no more than 20 percent of the roof area of the room.

#### **5. Floors**



The floor of the lowest occupied rooms shall be slab on fill, below grade or over a fully enclosed basement or crawlspace. All door and window openings in the fully enclosed basement shall be tightly fitted. All crawlspace vents must be fitted with a ½" plywood panel, with 1" semi-rigid insulation attached to the surface facing the vent, so that the panel is at least six inches larger than the vent opening on all sides and is attached to prevent direct line-of-site perpendicular to the vent. The new panel shall also be positioned so that the amount of ventilation is not reduced.

## **6. Ventilation**

- a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of the Mechanical Code, in each room without opening any windows, door or other opening to the exterior. Openable windows or doors will not be counted for compliance with the fresh air provisions. Fresh air must be brought in through the HVAC system.
- b. Window and/or through-the-wall ventilation or air-conditioning units shall not be used.
- c. All vent ducts connecting the interior space to the outdoors shall contain at least a ten-foot length of internal sound-absorbing duct lining. Each duct shall be provided with a ninety-degree (right angle) bend in the duct such that there is no direct line-of-sight through the duct from the venting cross-section to the room-opening cross-section. Residential bathroom vents discharging at an eave vent need only to have two ninety-degree (right angle) bends.
- d. Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.

## **7. Fireplaces**

Each fireplace constructed of masonry units shall be fitted with a spark arrestor, a damper as required by code and shall have glass doors across the front of the firebox.

## **8. Wall and Ceiling Openings**

Openings in the exterior that degrades its ability to achieve an interior rating of 45 dB or less when all doors and windows are closed are prohibited. Any access panels, pet doors, mail delivery drops, air conditioning, or other openings must be designed to maintain the 45 dB or less standard in the room to which they provide access.

At the penetration of exterior walls by pipes, ducts, or conduits, the space between the wall and pipes, ducts, or conduits shall be caulked at the pipe duct or conduit or filled with mortar to the wall.

\*STC ratings may overstate the actual attenuation provided by as much as 3 dB, therefore, 35 STC rating in lieu of 30 is mandated.

# **SECTION AK105 DEFAULT COMPONENT RATINGS**

**AK105.1 General.** The acoustical performance of the building depends on the combined performances of each of the elements. The final result depends on the transmission loss (or STC) and the relative surface areas of the elements. If any of the components has poor insulation properties the overall performance can be seriously weakened. Windows are usually one of the weakest elements in the dwelling's sound insulation performance.

The following default STC ratings may be used in determining the sound envelope of the building. The required combined default values are as follows:

**Zone 65 dB** – The sound enclosure must be comprised of all components, wall, window, doors and roof that each have a default STC rating of 25\* or higher.

**Zone 70 dB** – The sound enclosure must be comprised of all components, wall, window, doors and roof that have a default STC rating of 30\* or higher. It is permitted to use windows and doors of less than 30 STC but not less than 25 STC rating, provided the wall STC shall be downrated by 20% and the non-compliant window/door area shall not exceed 20% of the floor area per room.

**Zone 75 or higher dB** – The sound enclosure must be comprised of all components, wall, window, doors and roof that have a default STC rating of 35\* or higher. It is permitted to use windows or doors with less than 35 STC but not less than 30 STC rating, provided the wall STC shall be downrated by 20% and the non-compliant window/door area shall not exceed 20% of the floor area per room.

\*STC ratings may overstate the actual attenuation provided by as much as 3 dB, therefore, all STC rating requirements are upgraded by 5.

<b>Walls</b>	<b>STC</b>	<b>STC when under-rated windows or doors are used</b>
Exterior siding, 1/2" solid sheathing, 2 x 4" nominal stud 16" o.c., fiberglass insulation, 1/2" interior gypsum attached directly to studs	39	31
7/8" stucco, No. 15 felt building paper and 1" wire mesh, 2 x 4" nominal stud 16" o.c., fiberglass insulation, 1/2" gypsum board attached directly to stud.	46	37
Face Brick, 1/2" air space with metal ties, 3/4" insulation board sheathing, 2 x 4" nominal studs 16" o.c., fiberglass building insulation, 1/2" gypsum board attached directly to studs	56	45
1" stucco, 8" thick hollow concrete block, 1/2" gypsum attached to furring strips	49	39
Exterior siding, 7/16" solid sheathing, 2 x 4" nominal stud 16" o.c., batt insulation, resilient channels, 1/2" gypsum board	43	34

Exterior siding, 7/16" solid sheathing, 2 x 6" nominal stud 16" o.c., batt insulation, resilient channels, 1/2" gypsum board	47	37
Exterior siding, 7/16" solid sheathing, 2 x 4" staggered studs 16" o.c. on 2 x 6" base plate, batt insulation, 1/2" gypsum attached directly to studs	50	40

<b>Windows</b>	<b>STC</b>
Wood double hung, closed but unlocked, single glazing	23
Aluminum sliding, latched, single glazing	24
Wood double hung, closed but unlocked, glazed with 7/16" insulating glass	22
1/8" double glazed window with 1/4" air space	26
1/4" single glazed window	30
1/4" laminated glass single glazed window	34
1/4" + 1/8" double glazed window with 2" airspace	39
1/4" + 1/8" double glazed window with 4 3/4" airspace	43

<b>Doors</b>	<b>STC</b>
Wood, flush solid core, with brass weather stripping	27
Wood, flush solid core, plastic weather stripping, aluminum storm door	34
Wood, French door, brass weather stripping	26
Steel, flush, with urethane foam core, with magnetic weather stripping	28
Wood, solid core	26
Steel or fiberglass	25
Sliding glass	27

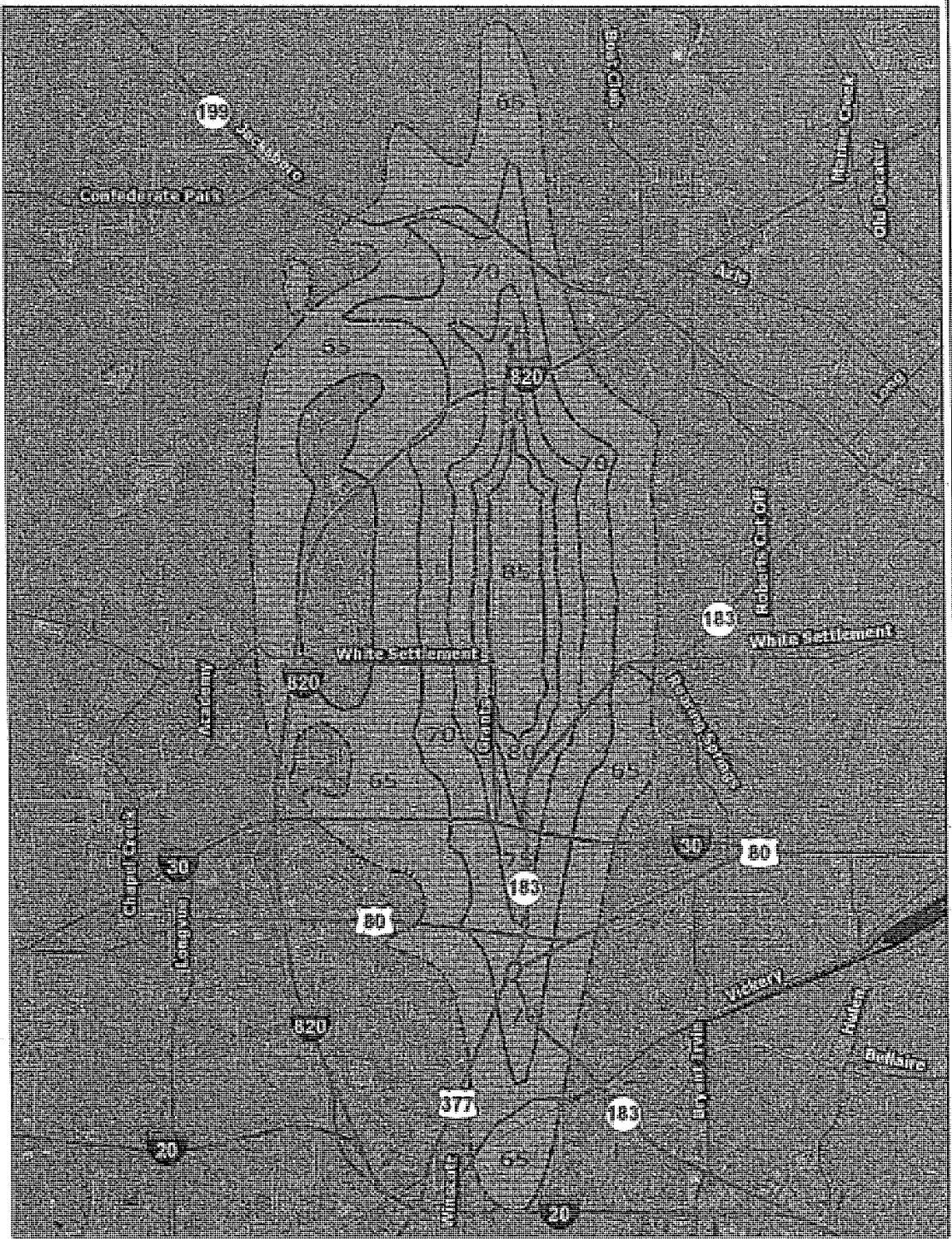


Figure AK101.1(1)

### **SECTION 3.**

This article shall be cumulative of all provisions of ordinances and of the Code of the City of Fort Worth, Texas (1986), as amended, except where the provisions of this article are in direct conflict with the provisions of such ordinances and such Code, in which event conflicting provisions of such ordinances and such Code are hereby repealed.

### **SECTION 4.**

It shall be unlawful for any person to erect, construct, enlarge, alter, repair, move, improve, remove, convert, demolish, equip, use, occupy, or maintain any building or structure in the City or cause the same to be done contrary to or in violation of any of the provisions of this Code. Any person, firm or corporation violating any of the provisions of this ordinance shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punishable by a fine not to exceed Two Thousand Dollars (\$2,000.00) for all violations involving fire safety, or public health and sanitation and shall be fined not more than Five Hundred Dollars (\$500.00) for all other violations of this ordinance. Each day or any portion thereof during which any violation of this ordinance occurs or continues shall be deemed a separate offense and upon conviction thereof shall be punishable as herein provided.

### **SECTION 5.**

It is hereby declared to be the intention of the City Council that the sections, paragraphs, sentences, clauses, and phrases of this ordinance are severable, and, if any phrase, clause, sentence, paragraph, or section of this ordinance shall be declared void, ineffective, or unconstitutional by the valid judgment or final decree of any court of competent jurisdiction, such voidness, ineffectiveness, or unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this ordinance, since the same would have been enacted by the City Council without the incorporation in this ordinance of any such void, ineffective, or unconstitutional phrase, clause, sentence, paragraph, or section.

### **SECTION 6.**

This ordinance constitutes a digest and revision of the Building Code of the City of Fort Worth, as provided in Section 2, Chapter XXV, and Section 9, Chapter XXVII, of the Charter of the City of Fort Worth. The Development Department of the City of Fort Worth, Texas, is hereby authorized to publish this ordinance in pamphlet form for general distribution among the public, and the operative provisions of this ordinance, as so published, shall be admissible in evidence in all courts without further proof than the production thereof, as provided in Chapter XXV, Section 3, of the Charter of the City of Fort Worth, Texas.

**SECTION 7.**

The City Secretary of the City of Fort Worth, is hereby directed to publish the caption, penalty clause, and effective date of this ordinance for two (2) days in the official newspaper of the City of Fort Worth, Texas as authorized by Section 2, Chapter XXV of the Charter of the City of Fort Worth, Texas and by Section 52.013 (a) of the Texas Local Government Code.

**SECTION 8.**

This ordinance shall take effect upon adoption and publication as required by law.

APPROVED AS TO FORM AND LEGALITY:

  
\_\_\_\_\_  
Assistant City Attorney

Adopted: August 9, 2007

Effective: August 24, 2007



*City of Fort Worth, Texas*  
**Mayor and Council Communication**

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**COUNCIL ACTION: Approved on 8/9/2007 - Ord. Nos. 17680-08-2007 and 17681-08-2007**

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**DATE:** Thursday, August 09, 2007

**LOG NAME:** 06AIRPORT NOISE

**REFERENCE NO.:** PZ-2747

**SUBJECT:**

Adopt Ordinances Amending the Building Code and Residential Code to Add Noise Attenuation Provisions for Noise-Sensitive Uses in the Naval Air Station Joint Reserve Base Noise Impact Areas

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**RECOMMENDATION:**

It is recommended that the City Council adopt the attached ordinances amending the Building Code and the Residential Code by adding construction provisions for attenuation of airport noise for certain uses in the Naval Air Station Joint Reserve Base noise impact areas.

**DISCUSSION:**

The City of Fort Worth, other adjacent municipalities, and Tarrant County are participating in a Joint Land Use Study (JLUS) associated with the Naval Air Station Joint Reserve Base. The purpose of the JLUS is to promote compatible community growth that supports military training and operational missions at the Joint Reserve Base. A JLUS Policy Committee is overseeing the study and will issue recommendations in October 2007. The recommendations will seek to minimize incompatible development in the noise impact areas, which are depicted in the attached ordinances. Each municipality will then review the recommendations and revise their development regulations on an individual basis.

Given the potential for incompatible development while the study recommendations are prepared and implemented, the City Council authorized staff to prepare building code amendments for noise sensitive uses in the noise impact areas. These uses include residences, nursing homes, hospitals, day care centers, and schools. The code amendments would require noise attenuation in the construction of new buildings to achieve an interior noise level of 45 DNL. The requirements will apply to exterior walls, exterior windows, exterior doors, roof/ceiling construction, wall and ceiling openings, floors, ventilation and fireplaces. The attached ordinances would amend the Building Code and the Residential Code.

In June and July, City staff briefed affected property owners, the Development Advisory Committee, and representatives of the Fort Worth Builders Association, Greater Fort Worth Association of Realtors, and the Fort Worth Chamber of Commerce. The City Council endorsed the proposed code amendments at the pre-Council meeting on July 31.

The ordinance amendments would affect property in COUNCIL DISTRICTS 3 and 7.

**FISCAL INFORMATION/CERTIFICATION:**

The Finance Director certifies that this action will have no material effect on City funds.

**TO Fund/Account/Centers**

**FROM Fund/Account/Centers**

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**Submitted for City Manager's Office by:**

Dale Fisseler (6266)

**Originating Department Head:**

Fernando Costa (8042)

**Additional Information Contact:**

Al Godwin (7825)

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## Chapter 17.78 - NAS OVERLAY DISTRICT

### Sections:

[17.78.010 - Purpose.](#)

[17.78.020 - Use regulations.](#)

### 17.78.010 - Purpose.

The purpose of this overlay district is to provide uses that are compatible with the aircraft operations at the Naval Air Station Fort Worth Joint Reserve Base. The boundaries of the district will be adopted by the city council and will approximate the area within the city that may be affected by day-night level (DNL) noise levels of sixty-five decibels (dB) or greater. The basis for the determination of the area affected by the sixty-five DNL will be the most recently-adopted Air Installation Compatible Use Zone (AICUZ) for NAS Fort Worth JRB adopted by the Department of Defense.

(Ord. 1257 § 6 (part), 2008)

### 17.78.020 - Use regulations.

In addition to the zoning restrictions contained within the underlying zoning district and notwithstanding any other provisions in the underlying district, no new building or newly-developed land shall be used and no buildings shall be hereafter erected, reconstructed, altered, or enlarged, within the NAS overlay district unless they comply with the following restrictions:

#### A. Prohibited uses:

1. One- and two-family dwellings. Exception: One- or two-family dwellings that were constructed or occupied on the date of the adoption of the ordinance codified in this chapter, or any existing platted lot that is zoned for one- or two-family dwellings, may construct or reconstruct a one- or two-family dwelling within the NAS overlay zone provided that construction methods are used to achieve an inside sound level reduction of thirty dB from the outside noise level.

#### B. Permitted uses allowed only with sound attenuation (minimum of twenty-five dB reduction):

1. Multiple-family dwellings (exceeding three units in each building);
2. Public, private, and parochial elementary and secondary schools;
3. Higher education institutions;
4. Religious institutions;
5. Museums, libraries and fine arts centers (including auditoriums and concert halls).

(Ord. 1257 § 6 (part), 2008)

AN ORDINANCE 2010-06-24-0640

**AMENDING CHAPTER 35, UNIFIED DEVELOPMENT CODE OF THE CITY CODE OF SAN ANTONIO, TEXAS BY ADOPTING A NEW ZONING DISTRICT AND REGULATIONS FOR A MILITARY SOUND ATTENUATION OVERLAY ZONING DISTRICT AS PART OF THE IMPLEMENTATION OF THE CAMP BULLIS JOINT LAND USE STUDY AND ADOPTING A RESOLUTION DIRECTING THE PLANNING AND DEVELOPMENT SERVICES DEPARTMENT TO INITIATE A ZONING DISTRICT BOUNDARY CHANGE FOR THE MILITARY SOUND ATTENUATION OVERLAY ZONING DISTRICT.**

\* \* \*

**WHEREAS**, the Camp Bullis Joint Land Use Study (JLUS) adopted by City Council in June of 2009 includes a recommendation for an initiative to implement a sound attenuation ordinance for the area impacted by noise from Camp Bullis training activities; and

**WHEREAS**, training is vital to the missions of the military bases, camps and installations in and around San Antonio. Continued complaints of noise from these military activities could result in reduction or loss of military missions at the local installations, which would have a negative impact on San Antonio's economy; and

**WHEREAS**, sound attenuation of structures for certain noise sensitive land uses, as recommended in the Camp Bullis JLUS will provide for a method to ameliorate the noise concerns; and

**WHEREAS**, City staff has worked with a stakeholder committee, which included industry experts and military representatives, to develop standards and regulations for a sound attenuation overlay zoning district; and

**WHEREAS**, a public hearing was held regarding this amendment at which time parties in interest and citizens were given an opportunity to be heard; and

**WHEREAS**, the Zoning Commission has recommended approval of a new zoning district and regulations for a Military Sound Attenuation Overlay District; and

**WHEREAS**, City Council now desires to amend the Unified Development Code by adopting a Military Sound Attenuation Overlay Zoning District; **NOW THEREFORE;**

**BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF SAN ANTONIO:**

**SECTION 1.** Chapter 35 of the City Code of San Antonio, Texas is hereby amended by adding language that is underlined (added) and deleting the language that is stricken (~~deleted~~) to the existing text as set forth in this Ordinance.

**SECTION 2.** Chapter 35 of the City Code of San Antonio, Texas is hereby amended as follows:

Chapter 35, Article III, Section 35-303 is amended by adding the Military Sound Attenuation Overlay District to the existing overlay districts as follows:

**Sec. 35-303. Establishment of Districts.**

\* \* \* \* \*

Overlay Districts  
(Listed in Alphabetical Order)

\*\*\*\*

"MLOD"	Military Lighting Overlay Districts
"MSAO"	<u>Military Sound Attenuation Overlay Districts</u>
"NCD"	Neighborhood Conservation Districts

\* \* \* \* \*

Chapter 35, Article III, is amended by adding Section 35-339.05 "MSAO" Military Sound Attenuation Overlay District as follows:

**Sec. 35-339.05. "MSAO" Military Sound Attenuation Overlay District.**

Statement of Purpose

Noise generated from military training exercises and aircraft operations affects quality of life for various San Antonio neighborhoods and business districts. This section establishes standards intended to lessen the external noise audible within the interior of noise sensitive structures to a level which greatly mitigates the impact on the general welfare of the public.

**(a) Zoning District Establishment and Designation Criteria.**

- (1) This section establishes a military sound attenuation overlay district as an overlay to the base zoning districts. Separate ordinances are required to designate an overlay district via the official rezoning process.
- (2) To be designated as a military sound attenuation overlay district, the area must be identified by the United States military, joint land use study or adopted master plan as being situated within a noise military influence area.
- (3) The zoning designation for a military sound attenuation overlay district shall consist of a base zone symbol and the "MSAO" symbol as a suffix. Military sound attenuation overlay districts shall be numbered sequentially to distinguish among different districts, i.e., "MSAO-1", "MSAO-2", etc.

**(b) Noise Sensitive Land Uses.** The following is a list of noise sensitive land uses subject to this section:

- (1) Residential structures including but not limited to single-family and multi-family dwellings

- (2) Assisted living facilities, nursing facilities, adult day cares and similar congregated living uses
- (3) Facilities for religious worship or study
- (4) In-patient medical facilities including but not limited to hospitals and residential treatment centers
- (5) Funeral homes
- (6) Child care facilities
- (7) Senior/community centers
- (8) Libraries
- (9) Schools including but not limited to primary and secondary schools, colleges and universities; **Exceptions:**
  - A. Public school buildings built with standard masonry construction techniques
  - B. Non-classroom portions of public or private school gymnasiums
  - C. Public school temporary portable buildings with standard exterior mounted HVAC units, and with construction materials for walls, ceilings, windows and doors having a minimum tested or listed sound transmission class (STC) rating of thirty-two (32), in accordance with ASTM E 90.

(c) **District Standards – Camp Bullis (MSAO-1)**

All habitable portions of structures occupied by noise sensitive land uses shall be designed and constructed to achieve either:

- an outside to inside noise level reduction (NLR) of at least twenty-five (25) a-weighted decibels (dBA), or
- be built to the standards set forth in subsection (c)(1) B. below.

These standards are required regardless of whether the noise sensitive land use is stand-alone as a single use or part of a larger development that may include more than one land use.

- (1) **Options for Compliance.** Compliance may be demonstrated using one of the following methods:
  - A. Use simultaneous noise readings of instantaneous outside and inside noise levels in accordance with ASTM E 966 to ensure the structure achieves an outside to inside NLR of at least twenty-five (25) dBA; or
  - B. Utilize construction materials with a minimum tested or listed sound transmission class (STC) rating of forty (40), in accordance with ASTM E 90, for walls and ceilings, and with a minimum tested or listed STC rating for doors and windows as specified below, in accordance with the following construction methods:
    1. **Walls.** The specific exterior wall assemblies listed below shall include the interior finishes set forth therein. **Exception:** Exterior wall assemblies or materials that have been tested or listed with a minimum STC rating of forty (40).
      - a. **Brick veneer.** When exterior walls are constructed using brick veneer, a minimum of one-half (½) inch gypsum drywall shall be applied as the interior finish, or a minimum of three and one-half (3½) inches of foam insulation shall be sprayed in as allowed by the building and fire code.
      - b. **Vinyl or cement sidings.** When exterior walls are constructed using vinyl or cement sidings, a minimum of five-eighths (5/8) inch gypsum drywall shall be applied as the interior finish, or a minimum of three and one-half (3½) inches of foam insulation shall be sprayed in as allowed by the building and fire code.
      - c. **Other assemblies and materials.** All other exterior wall assemblies or materials shall have a tested or listed minimum STC rating of forty (40).



2. **Roof/Ceiling Assemblies.** Roof/ceiling assemblies shall be constructed in accordance with the requirements of subsections a or b below. Exception: Roof/ceiling assemblies or materials that have been tested or listed with a minimum STC rating of forty (40).
  - a. Ceilings with unconditioned attic space shall be insulated with a minimum of one-half (1/2) inch gypsum drywall on the interior ceiling side covered with a minimum of twelve (12) inches of blown in fiberglass insulation, or a minimum of three and one-half (3 1/2) inches of spray foam insulation shall be applied to the underside of the roof deck as allowed by the building and fire code.
  - b. Ceilings without attic space above shall be insulated with a minimum of five-eighths (5/8) inch gypsum drywall on the interior side filled with a minimum of nine (9) inches of fiberglass batt insulation with a one (1) inch air space between the roof sheathing and the fiberglass, or a minimum of three and one-half (3 1/2) inches of spray foam insulation shall be applied to the underside of the roof deck as allowed by the building and fire code.
3. **Windows.** The cavity between the wood framing and the window frame shall be insulated with fiberglass insulation or foam insulation to the depth of the window frame.
  - a. If the exterior windows and doors together comprise no more than thirty percent (30%) of the total exterior wall area, all windows shall have a minimum tested or listed STC rating of thirty (30).
  - b. If the exterior windows and doors together comprise more than thirty percent (30%) but no more than forty percent (40%) of the total exterior wall area, all windows shall have a minimum tested or listed STC rating of thirty-two (32).
  - c. If the exterior windows and doors together comprise more than forty percent (40%) of the total exterior wall area, all windows shall have a minimum tested or listed STC rating of forty (40).
4. **Doors.**
  - a. If the exterior windows and doors together comprise no more than thirty percent (30%) of the total exterior wall area, all exterior doors shall have a minimum tested or listed STC rating of thirty (30).
  - b. If the exterior windows and doors together comprise more than thirty percent (30%) but no more than forty percent (40%) of the total exterior wall area, all exterior doors shall have a minimum tested or listed STC rating of thirty-two (32).
  - c. If the exterior windows and doors together comprise more than forty percent (40%) of the total exterior wall area, all exterior doors shall have a minimum tested or listed STC rating of forty (40).  
Exception: An exterior door may have a tested or listed STC rating of less than forty (40) when installed with a storm door which when combined, achieve a minimum tested or listed STC rating of forty (40).
5. **Mechanical Systems.** Mechanical ventilation systems (HVAC) shall provide minimum air circulation and fresh air requirements for various uses in occupied rooms without the need to open any windows, doors, or other openings to the exterior.
  - a. In-window, through-wall, or through-floor air conditioning, ventilating, or heating units may be used if:
    - i. the above insulation requirements for walls, ceilings, windows and doors are implemented, or
    - ii. walls, ceilings, windows and doors have a minimum tested or listed STC rating of forty (40).

- b. Evaporative coolers may be installed if the following is implemented to reduce sound entering through the unit:
  - i. Insert a duct extension with at least two (2) ninety degree (90°) "elbows" between the structure and the unit.
  - ii. Add acoustically designed "upducts" in the ceiling of each room to allow proper circulation of air while windows are closed.

(2) **Certification.**

- A. Prior to approval of final inspection or issuance of a certificate of occupancy, all project applicants shall submit to the planning and development services department a signed statement certifying compliance with this section.
- B. A single certification statement for multiple structures in the same development may be used as long as the structures implement the same floor plans and construction methods.

\*\*\*\*\*

Chapter 35, Appendix A, "Definitions and Rules of Interpretation" is amended by adding the following definitions:

**Appendix A**  
**Definitions and Rules of Interpretation.**

**Sec. 35-A101. Generally.**

\*\*\*\*\*

ASTM E 90. The standard test method for laboratory measurement of airborne sound transmission loss of building partitions and elements.

ASTM E 966. The standard guide for field measurements of airborne sound insulation of building facades and facade elements.

A-Weighted Decibel (dBA). The most commonly weighted sound filter used to measure perceived loudness versus actual sound intensity. The human ear responds differently to frequencies. For example, the human hearing system perceives mid-frequency sounds as louder than low and high frequency sounds. To accommodate this condition when measuring sound levels, filters need to be installed into sound meters. The results are a more accurate measurement of sound for the human hearing system.

Decibel (dB). Unit of measurement used to express the intensity or loudness of sound.

Sound Transmission Class (STC). An integer rating relating to the quality of sound attenuation for building partitions such as walls, ceilings, doors, and windows.

\*\*\*\*\*

**SECTION 3.** All other provisions of Chapter 35 of the City Code of San Antonio, Texas shall remain in full force and effect unless expressly amended by this ordinance.

**SECTION 4.** Should any Article, Section, Part, Paragraph, Sentence, Phrase, Clause, or Word of this ordinance, for any reason be held illegal, inoperative, or invalid, or if

any exception to or limitation upon any general provision herein contained be held to be unconstitutional or invalid or ineffective, the remainder shall, nevertheless, stand effective and valid as if it had been enacted and ordained without the portion held to be unconstitutional or invalid or ineffective.

**SECTION 5.** The City Clerk is directed to publish notice of these amendments to Chapter 35, Unified Development Code of the City Code of the City of San Antonio, Texas. Publication shall be in an official newspaper of general circulation in accordance with Section 17 of the City Charter.

**SECTION 6.** The publishers of the City Code of San Antonio, Texas are authorized to amend said Code to reflect the changes adopted herein and to correct typographical errors and to index, format and number paragraphs to conform to the existing code.

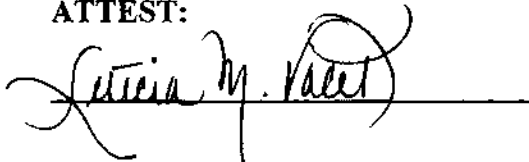
**SECTION 7.** The Planning and Development Services Department is directed to initiate a zoning district boundary change to apply the Sound Attenuation Overlay Zoning District.

**SECTION 8.** This ordinance shall take effect July 4, 2010.

**PASSED AND APPROVED on this 24<sup>th</sup> day of June 2010.**

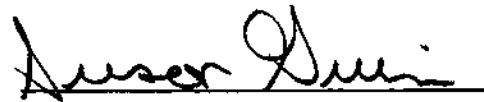
  
M A Y O R  
Julián Castro

**ATTEST:**



Leticia M. Vacek, City Clerk

**APPROVED AS TO FORM:**



for Michael D. Bernard, City Attorney



Request for  
**COUNCIL  
ACTION**



**Agenda Voting Results - 69**

<b>Name:</b>	68, 69, Z-2						
<b>Date:</b>	06/24/2010						
<b>Time:</b>	03:36:56 PM						
<b>Vote Type:</b>	Motion to Approve						
<b>Description:</b>	An Ordinance amending Chapter 35, Unified Development Code of the City Code of San Antonio, Texas by adopting a new zoning district and regulations for a Military Sound Attenuation Overlay zoning district as part of the implementation of the Camp Bullis Joint Land Use Study and adopting a Resolution directing the Planning and Development Services Department to initiate a zoning district boundary change for the Military Sound Attenuation Overlay zoning district. [T.C. Broadnax, Assistant City Manager; Roderick J. Sanchez, Director, Department of Planning and Development Services]						
<b>Result:</b>	Passed						
Voter	Group	Not Present	Yea	Nay	Abstain	Motion	Second
Julián Castro	Mayor		x				
Mary Alice P. Cisneros	District 1		x				
Ivy R. Taylor	District 2		x				
Jennifer V. Ramos	District 3		x				x
Philip A. Cortez	District 4		x				
David Medina Jr.	District 5		x				
Ray Lopez	District 6		x				
Justin Rodriguez	District 7		x				
W. Reed Williams	District 8		x				
Elisa Chan	District 9		x				
John G. Clamp	District 10		x			x	

OPNAVINST 11010.36C

MCO 11010.16

9 Oct 2008

**TABLE 1 - AIR INSTALLATIONS COMPATIBLE USE ZONES  
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES**

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 ( DNL or CNEL)		Noise Zone 2 ( DNL or CNEL)		Noise Zone 3 ( DNL or CNEL)		
SLUCM NO	LAND USE NAME	< 55	55- 64	65 - 69	70 -74	75- 79	80 -84	85+
<b>10</b>	<b>Residential</b>							
11	Household Units	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
11.11	Single units: detached	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
11.12	Single units: semidetached	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
11.13	Single units: attached row	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
11.21	Two units: side-by-side	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
11.22	Two units: one above the other	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
11.31	Apartments: walk-up	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
11.32	Apartment: elevator	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
12	Group quarters	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
13	Residential Hotels	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
14	Mobile home parks or courts	Y	Y <sup>1</sup>	N	N	N	N	N
15	Transient lodgings	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N
16	Other residential	Y	Y <sup>1</sup>	N <sup>1</sup>	N <sup>1</sup>	N	N	N
<b>20</b>	<b>Manufacturing</b>							
21	Food & kindred products; manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
22	Textile mill products; manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
24	Lumber and wood products (except furniture); manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
25	Furniture and fixtures; manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
26	Paper and allied products; manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
27	Printing, publishing, and allied industries	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
28	Chemicals and allied products; manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
29	Petroleum refining and related industries	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N

**TABLE 1 - AIR INSTALLATIONS COMPATIBLE USE ZONES  
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES (Continued)**

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 ( DNL or CNEL)		Noise Zone 2 ( DNL or CNEL)		Noise Zone 3 ( DNL or CNEL)		
SLUCM NO.	LAND USE NAME	< 55	55- 64	65 - 69	70 -74	75- 79	80 -84	85+
<b>30</b>	<b>Manufacturing (continued)</b>							
31	Rubber and misc. plastic products; manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
32	Stone, clay and glass products; manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
33	Primary metal products; manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
34	Fabricated metal products; manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	Y	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
<b>40</b>	<b>Transportation, communication and utilities</b>							
41	Railroad, rapid rail transit, and street railway transportation	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
42	Motor vehicle transportation	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
43	Aircraft transportation	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
44	Marine craft transportation	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
45	Highway and street right-of-way	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
46	Automobile parking	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
47	Communication	Y	Y	Y	25 <sup>5</sup>	30 <sup>5</sup>	N	N
48	Utilities	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
49	Other transportation, communication and utilities	Y	Y	Y	25 <sup>5</sup>	30 <sup>5</sup>	N	N
<b>50</b>	<b>Trade</b>							
51	Wholesale trade	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
52	Retail trade - building materials, hardware and farm equipment	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
53	Retail trade - shopping centers	Y	Y	Y	25	30	N	N
54	Retail trade - food	Y	Y	Y	25	30	N	N
55	Retail trade - automotive, marine craft, aircraft and accessories	Y	Y	Y	25	30	N	N
56	Retail trade - apparel and accessories	Y	Y	Y	25	30	N	N



**TABLE 1 - AIR INSTALLATIONS COMPATIBLE USE ZONES  
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES (Continued)**

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 ( DNL or CNEL)		Noise Zone 2 ( DNL or CNEL)		Noise Zone 3 ( DNL or CNEL)		
SLUCM NO.	LAND USE NAME	< 55	55- 64	65 - 69	70 -74	75- 79	80 -84	85+
57	Retail trade - furniture, home, furnishings and equipment	Y	Y	Y	25	30	N	N
58	Retail trade - eating and drinking establishments	Y	Y	Y	25	30	N	N
59	Other retail trade	Y	Y	Y	25	30	N	N
<b>60</b>	<b>Services</b>							
61	Finance, insurance and real estate services	Y	Y	Y	25	30	N	N
62	Personal services	Y	Y	Y	25	30	N	N
62.4	Cemeteries	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4,11</sup>	Y <sup>6,11</sup>
63	Business services	Y	Y	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
64	Repair Services	Y	Y	Y	Y <sup>2</sup>	Y <sup>3</sup>	Y <sup>4</sup>	N
65	Professional services	Y	Y	Y	25	30	N	N
65.1	Hospitals, other medical fac.	Y	Y <sup>1</sup>	25	30	N	N	N
65.16	Nursing Homes	Y	Y	N <sup>1</sup>	N <sup>1</sup>	N	N	N
66	Contract construction services	Y	Y	Y	25	30	N	N
67	Government Services	Y	Y <sup>1</sup>	Y <sup>1</sup>	25	30	N	N
68	Educational services	Y	Y <sup>1</sup>	25	30	N	N	N
69	Miscellaneous	Y	Y	Y	25	30	N	N
<b>70</b>	<b>Cultural, entertainment and recreational</b>							
71	Cultural activities (& churches)	Y	Y <sup>1</sup>	25	30	N	N	N
71.2	Nature exhibits	Y	Y <sup>1</sup>	Y <sup>1</sup>	N	N	N	N
72	Public assembly	Y	Y <sup>1</sup>	Y	N	N	N	N
72.1	Auditoriums, concert halls	Y	Y	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	Y	Y <sup>1</sup>	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	Y	Y	Y <sup>1</sup>	Y <sup>1</sup>	N	N	N
73	Amusements	Y	Y	Y	Y	N	N	N
74	Recreational activities (include golf courses, riding stables, water rec.)	Y	Y <sup>1</sup>	Y <sup>1</sup>	25	30	N	N
75	Resorts and group camps	Y	Y <sup>1</sup>	Y <sup>1</sup>	Y <sup>1</sup>	N	N	N
76	Parks	Y	Y <sup>1</sup>	Y <sup>1</sup>	Y <sup>1</sup>	N	N	N
79	Other cultural, entertainment and recreation	Y	Y <sup>1</sup>	Y <sup>1</sup>	Y <sup>1</sup>	N	N	N
<b>80</b>	<b>Resource Production and Extraction</b>							
81	Agriculture (except live stock)	Y	Y	Y <sup>8</sup>	Y <sup>9</sup>	Y <sup>10</sup>	Y <sup>10,11</sup>	Y <sup>10,11</sup>

**TABLE 1 - AIR INSTALLATIONS COMPATIBLE USE ZONES  
SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES (Continued)**

Land Use		Suggested Land Use Compatibility						
		Noise Zone 1 ( DNL or CNEL)		Noise Zone 2 ( DNL or CNEL)		Noise Zone 3 ( DNL or CNEL)		
SLUCM NO.	LAND USE NAME	< 55	55- 64	65 - 69	70 -74	75- 79	80 -84	85+
81.5	Livestock farming	Y	Y	Y <sup>8</sup>	Y <sup>9</sup>	N	N	N
81.7	Animal breeding	Y	Y	Y <sup>8</sup>	Y <sup>9</sup>	N	N	N
82	Agriculture related activities	Y	Y	Y <sup>8</sup>	Y <sup>9</sup>	Y <sup>10</sup>	Y <sup>10,11</sup>	Y <sup>10,11</sup>
83	Forestry Activities	Y	Y	Y <sup>8</sup>	Y <sup>9</sup>	Y <sup>10</sup>	Y <sup>10,11</sup>	Y <sup>10,11</sup>
84	Fishing Activities	Y	Y	Y	Y	Y	Y	Y
85	Mining Activities	Y	Y	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y	Y	Y

**KEY TO TABLE 1 - SUGGESTED LAND USE COMPATIBILITY IN NOISE ZONES**

- SLUCM Standard Land Use Coding Manual, U.S. Department of Transportation
- Y (Yes) Land Use and related structures compatible without restrictions.
- N (No) Land Use and related structures are not compatible and should be prohibited.
- Y<sup>x</sup> (Yes with Restrictions) The land use and related structures are generally compatible. However, see note(s) indicated by the superscript.
- N<sup>x</sup> (No with exceptions) The land use and related structures are generally incompatible. However, see notes indicated by the superscript.
- NLR (Noise Level Reduction) NLR (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
- 25, 30, or 35 The numbers refer to NLR levels. Land Use and related structures generally compatible however, measures to achieve NLR of 25, 30 or 35 must be incorporated into design and construction of structures. However, measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with one of these numbers.
- DNL Day Night Average Sound Level.
- CNEL Community Noise Equivalent Level (normally within a very small decibel difference of DNL)
- Ldn Mathematical symbol for DNL.

**NOTES FOR TABLE 1 - SUGGESTED LAND USE COMPATIBILITY**  
**IN NOISE ZONES**

1. General

a. Although local conditions regarding the need for housing may require residential use in these zones, residential use is discouraged in DNL 65 to 69 and strongly discouraged in DNL 70 to 74. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones.

b. Where the community determines that these uses must be allowed measures to achieve and outdoor to indoor NLR of at least 25 Decibels (dB) in DNL 65 to 69 and NLR of 30 dB in DNL 70 to 74 should be incorporated into building codes and be in individual approvals; for transient housing a NLR of at least 35 dB should be incorporated in DNL 75 to 79.

c. Normal permanent construction can be expected to provide a NLR of 20 dB, thus the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

d. NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, design and use of berms and barriers can help mitigate outdoor noise exposure NLR particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

2. Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the

public is received, office areas, noise sensitive areas or where the normal noise level is low.

4. Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

5. If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.

6. No buildings.

7. Land use compatible provided special sound reinforcement systems are installed.

8. Residential buildings require a NLR of 25

9. Residential buildings require a NLR of 30.

10. Residential buildings not permitted.

11. Land use not recommended, but if community decides use is necessary, hearing protection devices should be worn.

TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES <sup>1</sup>					
SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
<b>11 Residential</b>					
11	Household Units				
11.11	Single units: detached	N	N	Y <sup>2</sup>	Max density of 1-2 Du/Ac
11.12	Single units: semidetached	N	N	N	
11.13	Single units: attached row	N	N	N	
11.21	Two units: side-by-side	N	N	N	
11.22	Two units: one above the other	N	N	N	
11.31	Apartments: walk-up	N	N	N	
11.32	Apartment: elevator	N	N	N	
12	Group quarters	N	N	N	
13	Residential Hotels	N	N	N	
14	Mobile home parks or courts	N	N	N	
15	Transient lodgings	N	N	N	
16	Other residential	N	N	N	
<b>20 Manufacturing</b>					
21	Food & kindred products; manufacturing	N	N	Y	Max FAR 0.56 in APZ II
22	Textile mill products; manufacturing	N	N	Y	Same as above
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	N	N	N	
24	Lumber and wood products (except furniture); manufacturing	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II
25	Furniture and fixtures; manufacturing	N	Y	Y	Same as above
26	Paper and allied products; manufacturing	N	Y	Y	Same as above
27	Printing, publishing, and allied industries	N	Y	Y	Same as above
28	Chemicals and allied products; manufacturing	N	N	N	
29	Petroleum refining and related industries	N	N	N	
<b>30 Manufacturing (continued)</b>					

TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES <sup>1</sup>					
SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
31	Rubber and misc. plastic products; manufacturing	N	N	N	
32	Stone, clay and glass products; manufacturing	N	N	Y	Max FAR 0.56 in APZ II
33	Primary metal products; manufacturing	N	N	Y	Same as above
34	Fabricated metal products; manufacturing	N	N	Y	Same as above
35	Professional scientific, & controlling instrument; photographic and optical goods; watches & clocks	N	N	N	
39	Miscellaneous manufacturing	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II
<b>40 Transportation, communication and utilities <sup>2,3</sup></b>					
41	Railroad, rapid rail transit, and street railway transportation	N	Y <sup>5</sup>	Y	Same as above.
42	Motor vehicle transportation	N	Y <sup>5</sup>	Y	Same as above
43	Aircraft transportation	N	Y <sup>5</sup>	Y	Same as above
44	Marine craft transportation	N	Y <sup>5</sup>	Y	Same as above
45	Highway and street right-of-way	N	Y <sup>5</sup>	Y	Same as above
46	Auto parking	N	Y <sup>5</sup>	Y	Same as above
47	Communication	N	Y <sup>5</sup>	Y	Same as above
48	Utilities	N	Y <sup>5</sup>	Y	Same as above
485	Solid waste disposal (Landfills, incineration, etc.)	N	N	N	
49	Other transport, comm. and utilities	N	Y <sup>5</sup>	Y	See Note 5 below
<b>50 Trade</b>					
51	Wholesale trade	N	Y	Y	Max FAR of 0.28 in APZ I. & .56 in APZ II.
52	Retail trade - building materials, hardware and farm equipment	N	Y	Y	See Note 6 below
53	Retail trade - Shopping centers, Home Improvement Store, Discount Club, Electronics Superstore	N	N	Y	Max FAR of 0.16 in APZ II
54	Retail trade - food	N	N	Y	Max FAR of 0.24 in APZ II



TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES <sup>1</sup>					
SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
55	Retail trade - automotive, marine craft, aircraft and accessories	N	Y	Y	Max FAR of 0.14 in APZ I & 0.28 in APZ II
56	Retail trade - apparel and accessories	N	N	Y	Max FAR 0.28 in APZ II
57	Retail trade - furniture, home, furnishings and equipment	N	N	Y	Same as above
58	Retail trade - eating and drinking establishments	N	N	N	
59	Other retail trade	N	N	Y	Max FAR of 0.16 in APZ II
<b>60 Business services</b>					
61	Finance, insurance and real estate services	N	N	Y	Max FAR of 0.22 for "General Office/Office park" in APZ II
62	Personal services	N	N	Y	Office uses only. Max FAR of 0.22 in APZ II.
62.4	Cemeteries	N	Y <sup>9</sup>	Y <sup>9</sup>	
63	Business services (credit reporting; mail, stenographic, reproduction; advertising)	N	N	Y	Max FAR of 0.22 in APZ II
63.7	Warehousing and storage services	N	Y	Y	Max FAR 1.0 APZ I; 2.0 in APZ II
64	Repair Services	N	Y	Y	Max FAR of 0.11 APZ I; 0.22 in APZ II
65	Professional services	N	N	Y	Max FAR of 0.22 in APZ II
65.1	Hospitals, nursing homes	N	N	N	
65.1	Other medical facilities	N	N	N	
66	Contract construction services	N	Y	Y	Max FAR of 0.11 APZ I; 0.22 in APZ II
67	Government Services	N	N	Y	Max FAR of 0.24 in APZ II
68	Educational services	N	N	N	
69	Miscellaneous	N	N	Y	Max FAR of 0.22 in APZ II
<b>70 Cultural, entertainment and recreational</b>					
71	Cultural activities	N	N	N	
71.2	Nature exhibits	N	Y <sup>10</sup>	Y <sup>10</sup>	
72	Public assembly	N	N	N	
72.1	Auditoriums, concert halls	N	N	N	
72.11	Outdoor music shells, amphitheaters	N	N	N	

9 Oct 2008

TABLE 2 - AIR INSTALLATIONS COMPATIBLE USE ZONES SUGGESTED LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES <sup>1</sup>					
SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation	APZ-I Recommendation	APZ-II Recommendation	Density Recommendation
72.2	Outdoor sports arenas, spectator sports	N	N	N	
73	Amusements - fairgrounds, miniature golf, driving ranges; amusement parks, etc	N	N	Y	
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y <sup>10</sup>	Y <sup>10</sup>	Max FAR of 0.11 APZ I; 0.22 in APZ II
75	Resorts and group camps	N	N	N	
76	Parks	N	Y <sup>10</sup>	Y <sup>10</sup>	Same as 74
79	Other cultural, entertainment and recreation	N	Y <sup>9</sup>	Y <sup>9</sup>	Same as 74
<b>80 Resource Production and Extraction</b>					
81	Agriculture (except live stock)	Y <sup>1</sup>	Y <sup>11</sup>	Y <sup>11</sup>	
81.5, 81.7	Livestock farming and breeding	N	Y <sup>11,12</sup>	Y <sup>11,12</sup>	
82	Agriculture related activities	N	Y <sup>11</sup>	Y <sup>11</sup>	Max FAR of 0.28 APZ I; 0.56 APZ II no activity which produces smoke, glare, or involves explosives
83	Forestry Activities <sup>13</sup>	N	Y	Y	Same as Above
84	Fishing Activities <sup>14</sup>	N <sup>14</sup>	Y	Y	Same as Above
85	Mining Activities	N	Y	Y	Same as Above
89	Other resource production or extraction	N	Y	Y	Same as Above
<b>90 Other</b>					
91	Undeveloped Land	Y	Y	Y	
93	Water Areas	N <sup>15</sup>	N <sup>15</sup>	N <sup>15</sup>	

**KEY TO TABLE 2 - SUGGESTED LAND USE COMPATIBILITY**  
**IN ACCIDENT POTENTIAL ZONES**

SLUCM -	Standard Land Use Coding Manual, U.S. Department of Transportation
Y (Yes) -	Land use and related structures are normally compatible without restriction.
N (No) -	Land use and related structures are not normally compatible and should be prohibited.
Yx - (Yes with restrictions)	The land use and related structures are generally compatible. However, see notes indicated by the superscript.
Nx - (No with exceptions)	The land use and related structures are generally incompatible. However, see notes indicated by the superscript.
FAR - Floor Area Ratio	A floor area ratio is the ratio between the square feet of floor area of the building and the site area. It is customarily used to measure non-residential intensities.
Du/Ac - Dwelling Units per Acre	This metric is customarily used to measure residential densities.

**NOTES FOR TABLE 2 - SUGGESTED LAND USE COMPATIBILITY**  
**IN ACCIDENT POTENTIAL ZONES**

The following notes refer to Table 2.

1. A "Yes" or a "No" designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of densities of people and structures. In order to assist installations and local governments, general suggestions as to FARs are provided as a guide to density in some categories. In general, land use restrictions which limit commercial, services, or industrial buildings or structure occupants to 25 per acre in APZ I, and 50 per acre in APZ II are the range of occupancy levels, including employees, considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people per acre in APZ I, and Maximum (Max) assemblies of 50 people per acre in APZ II.

2. The suggested Max density for detached single-family housing is one to two Du/Ac. In a Planned Unit Development (PUD) of single family detached units where clustered housing development results in large open areas, this density could possibly be increased provided the amount of surface area covered by structures does not exceed 20 percent of the PUD total area. PUD encourages clustered development that leaves large open areas.

3. Other factors to be considered: labor intensity, structural coverage, explosive characteristics, air-pollution, electronic interference with aircraft, height of structures, and potential glare to pilots.

4. No structures (except airfield lighting), buildings or aboveground utility/communications lines should normally be located in clear zone areas on or off the installation. The clear zone is subject to severe restrictions. See UFC 3-260-01, "Airfield and Heliport Planning and Design" dated 10 November 2001 for specific design details.

5. No passenger terminals and no major above ground transmission lines in APZ I.

6. Within SLUCM Code 52, Max FARs for lumber yards (SLUCM Code 521) are 0.20 in APZ-I and 0.40 in APZ-II. For hardware/paint and farm equipment stores, SLUCM Code 525, the Max FARs are 0.12 in APZ-I and 0.24 in APZ-II.

7. A shopping center is an integrated group of commercial establishments that is planned, developed, owned, or managed as a unit. Shopping center types include strip, neighborhood, community, regional, and super regional facilities anchored by small businesses, supermarket or drug store, discount retailer, department store, or several department stores, respectively. Included in this category are such uses as big box discount clubs, home improvement superstores, office supply superstores, and electronics superstores. The Max recommended FAR for SLUCM 53 should be applied to the gross leasable area of the shopping center rather than attempting to use other recommended FARs listed in Table 2 under "Retail" or "Trade."

8. Low intensity office uses only. Accessory uses such as meeting places, auditoriums, etc., are not recommended.

9. No chapels are allowed within APZ I or APZ II.

10. Facilities must be low intensity, and provide no tot lots, etc. Facilities such as clubhouses, meeting places, auditoriums, large classes, etc. are not recommended.

11. Includes livestock grazing, but excludes feedlots and intensive animal husbandry. Activities that attract concentrations of birds creating a hazard to aircraft operations should be excluded.

12. Includes feedlots and intensive animal husbandry.

13. Lumber and timber products removed due to establishment, expansion, or maintenance of clear zones will be disposed of in accordance with appropriate DoD Natural Resources instructions.

14. Controlled hunting and fishing may be permitted for the purpose of wildlife management.

15. Naturally occurring water features (e.g., rivers, lakes, streams, (wetlands) are compatible.

**ORDINANCE NO. 20898-09-2013**

**AN ORDINANCE AMENDING THE ZONING ORDINANCE OF THE CITY OF FORT WORTH, BEING ORDINANCE NO. 13896, AS AMENDED, CODIFIED AS APPENDIX "A" OF THE CODE OF THE CITY OF FORT WORTH, BY AMENDING ARTICLE 4, "OVERLAY DISTRICTS," OF CHAPTER 4, "DISTRICT REGULATIONS," TO ADD A NEW SECTION, SECTION 4.405, "AIRPORT/AIRFIELD OVERLAY ("AO") DISTRICT"; PROVIDING FOR REGULATIONS FOR AIRPORT/AIRFIELD OVERLAY ZONES AND COMPATIBLE USE ZONES ("AO-CUZ") RESTRICTIONS FOR INCOMPATIBLE USES WITHIN CLEAR ZONES AND ACCIDENT POTENTIAL ZONES FOR THE NAVAL AIR STATION FORT WORTH JOINT RESERVE BASE; AND TO REVISE CHAPTER 9, "DEFINITIONS" TO ADD DEFINITIONS RELATED TO AIRPORTS; PROVIDING THAT THIS ORDINANCE SHALL BE CUMULATIVE; PROVIDING A SEVERABILITY CLAUSE; PROVIDING A PENALTY CLAUSE; PROVIDING A SAVINGS CLAUSE; PROVIDING FOR PUBLICATION IN THE OFFICIAL NEWSPAPER; AND PROVIDING AN EFFECTIVE DATE.**

**WHEREAS**, the Dallas Fort Worth International Airport, the Alliance Airport, Fort Worth Meacham International Airport, and Spinks Airport are major economic generators and fulfill an essential community purpose; and

**WHEREAS**, the Naval Air Station Fort Worth Joint Reserve Base (NAS FW JRB) serves a vital role in the economy of the City of Fort Worth and the region as well as in the defense of the Nation; and

**WHEREAS**, the creation or establishment of land uses or airport hazards that are not compatible with the operations of an airfield is a public nuisance, injures the region served by the airports, and affects the welfare of users of the airports and of owners, occupants, and users of land in the vicinity of the airports; and

**WHEREAS**, these nuisances may include any use, activity or structure that may be a hazard to the taking off, landing, and maneuvering of aircraft or that interferes with visual radar, radio, or other systems for tracking, acquiring data relating to, monitoring or controlling aircraft be prevented; or that may be sensitive to the noise level and vibrations that are typical in the vicinity of an operative airfield, tending to destroy or impair the utility of the airport and the public investment in the airports; and

**WHEREAS**, it is necessary in the interest of the health, safety, and welfare of the general public, as well as the economic stability of the region that the creation or establishment of incompatible land uses and airport hazards be prevented; and

**WHEREAS**, it is necessary in the interest of predictable growth and development of land in the vicinity of the airports, the long term integrity of the airports' usage and operations,



and minimizing future conflicts between use and operation of the airports and development of land in the vicinity of the airports that the creation or establishment of incompatible land uses and hazards be prevented; and

**WHEREAS**, the creation of an airport hazard or incompatible use should be prevented to the extent legally possible, by the exercise of police power without compensation; and

**WHEREAS**, it is further declared that the prevention of the creation or establishment of hazards to air navigation, the elimination, removal, alteration or mitigation of hazards to air navigation, or the marking and lighting of obstructions are public purposes for which a political subdivision may raise and expend public funds and acquire interests in land; and

**WHEREAS**, pursuant to Chapter 241 of the Texas Local Government Code, it is advisable to adopt regulations necessary to protect Runway Protection Zones (RPZ) for the municipal airports and Accident Potential Zones (APZ) for the NAS FW JRB at the ends of runways from uses and hazards that could prove detrimental to the operation and safety of the airfield,

**NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF FORT WORTH, TEXAS, AS FOLLOWS:**

**SECTION 1.**

Article 4, "Overlay Districts," of Chapter 4, "District Regulations," is amended to add a new section, Section 4.405, "Airport/Airfield Overlay ("AO") District" to provide development standards and guidelines and administrative procedures related to airports/airfields to read as follows:

**4.405 Airport/Airfield ("AO") Overlay District**

**A. Purpose and Intent**

The purpose of the airport/airfield overlay district is the regulation of land uses in the vicinity of the City's airports and airfields and to ensure the protection of the airports where it has been determined that they are an essential economic element of the City and surrounding cities. It is also the purpose of this section to protect the health, safety, and general welfare of the public where it is recognized that aircraft accidents and excessive noise have the potential for endangering or harming the lives and or property of users or occupants of land in the vicinity of the airports that serve Fort Worth.

## B. Generally

1. Applicability. Airport zoning regulations shall apply to all of the incorporated areas of the City of Fort Worth which are located within an accident potential zone or clear zone as described herein. The use of all land and any buildings or structures located upon the land, and the height, construction, reconstruction, alteration, expansion or relocation of any building or structure upon the land shall conform to all regulations applicable to this section. No land, building, structure or premise shall be constructed and/or used for any purpose or in any manner other than is permitted in this section.  
The airport zoning regulation shall also be in accordance with prescribed regulations contained in V.T.C.A., Local Government Code, § 241.001 et seq.
2. Notwithstanding any other provisions of this section, no use shall be made of land or water nor institution within an Airport/Airfield Overlay District in such a manner as to create electrical interference with navigational signals or radio communications between the airport and aircraft, make it difficult for pilots to distinguish between airport lights and others, impair visibility in the vicinity of the airport, create bird strike hazards or otherwise endanger or interfere with the landing, takeoff or maneuvering of aircraft utilizing the City of Fort Worth Airports or the Naval Air Station Fort Worth Joint Reserve Base (NAS FW JRB).
3. Maps identifying the boundaries of the Airport/Airfield Overlay District for the applicable airports and further described by each applicable airport subsection are hereby incorporated into the City's Official Zoning Map.
4. Zoning Classification:
  - a. Airport/Airfield Overlay District. The Airport/Airfield Overlay District is designed as an overlay to the base zoning district. Property located within this zoning overlay must also be designated as being within one of the base zoning districts. Permitted uses must be allowed in both the base zoning district and the overlay district and must comply with height, yard, area and parking requirements of the base zoning district.
  - b. Zoning Designation. The zoning designation of the property located within the Airport/Airfield Overlay District shall consist of the base zoning symbol and the overlay symbol as a suffix. For example, if a parcel is zoned "A-5" and is also located in the Airport/Airfield Overlay District, the zoning of the parcel would be "A-5/AO." The zoning designation of parcels located within a compatible use zone shall consist of the base zoning symbol and the following as a suffix: "AO-CUZ."
5. Height Considerations
  - a. Code of Federal Regulations Title 14, Part 77, Subpart C establishes the following imaginary surfaces for airports: approach surface; conical surface; horizontal surface; primary surface; and transitional surface as defined in the applicable Airport Layout Plan.
    - i. Structures cannot penetrate Federal Aviation Regulation Part 77 imaginary surfaces and elevation at the site of construction.
    - ii. Construction or Alteration Requiring Notice. Any person proposing construction or alteration whether permanent, temporary or of natural

growth in the area surrounding any municipal or military airport shall notify the Manager, Air Traffic Division of the Federal Aviation Administration (FAA) Regional Office and the Manager of the Municipal Airport or Community Liaison or other appointee of the NAS FW JRB, as applicable, if such construction or alteration exceeds any of the following height standards.

1. The height limits are defined in terms of imaginary surfaces in the airspace extending about two to three miles around airport runways and approximately 9.5 miles from the ends of the runways having a precision instrument approach.
  2. Notice must be provided for all structures measuring 200 feet above ground level measured at the point of highest elevation of the foundation or where it has been determined that the proposed construction penetrates the Federal Aviation Regulation Part 77 imaginary surfaces.
  3. When requested by the FAA, any construction or alteration that would be in an instrument approach area and available information indicates the height might exceed any FAA obstruction standard, must be submitted for review.
- b. Notice to FAA. Nothing in this section shall be construed as relieving any property owner, sponsor or agent from the requirement for filing a notice of proposed construction or alteration with the appropriate Federal Aviation Administration.
- c. A copy of a Determination of No Hazard or similar documentation will be required from the FAA, and the NAS FW JRB, as applicable, before release of a building permit by the City of Fort Worth.
6. Marking of Nonconforming Structures
- a. The owner of any nonconforming structure or object of natural growth deemed an operational hazard by the City of Fort Worth and/or Naval Air Station Joint Reserve Base is required to install and maintain thereon markers and lighting to indicate to the operators of aircraft in the vicinity of the airport the presence of such airport hazards. Such markers and lights shall be installed, operated and maintained at the expense of the property owner, as required by the FAA.

#### C. Naval Air Station Fort Worth Joint Reserve Base

##### 1. Purpose and Intent.

The City of Fort Worth has designated a NAS FW JRB Compatible Use Zone (AO-CUZ) in order to promote the public health, safety, peace, comfort, convenience, and general welfare of the inhabitants of and near military airport environs and to prevent the impairment of military airfields and the public investment therein. The land areas below military airport take off and final approach paths are exposed to significant danger of aircraft accidents. It is, therefore, necessary to limit the density of development and intensity of uses in such areas. The NAS FW JRB Compatible Use Zone is intended to: guide, control, and regulate future growth and development; promote orderly

and appropriate use of land; protect the character and stability of existing land uses; enhance the quality of living in the areas affected; protect the general economic welfare by restricting incompatible land uses; prevent the establishment of any land use which would endanger aircraft operations and the continued use of the NAS FW JRB.

2. Boundaries: The specific boundaries of the NAS FW JRB Compatible Use Zone are shown on the official zoning map maintained by the City and depicted and attached as Exhibit B.27. The Compatible Use Zones include the Clear Zones and Accident Potential Zones (APZs).
3. Use Restrictions in Accident Potential Zones and Clear Zone
  - a. Permitted uses shall be allowed in accordance with Table 1, attached and incorporated here to into the Zoning Ordinance.
  - b. Certain uses, unless stated otherwise, within Table 1 shall be prohibited within the APZs. Prohibited uses include but are not limited to, new residences, schools, places of public assembly and outdoor recreation uses. Other prohibited uses include the manufacture of flammable or combustible liquids or materials, the generation of any substance that would impair visibility or otherwise interfere with the operation of aircraft including steam/dust/smoke; and uses that may encourage the congregation of birds or waterfowl increasing the chance of a bird strike including landfills.
  - c. Above ground fuel storage facilities shall be permitted only in accordance with the Uniform Fire Code.
  - d. All new nonresidential uses indicated on the table as "N" Not Compatible on Table 1 are considered prohibited.
4. Residential Uses

In lieu of the requirements of Chapter 7, Nonconformities regarding construction, the following shall be allowed within the AO-CUZ:

  - a. Existing residential one-family uses located within a platted residential subdivision will be permitted to reconstruct a single-family residential structure.
  - b. New residential construction shall be permitted only on vacant lots that are within an existing platted residential subdivision. This section does not apply to residential properties located within the Clear Zone.
  - c. Tracts or lots may not be subdivided.
5. Existing Nonresidential Uses and Structures

In lieu of the requirements of Chapter 7, Nonconformities regarding construction and continuation of use, the following shall be allowed within the AO-CUZ:

  - a. Existing nonresidential uses or structures may reconstruct a structure for the same nonconforming use with equal or less square footage that had previously existed on the property or for such other use that has a density equal to or less than the prior use. Density will be measured from the occupancy count as determined by the City's Building Official.
  - b. A nonresidential structure that is vacant for any period of time will be allowed to request a Certificate of Occupancy for a new tenant or property



owner provided that the use requested is identical to the use identified on the last Certificate of Occupancy for the structure, or is for a use that has a density equal to or less than the previous use of the structure. Density will be measured from the occupancy count as determined by the City's Building Official.

- c. A Certificate of Occupancy may be issued for new tenants or property owners and changes of use for any use allowed in a shopping center with multiple tenant spaces or an existing regional mall site, as stated in Table 1, Note 7 and Note 8.
- d. In an existing structure, a use not allowed in Table 1 will be allowed provided that the proposed nonconforming use has a density equal to or less than the previous use of the structure. A use changed to a lower density than had previously existed may not thereafter be returned to a use of higher density, provided however the aforementioned shall not apply to a shopping center or an existing regional mall site.
- e. Any tenant or property owner of a building within an existing regional mall site shall be permitted to construct, re-construct, relocate and redevelop the square footage existing within the APZ 1 area as of the effective date of this ordinance plus an additional 25,000 square feet of building improvements at any location solely within 400 feet of the eastern APZ 1 boundary. The additional 25,000 square feet within 400 feet of the eastern APZ1 boundary shall be allocated to and located upon the applicable portion of the property described as Parcel 1 in the Special Warranty Deed filed of record under Instrument No.D205100827, Real Property Records, Tarrant County, Texas (the "Developer's Parcel") or such other tract within 400 feet of the eastern APZ 1 boundary designated by the owner of the Developer's Parcel.
- f. A nonconforming use if changed to a conforming use may not thereafter be changed to a nonconforming use, provided however the aforementioned shall not apply to a shopping center or an existing regional mall site.

## SECTION 2.

Chapter 9 "Definitions", of Ordinance No. 13896, of the Zoning Ordinance is hereby amended to read as follows:

The following words, terms and phrases, when used in this Article, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

*AICUZ* means the Air Installation Compatible Use Zone report of the Department of Defense.

*Airport* shall mean the Fort Worth Alliance Airport, Dallas-Fort Worth International Airport, Fort Worth Meacham International Airport, Naval Air Station Fort Worth Joint Reserve Base and Fort Worth Spinks Airport located in Tarrant, Dallas, Denton, Johnson and Tarrant Counties.

*Airport elevation* shall mean the elevation as established in the most current approved Airport Layout Plan Set.

*Airport hazard* shall mean any structure, tree, installation, electronic and/or visual interference, or use of land or water which obstructs the airspace required for the flight of aircraft in landing or taking off at the airport or is otherwise hazardous to such landing or taking off of aircraft.

*Airport hazard area* shall mean any area of land or water under the imaginary surfaces as established in Code of Federal Regulations Title 14, Part 77 – “Objects Affecting Navigable Space – Imaginary Surfaces” upon which an airport hazard might be established if not prevented as provided in section 4.405.

*Airport Height Control Area* shall mean the space between the earth's surface and the imaginary surfaces as established in 14 CFR Part 77 – “Objects Affecting Navigable Space – Imaginary Surfaces.”

*Airport Layout Plan* means a graphic representation of the current and future airport facilities as determined from the review of the aviation forecasts, facility requirements, and alternatives analysis.

*Accidental Potential Zone I (APZ I)* means the rectangular area beyond the Clear Zone which still has a measurable potential for aircraft accidents relative to the Clear Zone and is 3,000 feet in width by 5,000 feet in length.

*Accident Potential Zone II (APZ II)* means the rectangular area beyond the APZ I which has a measurable potential for aircraft accidents relative to APZ I or the Clear Zone and is 3,000 feet in width by 7,000 feet in length.

*Clear Zone (CZ)* means the trapezoidal area lying immediately beyond the end of the runway and outward along the extended runway center line for a distance of 3,000 feet. Dimensions are 1,500 feet in width at the runway threshold and 2,284 feet in width at its outer edge. The Clear Zone represents the highest potential for aircraft accidents.

*Height.* For the purpose of determining the height limits in the Airport/Airfield Overlay Districts and shown on the Airport Height Control Map, the datum shall be measured in mean sea level elevation unless otherwise specified.

*NAS FW JRB* means the Naval Air Station Fort Worth Joint Reserve Base

*Runway* shall mean the paved surface of an airport designated for the landing and taking off of aircraft.

*RPZ* means the Runway Protection Zone at the ends of the runways for the municipal airports.

*Structure* for the purposes of section 4.405 structures shall mean an object permanently or temporarily constructed or installed by man, including, but without limitation, buildings as



measured at its highest peak, towers, spires, architectural features, smokestacks and overhead transmission lines.

*Tree* shall mean any object of natural growth.

### **SECTION 3.**

This ordinance shall be cumulative of all provisions of ordinances and of the Code of the City of Fort Worth, Texas (1986), as amended, except where the provisions of this ordinance are in direct conflict with the provisions of such ordinances and such Code, in which event conflicting provisions of such ordinances and such Code are hereby repealed.

### **SECTION 4.**

It is hereby declared to be the intention of the City Council that the sections, paragraphs, sentences, clauses and phrases of this ordinance are severable, and, if any phrase, clause, sentence, paragraph or section of this ordinance shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs and sections of this ordinance, since the same would have been enacted by the City Council without the incorporation in this ordinance of any such unconstitutional phrase, clause, sentence, paragraph or section.

### **SECTION 5**

Any person, firm or corporation who violates, disobeys, omits, neglects or refuses to comply with or who resists the enforcement of any of the provisions of this ordinance shall be fined not more than Two Thousand Dollars (\$2,000.00) for each offense. Each day that a violation exists shall constitute a separate offense.

**SECTION 6.**

All rights and remedies of the City of Fort Worth, Texas, are expressly saved as to any and all violations of the provisions of Ordinance No. 13896 which have accrued at the time of the effective date of this ordinance and, as to such accrued violations and all pending litigation, both civil and criminal, whether pending in court or not, under such ordinances, same shall not be affected by this ordinance but may be prosecuted until final disposition by the courts.

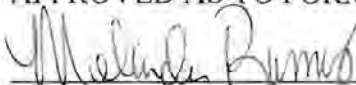
**SECTION 7.**

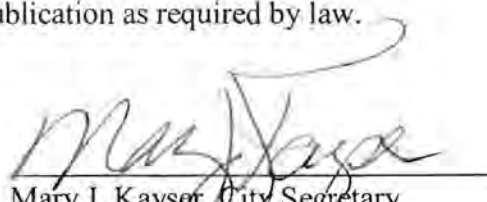
The City Secretary of the City of Fort Worth, Texas, is hereby directed to publish the caption, penalty clause and effective date of this ordinance for two (2) days in the official newspaper of the City of Fort Worth, Texas, as authorized by Section 52.013, Texas Local Government Code.

**SECTION 8.**

This ordinance shall take effect upon adoption and publication as required by law.

APPROVED AS TO FORM AND LEGALITY:

  
\_\_\_\_\_  
Assistant City Attorney

  
\_\_\_\_\_  
Mary J. Kayser, City Secretary

ADOPTED: September 10, 2013

EFFECTIVE: September 25, 2013

**TABLE 1 - COMPATIBLE USE ZONES**  
**LAND USE COMPATIBILITY IN ACCIDENT POTENTIAL ZONES**

Revised 8/30/13

2012 NAICS NO	LAND USE NAME	CLEAR ZONE	APZ-I	APZ-II	Density Guidelines
	<i>Residential</i>				
	Household Units				
236115	Single units: detached (new)	N	N	N	2
	Single units: detached (existing)	*	*	*	*Existing homes may be rebuilt; refer to Sect. 4.405C(4) for regulations in existing res. subd.
2361	Single units: semidetached	N	N	N	
2361	Single units: attached row	N	N	N	
2361	Two units: side-by-side	N	N	N	
2361	Two units: one above the other	N	N	N	
236116	Apartments: walk-up	N	N	N	
236116	Apartment: elevator	N	N	N	
7213	Group quarters	N	N	N	
7211	Residential Hotels	N	N	N	
	Mobile home parks or courts	N	N	N	
7211	Transient lodgings	N	N	N	
	Other residential	N	N	N	
	<i>Existing NonResidential Uses</i>	*	*	*	*Existing structures may be rebuilt to the same use and s.f.; refer to Sect. 4.405C(5) for regulations
	<i>Manufacturing</i>				
311	Food & kindred products; manufacturing	N	N	Y	Max FAR 0.56 in APZ II
313, 314	Textile mill products; manufacturing	N	N	Y	Max FAR 0.56 in APZ II
315, 316	Apparel and other finished products: products made from fabrics, leather and similar materials; manufacturing	N	N	N	
321	Lumber and wood products (except furniture); manufacturing	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II
337	Furniture and fixtures; manufacturing	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II
322, 323	Paper and allied products; manufacturing	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II
511	Printing, publishing, and allied industries	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II
325	Chemicals and allied products; manufacturing	N	N	N	
32411	Petroleum refining and related industries	N	N	N	
3252	Rubber and misc. plastic products; manufacturing	N	N	N	
327991, 3271, 3272	Stone, clay and glass products; manufacturing	N	N	Y	Max FAR 0.56 in APZ II
331	Primary metal products; manufacturing	N	N	Y	Max FAR 0.56 in APZ II
332	Fabricated metal products; manufacturing	N	N	Y	Max FAR 0.56 in APZ II
3333	Professional scientific, and controlling instruments; photographic and optical goods, watches and clocks	N	N	N	
339	Miscellaneous manufacturing	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II
	<i>Transportation, communication and utilities</i>				
482, 485	Railroad, rapid rail transit, and street railway transportation	N	Y 5	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II; See Note 3 below
485	Motor vehicle transportation	N	Y 5	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II; See Note 3 below
481	Aircraft transportation	N	Y 5	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II; See Note 3 below
483	Marine craft transportation	N	Y 5	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II; See Note 3 below
485	Highway and street right-of-way	N	Y 5	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II; See Note 3 below
81293	Automobile parking	N	Y 5	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II; See Note 3 below
517	Communication	N	Y 5	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II; See Note 3 below
22	Utilities	N	Y 5	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II; See Note 3 below
562	Solid waste disposal (landfills, incineration, etc.)	N	N	N	
	Other transportation, communication and utilities	N	Y 5	Y	See Note 5 below
	<i>Trade</i>				
42	Wholesale trade	N	Y	Y	Max FAR of 0.28 in APZ I & 0.56 in APZ II.
444	Retail trade - building materials, hardware and farm equipment	N	Y	Y	See Note 6 below
452	Retail trade (7)- shopping centers, home improvement store, discount club, electronics superstore	N	N	Y	See Note 7 below
452	Retail trade - regional mall (existing)	N	*	*	See Note 8 below. *Refer to Sect. 4.405C(5) for regulations.
445	Retail trade - food	N	N	Y	Max FAR of 0.24 in APZ II
441	Retail trade - automotive, marine craft, aircraft and accessories	N	Y	Y	Max FAR of 0.14 in APZ I & 0.28 in APZ II
448	Retail trade - apparel and accessories	N	N	Y	Max FAR 0.28 in APZ II
442	Retail trade - furniture, home, furnishings and equipment	N	N	Y	Max FAR 0.28 in APZ II
722	Retail trade - eating and drinking establishments	N	N	N	
45399	Other retail trade	N	N	Y	Max FAR of 0.16 in APZ II
	<i>Services</i>				
52	Finance, insurance and real estate services	N	N	Y	Max FAR of 0.22 for General Office/Office park in APZ II. See Note 9 below.
812	Personal services	N	N	Y	Office uses only. Max FAR of 0.22 in APZ II.
81222	Cemeteries	N	Y 10	Y 10	

5614	Business services (credit reporting, mail, stenographic, reproduction, advertising)	N	N	Y	Max FAR of 0.22 in APZ II
493	Warehousing and storage services	N	Y	Y	Max FAR 1.0 APZ I; 2.0 in APZ II
811	Repair services	N	Y	Y	Max FAR of 0.11 APZ I; 0.22 in APZ II
54, 62	Professional services/offices	N	N	Y	
622, 623	Hospitals, nursing homes/assisted living	N	N	N	
621999	Other medical facilities	N	N	N	See Note 11 below
23	Contract construction services	N	Y	Y	Max FAR of 0.11 APZ I; 0.22 in APZ II
92	Government services	N	N	Y	Max FAR of 0.24 in APZ II
61	Educational services	N	N	N	
	Miscellaneous	N	N	Y	Max FAR of 0.22 in APZ II
	<i>Cultural, entertainment and recreational</i>				
813	Cultural activities (and Religious Institutions)	N	N	N	
71219	Nature exhibits	N	Y 12	Y 12	
813	Public assembly	N	N	N	
71	Auditoriums, concert halls	N	N	N	
71	Outdoor music shells, amphitheaters	N	N	N	
7112	Outdoor sports arenas, spectator sports	N	N	N	
713	Amusements - fairgrounds, miniature golf, driving ranges, amusement parks, etc.	N	N	Y	
713	Recreational activities (include golf courses, riding stables, water recreation )	N	Y 12	Y 12	Max FAR of 0.11 APZ I; 0.22 in APZ II
7212	Resorts and group camps	N	N	N	
	Parks	N	Y 12	Y 12	Max FAR of 0.11 APZ I; 0.22 in APZ II
7139	Other cultural, entertainment and recreation	N	Y 9	Y 9	Max FAR of 0.11 APZ I; 0.22 in APZ II
	<i>Resource Production and Extraction</i>				
111	Agriculture (except livestock)	Y 4	Y 13	Y 13	
112	Livestock farming and breeding	N	Y 13,14	Y 13,14	
	Agriculture related activities	N	Y 13	Y 13	Max FAR of 0.28 APZ I; 0.56 APZ II no activity which produces smoke, glare, or involves explosives
113	Forestry Activities 15	N	Y	Y	Max FAR of 0.28 APZ I; 0.56 APZ II no activity which produces smoke, glare, or involves explosives
114	Fishing Activities 16	N 16	Y	Y	Max FAR of 0.28 APZ I; 0.56 APZ II no activity which produces smoke, glare, or involves explosives
21	Mining Activities	N	Y	Y	Max FAR of 0.28 APZ I; 0.56 APZ II no activity which produces smoke, glare, or involves explosives
212399	Other resource production or extraction	N	Y	Y	Max FAR of 0.28 APZ I; 0.56 APZ II no activity which produces smoke, glare, or involves explosives
	<i>Other</i>				
	Undeveloped Land	Y	Y	Y	
	Water Areas	N 17	N 17	N 17	

KEYS TO TABLE 1

Based on Operational Navy Instruction "Air Installation Compatible Use Zone (AICUZ) Program" OPNAVINST 11010.36C Dated 9-Oct-2008

NAICS North American Industry Classification System, US Dept. of Commerce, 2012  
Y (Yes) Land use and related structures are normally compatible without restriction  
N (No) Land use and related structures are not normally compatible and should be prohibited

Y# (Yes with Restrictions)

The land use and related structures are generally compatible. However, see notes indicated by the number.

N# - (No with exceptions)

The land use and related structures are generally incompatible. However, see notes indicated by the number.

FAR - Floor Area Ratio  
Du/Ac Dwelling Units Per Acre

A floor area ratio is the ratio between the square feet of floor area of the building and the site area. This metric is customarily used to measure residential densities.

NOTES FOR TABLE 1

1. A "Yes or a "No" designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of densities of people and structures. In order to assist installations and local governments, general suggestions as to floor/area ratios are provided as a guide to density, in some categories. In general, except with respect to an Existing Regional Mall site, land use restrictions which limit commercial, services, or industrial buildings or structure occupants to 25 per acre in APZ I, and 50 per acre in APZ II are the range of occupancy levels considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people per acre in APZ I, and maximum assemblies of 50 people per acre in APZ II.

2. The suggested maximum density for detached single-family housing is one to two du/ac. In a Planned Development (PD) of single family detached units where clustered housing development results in large open areas, this density could possibly be increased provided the amount of surface area covered by structures does not exceed 20 percent of the PD total area. PD encourages clustered development that leaves large open areas.

3. Other factors to be considered: labor intensity, structural coverage, explosive characteristics, air pollution, electronic interference with aircraft, height of structures, and potential glare to pilots.

4. No structures (except airfield lighting), buildings or aboveground utility/communications lines should normally be located in Clear Zone areas on or off the installation. The Clear Zone is subject to severe restrictions.

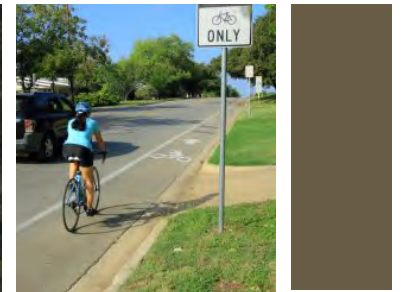
5. No passenger terminals and no major above ground transmission lines in APZ I.

6. Maximum FARs for lumber yards are 0.20 in APZ I and 0.40 in APZ II. For hardware/paint and farm equipment stores, the maximum FARs are 0.12 in APZ I and 0.24 in APZ II.

7. A "shopping center" is an integrated group of commercial establishments that is planned, developed, owned, or managed as a unit. Shopping center types include strip, neighborhood, community, regional, and super regional facilities anchored by a supermarket, or drug store, discount retailer, department store, or several department stores. Shopping centers include retail businesses, personal services, storefront offices and storefront financial services. The following uses are prohibited: any type of residential including hotels, hospitals/nursing homes/assisted living, other medical facilities, educational services, call centers, concert halls, sports arenas, and religious institutions; Eating and drinking establishments are limited to 40% of the total gross floor square foot area of the shopping center. Included in this category are such uses as big box discount clubs, home improvement superstores, office supply superstores, and electronics superstores. The maximum recommended FAR should be applied to the gross leasable area of the shopping center rather than attempting to use the other recommended FARs listed in this table under retail or trade. FARs do not apply to existing shopping centers.
8. An "existing regional mall" site, inclusive of anchor stores, and including commercial redevelopment of the site, is a type of shopping center. An existing regional mall site may have the uses allowed in the Trade and Services sections, with Eating and Drinking establishments limited to 40% of the total existing square footage. Movie theaters are allowed up to 7% of the total existing square footage. Other medical facilities, excluding blood banks and surgery centers, are permitted up to a maximum of 25,000 s.f. within 400 feet of the eastern APZ boundary. The following uses are prohibited: any type of residential including hotels, hospitals/nursing homes/assisted living, day care (child or adult), kindergarten, elementary or secondary school, college or university, call centers, concert halls, sports arenas, and religious institutions. FARs do not apply to an existing regional mall site.
9. Low intensity office uses only. Accessory uses such as meeting places, auditoriums, etc. are not recommended.
10. No chapels are allowed within APZ I and APZ II.
11. "Other medical facilities" includes medical and dental clinics, blood banks, outpatient/ambulatory surgery centers, dialysis centers, and similar higher density and sensitive uses.
12. Facilities must be low intensity and provide no tot lots, etc. Facilities such as clubhouses, meeting places, auditoriums, large classes, etc. are not recommended.
13. Includes livestock grazing, but excludes feedlots and intensive animal husbandry. Activities that attract concentrations of birds creating a hazard to aircraft operation should be excluded.
14. Includes feedlots and intensive animal husbandry.
15. Lumber and timber products removed due to establishment, expansion, or maintenance of Clear Zones will be disposed of in accordance with appropriate DOD Natural Resources Instructions.
16. Controlled hunting and fishing may be permitted for the purpose of wildlife management.
17. Naturally occurring water features (e.g. rivers, lakes, streams, wetlands) are compatible.



## APPENDIX J | ROADWAY INFRASTRUCTURE





## INTRODUCTION

The study area is served by a variety of roadways ranging from facilities that are part of the National Highway System to neighborhood streets. This hierarchy of roadway facilities accommodates necessary travel for people and goods within the study area.

Large portions of travel in the study area are accommodated by a few major facilities. Several classifications exist for these roadways and many facilities fall under more than one classification scheme. The major classifications include the National Highway System, Federal Functional Classification System, and Regionally Significant Arterials.

## TRAVEL DEMAND MODELING

An underlying and important basis of understanding existing and future transportation needs is the availability and use of data and models. In the Dallas-Fort Worth Metropolitan Area, the transportation planning process is facilitated by data generated from the regional travel demand model. This model data allows for a better understanding of the impacts that such things as population changes or new roadway facilities may have on travel in a given area. One important role of the model is to help regional stakeholders prioritize the location and timing of roadway improvements. This role becomes more important in an era in which funding for road construction is relatively scarce. By providing information on how well different roadways meet the demands placed on them helps stakeholders develop informed decisions.



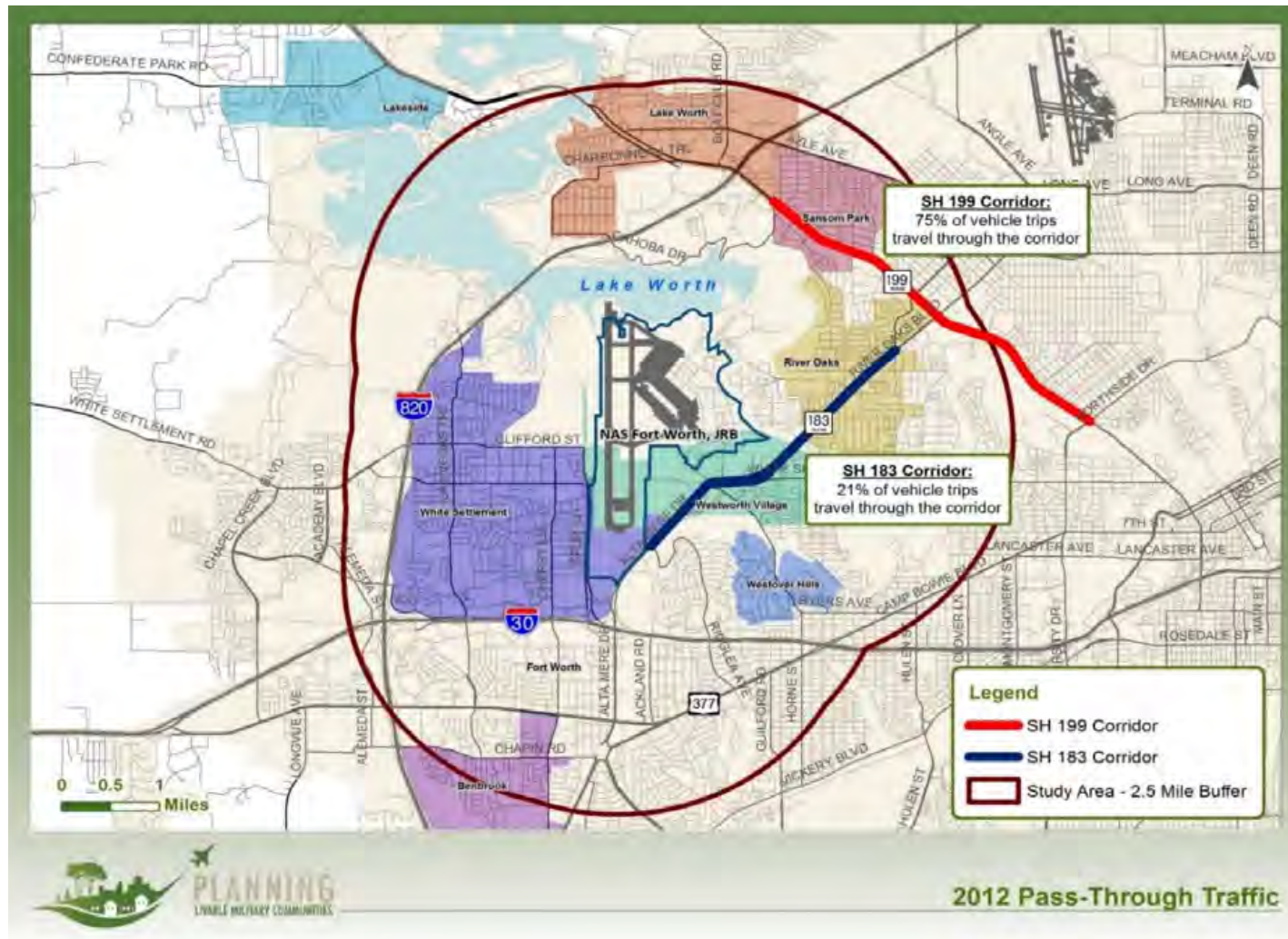
### SUB-REGIONAL/STUDY AREA TRAVEL PATTERNS

In order to provide a constructive response to this congestion, it is important to understand more about the general movements of traffic in the study area. Within the study area, the major travel corridors include SH 199, SH 183, and IH 820. IH 820 and SH 183 provide an outer and inner loop respectively around central Fort Worth, while SH 199 provides a connection from downtown Fort Worth to communities in northwest Tarrant County and beyond. While only IH 820 is a limited-access freeway, the other two roads are still major traffic arteries, featuring four or more travel lanes, dual carriageways, and limited traffic lights. Some portions of SH 183 include frontage roads. As demonstrated in the previous section, both SH 183 and SH 199 experience congestion during normal operation.

Analysis indicates that roughly 75 percent of the vehicle trips using SH 199 between Roberts Cut Off Road and Northside Drive are passing through, rather than stopping or turning onto a different road. This statistic highlights SH 199's importance as a regional arterial, carrying traffic from Lake Worth and beyond into central Fort Worth. In contrast, only 21 percent of trips using SH 183 between Green Oaks Boulevard and Long Avenue travel the entire length of the corridor. This suggests that most of the traffic on SH 183 is not using it as a through route, but rather using the highway to gain access to some point within the corridor—in many cases, the Joint Reserve Base or shopping destinations. This leaves IH 820 as the main route serving orbital traffic in the area. These findings are illustrated in **Figure 1**.

The high percentage of through traffic along SH 199 presents a particular difficulty. Traffic growth is likely to be driven by development along the SH 199 corridor northwest of the study area. Moreover, few adequate alternative routes exist that could act as relievers for this corridor. **Figure 2** shows the travel times on SH 199 and selected alternative routes between Lake Worth and downtown Fort Worth in 2012 and 2035.

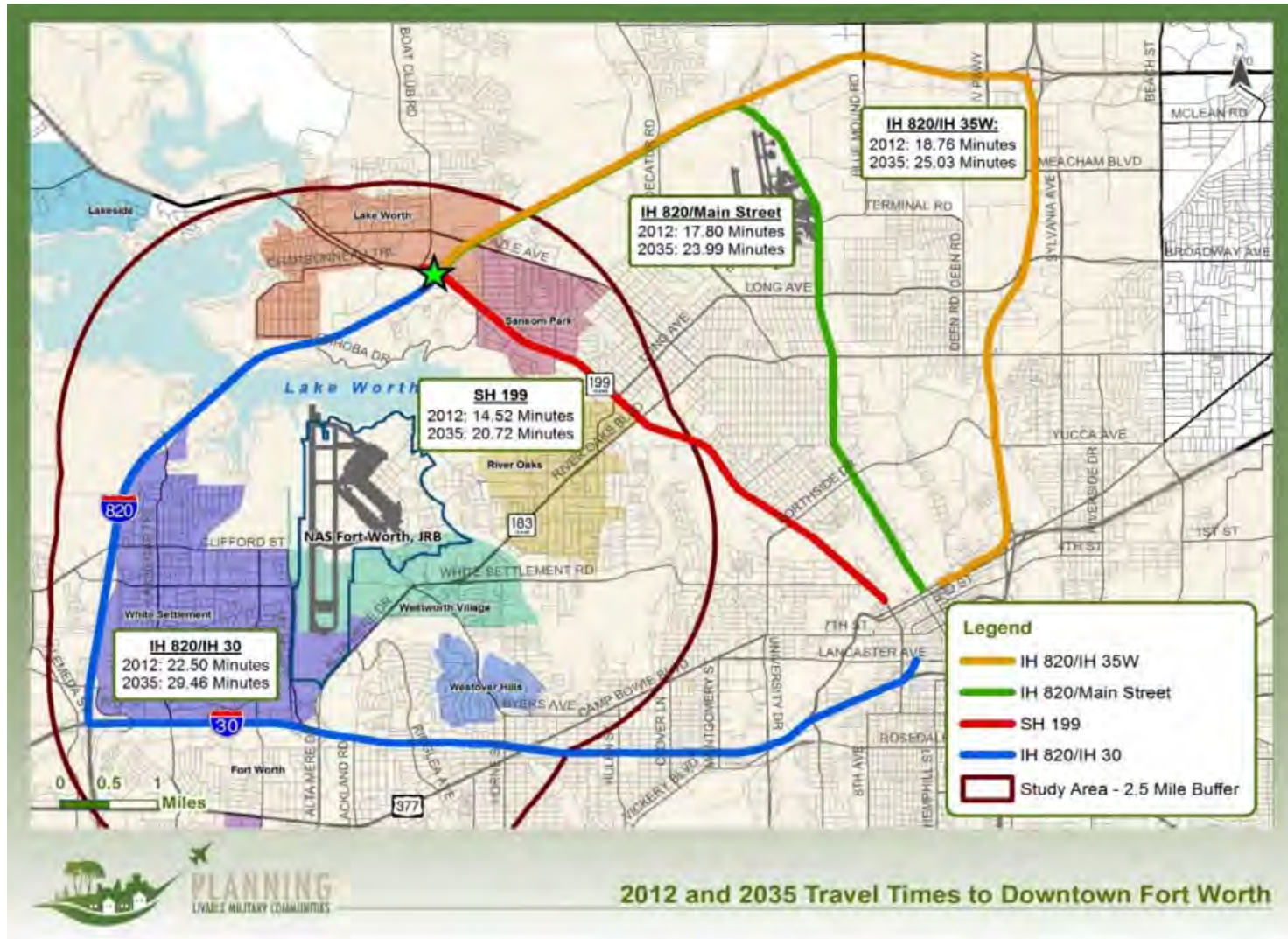
FIGURE 1: 2012 PASS-THROUGH TRAFFIC ALONG SH 183 AND SH 199



Source: NCTCOG



FIGURE 2: 2012 AND 2035 TRAVEL TIMES TO DOWNTOWN FORT WORTH

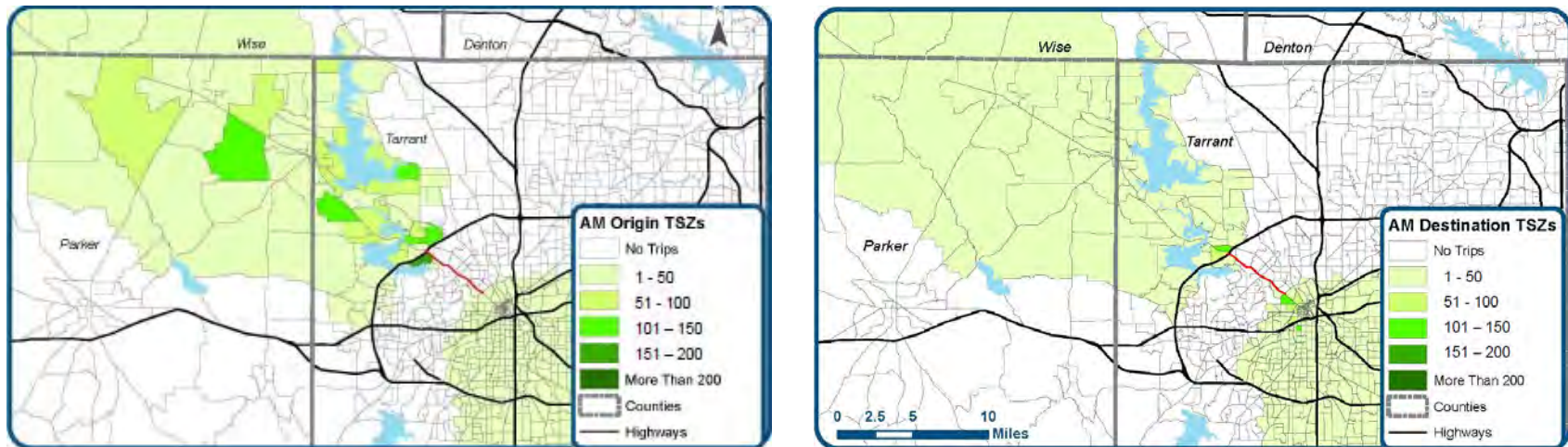


Source: NCTCOG

Figures 3, 4, and 5 provide further information on travel movements in the area. Each of these three exhibits shows the origins and destinations of traffic using the whole length of each of these corridors during the morning peak. In these maps, the trips are grouped by Travel Survey Zone (TSZ), which are the

lowest level of geography analyzed by the regional travel model. For example, in **Figure 3**, the left map highlights the fact that the TSZs generating the most trip origins in the morning peak are in northwest Tarrant County and northeast Parker County. This reaffirms that the majority of trips on SH 199 during the morning peak are moving toward downtown Fort Worth; however, it is noteworthy that some trips are traveling northwest. The right map indicates a concentration of morning trips ending in Lake Worth, as well as the northwest part of downtown Fort Worth.

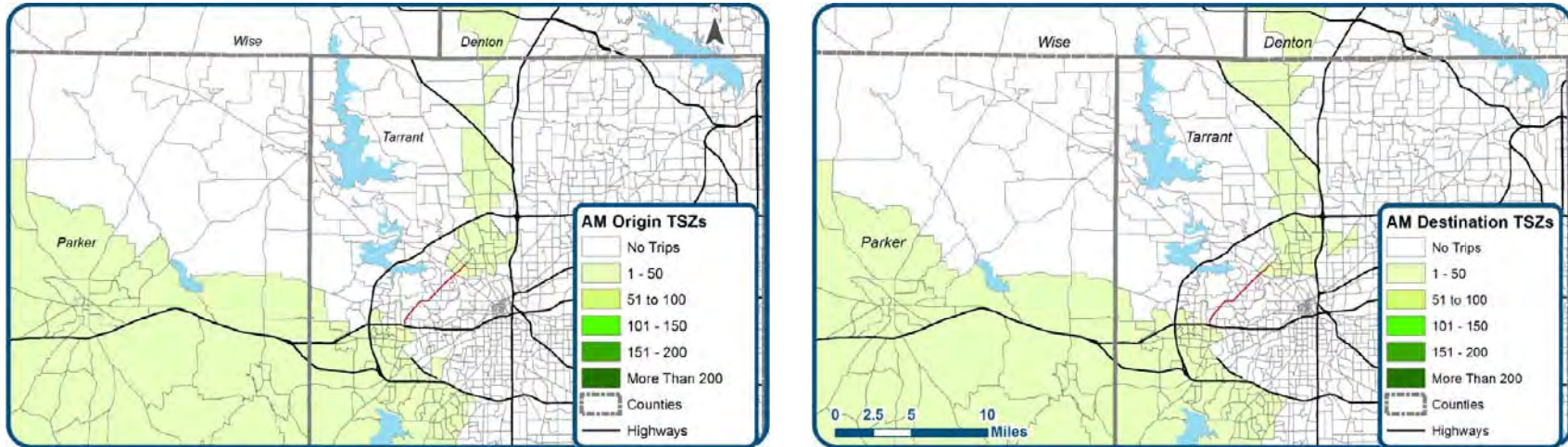
FIGURE 3: SH 199 ORIGINS AND DESTINATIONS OF AM TRAFFIC FROM IH 820 TO NORTHSIDE DRIVE



**Figure 4** repeats this exercise for the SH 183 corridor from SH 199 to Green Oaks Road. While traffic on the SH 183 originates from a broad territory, there is no area that is generating a concentrated trips. Likewise, the only concentrated destination zones are the TSZs containing the Lockheed factory and Hulen Mall; and even these concentrations are fairly minimal. Overall this map suggests that while SH 183 is being used as a corridor for passing between the IH 20/30 west and IH 35W north corridors, it is not a highly-favored one. The bulk of these trips are likely to occur either a) between the IH 20/30 corridor and the inner part of the IH 35W corridor or b) between the IH 35W corridor and the inner part of the IH 30 corridor.

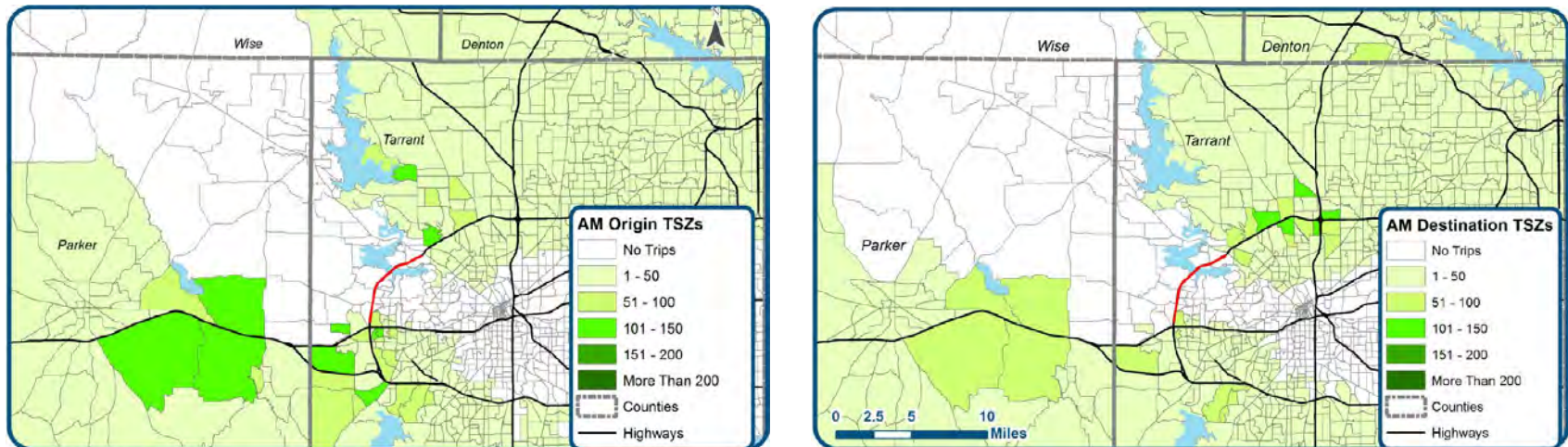


FIGURE 4: SH 183 ORIGINS AND DESTINATIONS OF AM TRAFFIC FROM SH 199 TO GREEN OAKS ROAD



These conclusions about the status of SH 183 are cemented by **Figure 5** which shows the origins and destinations for the IH 820 corridor between SH 199 and IH 30. The higher numbers of trips per TSZ indicate that IH 820 is a preferred route for orbital movements. This preference is so great even some trips to southern Fort Worth are being drawn through this corridor.

FIGURE 5: IH 820 ORIGINS AND DESTINATIONS OF AM TRAFFIC FROM SH 199 TO IH 30



## EXISTING AND FUTURE LEVELS OF SERVICE

A key concept in the analysis of model data is Level of Service (LOS). This performance measure, expressed as a letter ranging from A to F, indicates how well a roadway is performing with respect to the number of vehicles using it. Roadways showing LOS A have relatively low volumes of traffic compared to their design capacity, allowing traffic to flow freely. Roadways at LOS E have volumes that are approaching their capacity, leading to crowded conditions and lower speeds. Roadways reaching LOS F have, in effect, more traffic than they can handle, leading to heavy congestion. Inputs to this measure include the average daily volume of the defined roadway segment, its average capacity (based on the functional class of the roadway and the type of land uses on either side), and the average number of travel lanes within the segment.

**Figure 6** illustrates the LOS during the peak period in 2012 on selected corridors within the study area. SH 199 from Roberts Cut Off Road to Northside Drive shows up immediately as a trouble spot, as do Spur 341, Roberts Cut Off Road between Skyline Drive and SH 183, Azle Avenue in Lake Worth, and Roaring Springs Drive in Westover Hills. Likewise, SH 183 also warrants closer attention from Spur 580 to White Settlement Road.

It is worth noting that the actual peak in traffic volume may occur at different times on different roadways, or even different directions on the same roadway. For example, during the morning peak period, drivers driving southeast on SH 199 may experience heavy congestion while northwest-bound drivers experience lighter conditions. This map offers a summary view of where congestion occurs during the course of the average weekday.

**Figure 7** shows the projected LOS for 2035. In addition to the congested segments from 2012, this map also projects congestion on US 377 south of the Weatherford Traffic Circle, for more sections of Azle Avenue and SH 199, on the Meandering Road/Carswell Access Road entrance to the Joint Reserve Base, and on Horne Street south of Westover Hills. Traffic conditions on SH 183 have deteriorated notably from IH 30 to White Settlement Road.



**LOS ABC**  
A LOS of A, B, or C represents a relatively uncongested facility. Vehicles can move freely with little interference.



**LOS DE**  
A LOS of D or E represents a relatively congested facility. Vehicles can move with some interference.

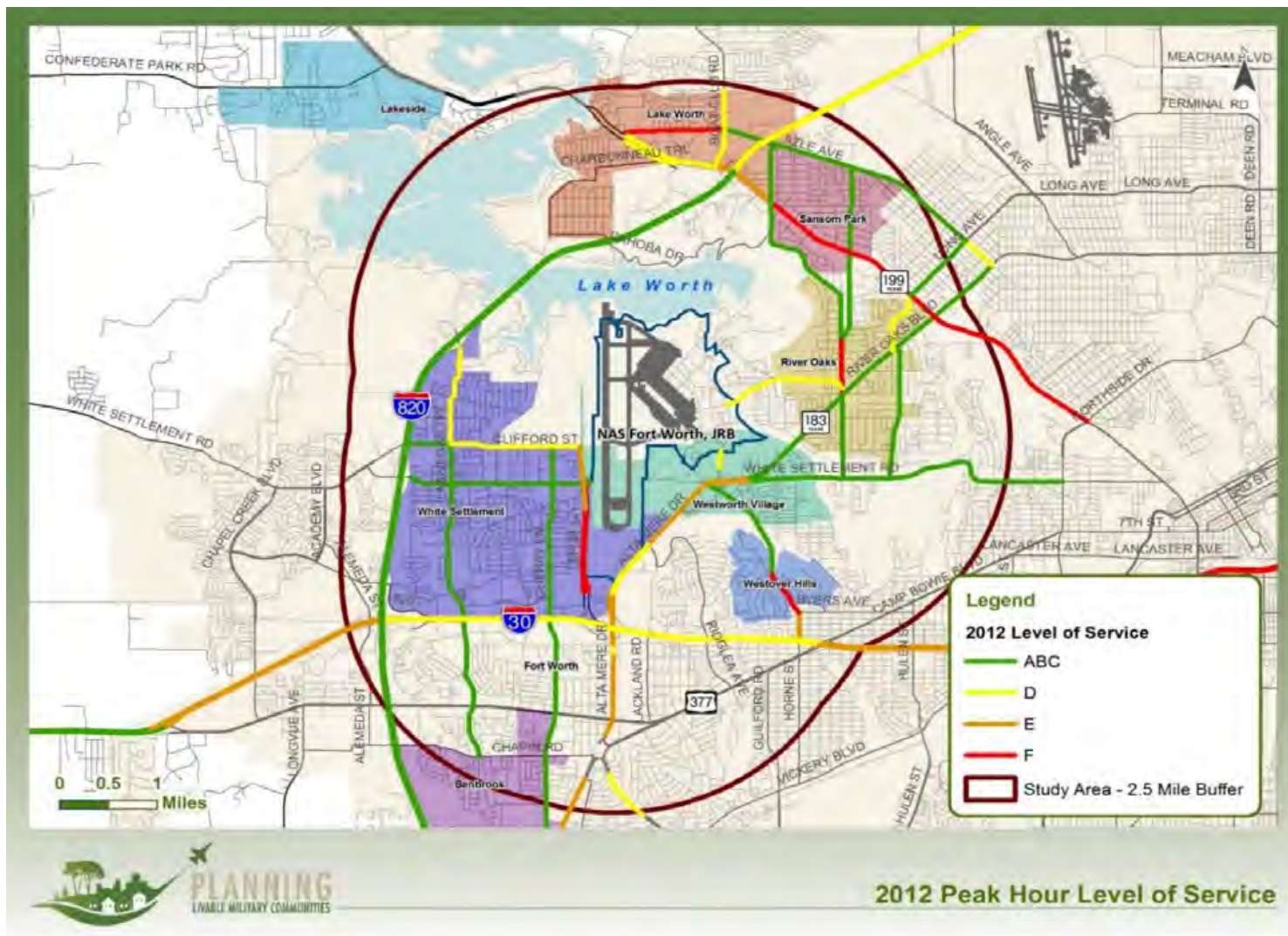


**LOS F**  
A LOS of F represents the worst level of congestion. Vehicles are unable to move freely without interference.

*Source: NCTCOG*

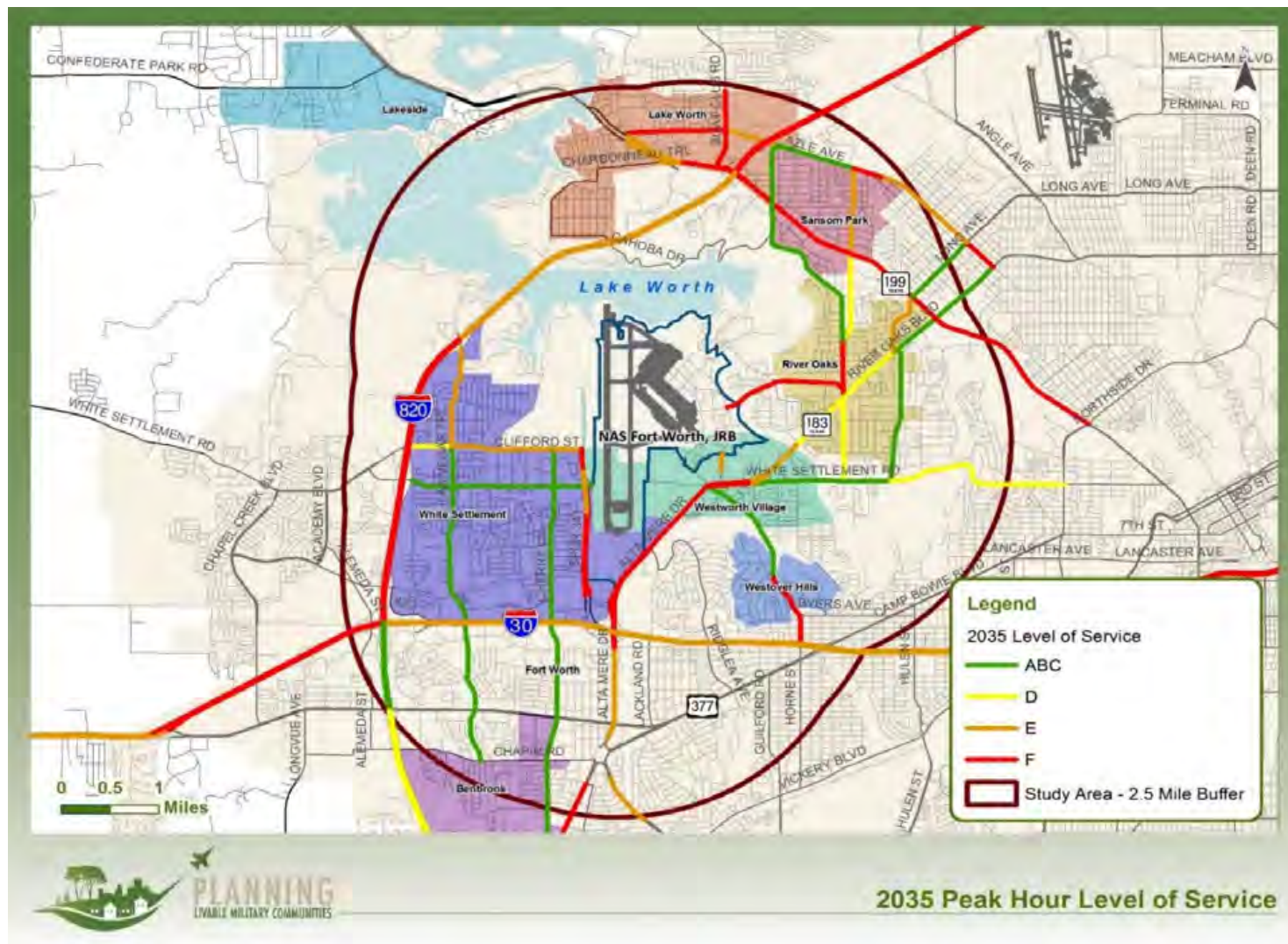


FIGURE 6: 2012 PEAK HOUR LEVEL OF SERVICE



Source: NCTCOG

FIGURE 7: 2035 PEAK HOUR LEVEL OF SERVICE



Source: NCTCOG

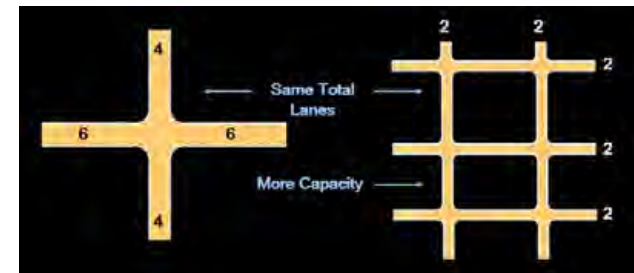
## CAPACITY AND LANE WARRANTS

In order to evaluate roadways based on the volume of traffic they carry with respect to their capacity for accommodating that volume, a capacity analysis can be used to evaluate the performance of a selected segment of roadway. The inputs to this analysis include the average volume of the defined roadway segment, its average capacity (based on the functional class of the roadway, its speed limit, and the type of land uses on either side), and the average number of travel lanes within the segment.

Based on these inputs, it is possible to project congestion levels during the busiest travel period of the day. Congestion levels are expressed in terms of Level of Service on a scale between C+ (free flow to steady traffic) and F (heavy congestion). Projected volumes and LOS are also used to estimate which roadway segments may warrant additional lanes. The lane warrants are expressed in terms of how many lanes are required in order to achieve a LOS of D, a level between C+ and F. This information is helpful when considering or prioritizing potential roadway expansion or redesign. **Figures 8 and 9** provide the detailed description of the corridors of interest by city and a comparison of the lane warrant analysis to the local government thoroughfare plans.

It is important to recognize that a lane warrant analysis is based on forecasted population and employment growth which can change over time, thus effecting the lane warrant analysis. Additionally, the lanes warranted demonstrate potential need and require further study and analysis to determine whether additional capacity in some corridors is the appropriate approach for a community. There are many traffic management and operation strategies, land use and corridor design strategies, and transportation modal options (i.e. bike and pedestrian) that, if improved, can reduce the demand and need for additional capacity in some corridors.

Because it is not possible to build enough transportation facilities to eliminate congestion or to completely meet future mobility needs, an integrated, multi-modal transportation system is necessary to support balanced job and household growth. The transportation system must also take into account the linkages between housing, employment, retail, education, health, and recreational opportunities. Implementing land use strategies, improving the existing transportation network, improving access to public transportation options, and implementing management and operations strategies should be considered and are recommended to improve traffic conditions before evaluating additional capacity. Several of these strategies are outlined in this Appendix.



Source: AECOM



FIGURE 8: CAPACITY AND LANE WARRANT ANALYSIS BY CITY

BENBROOK												
FACILITY	FROM	TO	2012				2035					LANES WARRANTED (LOS E/D) <sup>6</sup>
			LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	
WILLIAMS ROAD												
WILLIAMS RD	SPUR 580 CAMP BOWIE BLVD	CHAPIN RD	4	5,800	750	ABC	4	8,100	243	750	ABC	2
WILLIAMS RD	CHAPIN RD	US 377 BENBROOK BLVD	2	2,900	750	ABC	2	5,500	330	750	ABC	2

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D

FORT WORTH												
FACILITY	FROM	TO	2012				2035					LANES WARRANTED (LOS E/D) <sup>6</sup>
			LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	
28TH STREET NE (SH 183)												
28TH ST NE (SH 183)	JACKSBORO HWY	AZLE AVE	4	8,700	825	ABC	4	15,000	450	775	ABC	4
AZLE AVENUE												
AZLE AVE	SKYLINE DR	LONG AVE	2	6,200	850	ABC	2	10,200	612	750	3	2/4
AZLE AVE	LONG AVE	28TH ST NE (SH 183)	2	9,900	850	0	2	13,500	810	750	F	4
CARSWELL ACCESS ROAD												
CARSWELL ACCESS RD	NASA FORT WORTH, JRB GATE	MEANDERING RD	2	5,700	500	D	2	8,500	516	500	F	4
CERRY LANE												
CHERRY LN	IH 30	SPUR 580 CAMP BOWIE BLVD	4	11,800	750	ABC	4	15,400	462	750	ABC	4
CIMMARON TRAIL												
CIMMARON TR	SPUR 580 CAMP BOWIE BLVD	CHAPIN RD	2	2,300	500	ABC	2	2,600	156	500	ABC	2

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D

FORT WORTH												
			2012				2035					
FACILITY	FROM	TO	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES WARRANTED (LOS E/D) <sup>6</sup>
HORNE STREET												
HORNE ST	BYERS AVE	IH 30	2	13,000	800	E	2	15,400	924	750	F	4
JACKSBORO HIGHWAY (SH 199)												
JACKSBORO HWY (SH 199)	NORTHSIDE DR	SH 183	4	36,200	850	F	4	43,800	1,314	850	F	8
JACKSBORO HWY (SH 199)	SH 183	LONG AVE	4	35,000	925	F	4	43,400	1,302	850	F	8
JACKSBORO HWY (SH 199)	LONG AVE	SKYLINE DR	4	32,000	925	F	4	41,700	1,251	850	F	6/8
LAS VEGAS TRAIL												
LAS VEGAS TR	IH 30	NORMAN DALE ST	4	14,800	750	ABC	4	14,800	444	750	ABC	4
LAS VEGAS TR	NORMAN DALE ST	SPUR 580 CAMP BOWIE BLVD	5	9,600	820	ABC	5	13,300	319	820	ABC	2/4
LONG AVENUE												
LONG AVE	AZLE AVE	JACKSBORO HWY (SH 199)	4	8,400	900	ABC	4	11,300	339	825	ABC	2/4
ALTA MERE DRIVE (SH 183)												
ALTA MERE DR (SH 183)	WEATHERFORD TRAFFIC CIRCLE	RAMP SOUTH OF CALMONT AVE	6	34,300	850	E	6	41,300	826	850	E	6/8
ALTA MERE DR (SH 183)	RAMP SOUTH OF CALMONT AVE	CALMONT AVE	5	24,100	860	D	5	28,800	691	860	E	6
ALTA MERE DR (SH 183)	CALMONT AVE	SPUR 341 RAMPS	4/6	30,000	800	E	4/6	36,100	866	800	F	6/8
SKYLINE DRIVE												
SKYLINE DR	JACKSBORO HWY (SH 199)	ROBERTS CUT OFF RD	2	3,300	550	ABC	2	5,500	330	500	D	2
SOUTHWEST BOULEVARD (SH 183)												
SOUTHWEST BLVD (SH 183)	WEATHERFORD TRAFFIC CIRCLE	OVERHILL RD	6	30,700	850	D	6	40,600	812	850	E	6/8
US 377												
US 377	WEATHERFORD TRAFFIC CIRCLE	WILLIAMS RD	4	21,200	775	E	4	28,000	840	775	F	6

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D

FORT WORTH												
FACILITY FROM TO			2012				2035					LANES WARRANTED (LOS E/D) <sup>6</sup>
			LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	
WHITE SETTLEMENT ROAD												
WHITE SETTLEMENT RD	ROBERTS CUT OFF RD	CHURCHILL RD	4	11,600	750	ABC	4	16,100	483	750	ABC	4
WHITE SETTLEMENT RD	CHURCHILL RD	UNIVERSITY DR	4	13,900	750	ABC	4	18,400	552	750	D	4

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D

LAKE WORTH												
FACILITY FROM TO			2012				2035					LANES WARRANTED (LOS E/D) <sup>6</sup>
			LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	
AZLE AVENUE												
AZLE AVE	SH 199 WESTBOUND LAKE WORTH	BOAT CLUB RD	4	19,700	575	F	4	22,800	684	525	F	6/8
AZLE AVE	BOAT CLUB RD	ROBERTS CUT OFF RD	4	19,200	900	ABC	4	25,000	750	850	E	4/6
BOAT CLUB ROAD												
BOAT CLUB RD	SHADYDELL RD	SH 199	4	21,800	925	D	4	37,200	1,116	925	F	6/8
JACKSBORO HIGHWAY (SH 199)												
JACKSBORO HWY (SH 199)	ROBERTS CUT OFF RD	EAST OF IH 820	6	40,300	933	E	6	48,800	976	850	F	8/10
JACKSBORO HWY (SH 199)	EAST OF IH 820	BOAT CLUB RD	6	46,200	933	E	6	60,700	1,214	850	F	10/12
JACKSBORO HWY (SH 199)	BOAT CLUB RD	NORTHWEST CENTRE DR	6	33,000	883	D	6	41,300	826	783	F	8
JACKSBORO HWY (SH 199)	NORTHWEST CENTRE DR	AZLE AVE	6	31,700	933	D	6	40,800	816	850	E	6/8
ROBERTS CUT OFF ROAD												
ROBERTS CUT OFF RD	AZLE AVE	SH 199	2	1,200	850	ABC	2	1,400	84	750	ABC	2

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D



RIVER OAKS												
			2012				2035					
FACILITY	FROM	TO	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES WARRANTED (LOS E/D) <sup>6</sup>
CHURCHILL ROAD												
CHURCHILL RD	RIVER OAKS BLVD (SH 183)	WHITE SETTLEMENT RD	2	1,700	500	ABC	2	2,700	162	500	ABC	2
EPHRIHAM AVENUE (SH 183)												
EPHRIHAM AVE (SH 183)	LONG AVE	JACKSBORO HWY (SH 199)	4	10,500	850	ABC	4	16,600	498	850	ABC	4
LONG AVENUE												
LONG AVE	JACKSBORO HWY (SH 199)	RIVER OAKS BLVD (SH 183)	2	6,000	500	D	2	8,100	486	500	E	2/4
MEANDERING ROAD												
MEANDERING RD	CARSWELL ACCESS RD	ROBERTS CUT OFF RD	2	6,000	500	D	2	9,700	582	500	F	4
RIVER OAKS BOULEVARD (SH 183)												
RIVER OAKS BLVD (SH 183)	CALLOWAY DR	ROBERTS CUT OFF RD	4	14,000	850	ABC	4	20,800	624	850	D	4
RIVER OAKS BLVD (SH 183)	ROBERTS CUT OFF RD	LONG AVE	4	11,500	850	ABC	4	18,800	564	850	D	4
ROBERTS CUT OFF ROAD												
ROBERTS CUT OFF RD	SKYLINE DR	MEANDERING RD	2	13,800	750	F	2	18,900	1,134	750	F	4
ROBERTS CUT OFF RD	MEANDERING RD	RIVER OAKS BLVD (SH 183)	2	13,300	750	F	2	19,000	1,140	750	F	4
ROBERTS CUT OFF RD	RIVER OAKS BLVD (SH 183)	WHITE SETTLEMENT RD	2	7,000	750	ABC	2	9,600	576	750	D	2

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D

SANSOM PARK												
FACILITY	FROM	TO	2012				2035					LANES WARRANTED (LOS E/D) <sup>6</sup>
			LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	
AZLE AVENUE												
AZLE AVE	ROBERTS CUT OFF RD	SKYLINE DR	4	10,500	900	ABC	4	12,400	372	825	ABC	2/4
AZLE AVE	SKYLINE DR	SHERMAN AVE	2	6,200	850	ABC	2	18,500	1,110	750	F	4
JACKSBORO HIGHWAY (SH 199)												
JACKSBORO HWY (SH 199)	SKYLINE DR	ROBERTS CUT OFF RD	4	32,500	925	F	4	38,500	1,155	850	F	6/8
ROBERTS CUT OFF ROAD												
ROBERTS CUT OFF RD	JACKSBORO HWY (SH 199)	SKYLINE DR	2	8,200	850	ABC	2	8,200	492	850	ABC	2
SKYLINE DRIVE												
SKYLINE DR	AZLE AVE	JACKSBORO HWY (SH 199)	2	2,500	550	ABC	2	7,500	450	500	E	2/4

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D

WESTOVER HILLS												
FACILITY	FROM	TO	2012				2035					LANES WARRANTED (LOS E/D) <sup>6</sup>
			LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	
ROARING SPRINGS ROAD												
ROARING SPRINGS RD	WESTOVER DR	BYERS AVE	2	13,800	750	F	2	16,800	1,008	750	F	4

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D

WESTWORTH VILLAGE												
FACILITY	FROM	TO	2012				2035					LANES WARRANTED (LOS E/D) <sup>6</sup>
			LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	
PUMPHREY DRIVE												
PUMPHREY DR	NAS FORT WORTH, JRB GATE	SH 183 WESTBOUND ACCESS RD	4	12,200	525	D	4	15,300	459	475	E	4/6
WESTWORTH BOULEVARD (SH 183)												
WESTWORTH BLVD	CASSTEVENS ST	SAM CALLOWAY RD	4	16,200	925	ABC	4	24,100	723	850	E	4/6
ROARING SPRINGS ROAD												
ROARING SPRINGS RD	SH 183	WESTOVER DR	2	4,100	900	ABC	2	7,300	438	850	ABC	2
ALTA MERE DRIVE (SH 183)												
ALTA MERE DR (SH 183)	CITY LIMITS	ROARING SPRINGS RD	4	26,400	925	E	4	36,100	1,083	850	F	6/8
SH 183/WHITE SETTLEMENT ROAD INTERSECTION												
SH 183	McNAUGHTON LN	CASSTEVENS ST	4	16,500	925	Abc	4	24,500	735	850	3	4/6
ALTA MERE DRIVE (SH 183)												
SH 183	ROARING SPRINGS RD	McNAUGHTON LN (WHITE SETTLEMENT RD)	4	25,500	925	E	4	36,800	1,104	850	F	6/8
WHITE SETTLEMENT ROAD												
WHITE SETTLEMENT RD	SH 183	EAST OF SH 183	4	7,400	900	ABC	4	10,300	309	825	ABC	2
WHITE SETTLEMENT RD	EAST OF SH 183	ROBERTS CUT OFF RD	4	8,400	875	ABC	4	11,700	351	800	ABC	2/4

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D

WHITE SETTLEMENT												
FACILITY	FROM	TO	2012				2035					LANES WARRANTED (LOS E/D) <sup>6</sup>
			LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	
CHERRY LANE												
CHERRY LN	CLIFFORD ST	WHITE SETTLEMENT RD	4	2,800	750	ABC	4	3,600	108	750	ABC	2
CHERRY LN	WHITE SETTLEMENT RD	IH 30	4	6,200	825	ABC	4	7,800	234	800	ABC	2
CLIFFORD STREET												
CLIFFORD ST	IH 820 FRONTAGE RD NORTHBOUND	LAS VEGAS TR	4	11,000	750	ABC	4	16,800	504	750	D	4
CLIFFORD ST	LAS VEGAS TR	CHERRY LN	4	16,500	750	D	4	24,000	720	750	E	4/6
CLIFFORD ST	CHERRY LN	SPUR P341	4	17,000	750	D	4	23,800	714	750	E	4/6
LAS VEGAS TRAIL												
LAS VEGAS TR	IH 820 FRONTAGE RD NORTHBOUND	CLIFFORD ST	2	5,300	450	D	2	7,200	432	450	E	2/4
LAS VEGAS TR	CLIFFORD ST	WHITE SETTLEMENT RD	4	1,000	750	ABC	4	1,300	39	750	ABC	2
LAS VEGAS TR	WHITE SETTLEMENT RD	IH 30	4	4,000	750	ABC	4	7,100	213	750	ABC	2
ALTA MERE DRIVE (SH 183)												
ALTA MERE DR (SH 183)	SPUR 341 RAMSP	GREEN OAKS DR	4	19,800	850	D	4	31,000	930	850	F	6
ALTA MERE DR (SH 183)	GREEN OAKS DR	CITY LMITS	4	26,400	850	E	4	36,100	1,083	850	F	6/8
LOCKHEED BOULEVARD (SPUR 341)												
LOCKHEED BLVD (SPUR 341)	CLIFFORD ST	NORTH OF WHITE SETTLEMENT RD	6	34,700	750	E	6	37,700	754	750	F	8
LOCKHEED BLVD (SPUR 341)	NORTH OF WHITE SETTLEMENT RD	SOUTH OF WHITE SETTLEMENT RD	6	34,400	850	E	6	38,300	766	833	E	6/8
LOCKHEED BLVD (SPUR 341)	SOUTH OF WHITE SETTLEMENT RD	RAMPS TO SH 183	6	45,100	833	F	6	50,800	1,015	833	F	8/10

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D

WHITE SETTLEMENT												
			2012				2035					
FACILITY	FROM	TO	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES WARRANTED (LOS E/D) <sup>6</sup>
WHITE SETTLEMENT ROAD												
WHITE SETTLEMENT RD	IH 820 FRONTAGE RD NORTHBOUND	LAS VEGAS TR	4	10,300	750	ABC	4	15,800	474	750	ABC	4
WHITE SETTLEMENT RD	LAS VEGAS TR	CHERRY LN	4	8,100	750	ABC	4	13,000	390	750	ABC	4
WHITE SETTLEMENT RD	CHERRY LN	SPUR 341	4	8,700	750	ABC	4	11,400	342	750	ABC	2/4

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D

STUDY AREA FREEWAYS <sup>7</sup>												
FACILITY			2012				2035					LANES WARRANTED (LOS E/D) <sup>6</sup>
			LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	LANES <sup>1</sup>	AVG DAILY VOL <sup>2</sup>	AVG PEAK VOL/LANE <sup>5</sup>	AVG PEAK CAP/LANE <sup>3</sup>	PK HR LOS <sup>4</sup>	
IH 30												
IH 30	IH 20	TARRANT CO LINE	6	61,600	2,300	ABC	6	95,900	2,254	2,300	E	6
IH 30	TARRANT CO LINE	SPUR 580	6	63,600	2,300	ABC	6	99,200	2,186	2,300	E	6
IH 30	SPUR 580	IH 820	4/6	61,500	2,500	E	4/6	95,500	3,156	2,400	F	6
IH 30	IH 820	US 377	6/8	97,000	1,383	D	6/8	128,200	2,303	2,367	E	6
IH 30	US 377	SOUTHWEST PKWY	6/12	149,800	2,338	E	6/12	174,100	2,085	2,144	E	8
IH 30	SOUTHWEST PKWY	HENDERSON ST	6	126,500	2,300	E	8/10	174,300	2,026	2,244	E	8
IH 30	HENDERSON ST	IH 35W	8/10	161,200	1,978	F	6/10	179,500	2,603	2,138	F	10
IH 35W												
IH 35W	EAGLE PKWY	US 81/287	4/6	71,800	2,425	E	4/8	122,100	2,306	2,157	F	8
IH 35W	US 81/S87	BASSWOOD BLVD	4/6	125,800	1,950	F	10	223,600	2,755	2,300	F	12
IH 35W	BASSWOOD BLVD	IH 820	4/8	105,100	2,400	F	6/10	187,100	2,881	2,300	F	12
IH 35W	IH 820	SH 183	4/6	97,900	2,325	F	6/10	177,700	2,577	2,363	F	10
IH 35W	SH 183	SH 121	6/8	121,200	2,283	F	8/12	187,900	2,422	2,344	F	12
IH 35W	SH 121	IH 30	6/8	151,500	2,371	F	8/12	154,900	1,996	2,244	E	8
IH 820 WEST												
IH 820	IH 20	CAMP BOWIE BLVD	6/8	37,400	2,350	ABC	6/8	75,200	1,562	2,350	D	4
IH 820	CAMP BOWIE BLVD	IH 30	6/8	39,500	2,200	ABC	6/8	70,400	1,253	2,200	ABC	6
IH 820	IH 30	LAS VEGAS TR	6/8	64,700	2,186	ABC	6/8	122,900	2,188	2,186	F	8
IH 820	LAS VEGAS TR	SH 199	6/10	72,000	2,225	ABC	6/10	132,400	2,062	2,225	E	8
IH 820 NORTH												
IH 820	SH 199	BUS 287	6/8	82,700	2,383	D	6/8	133,100	2,573	2,383	F	8
IH 820	BUS 287	IH 35W	4/8	96,300	2,450	D	6/12	149,900	2,484	2,443	F	10

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>AVG DAILY VOL: The average number of vehicles projected to use the road segment in the course of a given day; <sup>3</sup>AVG PEAK CAP/LANE: The average capacity of the lane during the busiest (peak) hour; <sup>4</sup>PK HR LOS: The Level of Service during the busiest (peak) hour of the day; <sup>5</sup>AVG PEAK VOL/LANE: The average number of vehicles projected to use each lane during the busiest (peak) hour of the day; <sup>6</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>7</sup>Lane warrants on freeway segments reflect LOS E. Source: NCTCOG, 2013



FIGURE 9: LANE WARRANT ANALYSIS RESULTS COMPARED TO LOCAL GOVERNMENT THOROUGHFARE PLANS

BENBROOK								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
WILLIAMS ROAD								
WILLIAMS RD	CAMP BOWIE BLVD (SPUR 580)	CHAPIN RD	4	4	2	4	Minor Arterial	N/A
WILLIAMS RD	CHAPIN RD	BENBROOK BLVD (US 377)	2	2	2	2	Collector	N/A

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of Benbrook Comprehensive Plan. Source: NCTCOG, 2013

FORT WORTH								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
28TH STREET NE (SH 183)								
28TH ST NE (SH 183)	JACKSBORO HWY (SH 199)	AZLE AVE	4	4	4	4	Major Arterial	N/A
AZLE AVENUE								
AZLE AVE	SKYLINE DR	LONG AVE	2	2	2/4	3/4	Minor Arterial	N/A
AZLE AVE	LONG AVE	28TH ST NE (SH 183)	2	2	4	3/4	Minor Arterial	N/A
CARSWELL ACCESS ROAD								
CARSWELL ACCESS RD	NAS FORT WORTH, JRB GATE	MEANDERING RD	2	2	4	2	Collector/Local	N/A
CHERRY LANE								
CHERRY LN	IH 30	CAMP BOWIE BLVD (SPUR 580)	4	4	4	3/4	Minor Arterial	N/A
CIMMARON TRAIL								
CIMMARON TR	CAMP BOWIE BLVD (SPUR 580)	CHAPIN RD	2	2	2	2	Collector/Local	N/A

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of Fort Worth Master Thoroughfare Plan, 2009. Source: NCTCOG, 2013

FORT WORTH								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
HORNE STREET								
HORNE ST	BYERS AVE	IH 30	2	2	4	3/4	Minor Arterial	N/A
JACKSBORO HIGHWAY (SH 199)								
JACKSBORO HWY (SH 199)	NORTHSIDE DR	SH 183	4	4	8	6	Principal Arterial	N/A
JACKSBORO HWY (SH 199)	SH 183	LONG AVE	4	4	8	6	Principal Arterial	N/A
JACKSBORO HWY (SH 199)	LONG AVE	SKYLINE DR	4	4	6/8	6	Principal Arterial	N/A
LAS VEGAS TRAIL								
LAS VEGAS TR	IH 30	NORMAN DALE ST	4	4	4	3/4	Minor Arterial	N/A
LAS VEGAS TR	NORMAN DALE ST	CAMP BOWIE BLVD (SPUR 580)	5	5	2/4	3/4	Minor Arterial	N/A
LONG AVENUE								
LONG AVE	AZLE AVE	JACKSBORO HWY (SH 199)	4	4	2/4	3/4	Minor Arterial	N/A
ALTA MERE DRIVE (SH 183)								
ALTA MERE DR (SH 183)	WEATHERFORD TRAFFIC CIRCLE	RAMP SOUTH OF CALMONT AVE	6	6	6/8	6	Principal Arterial	N/A
ALTA MERE DR (SH 183)	RAMP SOUTH OF CALMONT AVE	CALMONT AVE	5	5	6	6	Principal Arterial	N/A
ALTA MERE DR (SH 183)	CALMONT AVE	SPUR 341 RAMPS	4/6	4/6	6/8	6	Principal Arterial	N/A
SKYLINE DRIVE								
SKYLINE DR	JACKSBORO HWY (SH 199)	ROBERTS CUT OFF RD	2	2	2	2	Collector/Local	N/A
SOUTHWEST BOULEVARD (SH 183)								
SOUTHWEST BLVD (SH 183)	WEATHERFORD TRAFFIC CIRCLE	OVERHILL RD	6	6	6/8	4	Major Arterial	N/A

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of Fort Worth Master Thoroughfare Plan, 2009. Source: NCTCOG, 2013

FORT WORTH								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
US 377								
US 377	WEATHERFORD TRAFFIC CIRCLE	WILLIAMS RD	4	4	6	4	Major Arterial	N/A
WHITE SETTLEMENT ROAD								
WHITE SETTLEMENT RD	ROBERTS CUT OFF RD	CHURCHILL RD	4	4	4	3/4	Minor Arterial	N/A
WHITE SETTLEMENT RD	CHURCHILL RD	UNIVERSITY DR	4	4	4	3/4	Minor Arterial	N/A

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of Fort Worth Master Thoroughfare Plan, 2009. Source: NCTCOG, 2013

LAKE WORTH								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
AZLE AVENUE								
AZLE AVE	LAKE WORTH BLVD (SH 199 WB)	BOAT CLUB RD	4	4	6/8	6	Major Thoroughfare	Divided
AZLE AVE	BOAT CLUB RD	ROBERTS CUT OFF RD	4	4	4/6	N/A	N/A	N/A
BOAT CLUB ROAD								
BOAT CLUB RD	SHADYDELL RD	SH 199	4	4	6/8	6	Major Thoroughfare	Undivided
JACKSBORO HIGHWAY (SH 199)								
JACKSBORO HWY (SH 199)	ROBERTS CUT OFF RD	EAST OF IH 820	6	6	8/10	N/A	N/A	N/A
JACKSBORO HWY (SH 199)	EAST OF IH 820	BOAT CLUB RD	6	6	10/12	N/A	N/A	N/A
JACKSBORO HWY (SH 199)	BOAT CLUB RD	NORTHWEST CENTRE DR	6	6	8	N/A	N/A	N/A

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of Lake Worth Master Thoroughfare Plan, 2003. Source: NCTCOG, 2013

LAKE WORTH								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
ROBERTS CUT OFF ROAD								
ROBERTS CUT OFF RD	AZLE AVE	SH 199	2	2	2	4	Major Collector	Undivided

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of Lake Worth Master Thoroughfare Plan, 2003. Source: NCTCOG, 2013

RIVER OAKS								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
CHURCHILL ROAD								
CHURCHILL RD	RIVER OAKS BLVD (SH 183)	WHITE SETTLEMENT RD	2	2	2	2	Collector	Undivided
EPHRIHAM AVENUE (SH 183)								
EPHRIHAM AVE (SH 183)	LONG AVE	JACKSBORO HWY (SH 199)	4	4	4	6	Primary Arterial	Divided
LONG AVENUE								
LONG AVE	JACKSBORO HWY (SH 199)	RIVER OAKS BLVD (SH 183)	2	2	2/4	2	Collector	Undivided
MEANDERING ROAD								
MEANDERING RD	CARSWELL ACCESS RD	ROBERTS CUT OFF RD	2	2	4	4	Minor Arterial	Undivided
RIVER OAKS BOULEVARD ( SH 183)								
RIVER OAKS BLVD (SH 183)	CALLOWAY DR	ROBERTS CUT OFF RD	4	4	4	6	Primary Arterial	Divided
RIVER OAKS BLVD (SH 183)	ROBERTS CUT OFF RD	LONG AVE	4	4	4	6	Primary Arterial	Divided

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of River Oaks Future Land Use Plan, 2006. Source: NCTCOG, 2013

RIVER OAKS								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
ROBERTS CUT OFF ROAD								
ROBERTS CUT OFF RD	SKYLINE DR	MEANDERING RD	2	2	4	2/3	Minor Arterial	Turn Lane
ROBERTS CUT OFF RD	MEANDERING RD	RIVER OAKS BLVD (SH 183)	2	2	4	N/A	Minor Arterial	N/A
ROBERTS CUT OFF RD	RIVER OAKS BLVD (SH 183)	WHITE SETTLEMENT RD	2	2	2	2	Minor Arterial	Undivided

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of River Oaks Future Land Use Plan, 2006. Source: NCTCOG, 2013

SANSOM PARK								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
AZLE AVENUE								
AZLE AVE	ROBERTS CUT OFF RD	SKYLINE DR	4	4	2/4	4	Principal Arterial	Divided
AZLE AVE	SKYLINE DR	SHERMAN DR	2	2	4	4	Principal Arterial	Divided
JACKSBORO HIGHWAY (SH 199)								
JACKSBORO HWY (SH 199)	SKYLINE DR	ROBERTS CUT OFF RD	4	4	6/8	6	Principal Arterial	Divided
ROBERTS CUT OFF ROAD								
ROBERTS CUT OFF RD	JACKSBORO HWY (SH 199)	SKYLINE DR	2	2	2	2	Minor Arterial	Undivided
SKYLINE DRIVE								
SKYLINE DR	AZLE AVE	JACKSBORO HWY (SH 199)	2	2	2/4	2	Collector	Undivided

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of Sansom Park Future Land Use Plan, 2005. Source: NCTCOG, 2013

WESTOVER HILLS								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
ROARING SPRINGS ROAD								
ROARING SPRINGS RD	WESTOVER DR	BYERS AVE	2	2	4	N/A	N/A	N/A

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D. Source: NCTCOG, 2013

WESTWORTH VILLAGE								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
PUMPHREY DRIVE								
PUMPHREY DR	NAS FORT WORTH, JRB GATE	SH 183 WB ACCESS	4	4	4/6	4	Minor Arterial	Undivided
WESTWORTH BOULEVARD (SH 183)								
WESTWORTH BLVD	CASSTEVENS ST	SAM CALLOWAY RD	4	4	4/6	4	Principal Arterial	Divided
ROARING SPRINGS ROAD								
ROARING SPRINGS RD	SH 183	WESTOVER DR	2	2	2	4	Minor Arterial	Undivided
ALTA MERE DRIVE (SH 183)								
ALTA MERE DR (SH 183)	CITY LIMITS	ROARING SPRINGS RD	4	4	6/8	4	Principal Arterial	Divided
SH 183/WHITE SETTLEMENT ROAD INTERSECTION								
SH 183	McNAUGHTON LN	CASSTEVENS ST	4	4	4/6	4	Principal Arterial	Divided
ALTA MERE DRIVE (SH 183)								
SH 183	ROARING SPRINGS RD	McNAUGHTON LN (WHITE SETTLEMENT RD)	4	4	6/8	4	Principal Arterial	Divided
WHITE SETTLEMENT ROAD								
WHITE SETTLEMENT RD	SH 183	EAST OF SH 183	4	4	2	4	Minor Arterial	Undivided
WHITE SETTLEMENT RD	EAST OF SH 183	ROBERTS CUT OFF RD	4	4	2/4	4	Minor Arterial	Undivided

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of Westworth Village Future Land Use Plan, 2000. Source: NCTCOG, 2013



WHITE SETTLEMENT								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
<b>CHERRY LANE</b>								
CHERRY LN	CLIFFORD ST	WHITE SETTLEMENT RD	4	4	2	5	Minor Arterial	Turn Lane
CHERRY LN	WHITE SETTLEMENT RD	IH 30	4	4	2	5	Minor Arterial	Turn Lane
<b>CLIFFORD STREET</b>								
CLIFFORD ST	IH 820 FRONTAGE RD NORTHBOUND	LAS VEGAS TR	4	4	4	5	Minor Arterial	Turn Lane
CLIFFORD ST	LAS VEGAS TR	CHERRY LN	4	4	4/6	5	Minor Arterial	Turn Lane
CLIFFORD ST	CHERRY LN	SPUR 341	4	4	4/6	5	Minor Arterial	Turn Lane
<b>LAS VEGAS TRAIL</b>								
LAS VEGAS TR	IH 820 FRGTG RD NORTHBOUND	CLIFFORD ST	2	2	2/4	4	Minor Arterial	Undivided
LAS VEGAS TR	CLIFFORD ST	WHITE SETTLEMENT RD	4	4	2	4	Minor Arterial	Undivided
LAS VEGAS TR	WHITE SETTLEMENT RD	IH 30	4	4	2	4	Minor Arterial	Undivided
<b>ALTA MERE DRIVE (SH 183)</b>								
ALTA MERE DR (SH 183)	SPUR 341 RAMPS	GREEN OAKS DR	4	4	6	6	Principal Arterial	Divided
ALTA MERE DR (SH 183)	GREEN OAKS DR	CITY LIMITS	4	4	6/8	6	Principal Arterial	Divided
<b>LOCKHEED BOULEVARD (SPUR 341)</b>								
LOCKHEED BLVD (SPUR 341)	CLIFFORD ST	NORTH OF WHITE SETTLEMENT RD	6	6	8	6	Principal Arterial	Divided
LOCKHEED BLVD (SPUR 341)	NORTH OF WHITE SETTLEMENT RD	SOUTH OF WHITE SETTLEMENT RD	6	6	6/8	6	Principal Arterial	Divided
LOCKHEED BLVD (SPUR 341)	SOUTH OF WHITE SETTLEMENT	RAMPS TO SH 183	6	6	8/10	6	Principal Arterial	Divided

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of White Settlement Thoroughfare Plan, 1999. Source: NCTCOG, 2013

WHITE SETTLEMENT								
FACILITY	FROM	TO	2012	2035		City Thoroughfare Plan <sup>3</sup>		
			LANES <sup>1</sup>	LANES <sup>1</sup>	LANES WARRANTED (LOS E/D) <sup>2</sup>	LANES <sup>1</sup>	FUNCTIONAL CLASSIFICATION	DIVIDED
WHITE SETTLEMENT ROAD								
WHITE SETTLEMENT RD	IH 820 FRONTAGE RD NORTHBOUND	LAS VEGAS TR	4	4	4	4	Minor Arterial	Undivided
WHITE SETTLEMENT RD	LAS VEGAS TR	CHERRY LN	4	4	4	4	Minor Arterial	Undivided
WHITE SETTLEMENT RD	CHERRY LN	SPUR 341	4	4	2/4	4	Minor Arterial	Undivided

<sup>1</sup>LANES: The average number of lanes in each road segment, including lanes in both directions; <sup>2</sup>LANES WARRANTED: The number of lanes required to raise the Level of Service during the busiest (peak) hour to LOS E or D; <sup>3</sup>City of White Settlement Thoroughfare Plan, 1999. Source: NCTCOG, 2013

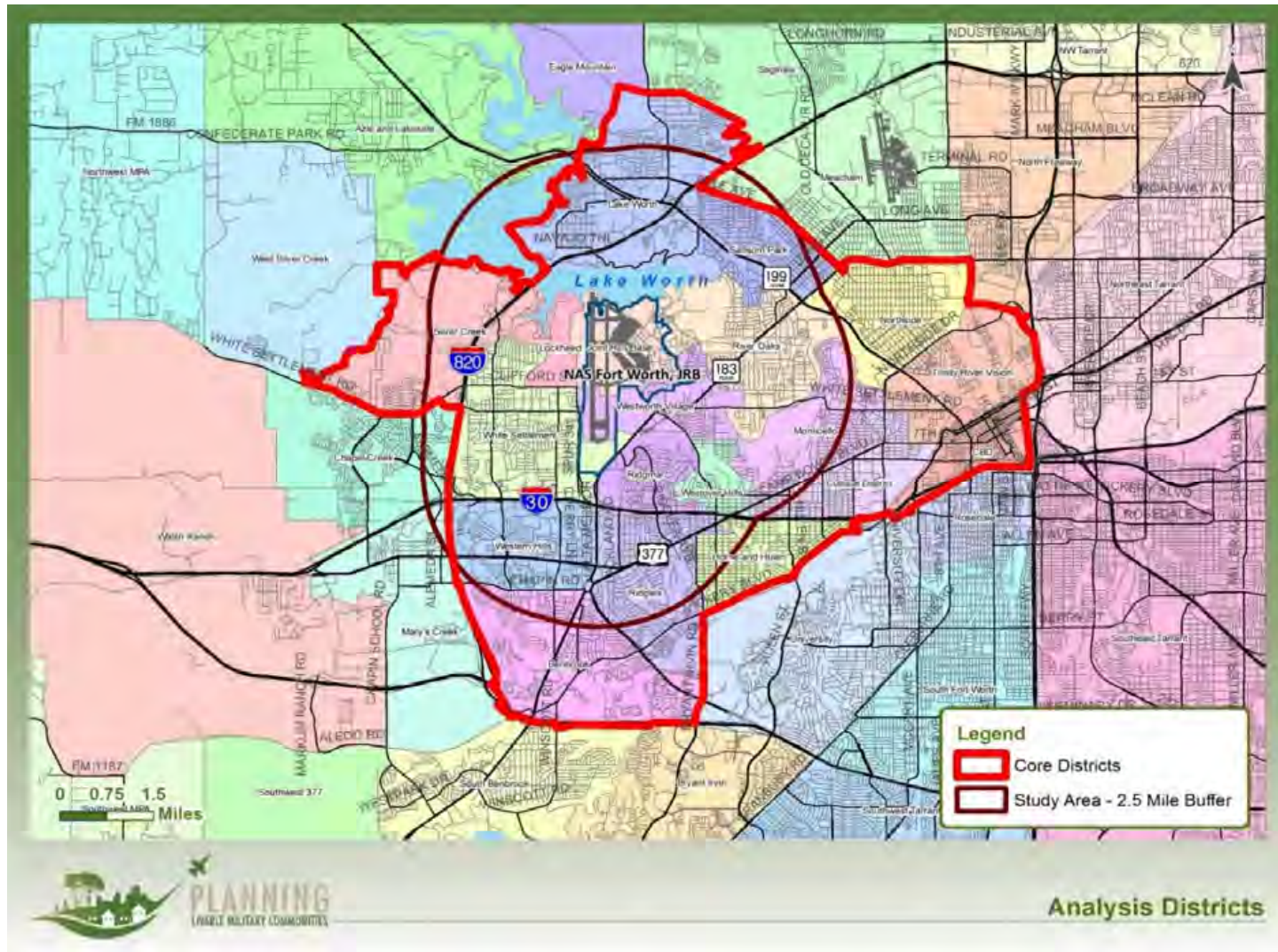
## LOCAL TRAVEL

In addition to looking at broad movements through the study area/sub-region, movements in smaller districts were considered. These local travel and demographic measures provide additional insight into local conditions that will impact congestion levels at a finer scale. Nineteen districts<sup>3</sup> were defined that roughly corresponded to city boundaries or other logical boundaries. **Figure 10** shows the location of the different districts. By defining these districts, it was possible to analyze demographic and roadway characteristics and compare changes from 2012 to 2035 to other districts, the sub-region, and the Dallas-Fort Worth regional totals.

**Figure 11** shows the percent change from 2012 to 2035 in population, households, and employment in all 19 districts compared to the sub-region and Dallas-Fort Worth region totals. There are three districts that are forecasted to experience very significant growth (all over 160 percent increase) in population and households including the Fort Worth Central Business District (CBD), Silver Creek District, and Trinity River Vision District. Several other districts will experience closer to average growth in population and households including Westworth Village and White Settlement, while the Lake Worth District's population and households are forecasted to grow by almost 100 percent. The NAS Fort Worth, JRB and Lockheed Districts show above average growth in population and households although these values are based on a population and household growth assumption that most likely does not represent the unique nature of the housing demand and constraints on the base nor in the small residential areas around Lockheed that are included in the Lockheed District.

While a large share of the sub-regional population and household growth will be attributed to a few districts growing at double or triple the regional growth, it is notable that the highest growth in employment will be occurring in three districts outside the IH 820 Loop and two districts inside the Loop. The Westworth Village, Silver Creek, Benbrook, White Settlement, and Lake Worth districts will have employment growth ranging from 62 percent (White Settlement) to 180 percent (Westworth Village and Silver Creek), representing higher forecasted employment growth than all other districts, the sub-region (29 percent), and the Dallas-Fort Worth regional total (47 percent).

FIGURE 10: ANALYSIS DISTRICTS USED FOR LOCAL TRAVEL PATTERNS ANALYSIS



Source: NCTCOG

FIGURE 11: PERCENT CHANGE IN POPULATIONS, HOUSEHOLDS, AND EMPLOYMENT  
FOR 19 DISTRICTS, SUB-REGION, AND DALLAS-FORT WORTH REGION

District <sup>1</sup>	Population <sup>2</sup>			Households <sup>2</sup>			Employment <sup>2</sup>		
	2012	2035	Growth	2012	2035	Growth	2012	2035	Growth
Benbrook	18,383	22,312	21%	6,717	8,001	19%	5,593	9,760	75%
Fort Worth CBD	6,644	18,864	184%	2,422	6,764	179%	64,526	75,841	18%
Cultural District	10,986	12,852	17%	4,013	4,609	15%	9,551	12,711	33%
Horne and Hulen	10,859	12,908	19%	3,966	4,629	17%	5,940	6,739	13%
Joint Reserve Base	280	496	77%	102	178	75%	6,178	6,589	7%
Lake Worth	17,022	33,531	97%	6,218	12,025	93%	7,187	11,666	62%
Lockheed	147	212	44%	54	76	41%	18,941	19,496	3%
Monticello	9,287	11,507	24%	3,393	4,127	22%	2,828	3,019	7%
Northside	13,790	17,542	27%	5,039	6,291	25%	6,529	9,265	42%
Ridglea	17,343	20,608	19%	6,335	7,390	17%	8,219	9,218	12%
Ridgmar	7,473	8,095	8%	2,730	2,903	6%	7,435	7,654	3%
River Oaks	13,311	16,906	27%	4,863	6,063	25%	3,485	5,057	45%
Sansom Park	9,507	11,673	23%	3,473	4,186	21%	2,311	2,742	19%
Silver Creek	5,056	14,341	184%	1,847	5,143	178%	1,714	4,803	180%
Trinity River Vision	2,619	7,138	173%	958	2,560	167%	13,419	20,961	56%
Western Hills	23,791	26,530	12%	8,691	9,514	9%	9,368	12,321	32%
Westover Hills	4,749	4,899	3%	1,735	1,757	1%	1,183	1,215	3%
Westworth Village	4,222	6,296	49%	1,542	2,258	46%	1,241	3,477	180%
White Settlement	17,083	24,754	45%	6,241	8,877	42%	7,540	13,310	77%
Sub-region Total	192,552	271,464	41%	70,339	97,351	38%	183,188	235,844	29%
<b>Dallas-Fort Worth Regional Total</b>	<b>6,699,977</b>	<b>9,902,543</b>	<b>48%</b>	<b>2,397,313</b>	<b>3,523,735</b>	<b>47%</b>	<b>4,222,781</b>	<b>6,198,013</b>	<b>47%</b>

<sup>1</sup>District boundaries do not exactly align with city boundaries.

<sup>2</sup>Source: NCTCOG

The forecasted population, employment, and household growth will contribute to significant changes in the vehicle miles traveled and growth in congestion levels on all roadway facilities in the 19 districts and region wide. **Figure 12** shows the percent change in lane miles and vehicle miles traveled for all roads (i.e. thoroughfares, freeways, ramps, and frontage roads), as well as the change in the percentage of lane miles that represent LOS D, E, or F. The percent of lane miles that represent LOS D, E, or F indicates the spread of congestion rather than its intensity; meaning rather than demonstrating the increase in hours people are spending in congestion in each district, it shows how many more roads are suddenly congested. **Figure 12** demonstrates the sub-region is forecasted to have 108 percent increase in lane miles at LOS D, E, or F by 2035. The sub-region is expected to have growth of 5 percent in lane miles by 2035 yet a 35 percent growth in vehicle miles traveled. The small percent of increased capacity (5 percent growth in lane miles) on all roadways in the sub-region coupled with population, employment, and vehicle miles of traveled growth will result in a significant decline in the ability of the roadway system to meet demand in 2035 as evidenced by triple digit increases in lane miles that are highly congested in many of the 19 districts.

One anomaly present in the Horne and Hulen District can be explained through further analysis. Vehicle miles traveled in this district will increase at a rate greater than the lane miles available yet no additional lane miles are forecast to be congested. Additional analysis reveals that while no, or almost no, additional miles are congested, congestion on the lane miles that are already congested worsens, moving from LOS D, E to LOS F.

**Figure 13** shows the growth in lane miles, vehicle miles traveled, and growth in congestion delay on thoroughfares (principal arterials, minor arterials, and collectors) for the 19 districts, the sub-region, and Dallas-Fort Worth regional totals. **Figure 13** demonstrates that 15 of the 19 districts will experience triple-digit increases in the vehicle hours spent in congestion (congestion delay). Of the PLMC communities, the Benbrook, Lake Worth, River Oaks, Sansom Park, and Westworth Village districts will have greater increases in congestion than the entire sub-region (182 percent). Sansom Park and River Oaks are forecasted to experience the greatest increase in congestion delay in the entire sub-region at 360 percent and 347 percent, respectively. In many of these districts forecasted to experience huge increases in congestion delay, the major contributing factors include no increased capacity (0 percent growth in lane miles) on thoroughfares and growth in population and vehicle miles of traveled.

FIGURE 12: PERCENT CHANGE IN LANE MILES, VEHICLE MILES TRAVELED, AND LANE MILES AT LOS D, E, OR F FOR ALL ROADS

District <sup>1</sup>	Lane Miles <sup>2</sup>			Vehicle Miles Traveled			Percent of Lane Miles at LOS D, E, or F		
	2012	2035	Growth	2012	2035	Growth	2012	2035	Growth
Benbrook	70	72	3%	285,849	493,624	73%	12%	43%	258%
Fort Worth CBD	108	121	12%	578,706	763,030	32%	34%	44%	28%
Cultural District	72	75	4%	377,276	481,919	28%	21%	42%	98%
Horne and Hulen	21	21	0%	87,063	106,663	23%	42%	42%	0%
Joint Reserve Base	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>
Lake Worth	104	109	5%	513,590	861,151	68%	18%	45%	148%
Lockheed	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>
Monticello	11	11	0%	24,243	32,301	33%	12%	47%	284%
Northside	52	50	-4% <sup>4</sup>	173,446	234,466	35%	27%	60%	117%
Ridglea	70	70	0%	293,049	379,751	30%	14%	41%	204%
Ridgmar	25	25	0%	140,216	174,474	24%	35%	51%	43%
River Oaks	28	28	0%	71,369	109,482	53%	21%	30%	44%
Sansom Park	19	19	0%	90,855	124,747	37%	39%	61%	56%
Silver Creek	33	46	39%	131,318	264,701	102%	17%	35%	104%
Trinity River Vision	35	41	17%	187,023	278,143	49%	33%	63%	90%
Western Hills	80	80	0%	310,227	477,338	54%	4%	30%	592%
Westover Hills	26	26	0%	171,881	232,778	35%	31%	51%	67%
Westworth Village	18	18	0%	64,656	92,122	42%	6%	53%	775%
White Settlement	97	97	0%	410,600	662,130	61%	21%	50%	144%
Sub-region Total	876	916	5%	3,911,240	5,281,789	35%	21%	44%	108%
<b>Dallas-Fort Worth Regional Total</b>	<b>47,675</b>	<b>53,794</b>	<b>13%</b>	<b>181,274,462</b>	<b>287,336,463</b>	<b>59%</b>	<b>17%</b>	<b>33%</b>	<b>91%</b>

<sup>1</sup>District boundaries do not exactly align with city boundaries.

<sup>2</sup>Lane miles are the number of lanes in each roadway segment, multiplied by the length of that segment, summed up within that district.

<sup>3</sup>Results not reported due to insufficient roadway network within the district.

<sup>4</sup>Reduction in lane miles in Northside district comes from narrowing of Ellis Avenue from 4 lanes in 2012 to 2 lanes in 2035.

Source: NCTCOG



FIGURE 13: PERCENT CHANGE IN 19 DISTRICT LANE MILES, VEHICLE MILES TRAVELED, AND CONGESTION DELAY FOR THOROUGHFARES ONLY

District <sup>1</sup>	Lane Miles <sup>2</sup>			Vehicle Miles Traveled			Congestion Delay (hours)		
	2012	2035	Growth	2012	2035	Growth	2012	2035	Growth
Benbrook	34	35	3%	102,657	151,710	48%	188	715	280%
Fort Worth CBD	85	86	1%	238,665	311,215	30%	1,130	2,164	92%
Cultural District	49	52	6%	131,903	170,545	29%	228	491	115%
Horne and Hulen	16	17	6%	80,955	99,409	23%	327	789	141%
Joint Reserve Base	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>
Lake Worth	56	60	7%	209,457	307,999	47%	828	3,700	347%
Lockheed	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>	N/A <sup>3</sup>
Monticello	11	11	0%	24,243	32,301	33%	59	170	188%
Northside	52	50	-4% <sup>4</sup>	173,446	234,466	35%	691	1,847	167%
Ridglea	59	59	0%	191,766	253,205	32%	449	1,155	157%
Ridgmar	16	16	0%	49,096	59,468	21%	203	349	72%
River Oaks	28	28	0%	71,369	109,482	53%	163	728	347%
Sansom Park	19	19	0%	90,855	124,747	37%	261	1,200	360%
Silver Creek	17	30	76%	40,311	95,941	138%	285	581	104%
Trinity River Vision	30	30	0%	136,290	183,367	35%	323	1,112	244%
Western Hills	48	48	0%	88,587	129,204	46%	109	309	183%
Westover Hills	12	12	0%	32,863	43,908	34%	80	255	219%
Westworth Village	17	17	0%	62,183	88,800	43%	104	413	297%
White Settlement	64	64	0%	156,233	212,860	36%	405	1,017	151%
Sub-region Total	620	638	3%	1,883,864	2,615,218	39%	5,634	15,865	182%
Dallas-Fort Worth Regional Total	38,227	41,174	8%	83,800,836	135,844,459	62%	217,198	770,288	255%

<sup>1</sup>District boundaries do not exactly align with city boundaries.

<sup>2</sup>Lane miles are the number of lanes in each roadway segment, multiplied by the length of that segment, summed up within that district.

<sup>3</sup>Results not reported due to insufficient roadway network within the district.

<sup>4</sup>Reduction in lane miles in Northside District comes from the narrowing of Ellis Avenue from 4 lanes in 2012 to 2 lanes in 2035.

Source: NCTCOG

Based on the evaluation of local travel and lane warrants for thoroughfare facilities in each district and by roadway segment (as shown in **Figures 8 and 9**), public input, and known transportation challenges, several roadway segments are recommended for future studies to evaluate improving mobility and safety and provide economic development opportunities.

## ROADWAY IMPLEMENTATION STRATEGIES

Roadway congestion presents a long-term challenge to the study area. Many options exist to improve roadway congestion depending on the root cause of the problem, the roadway type, existing and future traffic volumes, access and land use types along the corridor, availability of other transportation modes, and funding availability. A variety of strategies exists to improve roadway conditions in the study area; however, due to the nature of roadway planning and project development, it may take many years to implement. Some concerns can be mitigated in the short term with management and operational strategies.

### TRANSPORTATION MANAGEMENT AND OPERATION OPTIONS

The *Regional Coordination Committee Transportation Assessment* identified several transportation management and operation strategies that local governments and partners in the study area could implement to improve the functionality of the existing transportation system now and into the future. Transportation demand and operational management strategies are often low-cost with relatively large returns in transportation system benefit when compared to constructing or reconstructing major transportation facilities. These strategies are summarized here and are recommended for implementation in the study area:

#### *Transportation Demand Management*

- Increase marketing and participation of major employers in Employee Trip Reduction programs
- Implement carpooling, vanpooling, telecommuting, flexible work schedules, bicycle facilities, and transit passes

#### *Signage and Wayfinding*

- Improve highway and wayfinding signage
- Consider supplementary wayfinding signage to the base and other areas of interest

#### *Signalization*

- Evaluate existing signal timing plans and make improvements
- Install new signals and synchronize with existing signals
- Develop a systematic and multi-jurisdictional plan for retiming and maintenance of signals in the area

### *Bottlenecks*

- Improve operations at the NAS Fort Worth, JRB Main Gate (examples: staggering report times, designating lanes for different users, increase access points to base, etc.)
- Consider traffic calming strategies to address cut-through traffic

### *Safety*

- Improve signing, lighting, education, and traffic control measures
- Implement engineering solutions or redesign existing facilities
- Improve visibility in school zones through on-street pavement markings and signage
- Inventory crosswalks and provide crosswalks and signage at high-volume intersections and school zones

### *Other Strategies*

There are many traffic management and operation strategies in addition to those listed above that offer options to improving traffic conditions in an area. Additional strategies such as land use, corridor/area design, and transportation modal options (i.e. bike and pedestrian) can also contribute to reducing congestion and reducing the demand and need for additional capacity. These strategies are explored further in following sections of this Appendix, the Regional Comprehensive Plan, and the other Appendices.

## ROADWAY INFRASTRUCTURE IMPROVEMENT OPTIONS

It is envisioned that the roadway network within the study area will have adequate capacity to accommodate travel demand and be sufficiently maintained to ensure unimpeded travel throughout the area. It is preferred that the existing network be modernized and contain improvements that are contextually appropriate and accommodate a variety of corridor users. Longer-term, higher cost options for accommodating increased demand may include the provision of additional lanes, providing public transportation options, and ultimately re-constructing major interchanges and roadways. Likewise, a well-connected network of thoroughfares should exist to provide several route choices for people moving in and around the area. It should be a priority to ensure that any changes to, or future investment in, infrastructure in the NAS Fort Worth, JRB Accident Potential Zones be consistent with acceptable land uses for those zones.

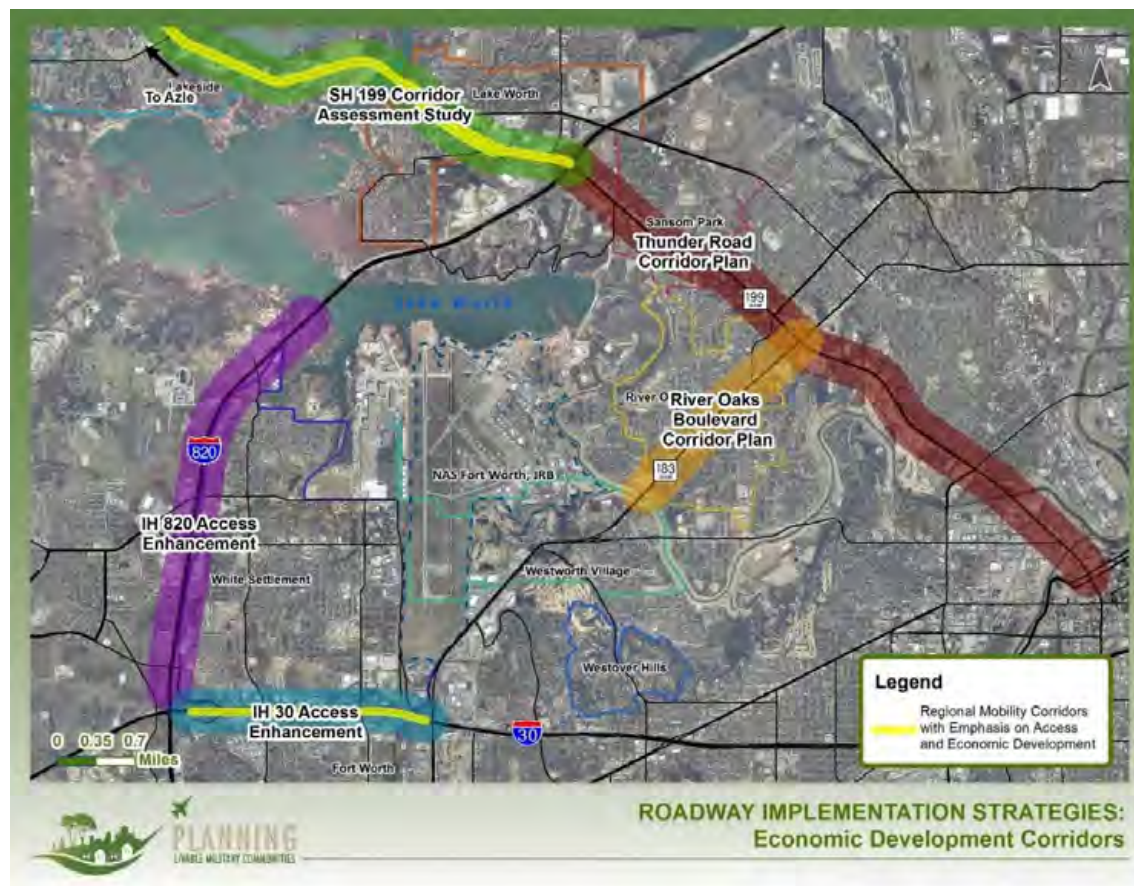
## IMPLEMENTATION STRATEGIES

### *Roadways Recommended for Economic Development Emphasis*

Several roadway corridors are recommended to serve as major economic development/redevelopment catalyst areas for the local governments. These corridors are regional facilities that primarily serve major commercial development. However, they represent significant opportunities to evaluate the addition of capacity while also promoting economic development along the corridor. Assessing alternative mode choices such as public transportation and bicycle and pedestrian options while facilitating increased traffic in the future is encouraged on these corridors.

It is recommended that four economic development corridors undergo further study to determine which potential mobility solutions may be appropriate in each context, assess future economic development needs, existing and forecasted traffic conditions, and incorporate Context Sensitive Solutions principles. Two of the roadways recommended for economic development emphasis are identified as regional mobility corridors. These corridors primarily serve high volumes of commuting traffic and forecasts show that volumes are expected to continue to grow. Ensuring that mobility is addressed while also promoting economic development along these corridors is crucial. **Figure 14** is a map depicting each Economic Development Corridor and descriptions of the proposed studies follows. Even where technical justification may exist for increasing the number of travel lanes, factors such as community preferences, cost, and the availability of funds may dictate the use of an alternative strategy.

FIGURE 14: ROADWAY IMPLEMENTATION STRATEGIES: ECONOMIC DEVELOPMENT CORRIDORS



Source: NCTCOG

## **SH 199 Corridor Assessment Study**

Continued growth along the SH 199 corridor beyond the study area will lead to increased traffic on this corridor with no suitable bypass route. The directional nature of the traffic, heavily dominated by through movements, suggests the need to maintain the relatively high-speed character of this facility, perhaps through additional lanes or signal timing strategies. An express bus connecting the two ends of the corridor should be considered for further study. This service should be considered to provide a pathway to evolving into a higher capacity service such as Bus Rapid Transit (BRT) and eventually fixed guide-way systems.

Several challenges exist along this corridor including multiple cross sections ranging from rural frontage roads and mainlanes to a major commercial district that needs improved access. Several of these cross-sections are shown from Lake Worth (IH 820 and SH 199 interchange) to city of Azle (see **Figure 15** for reference).

TxDOT has completed some preliminary work and has a schematic of the SH 199 corridor as a freeway from IH 820 to the Tarrant County line. This schematic includes a T-intersection instead of a cloverleaf at IH 820 as an example of some of the major design changes being considered for the future of this corridor to update design and accommodate increasing traffic volumes.

A Corridor Assessment Study is recommended for SH 199 from IH 820 to the city of Azle. This study would include a key partnership between TxDOT and the city of Lake Worth with involvement from the city of Fort Worth and other partners such as NCTCOG, the city of Lakeside, major landowners, and residents.

### *Implementation Steps*

Because this is a state owned and operated roadway, the city of Lake Worth should work with TxDOT to evaluate design concepts and carry out a public involvement process. Additional partners to include in the process would be the city of Lakeside, city of Azle, NCTCOG, and the public. The city of Lake Worth should coordinate with NCTCOG and TxDOT to consider the addition of this corridor in the next Metropolitan Transportation Plan for further evaluation.

FIGURE 15: SH 199 CORRIDOR CROSS-SECTIONS



Source: NCTCOG



## **Thunder Road Corridor Plan**

SH 199 through Sansom Park has been branded Thunder Road by the city of Sansom Park. The city has recently instituted a Tax Increment Finance district along their portion of SH 199 to improve future economic development. Due to tremendous population growth northwest of Sansom Park, traffic is forecasted to grow in the corridor by the year 2035. From an economic development perspective, in 2012, 75 percent of trips traveled through the corridor, meaning they did not stop in the corridor. The other 25 percent of trips are traveling the corridor to arrive at a destination along the corridor.

Currently, SH 199 from Northside Drive to Roberts Cut Off Road is a four-lane facility through Fort Worth and Sansom Park. Both Fort Worth's and Sansom Park's Thoroughfare Plans recommend this segment of SH 199 to be a six-lane principal arterial in the future. Additionally, TXDOT determined that Jacksboro Highway/SH 199 will not be widened with limited access frontage roads inside IH 820, thus allowing the SH 199 corridor to continue to be a primary arterial boulevard with direct access allowed to the businesses in this commercial corridor. Additionally, this corridor has a right-of-way cross-section of 155 feet, representing the availability of land to consider multiple improvement and engineering concepts and incorporate multi-modal transportation elements. **Figure 16** is an example of a rendering that was developed at the Corridor Visioning Workshop.

As a key regional artery that moves traffic from downtown Fort Worth to destinations northwest, SH 199 is a corridor ripe for redevelopment. It is recommended that a Thunder Road Master Plan be completed for this facility from downtown Fort Worth to IH 820 with an emphasis on economic development opportunities that provide transportation options while still maintaining function of moving traffic. Utilizing Context Sensitive Solutions principles and modern engineering designs is recommended to improve the livability of this corridor, provide transportation options for different users, and improve drainage. Consideration for a public transportation accommodations such as dedicated right-of-way could serve as an evolutionary transitway for future consideration of regional commuter rail in this corridor.

The Thunder Road Corridor Plan should include considerations for and elements of the following concepts:

- Community gateway features
- Streetscape, landscape, and signage elements

FIGURE 16: SH 199 RENDERINGS FROM CORRIDOR WORKSHOPS



Source: NCTCOG



- Intersection improvements
- Access management plans including slip street concept for building access
- Drainage engineering concepts and plans
- Pedestrian access
- Parking and building orientation and other land use and zoning considerations
- Architectural design controls and utility modifications
- Public transportation elements
- Public activity centers

### *Implementation Steps*

Because this is a state owned and operated roadway, TxDOT's involvement will be critical to the success of this project. NCTCOG has committed to leading the first phase of a Thunder Road Corridor Plan that will include partners such as Sansom Park and Sansom Park Economic Development Corporation, Fort Worth, Lake Worth, TxDOT, and the Fort Worth Transportation Authority. Once completed, Sansom Park should work with NCTCOG and TxDOT to consider the addition of this corridor in the next Metropolitan Transportation Plan for further evaluation and long-term funding consideration.

### **River Oaks Boulevard Corridor Plan**

SH 183 through River Oaks, also known as River Oaks Boulevard, is a TxDOT owned and operated facility. River Oaks, like many communities in the study area, has a vibrant history associated with the Naval Air Station, formerly known as Carswell Air Force Base. River Oaks Boulevard was originally designed as a rural highway cross section and as the adjacent land uses have changed and the city has become built-out, the corridor's design and function need to evolve as well.

Currently, SH 183 from Sam Calloway Road to Long Avenue is a four-lane facility through River Oaks. The city of River Oak's Thoroughfare Plan recommends this segment of SH 183 to be a divided six-lane principal arterial in the future. Additionally, this corridor has a right-of-way cross section of 150 feet, representing the availability of land to consider multiple improvement and engineering concepts and incorporate multi-modal transportation elements.

**Figure 17** is an example of a rendering that was developed during the Corridor Visioning Workshop.

Existing and future traffic volumes on this road, the availability of right-of-way, and economic development needs, make River Oaks Boulevard from SH 199 to the Trinity River a key candidate for a master plan that considers modern urban design and innovative access management strategies. Using concepts

such as Context Sensitive Solutions is recommended for this corridor to improve economic development potential and provide additional transportation options (bicycle and pedestrian facilities).

The River Oaks Boulevard Corridor Plan should include considerations for and elements of the following concepts:

- Community gateway features
- Streetscape, landscape, and signage elements
- Intersection improvements
- Access management plans including slip street concept for building access
- Drainage engineering concepts and plans
- Pedestrian access
- Parking and building orientation and other land use and zoning considerations
- Architectural design controls and utility modifications
- Public transportation elements
- Public activity centers

#### *Implementation Steps*

Because this is a state owned and operated roadway, TxDOT's involvement will be critical to the success of this project. NCTCOG has committed to lead the first phase of a River Oaks Boulevard Corridor Plan that will include partners such as River Oaks and the River Oaks Economic Development Corporation, Fort Worth, and TxDOT. Once completed, River Oaks should work with NCTCOG and TxDOT to consider the addition of this corridor in the next Metropolitan Transportation Plan for further evaluation and long-term funding consideration.

#### **Access Enhancement in White Settlement**

White Settlement is a community bordered by two major interstates, Interstate 30 and Interstate (Loop) 820. While having two major interstates border a city is a positive asset, accessing local roads and businesses from these two highways is currently hampered by a lack of access points and should be improved to contribute to improved economic development opportunities.

FIGURE 17: SH 183 RENDERINGS FROM CORRIDOR WORKSHOPS



Source: NCTCOG

### *Interstate Highway 30 Access Enhancement Study*

IH 30 is the major artery from downtown Fort Worth to towns and cities west of IH 820 that are undergoing tremendous growth. Existing and future growth and development west of IH 820 will create additional traffic considerations for IH 30. Currently, there are no planned improvements in the Metropolitan Transportation Plan, Mobility 2035 – 2013 Update, associated with IH 30 from west of downtown to IH 820. As TxDOT begins to consider future needs associated with IH 30, it is recommended that consideration for improved access ramps (ingress and egress), continuous parallel frontage facilities, and reconstruction of the IH 30/SH 183/Spur 341 interchange be considered in future corridor design studies. Improvements to these facilities along IH 30 from SH 183 to IH 820 would greatly enhance the ability of local traffic to traverse local parallel options, would provide improved access and visibility to vacant and frontage properties for economic development in White Settlement, and improve the flow of traffic to and from and visibility of other major destinations in the area such as Ridgmar Mall, Lockheed Martin, and NAS Fort Worth, JRB.

### *Interstate Highway 820 Access Enhancement Study*

IH 820 provides a critical artery for mobility in western Tarrant County and access to other regional corridors such as IH 35W and the Dallas-Fort Worth International Airport. In 2012, all segments of this highway from IH 20 to SH 199 function at a peak hour LOS of ABC. In 2035, several segments are forecasted to have a peak hour LOS of D, E, or F. These volumes and LOS reflect the increased growth west of IH 820 and western Tarrant County in general. The average daily volume on IH 820 from IH 30 to North Las Vegas Trail are forecasted to increase by 90 percent between 2012 and 2035. Improved access from the IH 30/IH 820 intersection to White Settlement is an important element to enhancing economic development potential in White Settlement and accommodating future traffic demands in a more efficient way. An Access Enhancement study should be completed to evaluate alternative ingress and egress (entrance and exit ramps) and frontage road improvements from the IH 30/IH 820 interchange to the Lake Worth water boundary, with an emphasis on providing access to land uses along the frontage roads.

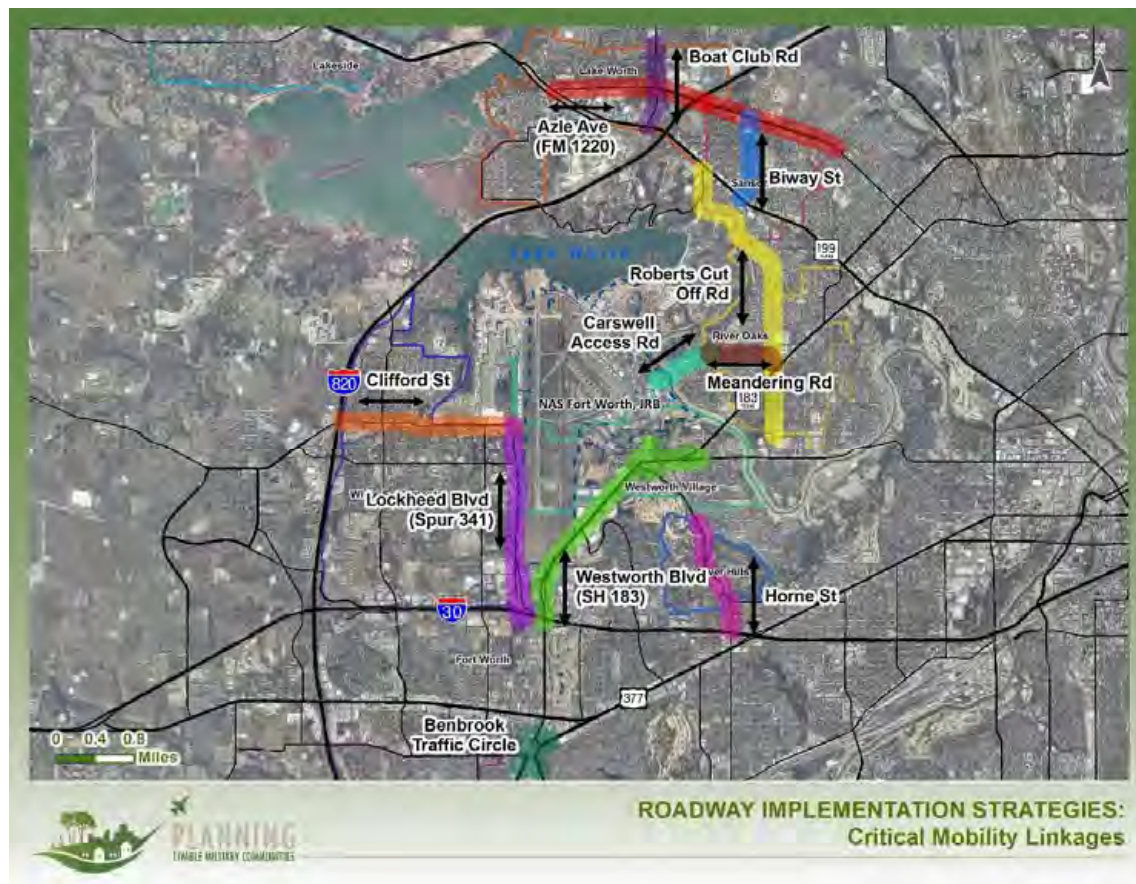
### *Implementation Steps*

Both IH 30 and IH 820 are maintained by TxDOT. It is recommended that TxDOT lead future access enhancement studies associated with IH 30 and IH 820 through partnerships from the city of White Settlement and NCTCOG. While both of these interstates provide key economic development potential for White Settlement and Fort Worth, it is recommended that improving access ingress and egress points along IH 820 proceed expeditiously due to a 90 percent increase in average daily traffic volumes and growth occurring in western Tarrant County. Moving forward, White Settlement should work with NCTCOG and TxDOT to consider the addition of this corridor in the next Metropolitan Transportation Plan for further evaluation and long-term funding consideration.

## ROADWAYS RECOMMENDED FOR CRITICAL MOBILITY LINKAGES

In addition to follow-up studies for key economic development corridors, a recommended list of roadways that provide critical mobility linkages is provided for future study consideration. Definition of these corridors is based on future traffic forecasts, the need to reduce future congestion, and access to residential areas and other key interest points in the study area. Additionally, the identification of needed access management improvements, roadway design challenges, and public input are considered. These corridors are shown in **Figure 18**. **Figure 19** lists these corridors and identifies the key emphasis area identified through this planning process.

FIGURE 18: ROADWAY IMPLEMENTATION STRATEGIES: CRITICAL MOBILITY LINKAGES



Source: NCTCOG

FIGURE 19: CORRIDORS PROVIDING CRITICAL MOBILITY LINKAGES FOR FUTURE STUDY CONSIDERATION

Roadway	City	Focus Area	Key Challenges	Potential Solutions
Azle Avenue (FM 1220)	Lake Worth	Sansom Park city limit to SH 199	<ul style="list-style-type: none"> <li>Existing and future traffic congestion</li> <li>Parallel facility to SH 199</li> <li>Future development impact on traffic</li> <li>No sidewalks or bike paths</li> </ul>	<ul style="list-style-type: none"> <li>Context Sensitive Solutions</li> <li>Emphasize commercial center access</li> <li>Potential evaluation of additional lane capacity (long term)</li> <li>Active transportation improvements</li> </ul>
Boat Club Road	Lake Worth	Shadydell Drive to SH 199	<ul style="list-style-type: none"> <li>Existing and future traffic congestion</li> <li>Further reduction in peak hour LOS</li> <li>Safety concerns</li> <li>Signal synchronization</li> <li>No sidewalks or bike paths</li> </ul>	<ul style="list-style-type: none"> <li>Context Sensitive Solutions</li> <li>Signal retiming (currently underway)</li> <li>Potential evaluation of additional lane capacity (long term)</li> <li>Active transportation improvements</li> </ul>
Carswell Access Road	Fort Worth	River Oaks city limit to NAS Fort Worth, JRB East Gate	<ul style="list-style-type: none"> <li>Episodic traffic back up associated with base training weekends</li> <li>No sidewalks or bike paths but is a critical linkage to Trinity Trails</li> <li>Commercial node enhancement</li> <li>Access to NAS Fort Worth, JRB East Gate</li> </ul>	<ul style="list-style-type: none"> <li>Neighborhood scale commercial development</li> <li>Active transportation improvements</li> <li>Coordination with base on training weekends to mitigate local traffic impacts</li> </ul>
Horne Street/Roaring Springs Road	Fort Worth	IH 30 to Volder Drive	<ul style="list-style-type: none"> <li>Forecasted traffic congestion</li> <li>No sidewalks or bike paths</li> <li>Maintaining residential character</li> </ul>	<ul style="list-style-type: none"> <li>Potential evaluation of additional lane capacity (long term)</li> <li>Context Sensitive Solutions</li> <li>Active transportation improvements</li> </ul>
Benbrook Traffic Circle	Fort Worth	SH 377 intersection with SH 183 near Benbrook	<ul style="list-style-type: none"> <li>Safety</li> <li>AICUZ compatibility considerations</li> <li>Outdated design</li> <li>Does not accommodate bike or pedestrian traffic well</li> </ul>	<ul style="list-style-type: none"> <li>Long-term evaluation of redesigning to modern intersection</li> <li>Future development opportunities with redesign although land use compatibility is key concern</li> <li>Active transportation improvements</li> </ul>
Meandering Road	River Oaks	Roberts Cut Off Road to Fort Worth city limit	<ul style="list-style-type: none"> <li>Maintenance capabilities of city</li> <li>Access to NAS Fort Worth, JRB East Gate</li> <li>Future reduction in peak hour LOS</li> <li>No sidewalks or bike paths but opportunity to serve as critical connections between Trinity Trails trailheads</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate opportunities for maintenance partnership with county or other local governments or base</li> <li>Potential evaluation of additional lane capacity (long term)</li> <li>Active transportation improvements</li> </ul>
Roberts Cut Off Road	River Oaks/ Fort Worth/ Sansom Park	Jacksboro Highway (SH 199) to White Settlement Road	<ul style="list-style-type: none"> <li>School zone on heavily traveled portion of Roberts Cut Off road</li> <li>Safety concerns</li> <li>Existing LOS F and future reduced LOS on some segments</li> <li>No sidewalks or bike paths</li> </ul>	<ul style="list-style-type: none"> <li>Context Sensitive Solutions</li> <li>Potential evaluation of additional lane capacity (long term)</li> <li>Traffic calming strategies</li> <li>Active transportation improvements, especially around school</li> </ul>
Biway Street	Sansom Park	SH 199 to Azle Avenue	<ul style="list-style-type: none"> <li>Safety concerns</li> <li>Major north/south cut-through from SH 199 to Azle Avenue</li> <li>No sidewalks or bike paths</li> </ul>	<ul style="list-style-type: none"> <li>Traffic calming strategies</li> <li>Potential evaluation of additional lane capacity (long term)</li> <li>Context Sensitive Solutions</li> <li>Active transportation improvements</li> </ul>



Roadway	City	Focus Area	Key Challenges	Potential Solutions
Alta Mere Drive/ Westworth Blvd. (SH 183)	Westworth Village/ Fort Worth/ White Settlement	IH 30 to north of White Settlement Road	<ul style="list-style-type: none"> <li>Declining level of service due to increasing traffic volumes</li> <li>Access to NAS Fort Worth, JRB</li> <li>Access to Ridgmar Mall</li> <li>Signal synchronization</li> <li>New NAS Fort Worth, JRB Commercial Gate installation and traffic signal changes</li> <li>No sidewalks or bike paths</li> <li>Infrastructure design</li> </ul>	<ul style="list-style-type: none"> <li>Signal retiming (completed in 2011 but should be re-evaluated periodically)</li> <li>Potential evaluation of additional lane capacity (long term) and intersection design</li> <li>Improved access management near Ridgmar Mall and other major commercial developments</li> <li>Active transportation improvements</li> <li>Context Sensitive Solutions</li> </ul>
Lockheed Blvd. (Spur 341)	White Settlement	IH 30 to Clifford Road	<ul style="list-style-type: none"> <li>Outdated design features</li> <li>Safety concerns due to slip ramps and intersections</li> <li>Access to key industrial development and major employers in the study area</li> <li>Key access point to Lockheed Martin and western border of NAS Fort Worth, JRB airfield</li> </ul>	<ul style="list-style-type: none"> <li>Modern design enhancements</li> <li>Potential evaluation of appropriate lane capacity (long term)</li> <li>Support additional industrial/light industrial business growth along this corridor</li> <li>Access management and commercial business access improvements</li> </ul>
Clifford Road	White Settlement	Grants Lane to IH 820	<ul style="list-style-type: none"> <li>Key access point to Lockheed Martin</li> <li>Declining level of service due to increasing traffic volumes and growth Northwest of White Settlement</li> <li>Major artery to access industrial development area</li> </ul>	<ul style="list-style-type: none"> <li>Consideration for alternative intersection designs such as local roundabouts</li> <li>Potential evaluation of additional lane capacity (long term)</li> <li>Economic and commercial development</li> <li>Context Sensitive Solutions</li> </ul>



## ROADWAY DESIGN FEATURES FOR FUTURE CONSIDERATION IN COMMUNITY THOROUGHFARE PLANNING

As discussed previously, there are many traffic management and operation strategies, land use and corridor design strategies, and transportation modal options (i.e. bike and pedestrian) that, if improved, can reduce the demand and need for additional capacity. While some capacity improvements may need to be evaluated in some areas, improving accessibility and reducing congestion through development of an integrated, multi-modal transportation system is a key consideration in community transportation planning.

Because it is not possible to build enough transportation facilities to eliminate congestion or to completely meet future mobility needs, an integrated, multi-modal transportation system is necessary to support balanced job and household growth. The transportation system must also take into account the linkages between housing, employment, retail, education, health, and recreational opportunities. Implementing land use strategies, improving the existing transportation network (as seen on page 12), improving access to public transportation options, and implementing management and operations strategies should be considered and are recommended to improve traffic conditions before evaluating additional capacity. Several of these strategies are outlined in this Appendix.

### *The Land Use – Transportation Connection*

Transportation and land use are intrinsically linked; transportation provides connections between land uses and the way the land is used imposes demands on the transportation system. Traditional land use and transportation planning practices encourage segregated land uses connected by a single mode of transportation, shown by the top image in **Figure 20**. Improving both the transportation network and encouraging a stronger mix of land uses and transportation options within an area can lead to improvements in quality of life, reduce vehicle miles of travel, and support enhanced economic development. The bottom image of **Figure 20** represents a connected, integrated transportation network which improves access to all land uses and supports more dense development patterns.

FIGURE 20: EXAMPLE OF LAND USE AND TRANSPORTATION CONNECTION – IMPROVING NETWORK OF ROADS INCREASES ACCESSIBILITY AND REDUCES DEMAND ON ALL FACILITIES



Top Image – no connected network;  
Bottom Image – connected network.

Source: AECOM

### *Context Sensitive Solutions/Context Sensitive Design*

Context Sensitive Solutions (CSS) is an approach that considers the total context within which a transportation improvement project will exist. CSS is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS should be considered during all phases of long range transportation planning, programming, environmental studies, design, construction, operations, and maintenance.<sup>1</sup> There are many resources available to assist cities and local governments to include CSS in local transportation planning and projects. Regionally, NCTCOG works at incorporating CSS in the planning and design of current and future facilities and projects and can serve as a CSS resource for communities in the Dallas-Fort Worth region.

### *Complete Streets*

According to the National Complete Streets Coalition, “Complete Streets are streets for everyone.” They are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street. Complete Streets make it easy to cross the street, walk to shops, bicycle to work, and are safe for people to walk to and from train stations.

Creating complete streets means transportation agencies must change their approach to community roads. By adopting a Complete Streets or similar policy, communities direct their transportation planners and engineers to routinely design and operate the entire right-of-way to enable safe access for all users, regardless of age, ability, or mode of transportation. Regionally, NCTCOG has begun development of a policy to encourage support for and inclusion of Complete Streets principles into local community transportation planning and projects. As of the date of this publication, this policy is not finalized. Local governments such as the City of Dallas, Texas have adopted policies that support the use of Complete Streets principles in the design and redesign of their local thoroughfares. Similar to CSS, there are many resources locally and nationally for communities interested in fostering Complete Streets principles in transportation projects. For regional updates and resources visit <http://www.nctcog.org/completestreets/>.

### *Green Streets*

An additional concept for roadway and local street design includes Green Streets principles. Green Streets are urban transportation right-of-ways that integrate stormwater treatment techniques such as natural processes and landscaping to reduce impervious surfaces, improve water quality, and reduce stormwater runoff. Green Streets are designed to mimic local hydrology prior to development and provide multiple benefits along the street right-of-way such as an integrated system of stormwater management, volume reductions in stormwater runoff, and aesthetic enhancement of rights-of-way.<sup>2</sup> The Low Impact Development Center, Inc. provides a summary of the approaches available for creating Green Streets including:

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<sup>1</sup> Federal Highway Administration, <http://contextsensitivesolutions.org/>

<sup>2</sup> Low Impact Development Center, Inc. <http://www.lowimpactdevelopment.org/greenstreets/>

- **Alternative Street Designs (Narrower Street Widths):** For new streets, the layout and street network must be planned to respect the existing hydrologic functions of the land (preserve wetlands, buffers, high-permeability soils, etc.) and minimize the impervious area. If retrofitting or redeveloping a street, opportunities to eliminate unnecessary impervious areas should be explored.
- **Swales:** Swales are vegetated open channels designed to reduce stormwater volume through infiltration, improve water quality through vegetative and soil filtration, and reduce flow velocity by increasing channel roughness.
- **Bioretention Curb Extensions and Sidewalk Planters:** Bioretention features can be tree boxes taking runoff from the street, planter boxes, or curb extensions. Infiltration and storage in bioretention features reduce runoff volumes, attenuate peak flows, and filter stormwater through vegetation and soil.
- **Permeable Pavement:** Permeable pavement includes permeable concrete, permeable asphalt, permeable interlocking concrete pavers, and grid pavers. Permeable pavement systems have an aggregate base in common which provides structural support, runoff storage, and pollutant removal through filtering and adsorption.
- **Sidewalk Trees and Tree Boxes:** Street trees reduce the urban heat island effect, reduce stormwater runoff, improve the urban aesthetic, and improve air quality. Trees along streets should have adequate soil volumes and good soil mixtures to grow properly and to full size, providing many benefits to the local community.

GREEN STREET APPROACHES  
IN SEATTLE, WA



Source: NCTCOG

Green Streets principles could be considered by the cities in the study area to reduce impervious surface, improve streetscape aesthetics, and improve water quality in the watershed. These principles could be considered during reconstruction of roadways and streets or during design of new streets.

*Modern Roundabouts*

Additional design features considered during portions of this study and that could be considered by cities in future street design and reconstruction projects included modern roundabouts. The Federal Highway Administration defines a modern roundabout as a type of circular intersection with yield control of entering traffic, islands on the approaches, and appropriate roadway curvature to reduce vehicle speeds. Modern roundabouts are different from rotaries and other traffic circles; they are typically smaller than traditional high-speed traffic circles but usually larger than neighborhood traffic circles used to calm traffic. There are many demonstrated safety benefits to roundabouts due to lower speeds such as decreased delay and thus congestion, fewer stops thus reduced pollution and fuel use, and reduced costs associated with no required signal equipment and often less pavement.<sup>3</sup> Many technical resources

<sup>3</sup> Federal Highway Administration: *Roundabouts, A Safer Choice*

exist for local governments and communities that are considering modern roundabouts as part of a community transportation system. One such site is <http://safety.fhwa.dot.gov/intersection/roundabouts/>.

As noted previously, modern roundabouts are different from traffic circles. The study area currently has a traffic circle known as the Benbrook Traffic Circle located in the study area at the intersection of SH 183 and US 377. **Figure 21** demonstrates the difference in scale between the Benbrook Traffic Circle, designed for high speeds and presents safety concerns, and a small neighborhood roundabout. For comparison, the exhibit demonstrates at the same scale, the size and design differences between the Benbrook Traffic Circle and two neighborhood roundabouts in Colleyville and Southlake, Texas. Several local governments in the Dallas-Fort Worth region are building roundabouts as part of their local thoroughfare system. For example, the cities of Southlake, Colleyville, and Kennedale have built modern roundabouts to move traffic through local intersections more efficiently.

NEIGHBORHOOD MINI-ROUNDBABOUT  
IN SEATTLE, WA





FIGURE 21: TRADITIONAL TRAFFIC CIRCLE COMPARED TO NEIGHBORHOOD ROUNDABOUTS



Source: NCTCOG

Many options exist to improve roadway congestion that is prevalent throughout the study area. The strategies discussed in this Appendix include transportation management and operations options, roadway infrastructure improvements, and utilizing alternative design features. These strategies should be implemented depending on the roadway type, existing and future traffic volumes, access issues, land use types along the corridor, availability of transportation modes, and funding. Specific recommended actions to enhance and improve the existing roadway infrastructure in the study area are outlined in **Figure 22**.

FIGURE 22: RECOMMENDED STRATEGIES FOR ROADWAY INFRASTRUCTURE IMPROVEMENTS

RECOMMENDED ACTIONS: ROADWAY					
Project/Initiative	Timeframe	Responsible Entities	Partners	Funding Sources	Order of Magnitude Cost
POLICY: IMPLEMENT PLMC ECONOMIC DEVELOPMENT CORRIDOR STUDIES					
<ul style="list-style-type: none"> <li>• Form a coalition between neighboring cities to assist and coordinate for common needs and mutual benefit along facilities that cross jurisdictional boundaries</li> <li>• Participate in studies for the following corridors recommended for economic development emphasis:               <ul style="list-style-type: none"> <li>○ SH 199 Corridor Assessment Study (Lake Worth/Fort Worth/ TxDOT/NCTCOG)</li> <li>○ Thunder Road Corridor Plan (Sansom Park/Fort Worth/ TxDOT/NCTCOG)</li> <li>○ River Oaks Boulevard Corridor Plan (River Oaks/Fort Worth/ TxDOT/NCTCOG)</li> <li>○ IH 30 Access Enhancement Study (White Settlement/ TxDOT/NCTCOG)</li> <li>○ IH 820 Access Enhancement Study (White Settlement/ TxDOT/NCTCOG)</li> </ul> </li> <li>• Integrate multi-modal considerations, context sensitive design, access management, land use evaluations, safety, stormwater management, streetscape improvements, and other engineering, planning, and economic development strategies into corridor studies.</li> </ul>	Short to Mid Term	City, TxDOT, and NCTCOG	Neighboring Cities, Economic Development Corporations, NCTCOG, TxDOT, The T, Tarrant County, Major Employers, Landowners, Public	City, State, Federal, Other Sources	Low



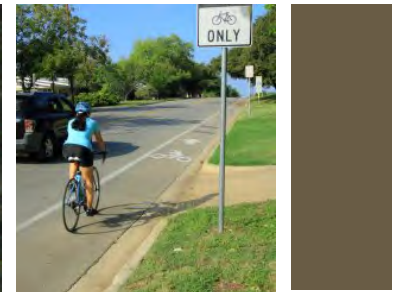
RECOMMENDED ACTIONS: ROADWAY					
Project/Initiative	Timeframe	Responsible Entities	Partners	Funding Sources	Order of Magnitude Cost
POLICY: IMPLEMENT PLMC MOBILITY LINKAGES CORRIDOR IMPROVEMENT STUDIES					
<ul style="list-style-type: none"> <li>Form a coalition between neighboring cities to assist and coordinate for common needs and mutual benefit along facilities that cross jurisdictional boundaries.</li> <li>Identify and define specific needs and goals of transportation corridor.</li> <li>Engage with Tarrant County and NCTCOG for planning assistance and other technical/policy needs.</li> <li>Engage other transportation implementers such as TxDOT and Tarrant Regional Water District and non-profit agencies such as Streams and Valleys.</li> <li>Integrate multi-modal considerations, context sensitive design, access management, land-use evaluations, safety, stormwater management, streetscape improvements, and other engineering, planning, and economic development strategies into studies.</li> <li>Seek out and utilize non-traditional funding such as grants from non-profits, philanthropies, non-transportation and transportation federal and state agencies (e.g. National Park Service, FHWA safety technical resources, etc.).</li> </ul>	Mid to Long Term	City and/or TxDOT	Neighboring Cities, Tarrant County, NCTCOG, TxDOT, The T, Economic Development Corporations, TRWD, Major Employers, Landowners, Public (depending on the project, may include other stakeholders)	City, State, Federal, Philanthropic, Non-Profit, Special Technical Assistance Grants	Low
POLICY: IMPLEMENT LOCAL PRIORITY IMPROVEMENTS TO PROVIDE A WELL-CONNECTED NETWORK OF THOROUGHFARES					
<ul style="list-style-type: none"> <li>Identify and prioritize improvements of importance to individual cities, the study area, and the larger Dallas-Fort Worth region.</li> <li>Integrate multi-modal considerations, context sensitive design, access management, land-use evaluations, safety, stormwater management, streetscape improvements, and other engineering, planning, and economic development strategies into local roadway planning, design, construction, operations, and maintenance.</li> <li>Update local thoroughfare plans to reflect priorities and implementation actions.</li> </ul>	Mid to Long Term	City, Tarrant County	TxDOT, NCTCOG, Tarrant County, Neighboring Cities	City, Federal	Low
<ul style="list-style-type: none"> <li>Establish local bond programs to implement or improve local facilities.</li> <li>Pursue Tarrant County Bond program funds for identified priority projects.</li> <li>Pursue all applicable traditional and non-traditional funding opportunities and leverage partnership opportunities.</li> </ul>	Mid to Long Term	City, Tarrant County	TxDOT, NCTCOG, Tarrant County,	City, Tarrant County, State, Federal, Private/Public Partnerships	High
Submit formal requests for projects of regional significance to be considered for further evaluation during the development of the Metropolitan Transportation Plan.	Ongoing	City, TxDOT	TxDOT, Tarrant County, NCTCOG	N/A	N/A

RECOMMENDED ACTIONS: ROADWAY					
Project/Initiative	Timeframe	Responsible Entities	Partners	Funding Sources	Order of Magnitude Cost
POLICY: ENHANCE ROADWAY DESIGN, IMPROVE SAFETY, AND SUPPORT THE PROVISION OF MOBILITY OPTIONS ON LOCAL ROADWAYS					
<ul style="list-style-type: none"> <li>Integrate Context Sensitive Design principles, including consideration for Green Streets principles, into future local roadway planning, design, construction, operations, and maintenance.</li> <li>Consider alternative roadway and intersection design features such as modern roundabouts, neighborhood traffic circles, traffic calming measures, or other features to improve safety, improve air quality, and enhance roadway attractiveness.</li> <li>Include bicycle and pedestrian modes in roadway corridor studies.</li> <li>Evaluate existing roadway rights-of-way for public transportation service options.</li> </ul>	Short to Long Term	City	Tarrant County, TxDOT, NCTCOG	City	Low to High Depending on Project
<ul style="list-style-type: none"> <li>Prioritize, fund, and implement sidewalks and other pedestrian facilities such as crosswalks, median islands, signage, and pedestrian signals as part of new roadway construction or reconstruction projects, new developments, and redevelopments, and in high pedestrian traffic locations.</li> <li>Provide accessibility to bicyclists through preservation of bicycle and pedestrian access within appropriate roadway rights-of-way, as well as the development of innovative, safety-enhanced on-street bicycle facilities as routine accommodations for new roadway construction or reconstruction.</li> </ul>	Short to Long Term	City	Tarrant County, TxDOT, NCTCOG, Neighboring Cities	City, Tarrant County, TxDOT, NCTCOG	High
POLICY: ENHANCE ROADWAY DESIGN, IMPROVE SAFETY, AND SUPPORT THE PROVISION OF MOBILITY OPTIONS ON LOCAL ROADWAYS					
Coordinate with transit providers to ensure accessibility through on-street bicycle facilities and sidewalks.	Long Term	City	The T, NCTCOG	N/A	Medium
POLICY: EVALUATE THE LOCAL TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONAL CHARACTERISTICS					
Continue coordination with NAS Fort Worth, JRB, Lockheed, and other major employers in the area on supporting their transportation needs.	Ongoing	City, Tarrant County	Major Employers, NCTCOG, Tarrant County, Neighboring Cities	N/A	N/A
Prioritize maintenance in local budgets to ensure that local roadway facilities remain in optimal condition.	Ongoing	City	Tarrant County, TxDOT	City, Tarrant County, TxDOT	High
Coordinate with NCTCOG, major employers, commercial districts, and other agencies to encourage the use of travel demand management programs such as telecommuting, carpooling, employer trip reduction (ETR) programs, and vanpooling. Increase the marketing and participation of major employers in the study area in ETR programs.	Short Term	City	Major Employers, Commercial Centers	City	Low

RECOMMENDED ACTIONS: ROADWAY					
Project/Initiative	Timeframe	Responsible Entities	Partners	Funding Sources	Order of Magnitude Cost
POLICY: EVALUATE THE LOCAL TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONAL CHARACTERISTICS					
<ul style="list-style-type: none"> <li>Conduct regular interval traffic counts.</li> <li>Conduct crash analysis and identify top safety needs and contributing factors.</li> </ul>	Short Term, Ongoing	City	Tarrant County, TxDOT, NCTCOG	City	Low
<ul style="list-style-type: none"> <li>Coordinate to improve traffic signal synchronization by evaluating existing timing plans, installing new signals, and having repairs and maintenance performed promptly. Develop an interagency plan for signal timing to address future conditions.</li> <li>Coordinate to provide well-signed routes.</li> </ul>	Short to Long Term	City and/or TxDOT	Tarrant County, TxDOT, NCTCOG	City, TxDOT, NCTCOG	Medium
POLICY: UPDATE AND ESTABLISH REVIEW PROCESS FOR LOCAL TRANSPORTATION PLANNING DOCUMENTS					
<ul style="list-style-type: none"> <li>Establish a review and update schedule for local thoroughfare plans and include considerations for future land uses, economic development needs, neighboring jurisdiction plans, and alternative roadway design and operation strategies such as context sensitive design.</li> <li>Identify and prioritize improvements of importance to individual cities, the study area, and the larger Dallas-Fort Worth region as part of thoroughfare planning process.</li> <li>Submit requests for transportation technical planning assistance to NCTCOG through the biannual Unified Planning Work Program process.</li> </ul>	Short Term and Ongoing	City	Tarrant County, Economic Development Corporations, NCTCOG	Local, Federal, Private, Non-Profit	Low
Consider land use compatibility associated with NAS Fort Worth, JRB Accident Potential Zones and noise contours to ensure compatibility of future infrastructure improvements.	Ongoing	City	NCTCOG, Other Jurisdictions, NAS Fort Worth, JRB	N/A	Low
<ul style="list-style-type: none"> <li>Integrate multi-modal considerations, context sensitive design, access management, parking, land-use evaluations, safety, stormwater management, streetscape improvements, and other engineering, planning, and economic development strategies into local roadway planning, design, construction, operations, and maintenance.</li> <li>Update local regulations to reflect desired access management, design features, landscaping, maintenance, parking regulations, and other requirements associated with streets and thoroughfares.</li> <li>Consider Corridor Overlays or other land use planning tools (e.g. Form Based Codes) to encourage desired future commercial development.</li> </ul>	Short to Long Term	City	TxDOT, NCTCOG, Economic Development Corporation, Public	City, State and Federal Grants, NCTCOG	Low to Medium Depending on Project Scope
Submit formal requests for projects of regional significance to be considered during development of the Metropolitan Transportation Plan.	Ongoing	City, TxDOT	TxDOT, Tarrant County, NCTCOG	N/A	N/A

RECOMMENDED ACTIONS: ROADWAY					
Project/Initiative	Timeframe	Responsible Entities	Partners	Funding Sources	Order of Magnitude Cost
POLICY: COORDINATE WITH REGIONAL TRANSPORTATION PARTNERS TO EVALUATE TRANSPORTATION NEEDS, DEFINE PRIORITIES, SECURE FUNDING, AND IMPLEMENT IMPROVEMENTS					
<ul style="list-style-type: none"> <li>Form a coalition between neighboring cities to assist and coordinate for common needs and mutual benefit along facilities that cross jurisdictional boundaries.</li> <li>Engage with your Regional Transportation Council representative</li> <li>Engage with Tarrant County and NCTCOG for planning assistance and other technical/policy needs.</li> <li>Engage other transportation implementers such as TxDOT and Tarrant Regional Water District and non-profit agencies.</li> </ul>	Short to Long Term	City	Tarrant County, NCTCOG, Regional Transportation Council, Other Transportation Implementers	N/A	Low
Adopt Regional Transportation Council Clean Fleet Vehicle Policy and Model Ordinance <a href="http://www.nctcog.org/fleetpolicy">www.nctcog.org/fleetpolicy</a>	Short Term	City	NCTCOG	N/A	Low

# APPENDIX = | REGIONAL BICYCLE AND PEDESTRIAN FACILITIES



## INTRODUCTION

Bicycle and pedestrian facilities are important to any community as they can result in high payoffs such as decreased motor vehicle traffic, improved air quality, and scenic beautification. In addition, increased pedestrian and bicyclist activity within a community is beneficial to the surrounding areas by stimulating economic growth, increasing the demand for housing, and supporting future development as it breathes life into redevelopment.

The CEOs for Cities, a community and partnership network of CEOs and urban leaders, published “Walking the Walk: How Walkability Raises Housing Values in US Cities” in 2009. The report reveals that houses in walkable neighborhoods are worth more than houses in less walkable neighborhoods, given that the houses have similar amenities. Dallas was one of the 13 areas studied.

*Houses with the above-average levels of walkability command a premium of about \$4,000 to \$34,000 over houses with just average levels of walkability in the typical metropolitan areas studied.*

The design scale and quality of buildings, streets, and landscaping all play a part in creating areas that are pleasant places to walk, bike, relax, and attract people. Safety and comfort are crucial to the success of walkable places. Public areas or places should create a sense of community, and surrounding neighborhoods should be included and connected to the areas. Features that help facilitate this type of environment include public plazas, outdoor markets or venues, decorative gardens, or other public amenities.

Heidi Garrett-Peltier from the Political Economy Research Institute published [Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts](#) in June 2011. Data was gathered from transportation and public works departments from 11 cities in the United States. Overall, the study found that investing in bike and pedestrian infrastructure such as sidewalks, bike lanes, and trails create the most jobs for a given level of spending.

*For each \$1 million, the cycling projects in the study create a total of 11.4 jobs within the state where the project is located. Pedestrian-only projects create an average of about 10 jobs per \$1 million and multi-use trails create nearly as many, at 9.6 jobs per \$1 million. Infrastructure that combines road construction with pedestrian and bicycle facilities creates slightly fewer jobs for the same amount of spending, and road-only projects create the least with a total of 7.8 jobs per \$1 million.*

Having the proper infrastructure in place that allows pedestrian and bicyclist access is crucial, as it creates walkable/bikeable areas that allows more people on the street and thus encourages spending needed funds to maintain the economy of an area. It can also attract new businesses to an area which is important in a region as diverse as Dallas-Fort Worth where there are numerous options of where to locate. An evaluation of the existing infrastructure related to pedestrian and bicycle movement, including sidewalks, pedestrian traffic signals, crosswalks, landscaping, signage, lighting, benches, bicycle facilities, and other public amenities throughout the area is necessary in order to determine ways to adjust or improve current conditions and facilitate future growth centered on the pedestrians and cyclists.



The most memorable public places in cities tend to be where people congregate on foot, whether that be streets, parks, plazas, or outdoor venues. These places make our cities livable and vital by creating a sense of place. In addition, accessibility to these places is often limited to walking and/or biking. Streets play an especially significant role as they act as linkages between destinations, and therefore must be accessible to all, and be functional, safe, and attractive places to walk. However, despite the important role walking and biking represent in the transportation system, they are rarely given the attention they deserve. Urban mobility discussions are often dominated by traffic reports, congestion relief, parking problems, and a whole list of other automobile-oriented issues. In fact, the national standards for transportation design, the American Association of State Highway and Transportation Officials (AASHTO): *A Policy on Geometric Design of Highways and Streets* commonly treat pedestrians and bicyclists as secondary issues to traffic flow, and focus on safety rather than accessibility. They are much more closely linked. People will not always choose the safest route if it is not the most accessible. However, an increasing interest in pedestrian and bicycle issues is being addressed through public policy and changes in the built environment. Improving the quality of life by increasing pedestrian and bicyclist comfort and improving accessibility have become major priorities for planners, designers, officials, and community members. In fact, a recent survey of US mayors of cities over 300,000 showed that the lack of funding for bicycle and pedestrian projects is a key issue facing many (60 percent).<sup>1</sup> Additionally, 75 percent support increasing the federal gas tax, which hasn't gone up since 1993, if a greater share of the funding was invested in bicycle and pedestrian projects.

Cities and counties within the North Central Texas Council of Governments (NCTCOG) region are responsible for the planning, development, and implementation of bicycle and pedestrian transportation infrastructure and amenities within each respective city and county. While NCTCOG plans for bicycling and walking facilities in coordination with local cities and counties, it is ultimately up to local governments to determine feasibility and ensure implementation of said planning efforts. Many local cities and counties have developed bicycle master plans, trail master plans, or a combination of both, resulting in a hiking and biking plan. In addition, many cities have adopted policies at the local level to enforce and encourage bicycling as a legitimate form of transportation. These documents are used in regional planning efforts to ensure regional connectivity and continuity. There are many components that should be considered in advancing bicycle transportation. The majority of these issues are discussed in the following sections.

## TYPES OF BICYCLISTS

As part of the planning, design, and implementation of roadway treatments for bicyclists, the needs of all bicyclists should be addressed. Roadway treatments should accommodate existing bicyclists and encourage increased bicycle use; therefore, any roadway treatments intended to accommodate bicycle use must address the needs of both experienced and less experienced riders. Bicyclists are typically grouped into one of three riding styles: Group A – Advanced; Group B – Basic; and Group C – Children. Each of these types are explained in more detail below.

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<sup>1</sup>Metropolitan Transportation Infrastructure Survey, Washington, D.C., the United States Conference of Mayors, 2011.

### **Group A – Advanced Bicyclists**

These are experienced riders who can operate under most traffic conditions. They comprise the majority of the current users of collector and arterial streets and are best served by the following:

- Direct access to destinations usually via the existing street and highway system.
- The opportunity to operate at maximum speed with minimum delays.
- Sufficient operating space on the roadway or shoulder to reduce the need for either the bicyclist or the motor vehicle operator to change position when passing.

### **Group B – Basic Bicyclists**

These are casual or new adult and teenage riders who are less confident of their ability to operate in traffic without special provisions for bicycles. Some will develop greater skills and progress to the advanced level, but this is by far the largest group of users and there will always be many basic bicyclists. They prefer:

- Comfortable access to destinations, preferably by a direct route, using either low-speed, low traffic-volume streets or designated bicycle facilities.
- Well-defined separation of bicycles and motor vehicles on arterial and collector streets (bike lanes or shoulders) or separate bike paths.

### **Group C – Children**

These are pre-teen riders whose roadway use is initially monitored by parents. Eventually they are accorded independent access to the system. They and their parents prefer the following:

- Access to key destinations surrounding residential areas, including schools, recreation facilities, shopping, or other residential areas.
- Residential streets with low motor vehicle speed limits and volumes.
- Well-defined separation of bicycles and motor vehicles on arterial and collector streets or separate bike paths.

## TYPES OF FACILITIES

To facilitate bicycle travel on roadways, facility types are generally grouped into one of three classes: Class I Bikeways, Class II Bikeways, and Class III Bikeways. It is emphasized that the designation of bikeways as Class I, II, and III should not be construed as a hierarchy of bikeways; that is, that one is better than the other. Each class of bikeway has its appropriate application.

### Class I Bikeway

Typically called a bike path or trail, a Class I Bikeway provides bicycle travel on a paved right-of-way completely separated from any street or highway. Generally, bike paths should be used to serve corridors not served by streets and highways or where wide right-of-way exists, permitting such facilities to be constructed away from the influence of parallel streets. Bike paths should offer opportunities not provided by the road system. They can either provide a recreational opportunity or, in some instances, can serve as direct high-speed commute routes if cross flow by motor vehicles and pedestrian conflicts can be minimized. Another common application of Class I facilities is to close gaps to bicycle travel caused by construction of freeways or because of the existence of natural barriers (rivers, hills, etc.). **Figure 1** portrays the typical schematic and signing for a Class I facility.

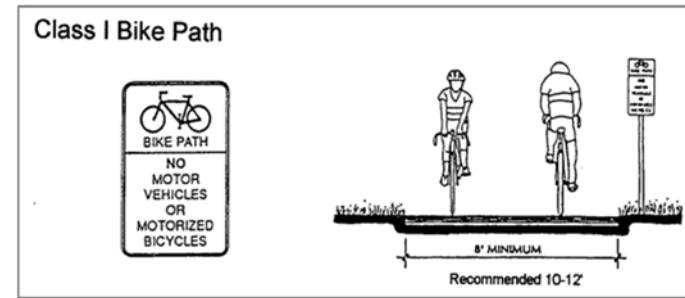
### Class II Bikeway

Often referred to as a bike lane, a Class II Bikeway provides a striped and stenciled lane for one-way travel on a street or highway. Bike lanes are established along streets in corridors where there is significant bicycle demand, and where there are distinct needs that can be served by them. The purpose should be to improve conditions for bicyclists in the corridors. Bike lanes are intended to delineate the right-of-way assigned to bicyclists and motorists and to provide for more predictable movements by each. **Figure 2** portrays the typical schematic and signing for a Class II facility.

### Class III Bikeway

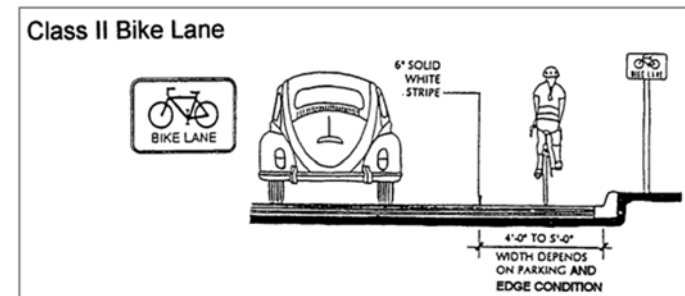
Generally referred to as a bike route, a Class III bikeway provides for shared use with motor vehicle traffic and is identified by signing and/or bicycle pavement markings. Bike routes are shared facilities which serve either to: (a) provide continuity to other bicycle facilities (usually Class II Bikeways); or (b) designate preferred routes through high demand corridors. As with bike lanes, designation of bike routes should indicate to bicyclists that there are particular advantages to using these routes as compared with alternative routes. Normally, bike routes are shared with motor vehicles. The use of sidewalks as Class III Bikeways is strongly discouraged. **Figure 3** portrays the typical schematic and signing for a Class II facility.

FIGURE 1: CLASS I BIKE PATH



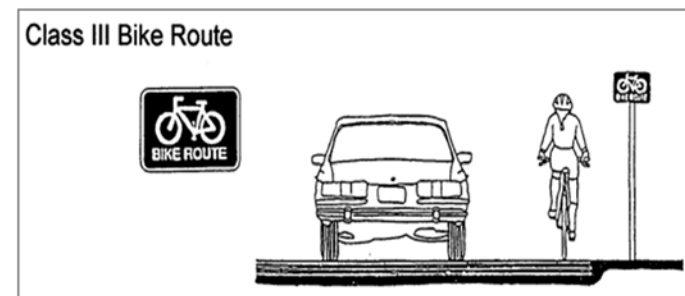
Source: "City of San Diego Bicycle Master Plan", 2002

FIGURE 2: CLASS II BIKE LANE



Source: "City of San Diego Bicycle Master Plan", 2002

FIGURE 3: CLASS III BIKE ROUTE

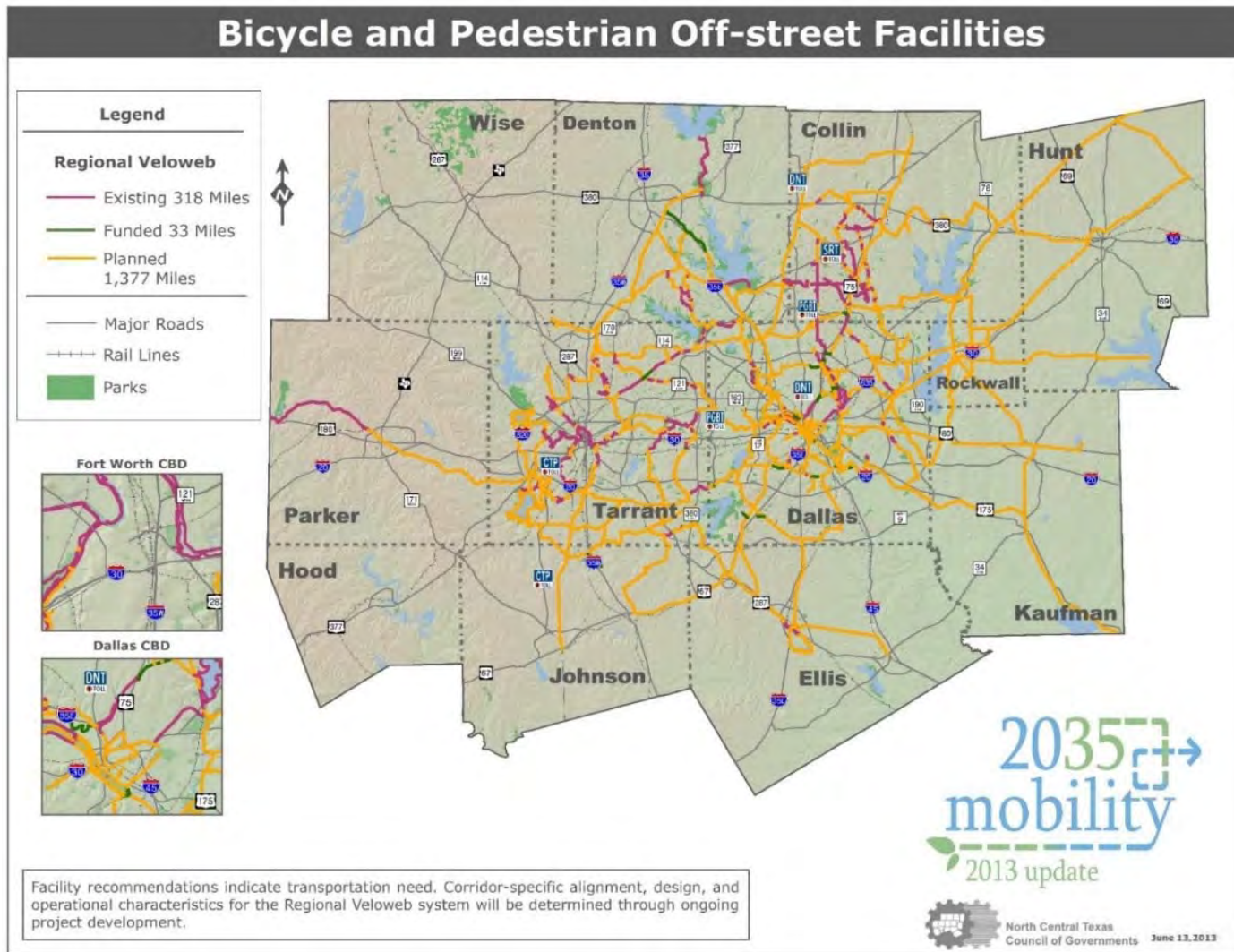


Source: "City of San Diego Bicycle Master Plan", 2002

## EXISTING PLANS AND FACILITIES

Trails should be specifically linked to the full system of routes included in the NCTCOG Regional Veloweb (**Figure 4**). The current Regional Veloweb was adopted in 2011 as part of the Metropolitan Transportation Plan: Mobility 2035. An updated Regional Veloweb was included in the Mobility 2035 – 2013 Update. It is a network of off-street shared use paths or trails (Class I Bikeways) designed for use by bicyclists, pedestrian and other non-motorized forms of transportation. The Veloweb serves as the regional expressway for bicycle transportation. It includes over 1,728 miles of interconnected off-street trails designed to link the entire North Central Texas region together. Linkages between neighboring counties and cities are critical as they provide connections throughout the communities, and encourage maximum use of the facilities by granting accessibility. Community borders are invisible but cities work and make improvements within their boundaries. Citizens want to commute between places seamlessly.

FIGURE 4: NCTCOG REGIONAL VELOWEB



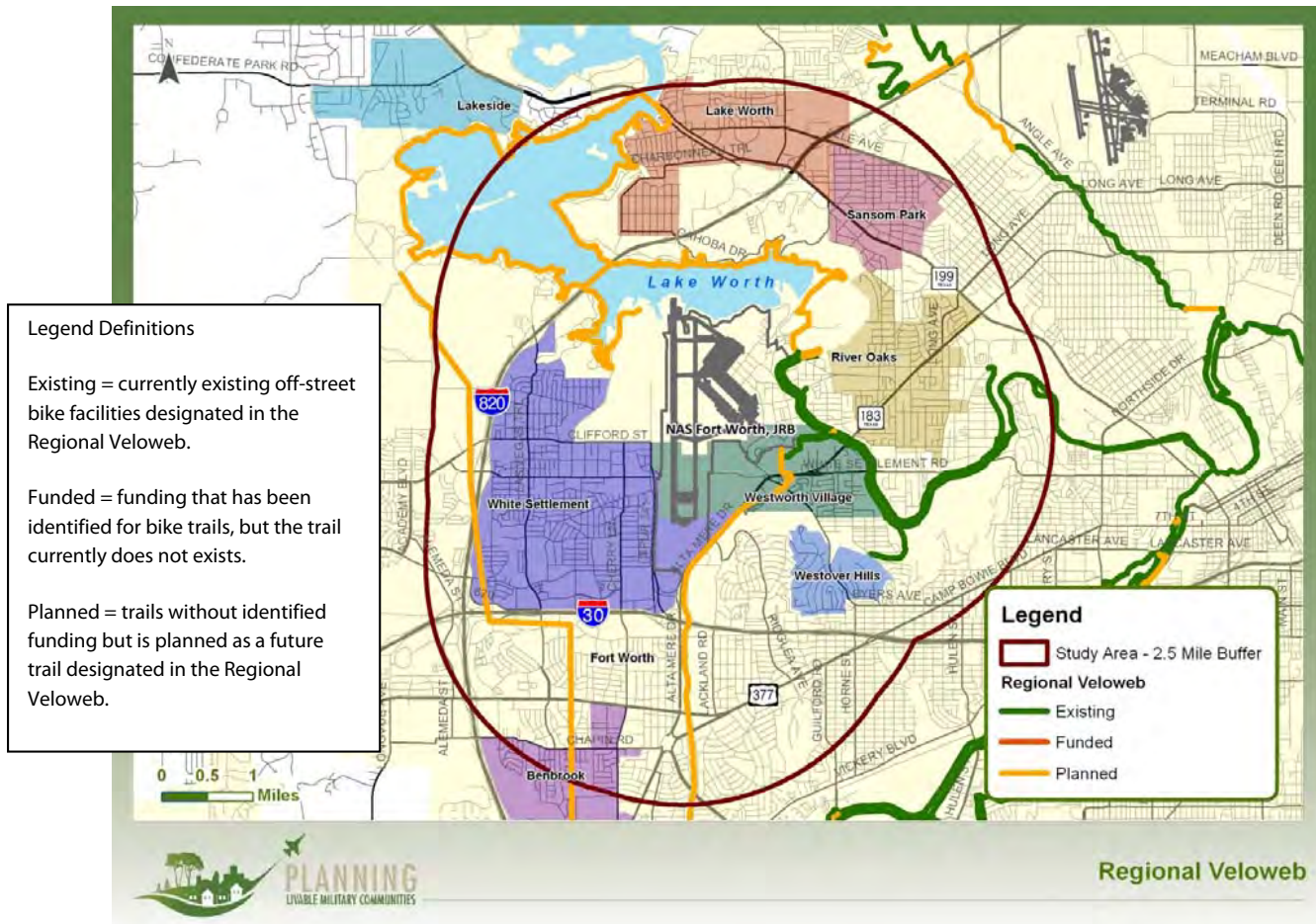
Source: NCTCOG

**Figure 5** provides a closer look at the Veloweb trails within the Planning Livable Military Communities study area. The only existing trail in the Regional Veloweb is the West Fork West Trinity Trail which is within the cities of Fort Worth and Westworth Village as shown in green in **Figure 5**. Trail construction



and maintenance along the Trinity River, such as that of the West Fork West trail, are composed of a partnership with the Fort Worth Parks Department, Water Department, Tarrant Regional Water District (TRWD), and Streams & Valleys, Inc. The TRWD provides quality water to its customers, implements vital flood control measures and creates recreational opportunities for Tarrant County residents and communities. TRWD, in partnership with Streams & Valleys, publishes a map of the Trinity Trails that provides information on trailheads, parking, and other trail facilities. Additionally, TRWD constructed an application for iPhones and Smartphones to download information regarding the bike facilities. The Streams & Valleys, Inc. is a nonprofit organization that plans and coordinates recreation enhancements and beautification efforts of the Trinity River.

FIGURE 5: NCTCOG REGIONAL VELOWEB WITHIN STUDY AREA



Source: NCTCOG



Communities within the study area are at varying levels of planning and implementation for bike facilities. The following is a brief overview of what's available to date or work underway.

## CITY OF BENBROOK

Benbrook has an active cycling community. The Comprehensive Plan adopted in February 2007 includes existing and planned bike facilities, as shown in **Figure 7**.

The city of Benbrook has an on-street bike lane along a portion of Chapin Road and Williams Road, as shown in **Figure 6**. These facilities are located in the southern section of the project boundary. The Chapin Road portion of the bike lane runs east-west from IH 820 to Williams Road. Williams Road runs north-south from Chapin Road to Highway Drive. The bike lane along Chapin Road intersects the White Settlement – Fort Worth Connector planned Veloweb trail.

Benbrook has a proposed trail that runs along the White Settlement-Fort Worth Commuter planned Veloweb route.

Definitions of the Benbrook bike facilities are the following:

1. Bike = bike route, only contains a physical bike sign to show that bikes are allowed on this segment of the street.
- 2a. Existing Bike Lane = segments of streets where there is a designated lane for bikes, bike sign, and lane painted on the street.
- 2b. Proposed Bike = future bike route.
- 3a. Bike/Hike = indicates that motorized vehicles are prohibited.
- 3b. Proposed Bike/Hike = future trail that prohibits motorized vehicles.

FIGURE 6: EXISTING BICYCLE FACILITIES IN BENBROOK, TX



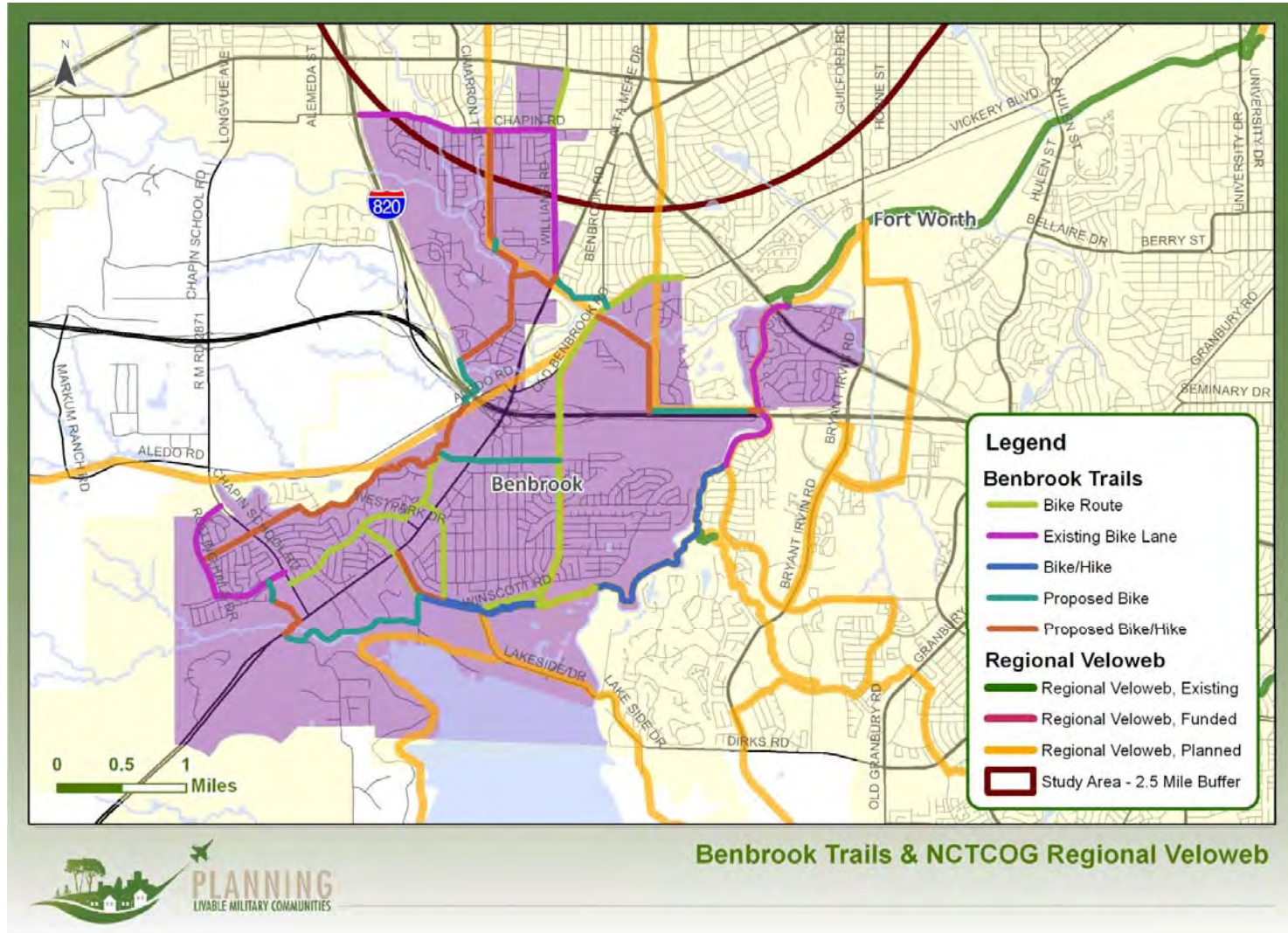
**Chapin Road**

Source: NCTCOG



**Williams Road**

FIGURE 7: BENBROOK COMPREHENSIVE PLAN AND REGIONAL VELOWEB CONNECTIONS



Source: Benbrook Comprehensive Plan and NCTCOG

## CITY OF FORT WORTH

The Fort Worth City Council adopted the Bike Fort Worth plan in February 2010. Bike Fort Worth is the city's comprehensive plan for promoting bicycling as a safe and attractive transportation alternative by working toward three goals:

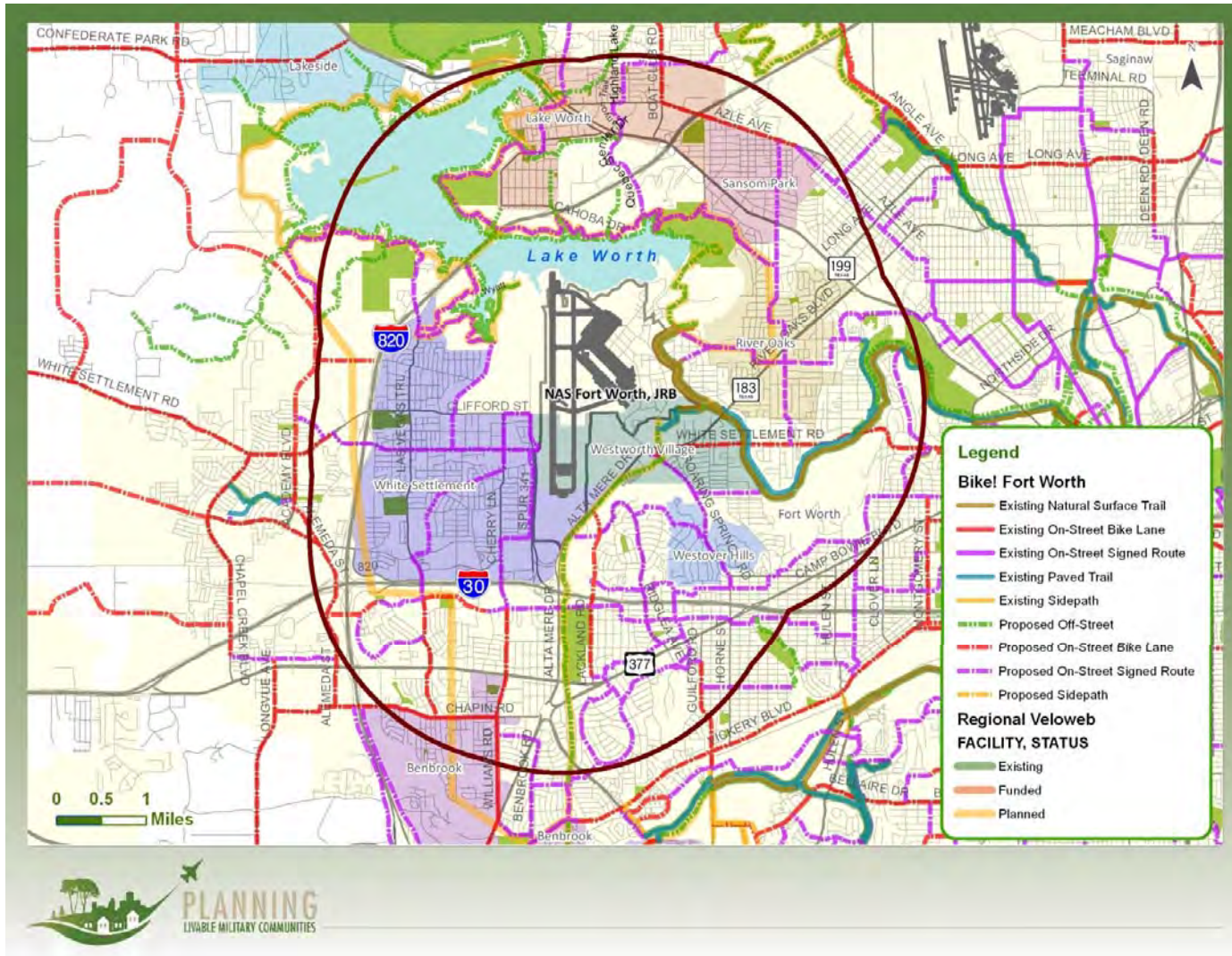
- Triple the number of bicycle commuters.
- Decrease bicyclist related crashes by ten percent.
- Attain official designation as a Bicycle Friendly Community through the League of American Bicyclists.

Bike Fort Worth layers together various types of facilities or bikeways for their network. On-street bike lanes (Class II) refers to a portion of a roadway which has been designated by pavement markings and, if used, signs, for the preferential or exclusive use of bicyclists. Off-street bike trails/shared-use paths/trails (Class I) are bikeways physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way. Shared-use paths may also be used by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users.

**Figure 8** shows the Bike Fort Worth trails that are within the study area. All trails align with the Veloweb except the White Settlement-West Fort Worth Connector. Additional planning with Fort Worth will need to occur to ensure that this alignment is in the ideal location for this area.



FIGURE 8: BIKE FORT WORTH TRAILS AND VELOWEB CONNECTIONS

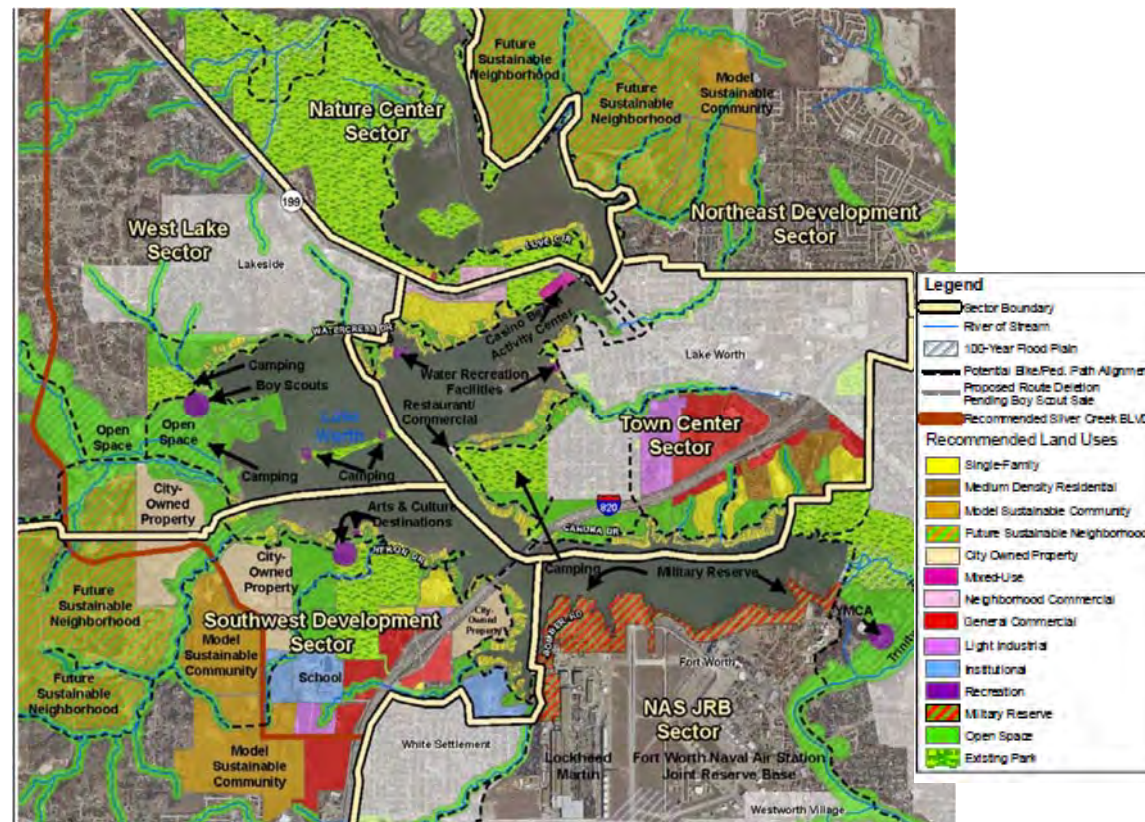


Source: Bike Fort Worth and NCTCOG

The city of the Fort Worth is conducting a bike plan that surrounds Lake Worth. The Fort Worth City Council adopted the Lake Worth Vision Plan in 2011 which highlights the importance the Lake Worth trail will have on future development (see **Figure 9**). The city has future plans to include more development along the lake. The Vision Plan includes four Lake Worth Vision Principles as stated below:

1. Protect and enhance Lake Worth’s water quality, natural beauty, and recreational character.
2. Develop Model Sustainable Communities in the Lake Worth area that create desirable places to live and work while enhancing livability of existing communities.
3. Create Lake Worth Regional Park, a linear park that encompasses the lake and provides high-quality recreational amenities and cultural hubs.
4. Connect communities, resources, and amenities with parkways, greenways, and trails.

FIGURE 9: LAKE WORTH VISION PLAN, 2011

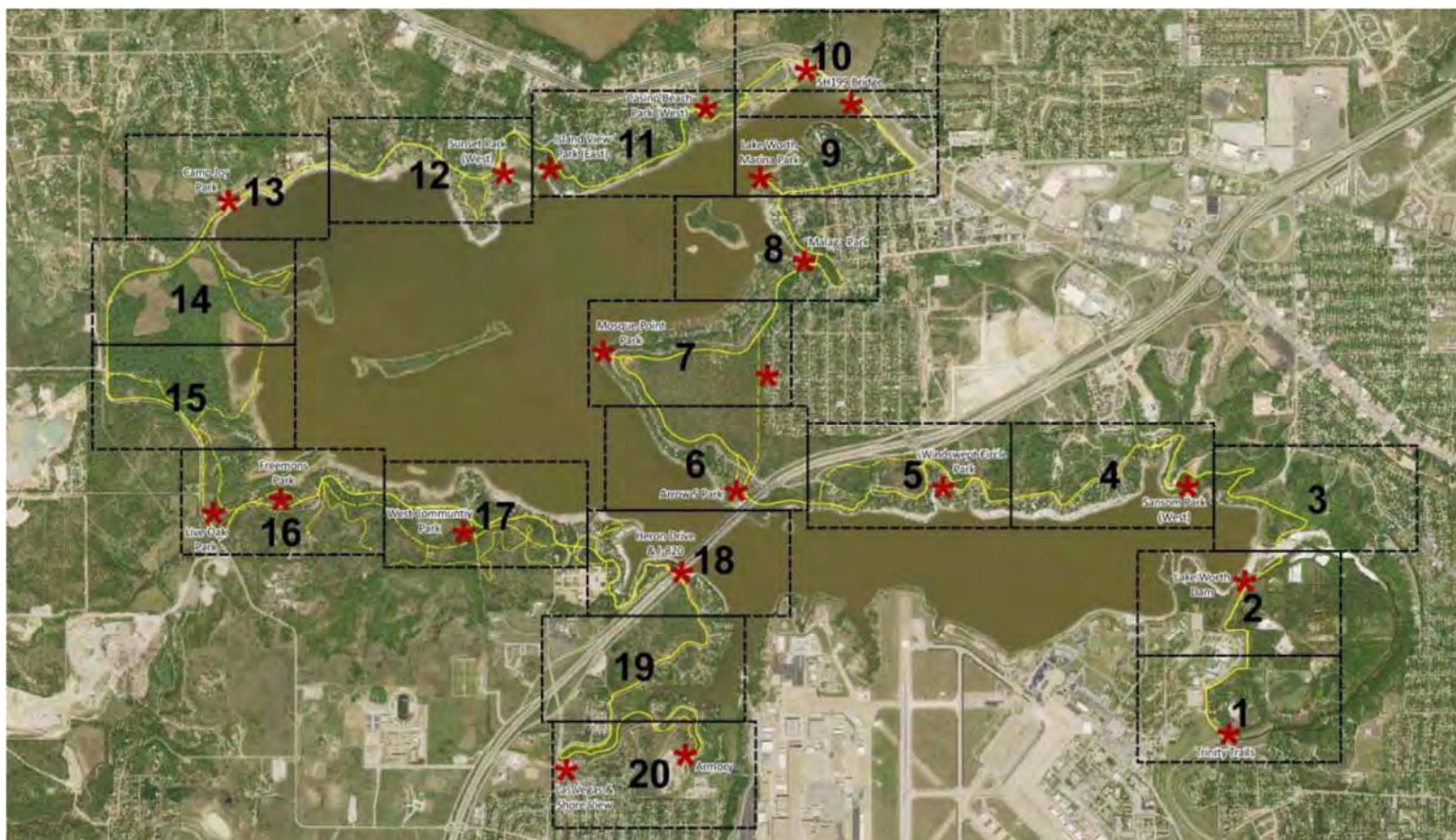


Source: City of Fort Worth, 2011



A Lake Worth Trail Routing Study is currently under development and the most recent trail alignment is shown in **Figure 10**. A more detailed design and topography review will be done in an upcoming Phase 2 of the study.

FIGURE 10: LAKE WORTH TRAIL ROUTE



Source: City of Fort Worth, 2012. Numbers and red asterisks indicate more specific trail segments that are discussed in the full Lake Worth Trail Routing Study.

Additional efforts near Lake Worth are the mountain biking trails in Marion Sansom Park, which is located along the eastern side of Lake Worth, **Figure 11**. Fort Worth has a memorandum of agreement with the Fort Worth Mountain Bikers Association (FWMBA) for mountain trail construction in Marion Sansom Park. FWMBA is an all-volunteer, 501c (3) non-profit organization dedicated to promoting responsible mountain biking through trail construction and maintenance, education, and organized events. Currently the FWMBA has constructed 11 miles of mountain trails in Marion Sansom Park and has



conducted \$200,000 worth of volunteering hours. Coordination between the city of Fort Worth and FWMBa will continue to occur to look at the feasibility of various future projects.

FIGURE 11: FORT WORTH MOUNTAIN BIKERS ASSOCIATION MAP



Source: Fort Worth Mountain Bikers Association

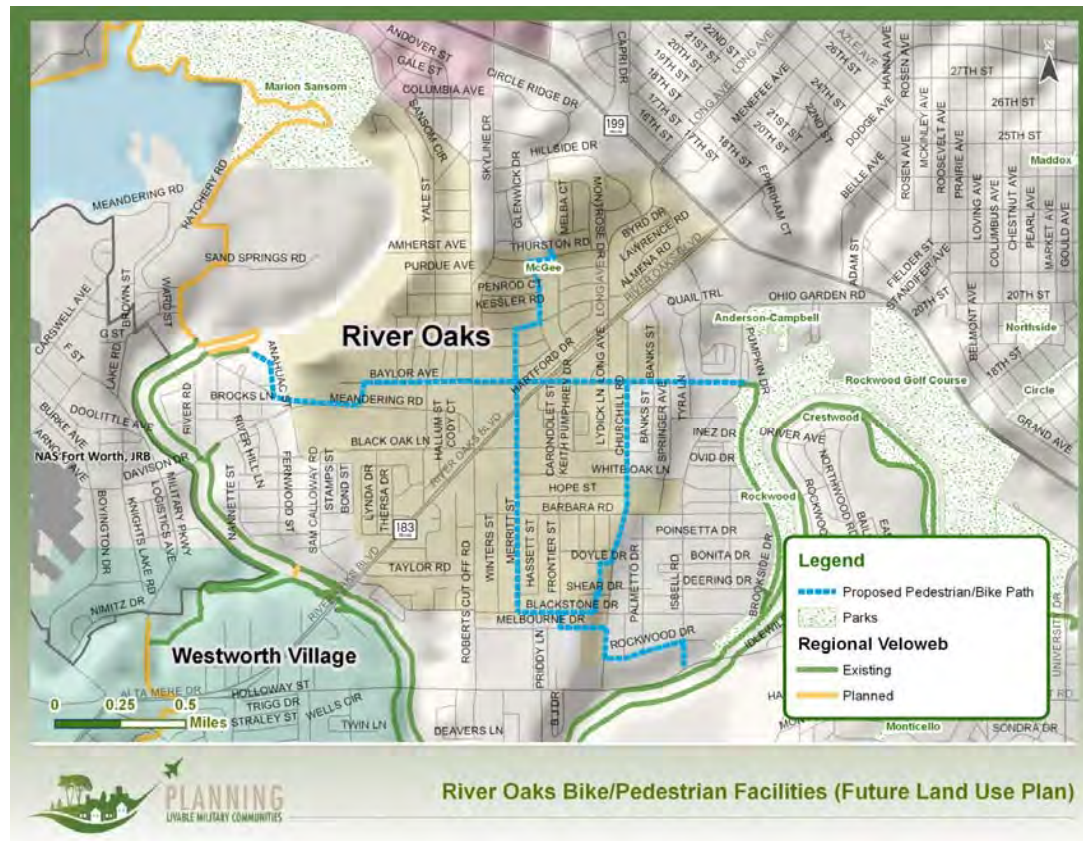
## CITY OF LAKE WORTH

Lake Worth adopted a Future Land Use Plan in 1995 which contains a proposed greenbelt. However, residential housing has been added and the greenbelt will not be possible. There are no further bicycle or pedestrian facilities currently planned for the city of Lake Worth.

## CITY OF RIVER OAKS

River Oaks adopted a Future Land Use Plan in April 2006. The plan contains proposed pedestrian/bike paths as shown in **Figure 12**; currently there are no existing bicycle facilities.

FIGURE 12: RIVER OAKS FUTURE LAND USE PLAN AND REGIONAL VELOWEB CONNECTIONS



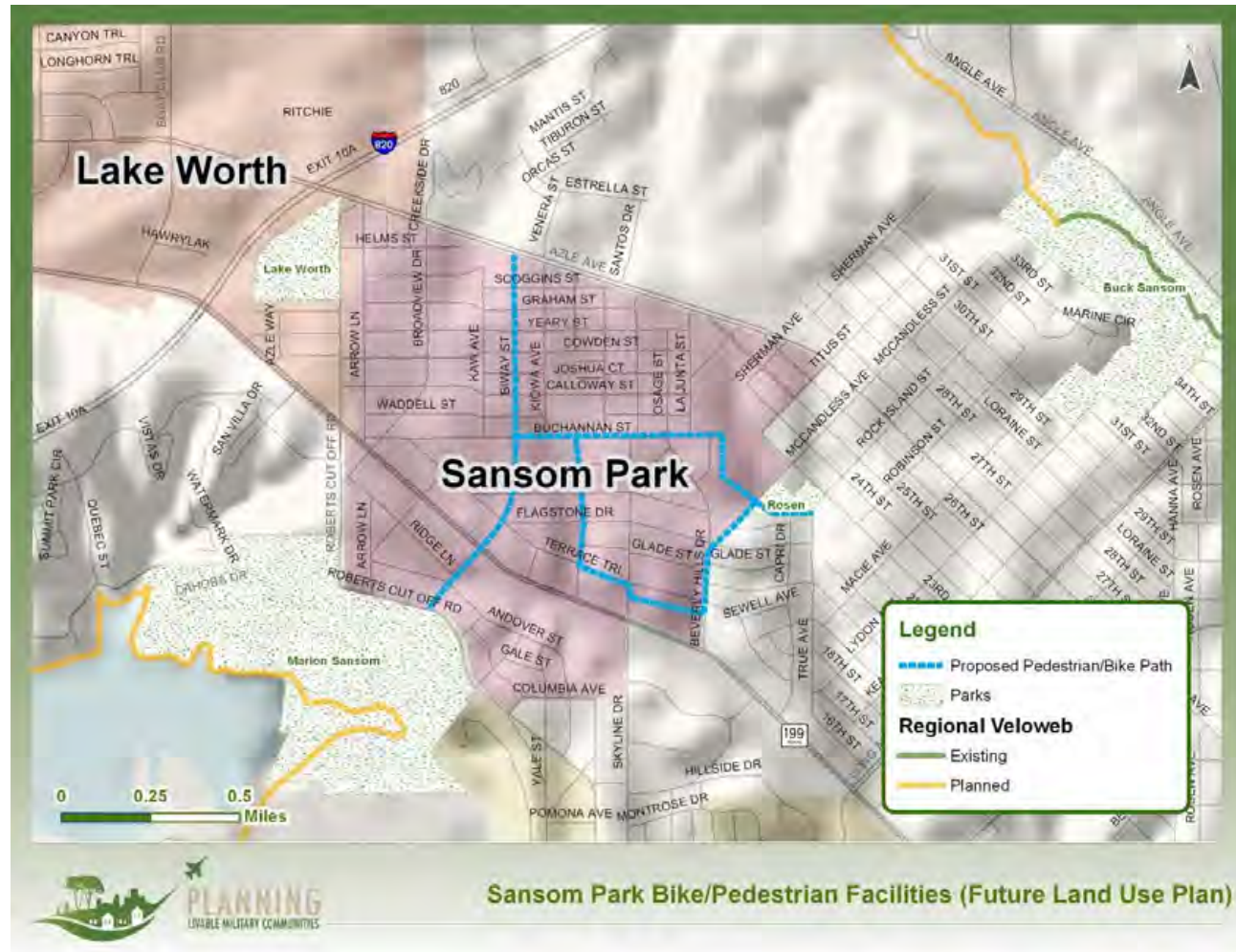
Source: River Oaks Future Land Use Plan, 2006



## CITY OF SANSOM PARK

Sansom Park adopted a Future Land Use Plan in November 2005. The plan contains proposed pedestrian/bike paths as shown in **Figure 13**; currently there are no existing bicycle facilities.

FIGURE 13: SANSOM PARK FUTURE LAND USE PLAN AND REGIONAL VELOWEB CONNECTIONS

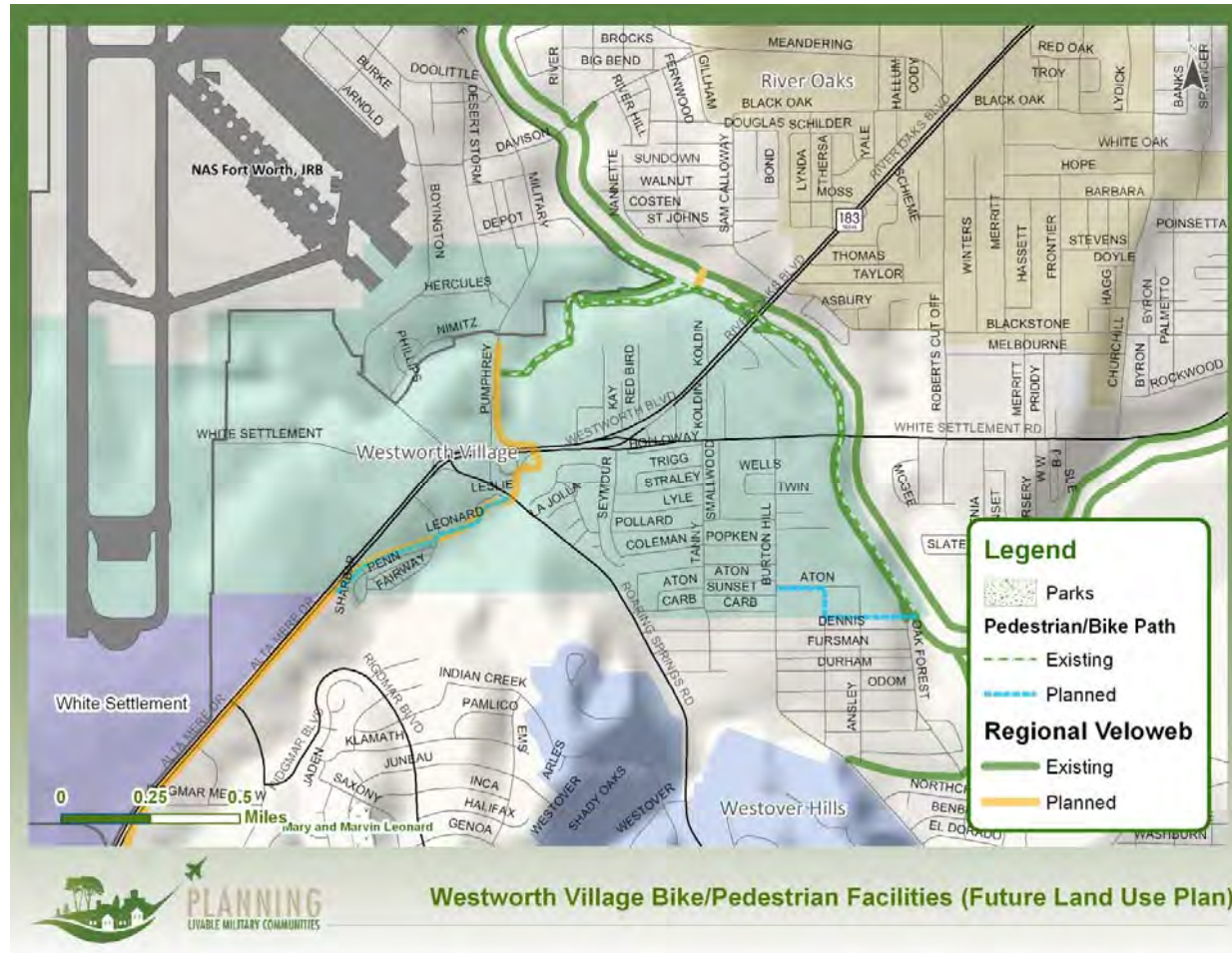


Source: Sansom Park Future Land Use Plan, 2005

## CITY OF WESTWORTH VILLAGE

Westworth Village adopted a Future Land Use Plan in June 2000. The plan contains proposed pedestrian/bike paths as shown in **Figure 14**. The segments that run along the West Fork West trail exist. The segments that are still planned are on the southeast portion of the city and parallel to Alta Mere Drive. The city is also currently undergoing a city-wide trails study and a study to improve Hawk's Creek Golf Course.

FIGURE 14: WESTWORTH VILLAGE FUTURE LAND USE PLAN AND REGIONAL VELOWEB CONNECTIONS



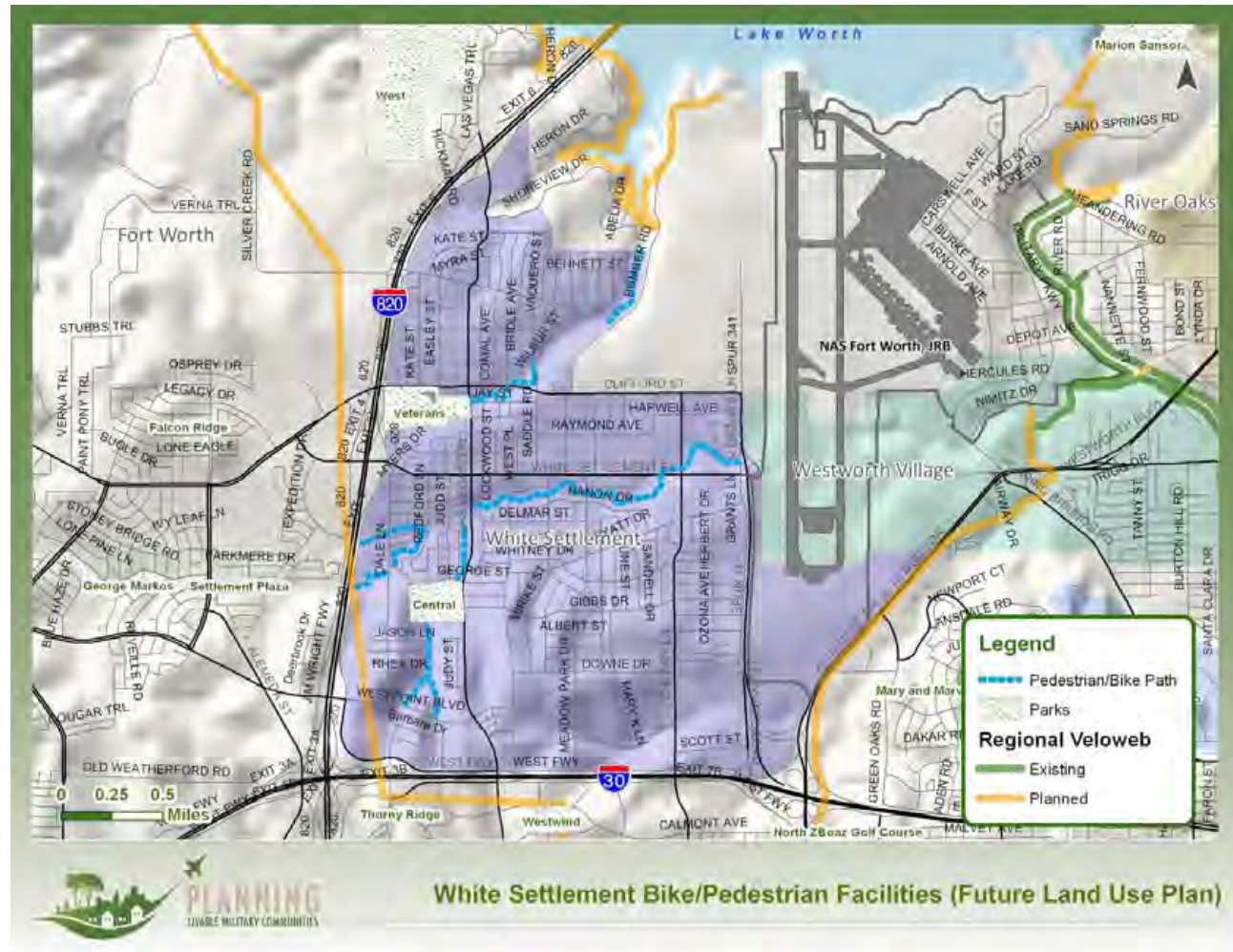
Source: Westworth Village Future Land Use Plan, 2000



## CITY OF WHITE SETTLEMENT

White Settlement adopted the Future Land Use Plan in November 1999. The plan contains proposed pedestrian/bike paths as shown in **Figure 15**; currently there are no existing bicycle facilities.

FIGURE 15: WHITE SETTLEMENT FUTURE LAND USE PLAN AND REGIONAL VELOWEB CONNECTIONS



Source: White Settlement Comprehensive Plan, 1999

## BIKE AND PEDESTRIAN CRASH DATA

Biking and walking are great alternatives to driving to and from destinations. The reasons people choose to bike range from recreation to necessity. Unfortunately there are accidents that occur with both mediums and the data below shows the types of accidents that occur within the study area. Accidents ranged from fatalities to possible injuries. The definitions for the types of accidents are listed below.

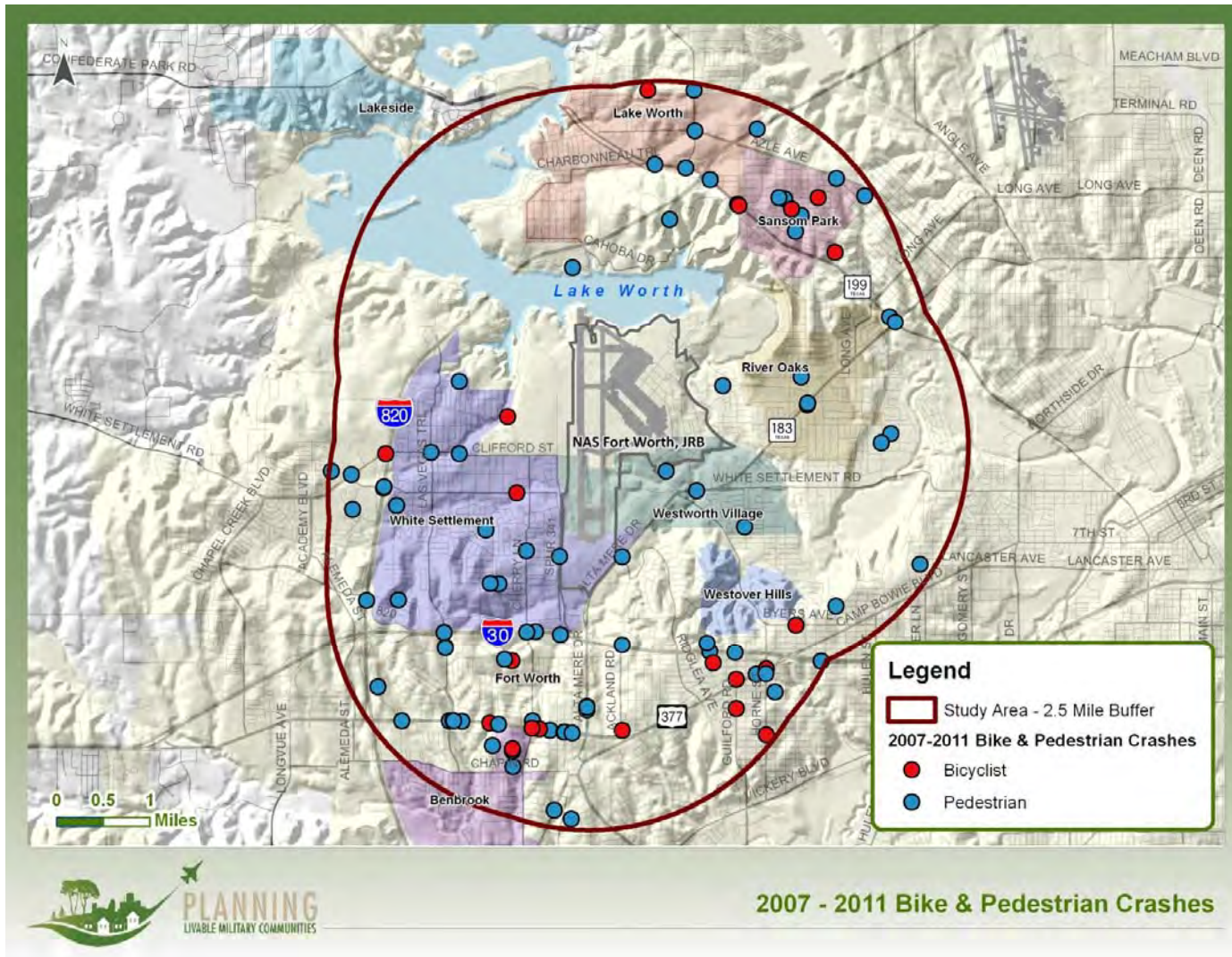
1. **Fatalities:** Any injury that results in death within 30 days of the motor vehicle traffic crash.
2. **Incapacitating Injuries:** Any injury, other than a fatal injury, which prevents the injured person from walking, driving, or normally continuing the activities the person was capable of performing before the injury occurred.
3. **Non-Incapacitating Injuries:** Any injury, other than a fatal injury or an incapacitating injury, which is evident to observers at the scene of the crash in which the injury occurred.
4. **Not Injured:** Is a situation in which there is no reason to believe that the person received any bodily harm from the motor vehicle traffic crash in which involved.
5. **Possible Injuries:** Any injury reported or claimed which is not a fatal injury, incapacitating injury, or non-incapacitating evident injury.

Non-incapacitating injuries were the leading type of reported bicycle accidents. **Figure 16** shows the 2007 to 2011 total reported bike/pedestrian accidents within the project boundary. **Figures 17 and 18** show the severity of reported bike/pedestrian accidents from 2007 to 2011. The data is received from TxDOT's Crash Records Information System (CRIS). Please note that the accident data in the Attendance Zones section are different as the area is larger than the project boundary.

- 26 out of 111 were bike accidents
  - 2 fatalities
  - 2 incapacitating Injuries
  - 13 non-incapacitating Injuries
  - 1 not Injured
  - 8 possible injuries
- 85 out of 111 were pedestrian accidents
  - 10 fatalities
  - 19 incapacitating Injuries
  - 26 non-incapacitating Injuries
  - 29 possible Injuries
  - 1 unknown

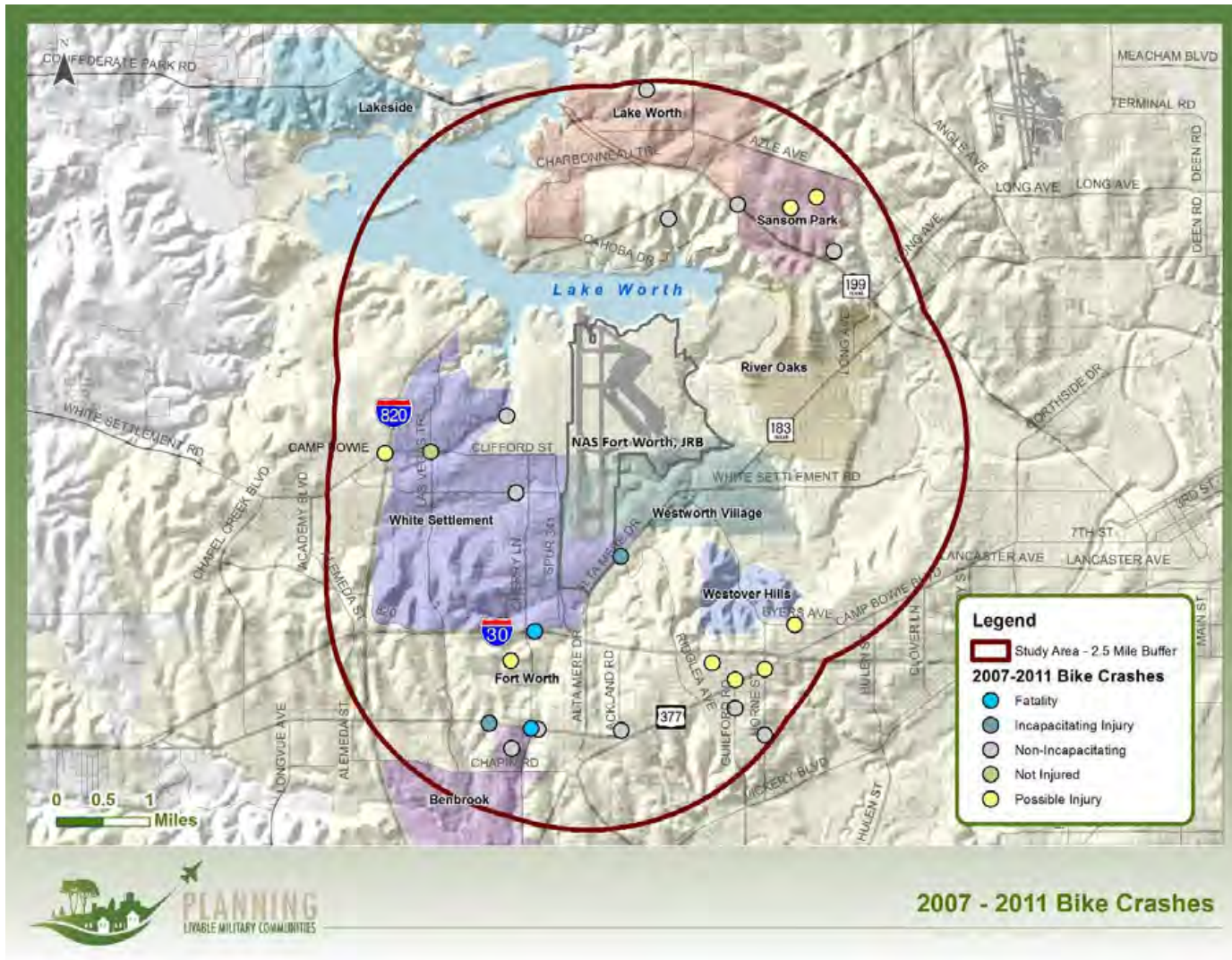


FIGURE 16: STUDY AREA ACCIDENTS BY TYPE, 2007 – 2011



Source: TxDOT Crash Records Information System, 2007-2011

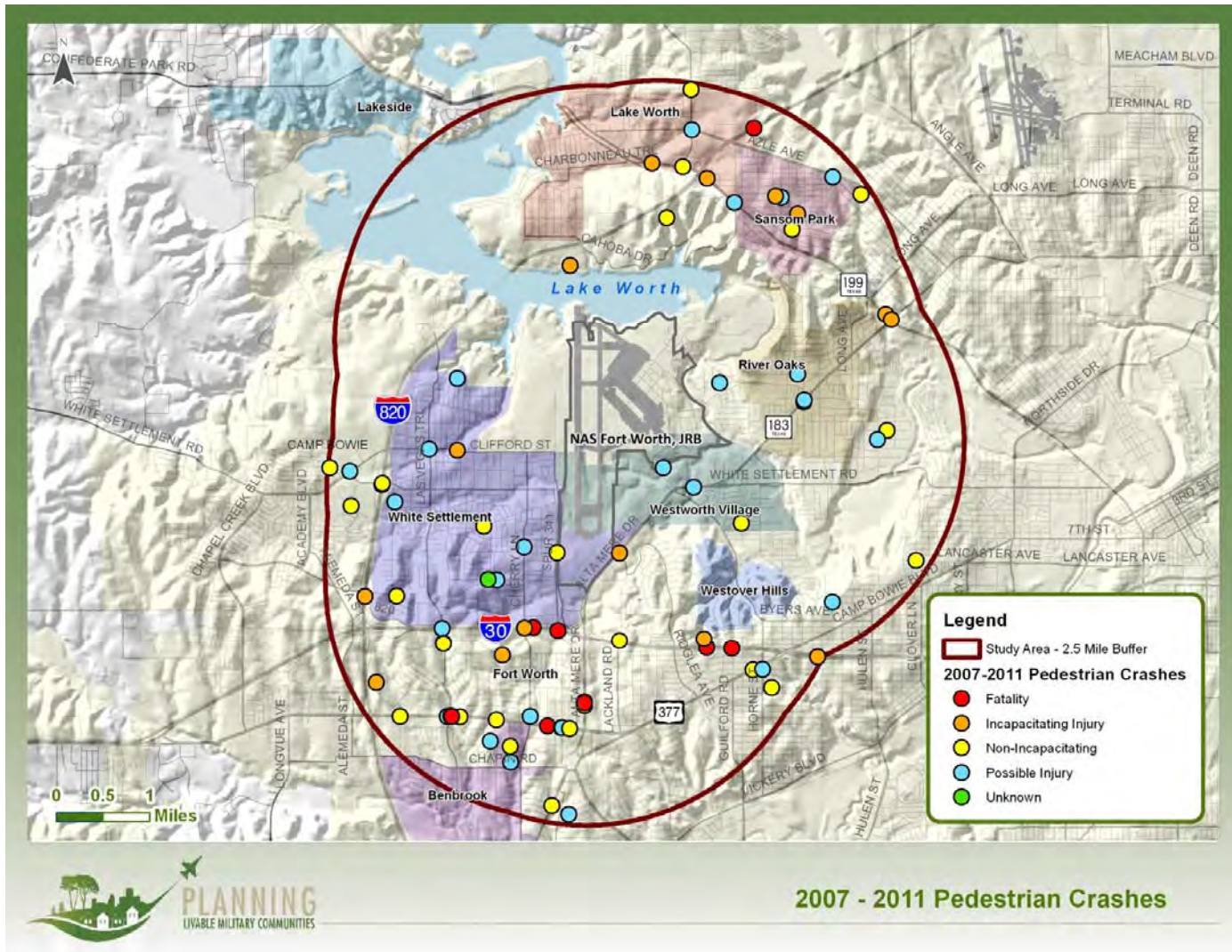
FIGURE 17: STUDY AREA BICYCLE CRASHES BY SEVERITY, 2007 – 2011



Source: TxDOT Crash Records Information System, 2007-2011



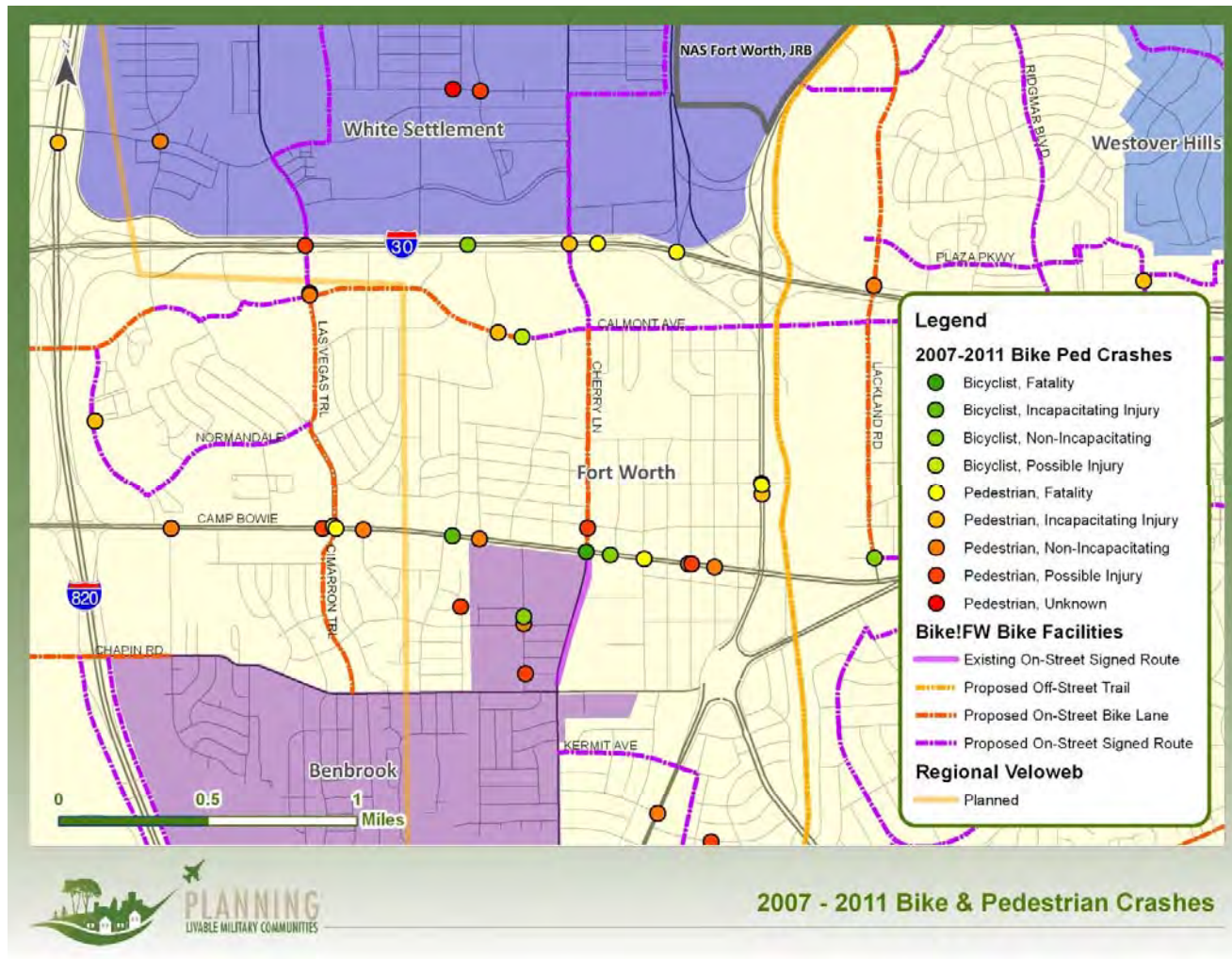
FIGURE 18: STUDY AREA PEDESTRIAN CRASHES BY SEVERITY, 2007 – 2011



Source: TxDOT Crash Records Information System, 2007-2011

A concentrated group of bicycle and pedestrian accidents happened between IH 30 and Camp Bowie Boulevard as shown in **Figure 19**. There are many commercial uses along the Camp Bowie Corridor. The Veloweb and Bike Fort Worth only have north-south planned trails; no trails are planned that run east-west on Camp Bowie Boulevard.

FIGURE 19: BICYCLE AND PEDESTRIAN ACCIDENTS ON CAMP BOWIE BOULEVARD

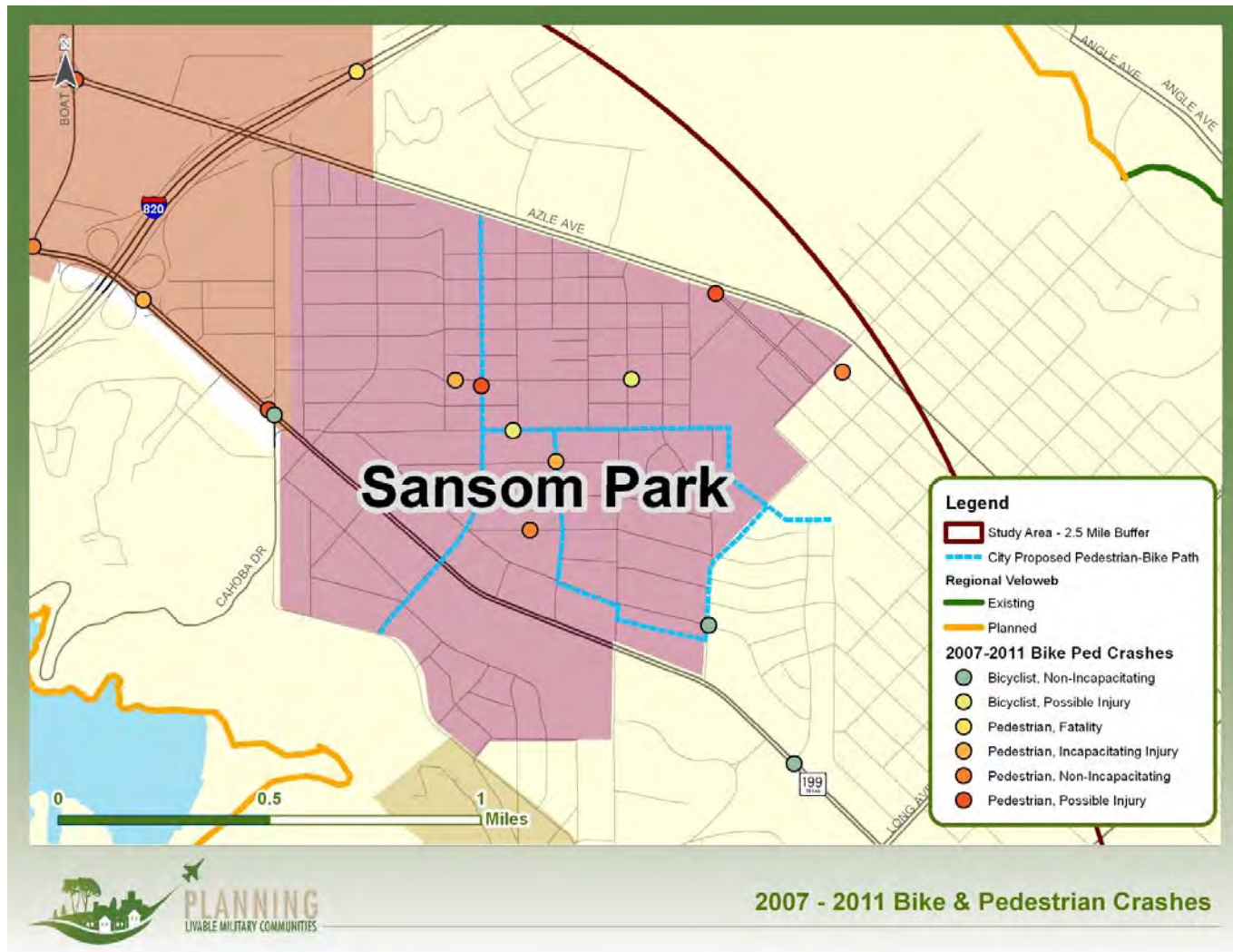


Source: TxDOT Crash Records Information System, 2007-2011



Another concentrated group of bicycle and pedestrian accidents exists in the City of Sansom Park which contains no sidewalks. However, according to the City of Sansom Park Comprehensive Plan there are proposed pedestrian-bike paths in some of the areas of concern as shown in **Figure 20**.

FIGURE 20: BICYCLE AND PEDESTRIAN ACCIDENTS IN THE CITY OF SANSOM PARK



Source: TxDOT Crash Records Information System, 2007-2011

Unfortunately, the accident data doesn't show origins or destination of injured individuals which would help shed light as to which areas need more secured paths. Continued safety analysis is needed to determine if accidents can be mitigated via engineering, education, and/or enforcement strategies.

## PUBLIC FEEDBACK

### SURVEY

A bicycle and pedestrian survey was developed to collect stakeholder's perception as it relates to the communities in the study area. The survey was provided at a series of Planning Livable Military Communities open houses in June 2012 and was available online from June 2012 to August 2012. A total of 80 responses were received. Home and work zip codes were requested from each respondent. Home zip codes ranged from Aledo, Arlington, Azle, Bridgeport, Granbury, Haltom City, Haslet, Irving, Keller, and Weatherford with the majority coming from Fort Worth. Work zip codes ranged from Arlington, Azle, and NAS Fort Worth JRB, with the majority working in Fort Worth. It is assumed that those with a home address outside the study area work within the area and vice versa.

Seven questions were asked of respondents to which they could select ratings from "Strongly Agree" to "Strongly Disagree". About 61 percent were not satisfied with their current transportation options. Seventy-eight percent of respondents were not satisfied with the existing bicycle and pedestrian facilities in the area. Eighty-six percent respondents would like to see additional bicycle and pedestrian facilities. 80 percent of respondents were open to exploring options for on-street bicycle facilities. Seventy-four percent of respondent would consider commuting by alternative modes if given the access to better bicycle and pedestrian facilities. Eighty-one percent would be comfortable spending public funds on bicycle and pedestrian facilities. **Figure 21** displays the combined results of the in-person and online survey.

FIGURE 21: BICYCLE/PEDESTRIAN SURVEY RESULTS

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Response
I am satisfied with my current transportation options.	6%	14%	19%	40%	21%	0%
I am satisfied with existing bicycle and pedestrian facilities.	5%	5%	11%	39%	39%	1%
I would like to see additional bicycle and pedestrian facilities.	67%	19%	5%	4%	5%	0%
I am open to exploring options for on-street bicycle facilities.	49%	31%	8%	5%	7%	0%
I am comfortable spending public funds on bicycle and pedestrian facilities.	60%	21%	9%	2%	8%	0%
If I had access to better bicycle and pedestrian facilities (sidewalks, trails, bike routes, etc.), I would consider commuting by alternative modes.	53%	21%	14%	6%	6%	0%

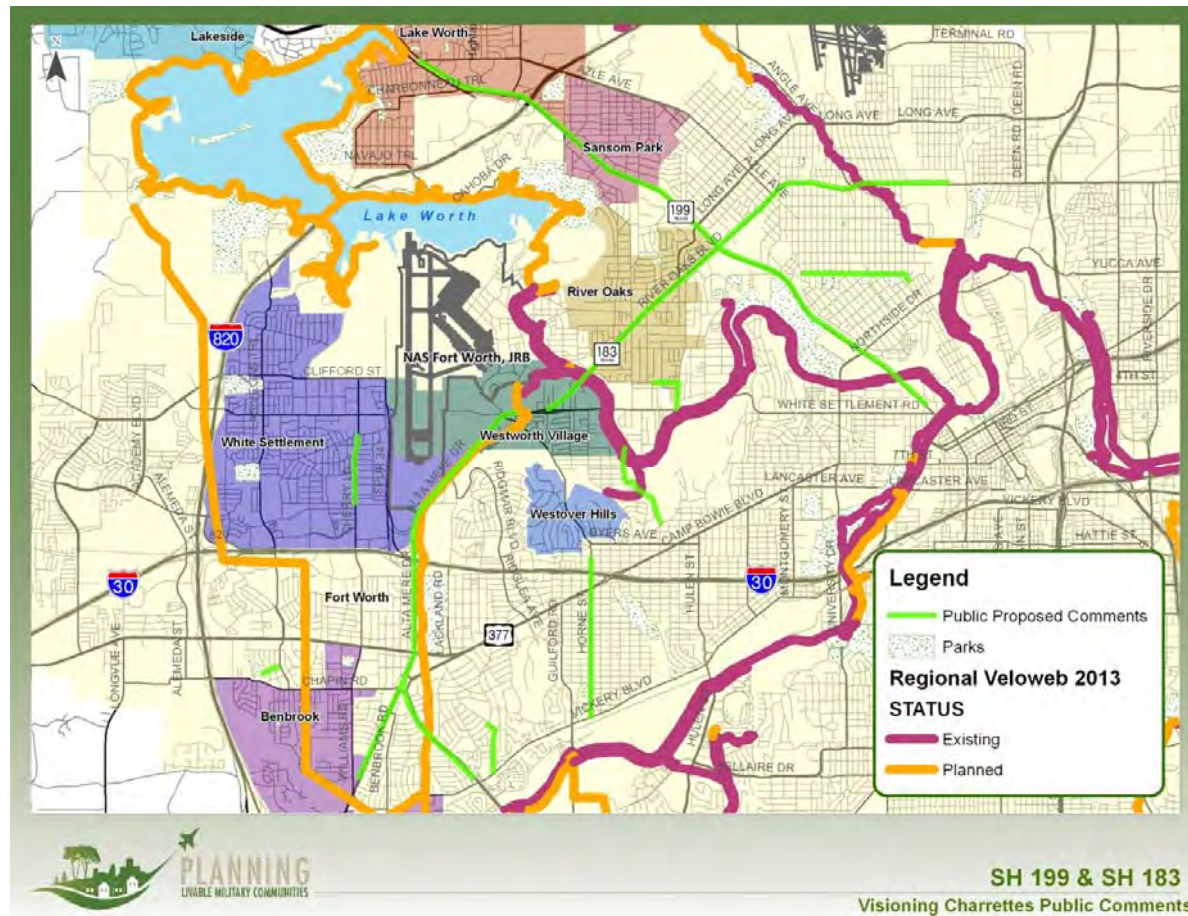
Source: NCTCOG



Overall, the majority of respondents would like to see improved bicycle and pedestrian facilities and access in the study area.

**Figure 22** displays outcomes of transportation workshops that incorporated public comments from the September Corridor Charrettes as described in the Regional Transportation Section. Overall comments received included: where area residents prefer to ride and where routes were considered the safest to commute and recreate. Proximity to schools and open space, low speed roads, and a complete network that had few intersections with the main arterial streets were the major criteria used to create this map.

FIGURE 22: PUBLIC COMMENTS RECEIVED FROM VISIONING CHARRETTES



Source: NCTCOG

During the November 2012 public meetings, residents were asked to comment on the existing bike plans within the study area. The comments are incorporated in the Recommendations section to follow. Residents were also given two stickers to provide feedback on their priority for bike facilities (see Figure 23). Out of six topics, “Link to Existing Trails” received the most votes followed closely by “Address Safety Concerns”. Additionally, feedback that was received indicated that people do bike to the large employer, Lockheed Martin, but conditions can be very dangerous where cyclists do not have a bike facility to utilize.

FIGURE 23: PUBLIC BICYCLE FACILITY PRIORITIES



Source: NCTCOG

## BEST PRACTICES FOR BICYCLE FACILITIES

Well-designed bicycle facilities are those that are safe, attractive, convenient, and easy to use. They minimize user conflicts and promote good riding habits. As such, well-designed facilities are popular community amenities and are heavily used. Poor bicycle facilities are those that few use, are used irresponsibly because of poor design, or have not been designed for ease of maintenance. Inadequate facilities discourage users from bicycling on a regular basis, waste money and resources, and make future bicycle improvements less favorable to the general public. The best way to ensure good facility design is to include the needs of bicyclists at the inception of a transportation project or improvement, so that the bicycle improvement is integrated into the total design of the project.

Design guidance for bicycle facilities has advanced significantly over the past two decades. Guidance at the national and state level encourages the development of bicycle facilities according to the recommendations established in the American Association of State Highway and Transportation Officials (AASHTO): *Guide for the Development of Bicycle Facilities*, 2012, and the Texas Department of Transportation (TxDOT): *Roadway Design Manual*, revised May 2010. The US Department of Transportation Federal Highway Administration's *Manual on Uniform Traffic*

*Control Devices* (MUTCD), 2009 mandates national guidelines for traffic control devices, such as pavement markings, signage, traffic safety lights, etc. In 2011, after a two-year design review period that began in 2009, TxDOT adopted the Texas MUTCD developed from the national MUTCD currently in use. AASHTO's *A Policy on Geometric Design of Highways and Streets* (The Green Book), 2011, provides national guidance on the design of highways and streets including recommendations for the safe interaction between motorists and bicyclists on roadways. For the latest versions of these documents, be sure to consult the appropriate Websites. There are various other documents that should be consulted during the design and development process, including city and county roadway design manuals, and other relevant planning and design manuals as applicable.

Recommendations at the regional level follow the aforementioned national and state guidelines. These guidelines are required on federal and state roadways, and on roadways constructed with federal or state funding initiatives. It is important to note that variations exist among the design guidelines for bicycle facilities and, therefore, a range of options are provided in the following sections. In addition, certain design guidance relies on an engineer's best judgment, and final decisions are based on location and other relevant circumstances at the local, state, and/or federal level(s).

Different types of streets and their associated characteristics necessitate different types of bikeway designs. Different design treatments need to be considered for arterial streets, collector or minor arterial streets and local streets. Appropriate design guidelines as recognized in the previously identified

**It is important to note that bicycles are permitted on all roads in the State of Texas (with the exception of access-controlled freeways). The designation of certain roads as Class II or III bicycle facilities is not intended to imply that these are the only roadways intended for bicycle use, or that bicyclists should not be riding on other streets. Rather, the designation of a network of Class II and III on-street bikeways recognizes that certain roadways are optimal bicycle routes, for reasons such as directness or access to significant destinations.**



bicycle facility guidance manuals are described in the following section, and are grouped according to the bikeway facility classes identified previously. A detailed table outlining specifics of the facility types is presented in **Figure 33** at the end of the section.

## CLASS I BIKEWAYS

***Shared-Use Path:*** A shared-use path is a facility on exclusive right-of-way and with minimal intersections with motor vehicles. Shared-use paths are sometimes referred to as trails; however, the term trail can refer to a variety of facilities that do not necessarily meet the design criteria for shared-use paths, so care should be taken when using these terms interchangeably. Users are restricted to non-motorized forms of transportation (with the exception of maintenance vehicles) and may include, but are not limited to, bicyclists; in-line skaters; wheelchair users; and pedestrians, including runners, people with baby strollers, people walking dogs, etc. Shared-use paths should not be used to preclude on-road bicycle facilities, but rather to supplement a system of on-road facilities. Shared-use paths can serve a variety of purposes, from recreational facilities, to facilities along abandoned and active rail rights-of-way and utility corridors, to facilities that provide bicyclists access to areas that are otherwise served only by limited-access highways closed to bicycles or that are limited by barriers. **Figure 24** is an example of a shared-use path in the North Central Texas region.

***Design Considerations:*** A recommended minimum width for two-directional travel on a shared-use path is ten feet with two-foot shoulders on either side. However, NCTCOG strongly encourages two-directional travel paths be implemented at a width of 12 feet. Under certain circumstances where high volumes of bicycles, joggers, skaters, and pedestrians are expected, a desired width is 14 feet with two-foot shoulders on either side. Additional clearance of one foot for signage is recommended.

***Sidepath:*** A sidepath is a shared-use path marked for bicycle (and sometimes pedestrian) use that is adjacent to a roadway, and is most appropriate in corridors where there are limited driveway crossings and intersections, or adjacent roadway speeds and volumes are higher. This facility offers an option for those not comfortable riding on the road with traffic. However, careful facility design is needed to minimize conflicts between motorists and bicyclists at intersections. In addition, where sidepaths are present, bicyclists should not be prohibited from the roadway. **Figure 25** is an example of an existing sidepath.

***Design Considerations:*** A recommended width for two-directional travel on a sidepath is ten feet with two-foot shoulders on either side. The minimum width of a one-directional sidepath is six feet with two-foot shoulders on either side (in instances when Sidepaths are to be implemented on both sides

FIGURE 24: SHARED-USE PATH, NORTH RICHLAND HILLS, TX



of the roadway). Sidepaths should be separated from the roadway by a five-foot buffer. If this is not possible, a physical barrier not less than 42 inches high is recommended between the sidepath and roadway to prevent path users from making unwanted movements between the path and the roadway. Additional clearance of one foot for signage is recommended.

## CLASS II BIKEWAYS

***Bicycle Lane:*** Bicycle lanes are portions of the roadway that have been designated for the preferential or exclusive use of bicyclists through striping, signage, and other pavement markings. On two-way streets, bike lanes should be provided on both sides of the road so that bicyclists can ride in the same direction as adjacent motor vehicle traffic. **Figure 26** is an example of an existing bicycle lane.

***Design Considerations:*** Bicycle lanes should be at least four feet wide on roadways with open shoulders and five feet wide on roadways with curb and gutter or on-street parking. Pavement markings should appear at intervals not to exceed one-half mile. Five-foot wide bicycle lanes are typical, but wider lanes (i.e., six foot) are often used on roadways with high motor vehicle traffic volumes.

***Buffered Bicycle Lane:*** The buffered bicycle lane is a bicycle lane that is buffered by a two- to six-foot wide striped cross-hatched “shy zone” between the bicycle lane and the moving vehicle lane or the parking lane. This design makes movement safer for both bicyclists and vehicles. With the shy zone on the left, the buffered lane offers a more comfortable riding environment for bicycle riders who prefer not to ride adjacent to traffic; on the right, it puts bicycle riders outside of the ‘door zone’ of parked cars. This system allows motorists to drive at a normal speed; they only need watch for cyclists when turning right at cross-streets or driveways and when crossing the buffered lane to park. **Figure 27** portrays examples of existing buffered bicycle lanes in the United States.

***Design Considerations:*** For use on streets with high bicycle volume and/or high motor vehicle volumes and speeds. Bicycle lanes should be five feet wide with a two- to six-foot wide striped cross-hatched buffer, and bicycle pavement markings appearing more frequently than standard bicycle lanes (every 50 to 100 feet) to prevent vehicles from driving in the lane.

FIGURE 25: SIDEPATH, WATERTOWN, MA



FIGURE 26: BICYCLE LANE, VANCOUVER, WA





FIGURE 27: BUFFERED BICYCLE LANES, BROOKLYN, NY AND TUCSON, AZ



***Cycle Track:*** The cycle track is an exclusive bicycle facility adjacent to, but separated from, the roadway by a physical barrier. The facility is also separated from the sidewalk. The cycle track combines the user experience of a separated path with the on-street infrastructure of a bicycle lane. For use on arterial roadways with high motor vehicle speeds and volumes and roads with fewer cross-streets and longer blocks. **Figure 28** shows an example of an existing cycle track.

***Design Considerations:*** Between six and eight feet wide, with a two-foot buffer on the vehicle side. Separation from the vehicle lane is channelized (elevated or at-grade), a mountable curb, or bollards/markings.

***Climbing Lane:*** Uphill bicycle lanes (also known as “climbing lanes”) separate vehicle and bicycle traffic, and enable motorists to safely pass slower-speed bicyclists, thereby improving conditions for both travel modes. While descending bicyclists are often able to maintain vehicular travel speeds, bicyclists ascending hills tend to lose momentum, especially on longer street segments with continuous uphill grades. This speed reduction creates greater speed differentials between bicyclists and motorists, creating uncomfortable and potentially unsafe riding conditions. The right-of-way or curb-to-curb width on some streets may only provide enough space to stripe a bicycle lane on one side. Under these conditions, bicycle lane striping could be added to the uphill side of the street, and shared-lane markings on the downhill side of the street. **Figure 29** is an existing example of a climbing lane.

FIGURE 28: CYCLE TRACK, NEW YORK, NY





**Design Considerations:** The uphill bicycle lane should be five to six feet wide. On the downhill side, the bicycle lane should be five to six feet wide if room permits; otherwise, a shared-lane marking should be installed according to the design guidelines outlined for shared-lane marking facilities.

### CLASS III BIKEWAYS

**Signed Bicycle Route:** A signed bicycle route is a shared roadway without any designated bicycle facilities (i.e., no roadway striping or markings). Many non-arterial roadways with low traffic volumes and low speeds, such as neighborhood connectors, are ideal as a signed bicycle route. **Figure 30** is an example of a signed bicycle route.

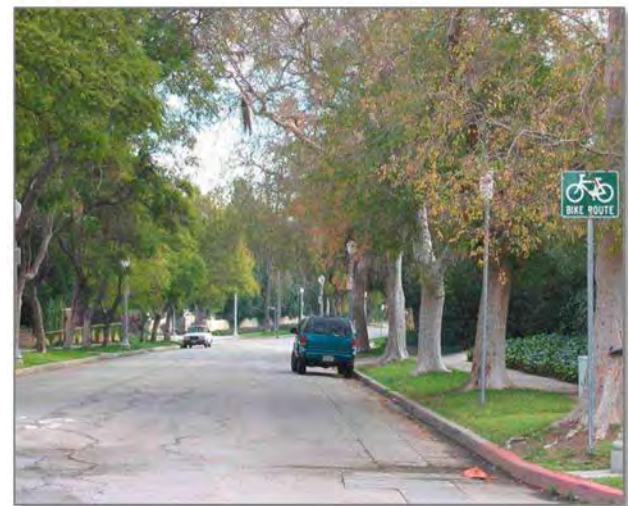
**Design Considerations:** Provide bicycle route signs every one-third to one-half mile on straight segments of the route, depending on the locations of crossings with other bicycle routes, locations of primary arterial roadway crossings, sight distance, and the overall frequency of street crossings.

**Shared-Lane Marking:** Shared-lane markings (sometimes referred to as a “sharrows”) are pavement symbols consisting of a bicycle with two chevron markings above the bicycle. The shared-lane marking is utilized on roadways where bicyclists and motorists share the lane, of which the intent of the shared-lane marking is to improve bicyclist and bicyclist-motorist positioning. Traffic lanes are often too narrow to be shared side-by-side by bicyclists and passing motorists. Where parking is present, bicyclists wishing to stay out of the way of motorists often ride too close to parked cars and risk being struck by a suddenly opened car door (being “doored”). Where no parking is present, bicyclists wishing to stay out of the way of motorists often ride too close to the roadway edge, where they run the risks of being run off the road, being clipped by overtaking motorists who misjudge passing clearance, or of encountering drainage structures, poor pavement, debris, and other hazards. Riding further to the left avoids these problems, and is legally permitted where needed for safety. However, this practice can run counter to motorist expectations. The shared-lane marking, therefore, indicates the legal and appropriate bicyclist line of travel, and cues motorists to pass with sufficient clearance, as needed. **Figure 31** is an example of a shared-lane marking.

FIGURE 29: CLIMBING LANE, PORTLAND, OR



FIGURE 30: SIGNED BICYCLE ROUTE, SEATTLE, WA



*Design Considerations:* The shared-lane marking should not be placed on roadways that have a speed limit above 35 mph. If used in a shared lane with on-street parallel parking, shared-lane markings should be placed so that the centers of the markings are at least 11 feet from the face of the curb, or from the edge of the pavement where there is no curb. If used on a street without on-street parking that has an outside travel lane that is less than 14 feet wide, the centers of the shared-lane markings should be at least four feet from the face of the curb, or from the edge of the pavement where there is no curb. If used, the shared-lane marking should be placed immediately after an intersection and spaced at intervals not greater than 250 feet thereafter.

**Paved Shoulder:** Typically found in rural areas, shoulder bikeways are paved roadways with striped shoulders wide enough for bicycle travel. In some cases, the opportunity to develop a standard bicycle lane on a street where it is desirable may not be possible. However, it may be possible to stripe the shoulder in lieu of bicycle lanes by reducing the outside lane width to the AASHTO minimum. Where feasible, extra width should be provided with pavement resurfacing, but not exceeding desirable bicycle lane widths. **Figure 32** is an example of a paved shoulder.

*Design Considerations:* Striped shoulders should be four feet minimum without a curb; five feet minimum with a curb. Shoulder bikeways often, but don't always, include signage alerting motorists to expect bicycle travel along the roadway. Below four feet should not be designated or marked as a bicycle facility.

Additional bicycle facility options not covered in detail in this section include counterflow bicycle lanes which enable bicycle travel on one-way streets, and bicycle-bus lanes where bicycles and buses share the same lane.

FIGURE 31: SHARED LANE MARKING, SAN FRANCISCO, CA



FIGURE 32: PAVED SHOULDER, FLORIDA



FIGURE 33: BICYCLE FACILITY TYPES AND CHARACTERISTICS

Facility Type	Location	Design Considerations
Shared-Use Path (Class I Bikeway)	Exclusive right-of-way	10 to 14 feet depending on volume of users with 2-foot shoulders on either side. Supplemental on-road system.
Sidepath (Class I Bikeway)	Exclusive right-of-way	10 foot minimum for two-way travel with 2-foot shoulders on either side; 6 foot minimum for one-way travel with 2-foot shoulders on either side. Five-foot buffer between path and roadway or a physical barrier.
Bike Lane (Class II Bikeway)	On roadways: minor arterials, arterials	Bike lanes should be at least 4 feet wide on roadways with open shoulders and at least 5 feet wide on roadways with curb and gutter or on-street parking. Pavement markings should appear every one-half mile.
Climbing Lane (Class II Bikeway)	On roadways with hills where adequate right-of-way for bike lanes on both sides of the roadway cannot be acquired	The uphill bike lane should be 5 to 6 feet wide. On the downhill side, the bike lane should be 5 to 6 feet wide if room permits, or shared-lane markings should be installed according to recommendations.
Buffered Bike Lane (Class II Bikeway)	On roadways with high motor vehicle volumes and/or speeds; on roadways with on-street parking that has a high turnover	Bike lanes should be 5 feet wide with a 2- to 6-foot wide striped cross-hatched buffer, and bicycle pavement markings should be placed every 50 to 100 feet.
Cycle Track (Class II Bikeway)	On roadways with high motor vehicle volumes and/or speeds	Between 6 to 8 feet wide, with a 2-foot buffer on the vehicle side. Separation from the vehicle lane is channelized (elevated or at-grade), a mountable curb, or bollards/markings.
Signed Bike Route (Class III Bikeway)	On lower volume roadways that have lower speeds: neighborhood streets, collectors, etc.	Provide bike route signs every one-fourth mile and at intersections.
Shared-Lane Marking (Class III Bikeway)	On lower volume roadways that do not have a speed limit over 35 mph: arterials, minor arterials, collectors, neighborhood streets, etc.	Shared-lane markings on roadways with on-street parallel parking should be placed 11 feet from edge of curb or edge of pavement. Without on-street parallel parking, markings should be 4 feet from curb or edge of pavement. Pavement markings immediately after an intersection and at least every 250 feet.
Paved Shoulder (Class III Bikeway)	On rural roadways, or on roadways where adequate right-of-way for on-street facilities cannot be acquired	Striped shoulders should be 4 feet minimum without a curb; 5 feet minimum with a curb. Signage optional.

\*Planning level estimates do not include ROW acquisition costs; costs for potentially required bridges or retaining walls; costs for amenities including lighting, benches, bicycle parking, interpretive kiosks, etc.; or costs for maintenance.

## INNOVATIVE BICYCLE FACILITIES

Municipalities typically experience new issues regarding bicycle facilities as bicycle ridership rates increase. The following section outlines several best practices in emerging innovations for bicycle planning and design. Professional judgment and sound engineering practices must be used on the site-specific application of these design treatments. In addition, the treatments outlined in the following section may require experimental status from the Federal Highway Administration (FHWA).

**Colored Bicycle Lanes:** A contrasting color for the paving of bicycle lanes can be applied to continuous sections of roadways. These situations help to better define road space dedicated to bicyclists and make the roadway appear narrower to drivers resulting in beneficial speed reductions. Colored bicycle lanes are implemented according to general bicycle lane guidelines. Colored bicycle lanes require additional cost to install and maintain. Techniques include paint – less durable and can be slippery when wet; colored pavement – colored medium in pavement (most durable); or colored and textured sheets of acrylic epoxy coating. **Figure 34** is an example of an existing colored bicycle lane in the United States.

**Bike Box:** A bike box is generally a right angle extension of a bike lane at the head of a signalized intersection. The bike box allows bicyclists to move to the front of the traffic, queue on a red light, and proceed first when that signal turns green. Motor vehicles must stop behind the white stop line at the rear of the bike box. Bike boxes can be installed with striping only or with colored treatments to increase visibility. Bike boxes should be located at signalized intersections only, and right turns on red should be prohibited. On roadways with one travel lane in each direction, the bike box also facilitates left turning movements for cyclists. **Figure 35** is an example of an existing bike box in the United States.

**Back-In Diagonal Parking:** The use of ‘back-in diagonal parking’ or ‘reverse-angled parking’ is recommended over head-in diagonal parking. This design addresses and improves sight distance between drivers and bicyclists and has been shown to reduce parking-related crashes. In certain areas, diagonal parking can be used to increase parking supply. Conventional diagonal parking is not compatible or recommended in conjunction with high levels of bicycle traffic. While there may be a learning curve for some drivers, using back-in diagonal parking is typically an easier maneuver than conventional parallel parking. **Figure 36** shows how a bicycle lane can be incorporated after back-in diagonal parking is installed.

FIGURE 34: COLORED BICYCLE LANE, SEATTLE, WA

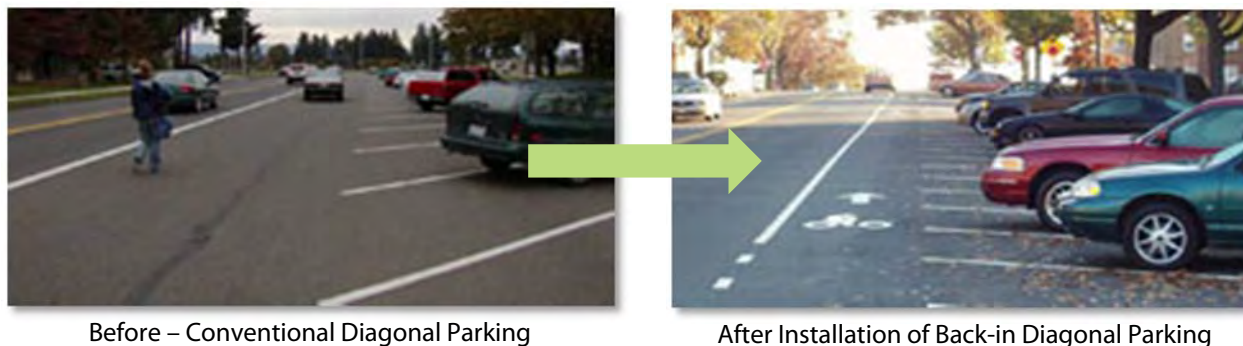


FIGURE 35: BIKE BOX, PORTLAND, OR





FIGURE 36: BEFORE AND AFTER INSTALLATION OF BACK-IN DIAGONAL PARKING



***Bicycle Signal:*** A bicycle signal directs two-wheeled traffic through dangerous intersections connected to bicycle or shared-use paths with bicycle-shaped red, amber, and green lights. Cyclists activate the light by placing their wheels on a bicycle-shaped signal on the ground, then cross the intersection diagonally. A bicycle signal may be considered for use when the volume and collision or volume and geometric warrants have been met. **Figure 37** is an example of an existing bicycle signal in the United States.

***Bicycle Boulevards:*** A bicycle boulevard, sometimes called a bicycle priority street, is a roadway where all types of vehicles are allowed, but the roadway is modified as needed to enhance bicycle safety and convenience. Bicycle boulevards are not approved for use on the State Highway System. Typically these modifications will also calm traffic and improve pedestrian safety. Modifications include signage, unique pavement (colored, textured, etc.), pavement legends, landscaping/street trees, traffic circles, bulb outs, traffic signals, and highly visible crosswalks. In some cases, bicycles may be granted through access to the roadway while vehicles may not. Bicycle boulevards discourage cut-through motor vehicle traffic, but typically allow local motor vehicle traffic. **Figure 38** is an example of an existing bicycle boulevard in the United States. They are designed to give priority to cyclists as through-going traffic. They improve bicycle safety and circulation in various ways:

- Low traffic volumes (or bike lanes where traffic volumes are medium).
- Discouragement of non-local motor vehicle traffic.

FIGURE 37: BICYCLE SIGNAL, SAN FRANCISCO, CA



- Free-flow travel for bikes by assigning the right-of-way to the bicycle boulevard at intersections wherever possible.
- Traffic control to help bicycles cross major arterial roads.
- A distinctive look and/or ambiance such that cyclists become aware of the existence of the bike boulevard and motorists are alerted that the roadway is a priority route for bicyclists.

## FACILITY IMPLEMENTATION

There are several options to implement bicycle facilities within the existing road right-of-way. Several of these options are discussed in further detail below.

*Include in Road Construction:* Locations where bicycle facilities can be provided as part of planned transportation improvement projects.

*Stripe/Add Pavement Markings:* Locations where facilities can be added by simply adding pavement markings. Capital costs: ~\$1,000 per mile (if the old paint does not need to be changed).

*Remove Parking:* Locations where facilities can be added by eliminating on-street parking. Please note that this recommendation is used only sparingly and would require extensive public outreach. Capital costs: ~\$5,000 to \$10,000 per mile (depending on the number of lanes that need to be repainted).

*Lane Diet:* Locations where narrowing automobile travel lanes creates enough space within the existing road right-of-way to provide bicycle facilities. The 2010 version of the Highway Capacity Manual will include safety data supporting ten-foot wide travel lanes as a standard option. Capital costs: ~\$5,000 to \$10,000 per mile (depending on the number of lanes that need to be repainted). **Figure 39** depicts how an existing roadway looks before and after a lane diet.

FIGURE 38: BICYCLE BOULEVARD, BERKLEY, CA





FIGURE 39: BEFORE AND AFTER LANE DIET, NEW YORK, NY



Before Lane Diet, New York, NY

After Lane Diet, New York, NY

**Road Diet:** Locations in which a road is reduced in the number of travel lanes and/or effective width in order to achieve systemic improvements. A typical road diet technique is to reduce the number of lanes on a roadway cross-section. The additional space that is freed up by removing a vehicular travel lane is converted into bicycle lanes on either side of the roadway. A significant amount of studies have been conducted on the safety benefits of road diets. Conclusions of these studies indicate reductions in crash rates, injury rates, and speeding; an increase in on-street parking utilization; pedestrian and bicyclist volumes; and a total crash reduction factor (CRF) of 29 percent.<sup>2</sup> Additional benefits of road diets include:

- Provide space to add bicycle lanes.
- Reduce crossing distance for pedestrians.
- Eliminate or reduce “multiple threat” crash types.
- Crossing islands result in two simple steps crossing for pedestrians.
- Reduce top-end travel speeds.
- Buffer sidewalk from travel lanes (install parking or bicycle lanes).
- Reclaim street space for other uses rather than moving peak-hour traffic.

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<sup>2</sup> Highway Traffic Research Board, [NCHRP Research Results Digest 299](#), November 2005.

Capital costs: ~\$5,000 to \$20,000 per mile (depending on the number of lanes that need to be repainted). **Figure 40** depicts how an existing roadway looks before and after a road diet.

FIGURE 40: BEFORE AND AFTER ROAD DIET, SAN ANTONIO, TX



## ADDITIONAL CONSIDERATIONS

The planning, design, and implementation of bicycle facilities remains the strongest indicator for bicycle transportation. However, there are several other components that should be considered for a successful bicycle system, including bicycle end-of-trip facilities, maintenance activities, and signal operations for Bicyclists, each of which is discussed in further detail in the following sections.

### End-of Trip Facilities

The term bicycle end-of-trip facilities refers to parking and complementary infrastructure for bicycles.

***Bicycle Parking Infrastructure:*** Includes stands or racks that support bicycles and shelters or enclosures that protect parked bicycles from vandalism, theft, and the elements.

***Bicycle Parking:*** One of the most common obstacles for bicyclists is often cited as the lack of bicycle parking. Adequate parking encourages people to ride. In addition, designated, well-designed parking promotes a more orderly streetscape and preserves the pedestrian right-of-way. Bicycle parking also helps

legitimize bicycling as a transportation mode by providing parking opportunities equal to motorized modes. Short-term parking (i.e., bicycle racks or surface parking) and long-term parking (i.e., lockers or restricted access parking locations) facilities should be considered to support a successful bicycle system. Bicycle parking should be available at major destinations such as employment and shopping centers, transit stations, schools, etc. The *Bicycle Parking Guidelines, 2nd Edition: A set of recommendations from the Association of Pedestrian and Bicycle Professionals* offers additional guidance and recommendations for facility options and installation techniques.

**Complementary Infrastructure:** Include lockers for stowing helmets, bicycle clothing, and other personal belongings; change rooms and showers; air pumps; and sometimes even bicycle parts and maintenance shops. Private-public partnerships are encouraged to provide complementary infrastructure at major destinations such as employment and shopping centers, transit stations, schools, etc. Bikestation® is an organization that works with a number of agencies and organizations in the planning, development, and implementation of bike-transit related projects. Bikestation® offers its members bicycle parking and related services at its facilities. Bikestations offer secure bicycle parking, changing facilities, and even bicycle rentals and bicycle repairs. **Figure 41** is an example of an existing bike station in the United States.

### **Maintenance Activities**

On-street bicycle facilities require maintenance activities similar to those that apply to vehicular roadway facilities. There has been a long-standing debate on the practicality of on-street bicycle facilities due to the lack of regular maintenance provided by municipalities for these facilities, including routine sweeping of bicycle lanes. However, when routine maintenance is provided for these facilities, there is a general consensus that on-street facilities are greatly favored over the alternative.

**Figure 42** provides a range of maintenance activities that should be provided regularly by the implementing agency and the frequency these activities should be performed.

FIGURE 41: BIKE STATION, WASHINGTON, D.C.



FIGURE 42: MAINTENANCE ACTIVITIES AND FREQUENCY

Maintenance Activity	Frequency
Inspections	Seasonal; at the beginning and end of summer
Pavement sweeping/blowing	As needed, weekly in the fall
Pavement sealing, potholes	5 to 15 years
Culvert and drainage grate inspection	Before winter and after major storms
Pavement markings replacement	1 to 3 years
Signage replacement	1 to 3 years
Shoulder plant trimming (weeds, trees, brambles)	Twice a year; middle of growing season and early fall
Tree and shrub plantings, trimming	1 to 3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible

Source: City of Milwaukee 2010 Bicycle Master Plan

### Signal Operations for Bicyclists

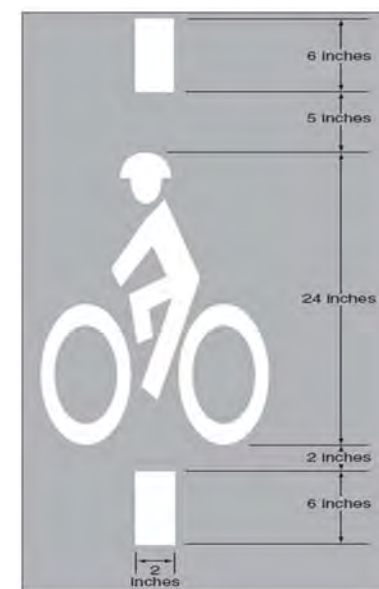
Signal operations for bicyclists is a major issue as many traffic signals are not set to detect bicyclists. All signals on roadways that allow bicycle travel should be set to detect bicyclists, either through setting adjustments (new signals) or through the installation of a bicycle detector in the pavement (older signals). In the latter, a bicycle detector pavement marking (see **Figure 43**) should be placed on the pavement to indicate optimum position for bicyclists to activate the symbol. **Figure 44** contains MUTCD guidance on signal operations for bicyclists.

FIGURE 44: MUTCD GUIDANCE ON SIGNAL OPERATIONS FOR BICYCLISTS

<b>Per MUTCD Section 9D.02</b>
At installations where visibility-limited signal faces are used, signal faces shall be adjusted so bicyclists for whom the indications are intended can see the signal indications. If the visibility-limited signal faces cannot be aimed to serve the bicyclist, then separate signal faces shall be provided for the bicyclist.
On bikeways, signal timing and actuation shall be reviewed and adjusted to consider the needs of bicyclists.
<b>Per MUTCD Section 9C.05</b>
A bicycle detector symbol may be placed on the pavement indicating the optimum position for a bicyclist to actuate the signal.
A sign may be installed to supplement the pavement marking.

Source: MUTCD

FIGURE 43: MUTCD BICYCLE DETECTOR PAVEMENT MARKING





**Parking:** Because density – building up rather than out – is a key strategy for clustering growth, the extra land area devoted to parking can cause a serious problem. If densities are increased, more land area must be devoted to parking and the distance between buildings increases, making the environment more hostile to pedestrians. Under many current parking standards used within the region, it would be nearly impossible to achieve pedestrian-scaled environments. The best solution is to lower parking ratios and put as much parking as possible on streets, in garages or, better yet, underground. Lowering parking ratios can be achieved by utilizing a shared parking factor. Both maximum parking allowances and minimum parking requirements for all commercial and employment development should be established within the station area. Minimum requirements help to avoid spillover parking in retail areas or in nearby neighborhoods; maximums guard against overly generous parking supplies that discourage transit use. Short-term parking controls should be utilized in commercial core areas to discourage commuter parking near retail uses.

On-street parking is critical to keeping the focus of a community on the street, rather than the interior of lots. On-street parking slows vehicle speeds and helps to create street activity, as well as buffer the pedestrian from vehicle traffic. It provides convenient access for guests or patrons, reinforcing the orientation of building entries to the street. On-street parking can be compatible with bicycle travel, provided that auto speeds are slow enough to allow bicyclists to travel safely in the street. Implementing these techniques will discourage individuals from using the automobile unnecessarily and help promote alternative modes of transportation. **Figure 45** is an example of existing on-street parking in Fort Worth.

**Driveways:** Driveways should be clearly marked and designed to look like driveways, not intersections. Sidewalks should continue through the driveway and the driveway should be sloped to establish a clear right-of-way for pedestrians, and ultimately slow down the motorist to allow for increased pedestrian safety. Driveways should be located away from intersections and consolidated or narrowed where possible to reduce the number of conflict points for pedestrians. Parking access on streets located within the pedestrian-oriented zone ideally should be restricted to on-street parking or via alleyways. For residential uses, minimum driveway width should be set at 10 feet with a maximum of 14 feet. For commercial uses, the minimum driveway width for two-way traffic should be 22 feet. **Figure 46** is an example of existing limited driveways in Fort Worth.

FIGURE 45: ON-STREET PARKING, FORT WORTH, TX



FIGURE 46: LIMITED DRIVEWAYS, FORT WORTH, TX



**Street Network:** When redeveloping groups of parcels, it is important to create good block form, often in a grid or other highly connected pattern which should offer multiple access points to the station and other uses within the development. Block distances should range from 300 to 500 feet in order to keep walking distances short and provide alternative route options for pedestrians. Frequent, interconnected streets increase the efficiency of transit and circulation and offer more choices for pedestrians. Street links to trails within surrounding neighborhoods should be considered priority as they allow for an alternate accessibility route for adjacent communities. In addition, land use and zoning policies can also provide backing behind the development of a stronger non-motorized network. Safe and convenient access from a bicycle and pedestrian network to an entrance should be provided. Buildings should be as close to the transportation network as possible and provide safe entrances to the building which minimizes interaction between vehicles, pedestrians, and bicyclists.

**Building Placement and Features:** Street-facing buildings with articulated facades should be oriented toward the pedestrian with minimal setbacks. Recurring windows and multiple entries should be prevalent with the minimum amount of ground floor window space area equal to 40 percent of a building's length. Mixed-use and commercial buildings are desirable in the pedestrian-oriented zone. **Figure 47** is a regional example of a mixed-use development. For added definition and a sense of enclosure to the street, multi-story buildings should be present along with shelters such as arcades, awnings, trellises, and other overhangs to protect pedestrians from the effects of the region's changing seasons.

**Traffic Calming Measures:** Medians, bicycle lanes, narrow and reduced numbers of travel lanes, as well as on-street parking have all been proven effective means for creating a more pedestrian-friendly environment. The benefits for pedestrians include lower motor vehicle traffic speeds, more attentive motor vehicle operators, and shorter, more effective crossings. In general, on-street parking should be implemented on at least one side of the street at a width of eight feet, along with a six-foot wide bicycle lane. Narrowing travel lanes to 10 or 11 feet will slow motor vehicle traffic speeds and create space for bicycle lanes, which will also act as a buffer for pedestrians and create a safer environment for cyclists. Medians can create pedestrian crossing islands at large intersections or in the event that a crossing needs to occur at an uncontrolled location. They can be signalized or non-signalized, but should at least include zebra striping across the entire length of the pedestrian crossing. In general, pedestrian crossing islands should only be constructed when pedestrian volumes are high and crossing poses a safety concern for pedestrians. Within neighborhoods, traffic calming measures can be used to slow motor vehicle traffic with techniques such as speed humps and roundabouts. These methods are also beneficial in breaking up long stretches of straight streets. **Figure 48** is a regional example of an existing traffic circle.

FIGURE 47: MIXED-USE DEVELOPMENT, PLANO, TX





## BICYCLE FACILITY DESIGN RESOURCES

The following design resources should be used as appropriate when designing bikeway and/or pedestrian facilities.

Guide for the Planning, Design and Operation of Pedestrian Facilities, American Association of State Highway and Transportation Officials (AASHTO), 2004.

[https://bookstore.transportation.org/item\\_details.aspx?id=119](https://bookstore.transportation.org/item_details.aspx?id=119)

Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, Institute of Transportation Engineers, 2010.

<http://www.ite.org/emodules/scriptcontent/orders/ProductDetail.cfm?pc=RP-036A-E>

Guide for the Development of Bicycle Facilities, Fourth Edition, AASHTO, 2012.

[https://bookstore.transportation.org/collection\\_detail.aspx?ID=116](https://bookstore.transportation.org/collection_detail.aspx?ID=116)

Roadway Design Manual, Section 2: Design Exceptions, Design Waiver and Design Variances, Texas Department of Transportation, 2010.

[http://onlinemanuals.txdot.gov/txdotmanuals/rdw/design\\_exceptions\\_design\\_waivers\\_design\\_variances.htm#i1002915](http://onlinemanuals.txdot.gov/txdotmanuals/rdw/design_exceptions_design_waivers_design_variances.htm#i1002915)

Urban Bikeway Design Guide, Second Edition, National Association of City Transportation Officials (NACTO), 2012. (Guide includes innovative designs that can be used where only local funds are used, or with a Federal Highway Administration.

<http://nacto.org/cities-for-cycling/design-guide/>

Texas MUTCD (Manual on Uniform Traffic Control Devices) Part 9 Traffic Control for Bicycle Facilities, Revision 1, 2012

[http://ftp.dot.state.tx.us/pub/txdot-info/trf/tmutcd/2011\\_rev1/9.pdf](http://ftp.dot.state.tx.us/pub/txdot-info/trf/tmutcd/2011_rev1/9.pdf)

Bicycle Parking Guidelines, Second Edition, Association of Pedestrian and Bicycle Professionals (APBP), 2010.

<http://www.apbp.org/?page=publications>

FIGURE 48: TRAFFIC  
ROUNDAABOUT, DALLAS, TX



## GENERAL FUNDING INFORMATION

As stated in federal guidance, “Bicycling and walking contribute to many of the goals for the transportation system we have at Federal Highway Administration (FHWA) and at the state and local levels. Increasing bicycling and walking offers the potential for cleaner air, healthier people, reduced congestion, more livable communities, and more efficient use of precious road space and resources. That is why funds in programs such as Congestion Mitigation and Air Quality Improvement Program (CMAQ), Transportation Enhancements (TE), and the National Highway System (NHS) are eligible to be used for bicycling and walking improvements that will encourage the use of the two modes.”<sup>3</sup> All major transportation funding programs can be used for bicycle and pedestrian programs, so there should be no federal barrier in implementing bicycle and pedestrian projects, either as stand-alone projects or in conjunction with other federally funded transportation projects. Federal guidance makes it clear that the choice on how to use funds rests with the state; the one restriction in funding guidance being the requirement that bicycle projects funded through the Surface Transportation Program (STP), Congestion Mitigation and Air Quality Improvement, National Highway System, or Federal Lands Highway Program be “principally for transportation rather than recreation purposes.”<sup>4</sup> Cities should be aware of the federal funding opportunities and restraints as development of the county-wide bicycle and pedestrian system continues. The system will be implemented more quickly if local funds are leveraged with state and federal dollars.

### FEDERAL FUNDING

Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP-21) was signed by the President in July 2012. This transportation bill replaces the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. MAP-21 provides needed funds and, more importantly, it transforms the policy and programmatic framework for investments to guide the growth and development of the country’s vital transportation infrastructure. States are currently waiting on guidance from the US Department of Transportation on the amount of funding bicycle and pedestrian projects will be able to utilize for Fiscal Year 2013 and 2014. Please reference **Figure 49** for a program breakdown of existing federal funding initiatives (1992 – 2006). Much of this discussion has been centered on concerns of future fuel prices and limited non-renewable resources that are needed to sustain current transportation investments and patterns. The following is a list of federal program examples that provided funding for bicycle and pedestrian projects and programs.

#### **Funding Sources: Federal Highway Administration (administered by the state of Texas)**

Funding that is directly applied at the federal level is denoted as federal. Funding that is applied to the state level is denoted as federal/state.

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<sup>3</sup> US Department of Transportation Federal Highway Administration: Transmittal of Guidance on Bicycle and Pedestrian Provisions of the Federal-aid Program, <http://www.fhwa.dot.gov/environment/bikeped/memo.htm>.

<sup>4</sup> FHWA Guidance - Bicycle and Pedestrian Provisions of Federal Transportation Legislation, <http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm>.

**National Highway System** (NHS) funds may be used to construct bicycle and pedestrian facilities within NHS corridors including projects within Interstate rights-of-way. Shared-use paths along Interstate corridors are eligible for the use of NHS funds, as are bike lanes, shoulder and sidewalk improvements on major arterial roads that are part of the NHS, and bicycle and/or pedestrian bridges and tunnels that cross NHS facilities.

MATCHING FUNDS: *80 percent federal; 20 percent non-federal (federal).*

**Highway Safety Improvement Program** (HSIP) funds are a ten percent set-aside of a state's STP funds to carry out hazard elimination activities. HSIP funds can be used for pedestrian and bicycle safety improvements. States may obligate funds under the HSIP to carry out any highway safety improvement project on any public road or publicly owned bicycle or pedestrian pathway or trail, or as provided under Flexible Funding for States with a Strategic Highway Safety Plan, other safety projects.

MATCHING FUNDS: *80 percent federal; 20 percent non-federal (federal).*

The **Safe Routes to School Program** (SRTS) provides funds to states to substantially improve the ability of primary and middle school students to walk and bike to school safely. Funds are apportioned to each state based on their relative share of enrollment in primary and middle schools. The program establishes two distinct types of funding opportunities: infrastructure projects (engineering improvements) and non-infrastructure related activities (such as education, enforcement, and encouragement programs). Infrastructure funds can be utilized for on- and off-street bicycle and pedestrian facilities on any public right-of-way within a two-mile radius of an eligible school. Seventy to 90 percent of funds are dedicated to infrastructure projects, with the remaining 10 to 30 percent of funds dedicated to non-infrastructure projects. Since 2005, over \$16 million in SRTS grants in over 20 communities have been awarded to Dallas-Fort Worth region.

MATCHING FUNDS: *100 percent federal (federal/state).*

**Transportation Enhancement** (TE), formerly referred to as the **Statewide Transportation Enhancement Program** (STEP), program funds are a ten percent set-aside of a state's STP funds. Projects must meet at least one of 12 eligible activities, of which three relate specifically to bicycle and pedestrian transportation: (1) provision of facilities for bicyclists and pedestrians, (2) provision of safety and educational activities for pedestrians and bicyclists, and (3) preservation of abandoned railroad corridors (including the conversion and use for pedestrian or bicycle trails). Projects using TE funds need not be located on the Federal-aid Highway System and may be non-construction activities. However, enhancement projects should "relate to surface transportation" and have typically been limited by states to construction projects, planning activities, and related publications rather than salaries and administrative costs.

MATCHING FUNDS: *80 percent federal; 20 percent non-federal (federal/state).*

The **Congestion Mitigation and Air Quality Improvement Program**: (CMAQ) assists areas designated as nonattainment or maintenance under the Clean Air Act Amendments of 1990 to achieve and maintain healthful levels of air quality by funding transportation projects and programs. Projects must be likely to contribute to the attainment of national ambient air quality standards (or the maintenance of such standards where this status has been reached) based on an emissions analysis. A major source of funding for many bicycle-related construction and safety projects, CMAQ is administered locally by NCTCOG

and its Transportation Improvement Program (TIP). Eligible activities include the construction of bicycle and pedestrian facilities, non-construction projects related to safe bicycle use, and many other projects and programs related to the implementation of bicycle and pedestrian transportation.

*MATCHING FUNDS: 80 percent federal; 20 percent non-federal (federal/state).*

The **Recreational Trails Program** (RTP) provides funds to states to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Each state administers its own program – the Texas Parks and Wildlife Department administers the RTP for the state of Texas. Of the funds apportioned to a state, 30 percent must be used for motorized trail uses, 30 percent for non-motorized trail uses and 40 percent for diverse trail uses. Eligible activities include maintenance and restoration of existing trails, development and rehabilitation of trailside and trailhead facilities and trail linkages, purchase and lease of trail construction and maintenance equipment, construction of new trails (with restrictions for new trails on federal lands), acquisition of easements or property for trails, assessment of trail conditions for accessibility and maintenance, operation of educational programs to promote safety and environmental protection as those objectives relate to the use of recreational trails.

*MATCHING FUNDS: 80 percent federal; 20 percent non-federal (federal/state).*

The **Highway Bridge Replacement and Rehabilitation Program** (HBP or BRR) funds the replacement or rehabilitation of highway bridges. If a highway bridge deck is being replaced, and bicyclists are permitted at each end, then the bridge project must include safe bicycle accommodations (at reasonable cost).

*MATCHING FUNDS: 80 percent federal; 20 percent non-federal (federal).*

**Metropolitan Planning Funds** (PLA) are a one percent set-aside of the funds authorized for the Interstate Maintenance, NHS, STP, CMAQ, and Bridge Programs that are available only for metropolitan transportation planning. The funds are allocated to each state based on the population of urbanized areas in each state. Funds may be used for bicycle and pedestrian related plans that are part of the metropolitan transportation planning process.

*MATCHING FUNDS: 80 percent federal; 20 percent non-federal (federal/state).*

The **Federal Lands Highways Program** (FLH) provides funding for a coordinated program of public roads and transit facilities serving federal and Indian lands. Provision for pedestrians and bicycles are eligible activities in conjunction with projects on each of the classes of Federal Lands Highways: Forest Highways, Indian Reservation Roads, Park Roads and Parkways, Refuge Roads, and Public Lands Highways. Project selection is determined by the appropriate Federal Land Agency or tribal government.

*MATCHING FUNDS: 100 percent federal (federal).*

The **National Scenic Byways Program** (BYW) recognizes roads having outstanding scenic, historic, cultural, natural, recreational, and archaeological qualities by designating them as National Scenic Byways or All-American Roads. Funds may be spent on a variety of activities including "construction along

a scenic byway of a facility for pedestrians and bicyclists, rest area, turnout, highway shoulder improvement passing lane, overlook, or interpretive facility.” Projects must be either associated with a National Scenic Byway, All-American Road, or a State Scenic Byway.

MATCHING FUNDS: *80 percent federal; 20 percent non-federal (federal).*

The **State and Community Highway Safety Grant Program** (Section 402) supports state highway safety programs designed to reduce traffic crashes and resulting deaths, injuries, and property damage. States are eligible for these funds (known as "Section 402 funds") by submitting a Performance Plan with goals and performance measures, and a Highway Safety Plan describing actions to achieve the Performance Plan. Grant funds are provided to states each year according to a statutory formula based on population and road mileage. Funds may be used for a wide variety of highway safety activities and programs including those that improve pedestrian and bicycle safety. States have funded a wide variety of enforcement and educational activities with Section 402 funds including safety brochures such as "Share the Road"; bicycle training courses for children, adults, and police departments; training courses for traffic engineers; helmet promotions; and safety-related events.

MATCHING FUNDS: *80 percent federal; 20 percent non-federal (federal).*

The **Transportation and Community and System Preservation Program**(TCSP) is a competitive grant program designed to support projects that show how transportation projects and plans, community development, and preservation activities can be integrated to create communities with a higher quality of life. The annual grant program is administered by FHWA, in partnership with the Federal Transit Administration and Environmental Protection Agency (EPA), and may be used to fund state, Metropolitan Transportation Organizations, or local government agencies. Bicycling, walking, and traffic calming projects are eligible activities and may well feature as an integral part of many proposed projects that address larger land use and transportation issues.

MATCHING FUNDS: *100 percent federal.*

**Interstate Maintenance** (IM) funding is targeted at maintaining and improving the Interstate Highway System. IM funds may be used for resurfacing, restoration, rehabilitation, and reconstruction (4R) projects, including pedestrian and bicycle facilities that are incorporated in the design of new interchanges and overcrossings.

MATCHING FUNDS: *90 percent federal; 10 percent non-federal (federal).*

**High Priority Projects** (HPP) funds are designated for specific projects identified in SAFETEA-LU by Congress. The funds designated for the project in this program are available only for these HPP projects.

MATCHING FUNDS: *100 percent federal.*

**Statewide Planning** funds are a two percent set-aside of the funds states receive for the IM, NHS, STP, CMAQ and Bridge programs that are available only for planning, research, and technology transfer activities. This list includes the Statewide Long Range Transportation Plan and Transportation Improvement Program, and may include bicycle- and pedestrian-related plans, research, and technology transfer activities.

MATCHING FUNDS: *80 percent federal; 20 percent non-federal (federal).*

#### ADDITIONAL FEDERAL FUNDING

There are a number of FTA sponsored programs that allow for pedestrian and bicycle funding. Transit funds can allow for funds to be used for improving bicycle and pedestrian access to transit facilities and vehicles. The Job Access and Reverse Commute (JARC) Grants Program provides competitive grants to local governments and non-profit organizations to develop transportation services to connect welfare recipients and low-income persons to employment and support services. Programs, which must be approved by a transit agency, may include activities that encourage bicycling. Project selection is made by NCTCOG in the Dallas-Fort Worth region.

MATCHING FUNDS: *50 percent federal*

The **Land and Water Conservation Fund** (LWCF) Program is administered by state agencies in cooperation with the National Park Service. Program funds are intended for the acquisition and development of outdoor recreation areas; trails are one priority of this program.

MATCHING FUNDS: *50 percent federal; 50 percent non-federal.*

**Emergency Relief** funds are available for the reconstruction of highways, roads, and trails in any part of the United States that the Secretary finds has suffered serious damage as a result of natural disaster over a wide area (e.g., flood, hurricane, tidal wave, earthquake) or catastrophic failure from any external cause. The restoration of bicycle and pedestrian facilities, including shared-use paths, is an eligible activity for Emergency Relief funds.

**Energy Efficiency and Conservation Block Grant** (EECBG) Program, as included in the Energy Independence and Security Act of 2007 are funds designed to assist eligible entities in implementing energy efficiency and conservation strategies, of which developing and implementing programs to conserve energy used in transportation including bike lanes/pathways, and pedestrian walkways are eligible. The EECBG Program was enacted as part of the American Recovery and Reinvestment Act, and issued direct formula (to cities over 35,000 and counties over 200,000) and non-direct formula (state administers the remaining funds to cities and counties not receiving direct formula funding) grants. The city of Fort Worth received \$6,738,300 in funding from the EECBG Program, of which \$400,000 has been designated for bicycling facilities (on-street lanes/routes and bike parking) for the downtown area.

The US Department of Housing and Urban Development (HUD) **Community Development Block Grants** (CDBG) Program provides annual grants on a formula basis to entitled cities and counties to develop viable urban communities by providing decent housing and a suitable living environment, and by expanding economic opportunities, principally for low- and moderate-income persons. Eligible activities include the construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers, and the conversion of school buildings for eligible purposes. In the Dallas-



Fort Worth region, the cities of Allen, Arlington, Carrollton, Dallas, Denton, Euless, Frisco, Fort Worth, Garland, Grand Prairie, Irving, Lewisville, McKinney, Mesquite, North Richland Hills, Plano, and Rowlett, along with the counties of Dallas and Tarrant, are designated entitlement communities and have the opportunity to use their allocated CDBG funds to fund sidewalk and bikeway improvements within their designated communities (federal/state).

The US Environmental Protection Agency (EPA) **Climate Showcase Communities Grants** was launched in 2009 to assist local and tribal governments in establishing and implementing climate change initiatives. The overall goal of the Climate Showcase Communities Grant Program is to create replicable models of sustainable community action that generate cost-effective and persistent greenhouse gas reductions while improving the environmental, economic, public health, or social conditions in a community. The total estimated funding for the grant program is approximately \$10 million. Approximately \$500,000 of this amount is awarded to tribal governments. The EPA awards up to 30 cooperative agreements ranging from \$100,000 to \$500,000 per year (subject to availability of funds and the quality of proposals received).

The **Urban and Community Forestry** (UCF) Program of the US Forest Service, and administered through the US Department of Agriculture, provides technical, financial, research, and educational services to local government, non-profit organizations, community groups, educational institutions, and tribal governments.

Though not a source of funding, the **Rivers, Trails, and Conservation Assistance** (RTCA) Program is a technical assistance arm of the National Park Service dedicated to helping local groups and communities preserve and develop open space, trails, and greenways. RTCA is an important resource center for many trail builders in urban, rural, and suburban areas. Instead of money, RTCA supplies a staff person with extensive experience in community-based conservation to work with a local group on a project.

Though not a source of funding, the **National Recreation Trails** (NRT) designation from the Secretary of the Interior recognizes exemplary existing trails of local or regional significance. NRT designation provides benefits, including access to technical assistance from NRT partners and a listing in a database of National Recreation Trails. In addition, some potential support sources will take NRT designation into account when making funding decisions. The NRT Program is open to applications.

FIGURE 49: FEDERAL BICYCLE AND PEDESTRIAN FUNDING OPPORTUNITIES BROKEN OUT BY ELIGIBLE ACTIVITIES

	NHS	STP	HSIP	SRTS	TE*	CMAQ	RTP	HBR	PLA	FLH	BYW	402	FTA	TRE	JARC	TCSP
Bicycle and Pedestrian Planning		*				*			*							*
Bicycle Lanes on Roadway	*	*	*	*	*	*		*		*	*		*	*		
Paved Shoulders	*	*	*	*	*	*		*		*	*					
Signed Bike Route	*	*		*	*	*				*	*					
Shared-Use Path/Trail	*	*		*	*	*	*	*		*	*					
Single Track Hike/Bike Trail							*									
Spot Improvement Program		*	*	*	*	*										
Maps		*		*		*						*				
Bike Racks on Buses		*			*	*							*	*		
Bicycle Parking Facilities		*		*	*	*					*		*	*		
Trail/Highway Intersection	*	*	*	*	*	*	*			*	*					
Bicycle Storage/Service Center		*		*	*	*							*	*	*	*
Sidewalks, New or Retrofit	*	*	*	*	*	*		*		*	*		*	*		
Crosswalks, New or Retrofit	*	*	*	*	*	*				*	*		*	*		
Signal Improvements	*	*	*	*	*	*										
Curb Cuts and Ramps	*	*	*	*	*	*										
Traffic Calming		*	*	*												*
Coordinator Position		*		*		*										*
Safety/Education Position		*		*		*						*				
Police Patrol		*		*								*				
Helmet Promotion		*		*	*							*				
Safety Brochure/Book		*		*	*	*	*					*				
Training		*		*	*	*	*					*				

\*The TE Program may be replaced with a similar program. Guidance from the MAP-21 has not been finalized to date.

**ACRONYMS:** NHS: National Highway System; STP: Surface Transportation Program; HSIP: Highway Safety Improvement Program; SRTS: Safe Routes to School Program; TE: Transportation Enhancement; CMAQ: Congestion Mitigation/Air Quality Improvement Program; RTP: Recreational Trails Program; HBR: Highway Bridge Replacement and Rehabilitation; PLA: State/Metropolitan Planning Funds; FLH: Federal Lands Highway Program; BYW: Scenic Byways; 402: State and Community Highway Safety Grant; FTA: Federal Transit Capital, Urban, and Rural Funds; JARC: Job Access and Reverse Commute; TCSP: Transportation and Community and System Preservation Pilot Program

## LOCAL FUNDING

A variety of opportunities for funding bicycle and pedestrian facilities exist at the local level, including the city and county bond programs, which allocate funds for specific roadway and transportation projects. In addition, the Capital Improvements Program (CIP) is a plan for capital expenditures that extends

five years beyond the capital budget. One of the main components of the CIP is for public facilities, including the implementation of transportation facilities. In addition, funds allocated in a city or county's maintenance program can be utilized for bicycle and pedestrian facilities through re-striping and re-paving activities, as well as maintenance of existing facilities (street sweeping and re-striping activities). Some of the most successful cities in the nation, including Austin, Texas, have implemented the majority of their on-street bicycle facilities through the city maintenance program. In addition, funds at the city and county levels include allocations from a specific department (i.e., Parks and Recreation), or through impact fees which are regulated by county and municipal subdivision policies, and require residential, industrial, and commercial development project leaders to provide sites, improvements, and/or funds to support public amenities such as open space and trails.

NCTCOG also administers several funding initiatives for bicycle and pedestrian projects at the local level. The Texas Legislature enabled TxDOT to consider public- and private-sector partnerships to finance roadways. As a result, in 2007, the Dallas-Fort Worth region completed a project with the North Texas Tollway Authority (NTTA) that included a toll component and revenue for transportation projects known as the Regional Toll Revenue (RTR) initiative administered by NCTCOG. Funds offered through this initiative include allocations to regional trail and other sustainable development projects. Projects selected for funding through the RTR initiative are decided through county task force and public meetings, before seeking approval by the Regional Transportation Council (RTC). NTTA paid the region a total of \$3.2 billion administered through the RTR funding initiative.

In addition, the Regional Transportation Council has programmed over \$80 million towards projects that improve air quality within the region through RTC local initiatives, including the Local Air Quality (LAQ) Program and the Sustainable Development (SD) Funding Program. The LAQ Program awarded funds to six bicycle and pedestrian projects selected in the 2005-2006 Call for Projects (CFP). The SD Funding Program has awarded a total of 102 projects in excess of \$125 million since 2001. Projects selected through both of these funding initiatives must demonstrate an air quality benefit and include bicycle and pedestrian components.

MATCHING FUNDS: 80 percent local; 20 percent non-local.

## PRIVATE FUNDING

Funding at the private level offers additional opportunities for bicycle- and pedestrian-related facilities and advocacy that are not otherwise offered in the national, state, and local funding initiatives. Several of these private funding opportunities are outlined below.

The **American Hiking Society's National Trails Fund** is the only privately supported national grants program providing funding to grassroots organizations working toward establishing, protecting and maintaining foot trails in America. National Trails Fund grants help give local organizations the resources they need to secure access, volunteers, tools, and materials to protect America's cherished hiking trails. To date, American Hiking has granted nearly \$487,500 to 157 different trail projects across the United States for land acquisition, constituency building campaigns, and a variety of trail work projects. Awards typically range from \$500 to \$5,000 per project. Beginning in 2010, all National Trails Fund applicants will be required to be members of the Alliance of Hiking Organizations.

The **Bikes Belong Coalition** is sponsored by member companies of the American Bicycle Industry. The Coalition's stated goal is to put more people on bikes more often through the implementation of SAFETEA-LU. One of the Coalition's primary activities is the funding of local bicycle advocacy organizations, in conjunction with government agencies that are trying to ensure that SAFETEA-LU funded bicycle or trail facilities are built. Grants are awarded for up to \$10,000 on a rolling basis. Grant applications are accepted quarterly.

The **Kodak American Greenways Awards** Program provides small grants as seed money to stimulate the planning and design of greenways in communities throughout America. Grants may be used for activities such as mapping, ecological assessments, surveying, conferences, and design activities; developing brochures, interpretative displays, audio-visual productions or public opinion surveys; hiring consultants, incorporating land trusts, building a foot bridge, planning a bike path, or other creative projects. In general, grants can be used for all appropriate expenses needed to complete a greenway project including planning, technical assistance, legal, and other costs. Grants may not be used for academic research, general institutional support, lobbying, or political activities. The maximum grant is \$2,500; however, most grants range from \$500 to \$1,000. Applications may be submitted to American Greenways, The Conservation Fund from March 1 to June 1 each year. Announcement of awards are made in early fall.

The **Robert Wood Johnson Foundation** (RWJF) provides grants for projects in the US that improve the health and health care of all Americans. For projects to be eligible for funding, they must address one of seven program areas: (1) Childhood Obesity, (2) Coverage, (3) Human Capital, (4) Pioneer, (5) Public Health, (6) Quality/Equality, or (7) Vulnerable Populations. Eligible organizations include public agencies, universities, and public charities that are tax-exempt. Each program area has three strategies: evidence, advocacy, and action. Related calls for grant proposals are issued as developed, and multiple communities across the nation have received grants related to promotion of trails and other non-motorized transportation facilities. Components of bicycle and pedestrian transportation projects include the development, implementation, and sustained collaboration among stakeholders for public health, city planning, transportation, architecture, recreation, crime prevention, traffic safety, and education. In addition, the RWJF has an ongoing "Active Living by Design" grant program that promotes the principles of active living, including non-motorized transportation, under which numerous communities nationwide have received funding.

The Rails-to-Trails (RTC) Conservancy Organization actively pursues abandoned railroad corridors through the Surface Transportation Board (STB), the federal agency that oversees changes made by railroad companies (formerly the Interstate Commerce Commission). When a rail line becomes abandoned (i.e., when the railroad has applied to the STB for abandonment authorization, the STB has issued an order authorizing abandonment of the line, and the railroad has notified the STB that it has consummated the abandonment authorization), the rail line can be acquired and a local or state agency has the opportunity to use the corridor for the development of trails and greenways. As rail lines often connect important destinations, this initiative offers an opportunity for jurisdictions to acquire a right-of-way at no cost (other than administrative) to utilize in the development of bicycle and pedestrian facilities.

## LOCAL FUNDING THROUGH THE PRIVATE SECTOR

Investments in bicycle and pedestrian transportation infrastructure, including construction of sidewalks and provision of bicycle amenities (lockers, showers, parking, etc.) can be significantly leveraged by offering compelling incentives to developers through provisions adopted in local government land development codes. There are a number of incentives that can be offered to the private sector; many of these incentives can be offered at little or no actual

expense to the jurisdiction. Some of these incentives include the following: property tax abatements, parking requirement reductions, preferential fee structuring, rebate or payback programs to ensure contiguous development (developers construct infrastructure in excess of requirements, in order to prepare for future growth, but local government pays for the portion of the infrastructure that serves future growth), government support for on-site or off-site improvements, priority status for development review, and flexible public facility standards for compact mixed-use projects. There are two phases in which incentives can be effective: upon initial land development and during tenant build-out and/or maintenance.

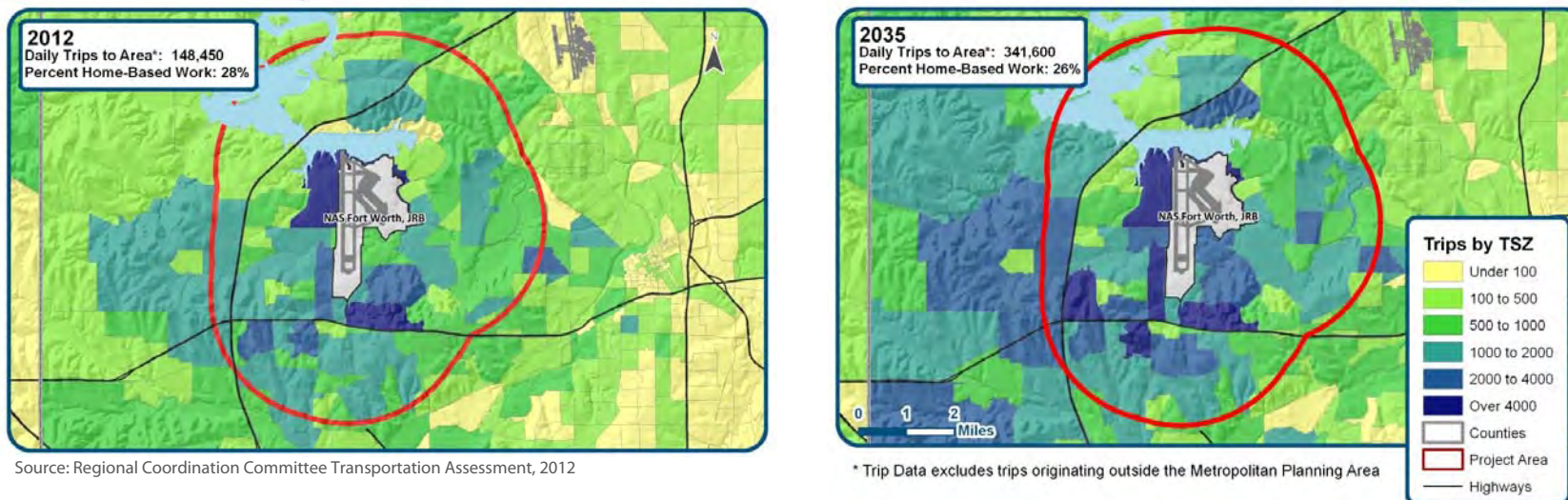
Another approach used by many jurisdictions throughout the United States is to allow “in lieu of” payments to the community’s sidewalk fund. Rather than requiring developers to construct sidewalks in front of their properties, which frequently leads to an intermittent and inconsistent sidewalk network, this approach allows sidewalk funding to be pooled. By collecting equal payments in lieu of actual on-site sidewalk construction, more strategic choices can be made regarding where and when sidewalks are built.

## RECOMMENDATIONS

The study area contains many bike lanes and trails that have been planned and are reflective in the Veloweb, the [Bike Fort Worth Plan](#), the Benbrook Comprehensive Plan, and the various other city plans. Very few bike facilities currently exist, as shown in the Existing Bike Facilities section. While biking in general is important, destinations that attract a more consistent travel pattern such as employment centers and schools should be given priority to build a bike facilities.

As stated in the *Regional Coordination Committee Transportation Assessment*, vehicle trips in the area will increase from 2012 to 2035. **Figure 50** shows the average daily trips to the study area for 2012 and 2035. FHWA states that the average person is willing to bike for two miles. The study area includes a five-mile buffer around the NAS Fort Worth, JRB.

FIGURE 50: 2012 AND 2035 DAILY TRIPS TO THE STUDY AREA BY TRAFFIC SURVEY ZONE



Source: Regional Coordination Committee Transportation Assessment, 2012

Information on road diets is provided under the Best Practices section. **Figure 51** provides a regional view where areas may increase in vehicle trips in the future. Further analysis of specific corridors will need to be examined further to evaluate if they are appropriate for road diets which may help provide facilities for bicycle travel.



FIGURE 51: 2012 AND 2035 DAILY TRIPS TO THE STUDY AREA



In general, 37 percent and 31 percent of trips will come from south and north, respectively, in 2035 as shown in **Figure 50**. Providing more bike facilities in the area may help alleviate some of the traffic stress on the roadways as shown in **Figures 50 and 51**. The availability of bike facilities can attract residents to live closer to trails, and support greater cycling as a mode of travel in the study area.

*According to the Dallas Morning News, there is a 25 percent premium for properties adjacent to the Katy Trail in the city of Dallas.*

*Homeowners are willing to pay a \$9,000 premium to live within 1,000 feet of the Little Miami Scenic Trail.<sup>5</sup>*

With the availability of residents having access to trails, it can also incentivize biking to work which could reduce vehicle travel and improve air quality.

*In San Jose, California, bicycling to work increased 200 percent between 2006 and 2008. A study of the city's bike trail system found that use has increased by double-digits every year from 2006 to 2008 and that more than 50 percent of trail users are commuting to and from work.<sup>6</sup>*

<sup>5</sup> Vom Hofe, R., and Parent, O., in University of Cincinnati, 2011

<sup>6</sup> Zsutty, Y., 2010

Public feedback gathered indicates that most residents in the area indicate a need for more bike facilities for commuting to work, school, recreational purposes, and overall improved safety for cyclist, pedestrians, and drivers.

**Figure 52** shows the dangerous conditions for pedestrians along major roadways that currently exist in the study area.

The following bicycle recommendations are based on public feedback, existing information, and planned routes.

**Figure 53** provides a description of the regional bike facility recommendations and **Figure 54** is a map of these regional routes. Regional bike facilities can consist of connected trails that are continuous between and through communities. A single bike facility can also carry regional significance if it can attract audiences from various parts for recreation, or as a way to connect different neighborhoods to destinations. Trails that connect to the Regional Veloweb extend the regional connectivity of trails. The trails with benefits to the community (access to employers, schools, parks, etc.) and those that received public feedback were the top recommended facilities. Communities should consider adding the recommended bike facilities to their bike plans and/or comprehensive plans to afford improved regional connectivity and continuity to recreational areas, schools, and/or employers access via bike trails or lanes. **Figure 55** shows the locations of the regional bicycle recommendations in relation to the local bicycle recommendations.

FIGURE 52: DANGEROUS CONDITIONS ALONG SH 199



Source: NCTCOG

FIGURE 53: REGIONAL BICYCLE FACILITY RECOMMENDATIONS

Order of Priority	Bicycle Facility	Facility Type	Safety Concerns	Access to Employers	School Access	Connections to Parks/Open Space	Connections to Existing/Planned Trails/Bike Lanes	Connections to Community Areas	Population*	Cities	Public Input
1	Bomber Spur (southern access to Lockheed Martin)	Off-Street Path (where feasible)	X	X	X	X	X	X	13,280	3	X
2	Lake Worth Trail	Off-Street Path (where feasible)		X	X	X	X		8,629	1	X
3	SH 183 and SH 199	To be determined through additional planning and engineering studies	X	X	X	X	X	X	26,500	6	X
4	River Oaks Trinity Trails Connection (Meandering Road and Roberts Cut Off Road)	On-Street Bike Lane and Off-Street Path Alternative Route: On-Street Bike Lane and Signed Route	X	X	X	X	X		4,780	2	X
5	Southeast Connection to Base Entrance (Roaring Springs Road and Horne Street)	Off-Street Sidepath		X	X	X		X	7,750	3	

\*Analysis was performed within a 0.25 mile buffer of the bike facility.

Costs estimates were not developed as part of this analysis and should be determined through future study.

FIGURE 54: REGIONAL BICYCLE FACILITY RECOMMENDATIONS

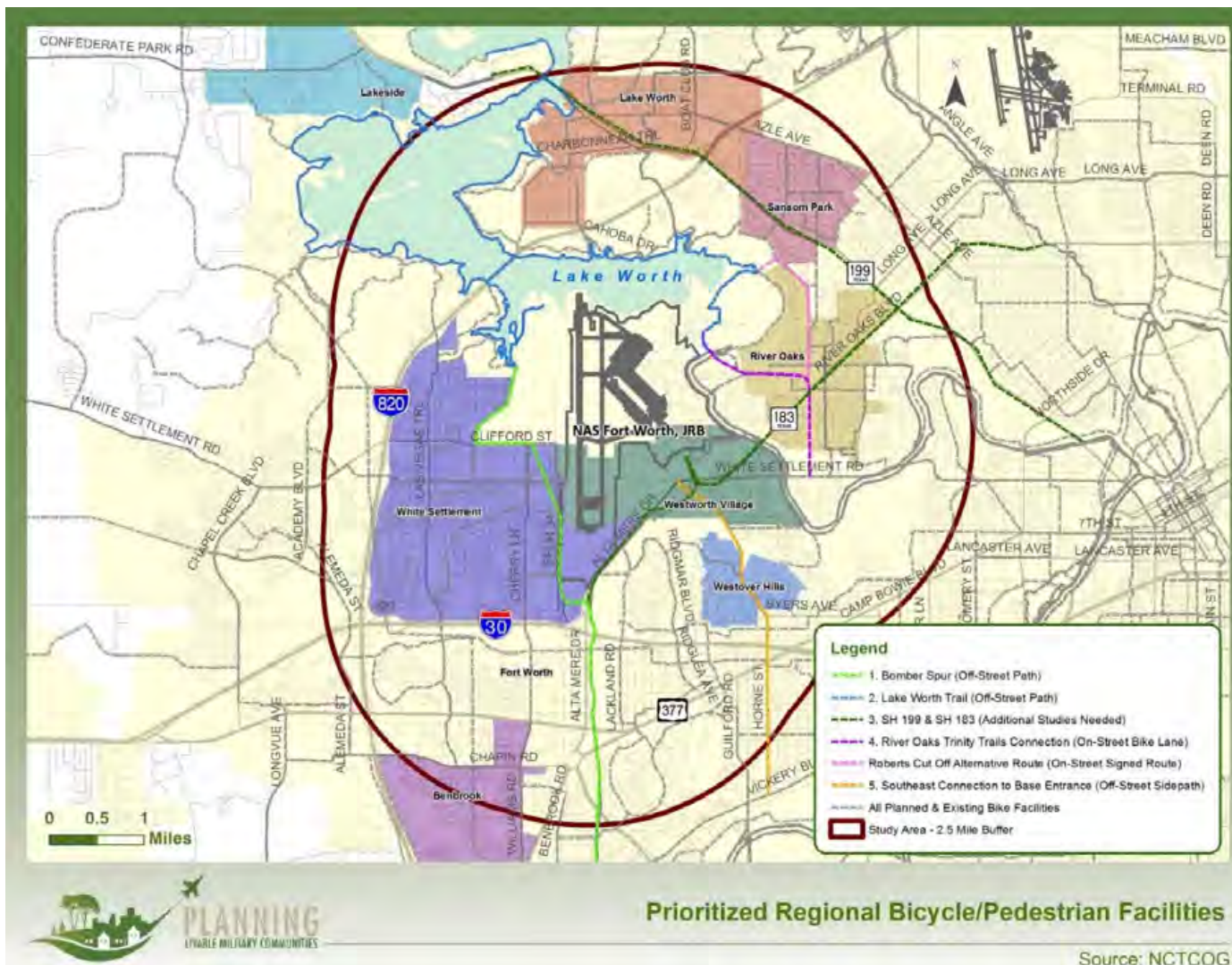
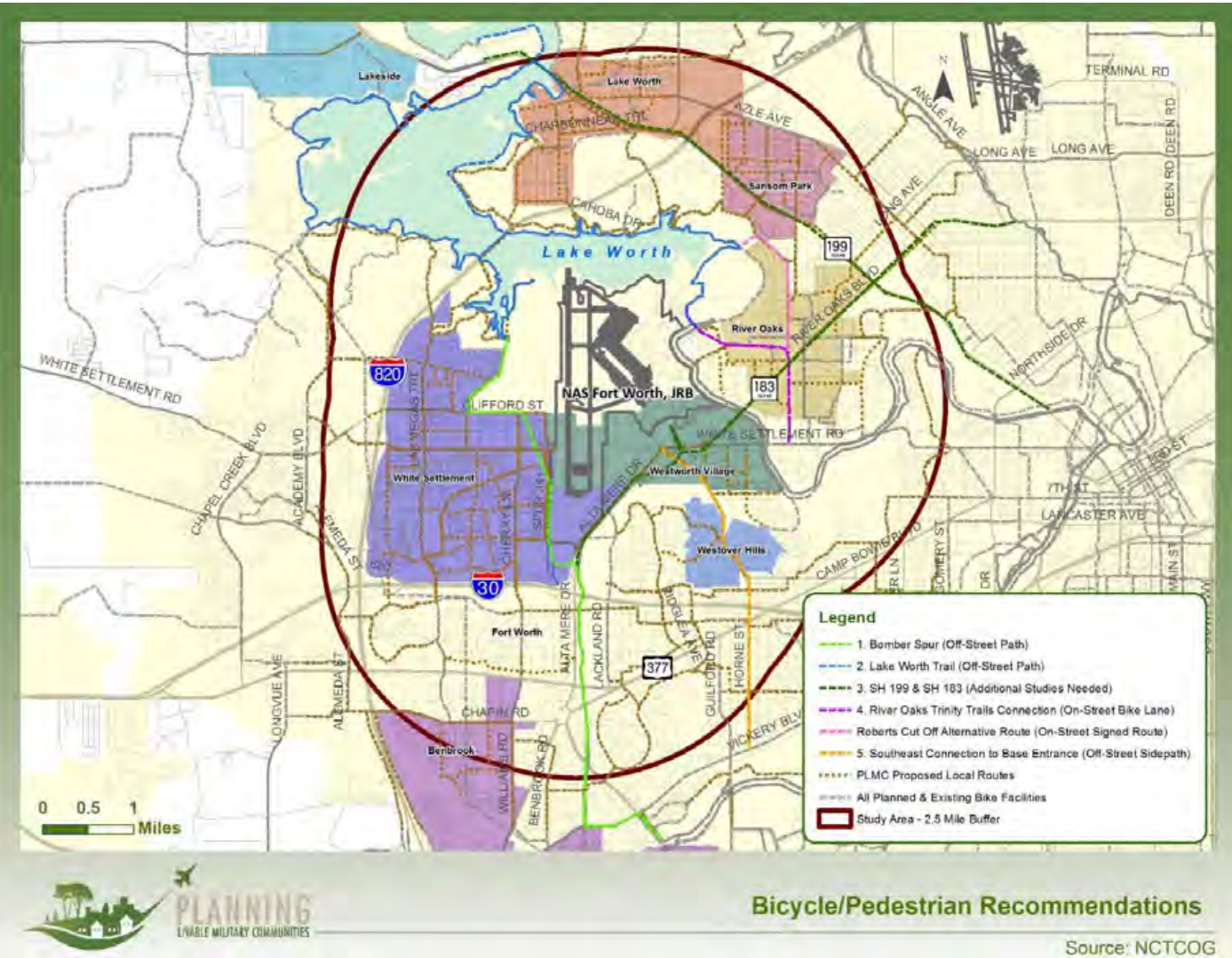




FIGURE 55: LOCAL AND REGIONAL BICYCLE FACILITY RECOMMENDATIONS



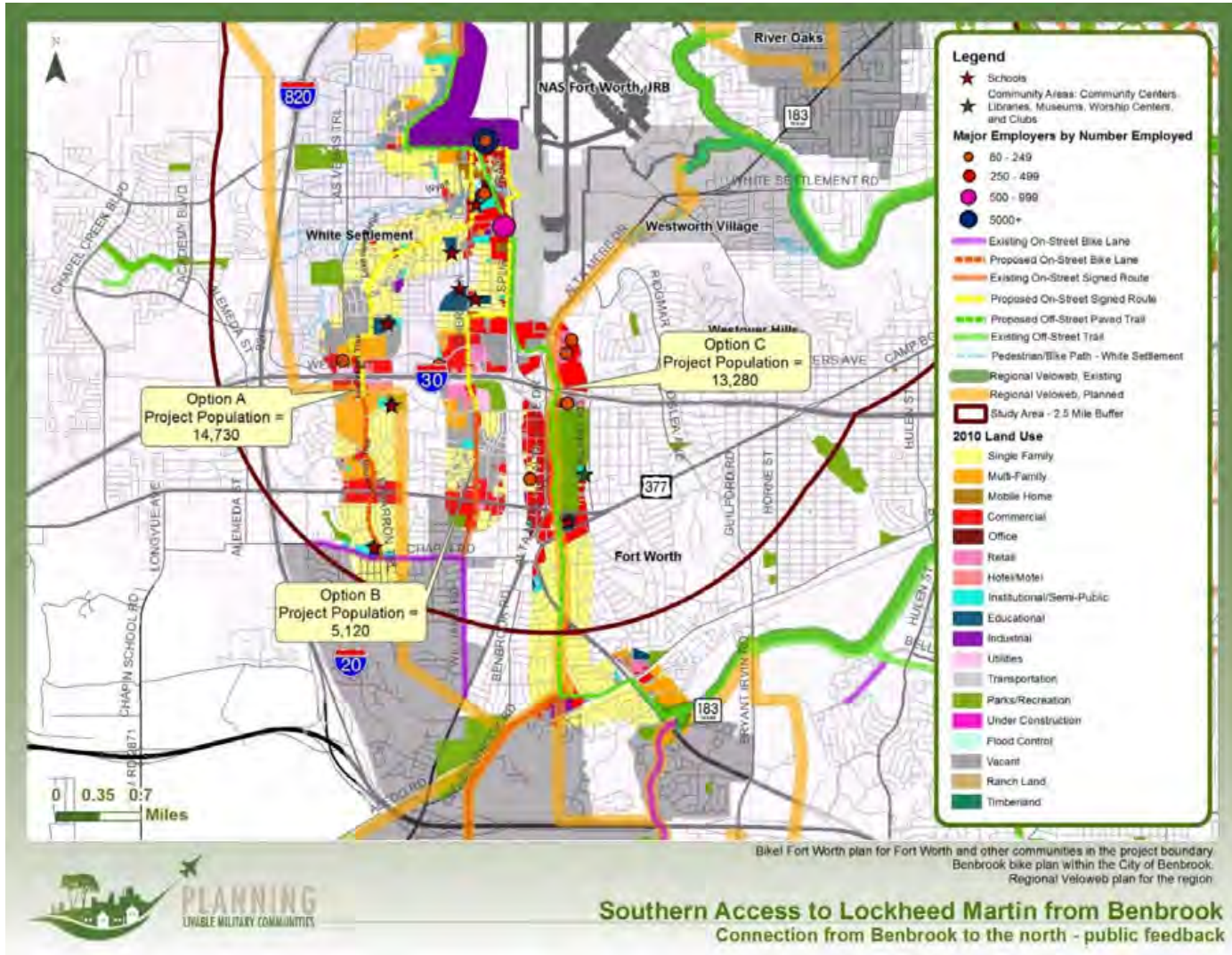
## RECOMMENDATION 1: BOMBER SPUR

Several Lockheed Martin employees have expressed concerns about a lack of safe routes from the southern portion of the study area to Lockheed Martin. The Bike Fort Worth plan has a proposed on-street bike lane that starts at the corner of Chapin Road and Williams Road in Benbrook which has an existing on-street bike lane as shown in **Figure 56** and goes north. Three options to connect Benbrook to Lockheed Martin were proposed to the public at the November 7 and 8, 2012 meetings. Option A takes the bike facility from the Chapin Road on-street lane up north through Las Vegas Trail, Lakeview Ridge to Cherry Lane, ending at the entrance of Lockheed Martin. There are safety concerns associated with this trail as it goes under IH 30. This may cause visibility issues since it can be very dark when the travel lanes cross under the Interstate overpass. Additionally, this trail is hilly, leaving cyclists with a disadvantage to keep momentum. Option B starts the trail from the existing signed bike route on Williams Road and Camp Bowie Boulevard, goes north to Cherry Lane, then turns east to Spur 341 to the Lockheed Martin entrance on Clifford Street. Safety concerns were expressed of high vehicle speeds on Spur 341. Option C would start from the existing on-street bike lane and become an off-street path going north along Alta Mere Drive to Spur 341.

According to public feedback received, the option that was most preferred was Option C, which is referred to as the Bomber Spur. **Figure 56** shows the off-street path starting from the Clear Fork Trinity Trail on the south traveling north through the Bomber Spur with a trail to Lockheed Martin's Clifford Street entrance. A section of the trail was extended to make a connection to the Lake Worth planning efforts. The modification includes extending the trail west on Clifford Road and north on Bomber Road. The north/south line that travels from the edge of Benbrook to Westworth Village is known as the Defensive Line in the Regional Veloweb. However, some of the local residents have come to know this segment as the Bomber Spur, which is an abandoned railroad path. The cities of Benbrook, Fort Worth, and White Settlement, in addition to Tarrant County, the Tarrant Regional Water District, NCTCOG, Lockheed Martin, TxDOT, the Joint Reserve Base, and non-profits such as Streams & Valleys, Inc. should work together to determine the most appropriate alignments and identify funding to engineer and construct this facility. Additional studies would need to occur to determine the appropriate on-street, off-street, or a combination of both facilities that could be implemented along the corridor. Options A and B should still be considered for bike facility implementation.



FIGURE 56: SOUTHERN ACCESS TO LOCKHEED MARTIN OPTIONS

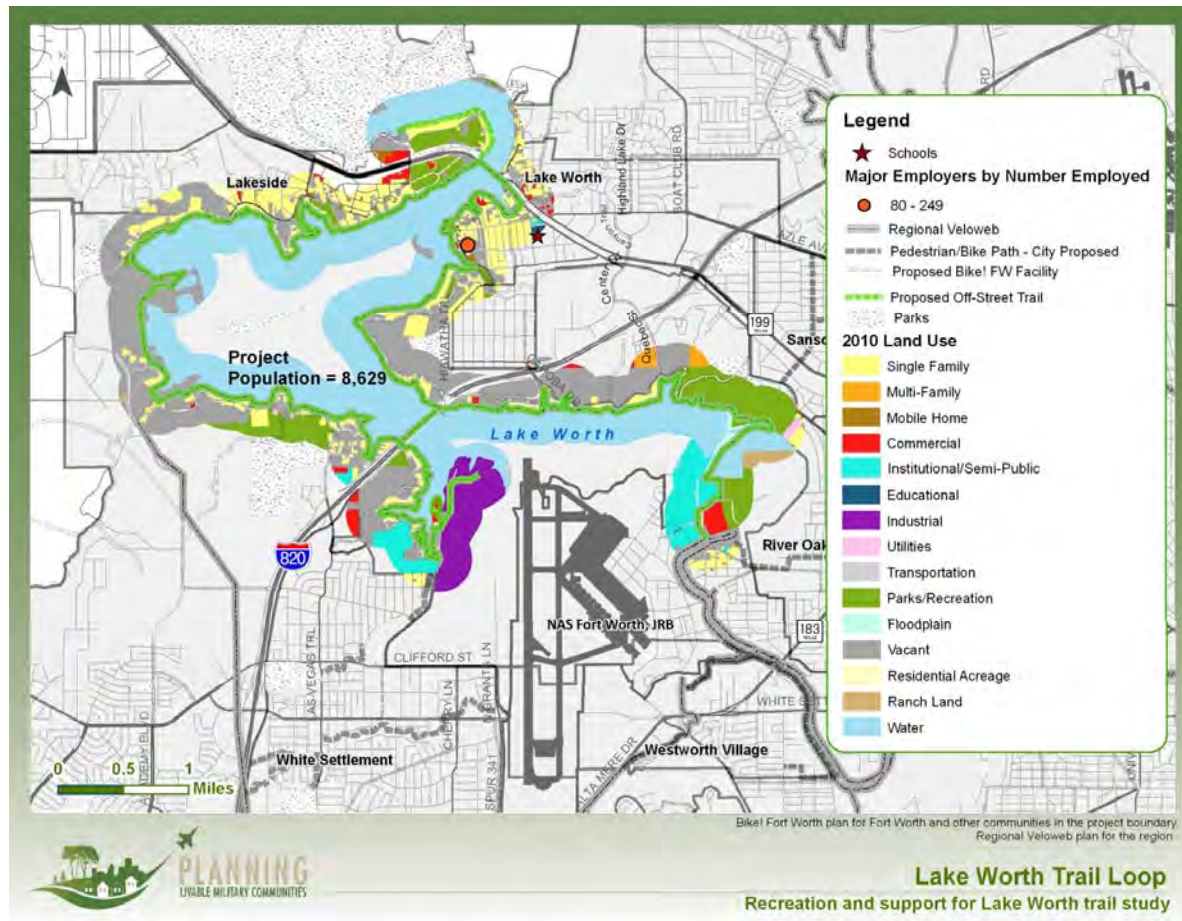


Source: NCTCOG

## RECOMMENDATION 2: LAKE WORTH TRAIL

The communities near Lake Worth such as the cities of Lake Worth, Sansom Park, and River Oaks should consider adding bike facilities that connect to the current efforts of Fort Worth’s Lake Worth Trail Routing Study (see **Figure 57**). Biking along trails can have many benefits to not only the residents but can contribute to the tourism economy. According to the Economic Impact of Recreation Trail Use prepared by Ernesto Venegas, Ph.D., bicyclists on Minnesota’s trails spend \$481 million annually while recreating, creating 5,880 jobs and \$40.6 million in state and local taxes.

FIGURE 57: LAKE WORTH TRAIL ACCESS



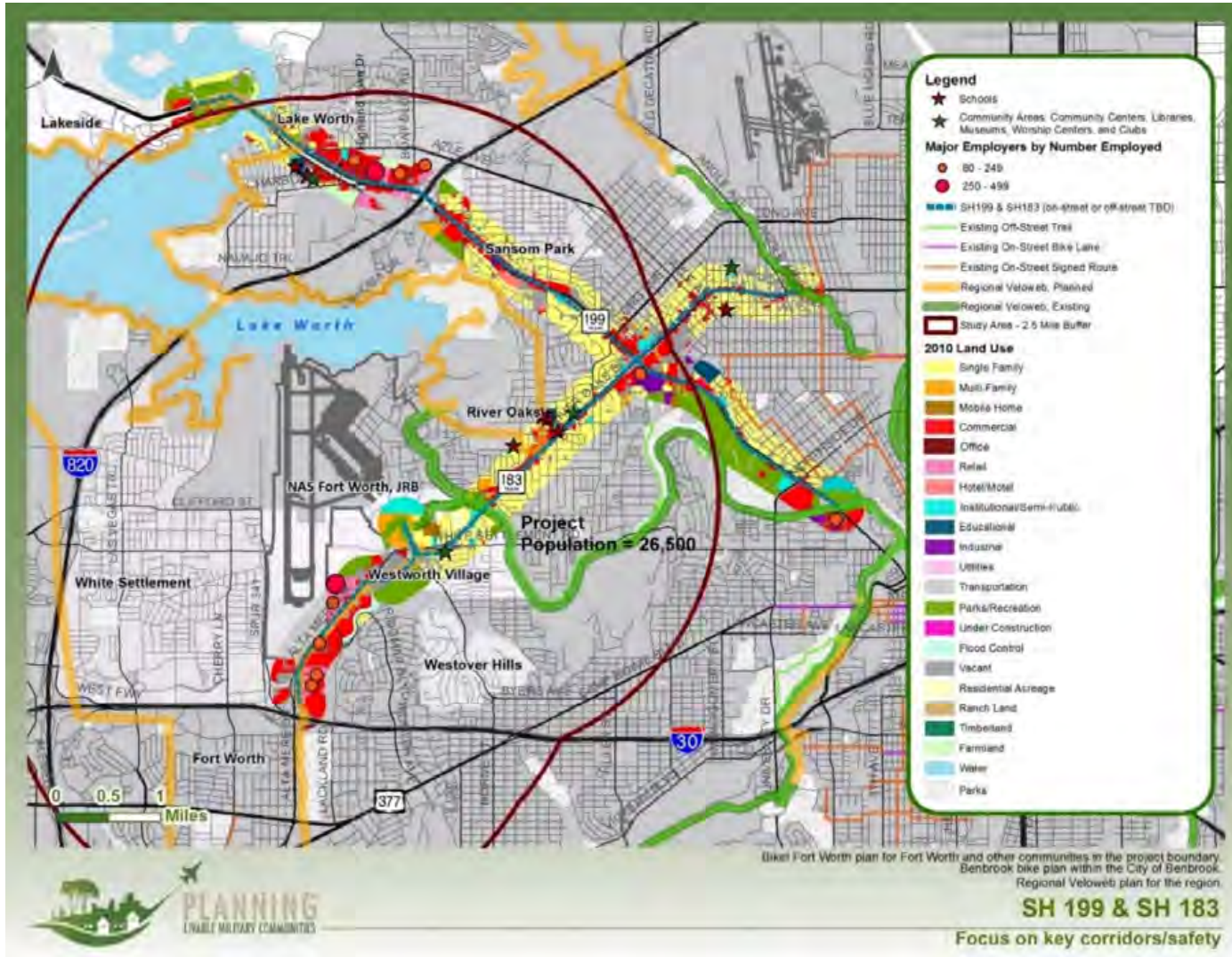
Source: NCTCOG

### RECOMMENDATION 3: SH 183 AND SH 199

The Visioning Charrettes, as discussed in the Regional Transportation section, focused on the SH 183 and SH 199 corridors (**Figure 58**). About 26,500 people live within one-quarter mile of those corridors which are mainly made up of single family residences. It is not rare to see people walking along SH 199 and SH 183 in areas where no sidewalks are provided. Special treatments are needed for safety and access. The Visioning Charrettes provided a recommendation for a bike and pedestrian sidepath in areas that are appropriate along SH 199 and SH 183. This type of facility would be the safest since the area is used by pedestrians and bicyclists. However, the challenge is the cost of sidepaths versus on-street bike lanes or signed routes. Close coordination with the impacted communities and TxDOT will be needed to determine specific facilities.



FIGURE 58: SH 183 AND SH 199 CORRIDORS



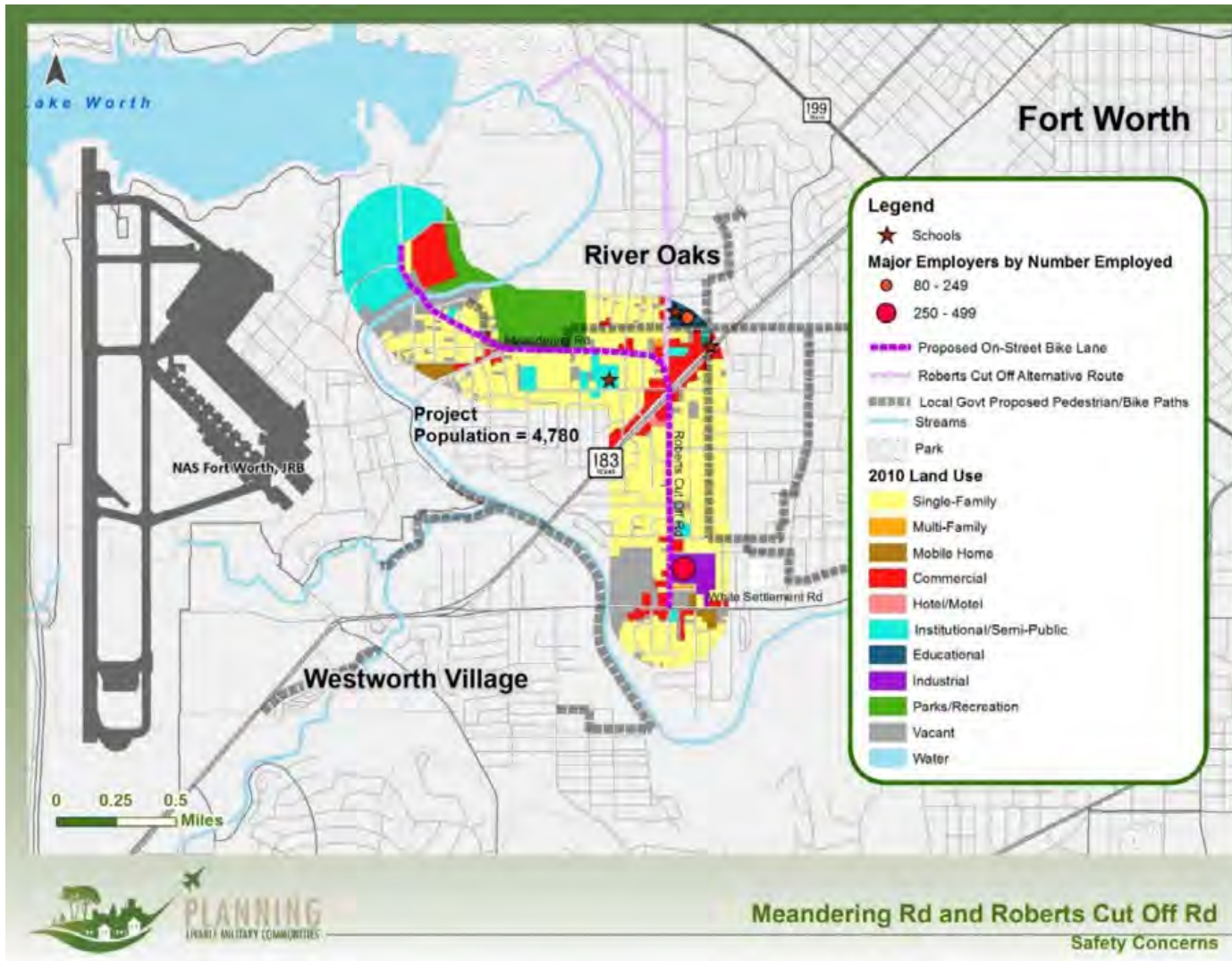
Source: NCTCOG

#### RECOMMENDATION 4: RIVER OAKS/TRINITY TRAILS CONNECTION

Meandering Road and Roberts Cut Off Road were often discussed by the public as roadways that showed frequent pedestrian and bicyclist activity although the corridors are not safe for these activities as no sidewalks or bike facilities currently exist. This route would connect the existing Trinity Trails south and west of River Oaks to the mountain biking trails at Marian Sansom Park in the city of Fort Worth (**Figure 59**). Meandering Road, at a minimum, should be a signed bike route; however, information received from the public indicates that the street had no steel put in the road so the outside lanes are caving in and are in need of repair. Additionally, there are no sidewalks. Residents have observed that from 8 am to 12 pm about 20 bicyclists will be on Meandering Road heading to Inspiration Way which leads to Marian Sansom Park. If Meandering Road were to be repaired, it may be a good opportunity to do a road diet and add a bike lane and sidewalks, though additional engineering analysis would be needed regarding the feasibility. Additionally, there are security concerns associated with Camp Carter, so a bicycle route through the camp may not be feasible.

Another option would be a route through River Oaks to connect to Marian Sansom Park. A potential alternative route would be to go east on Meandering Road and then north on Roberts Cut Off Road to access the park trails until further studies and discussion can address safety concerns. This segment is shown in a light purple line in **Figure 59**. The cities of River Oaks and Fort Worth, in addition to Tarrant County, the Tarrant Regional Water District, NCTCOG, YMCA - Camp Carter, Fort Worth Mountain Biker's Association, and TxDOT should work together to determine the most appropriate alignments and identify funding to engineer and construct this facility.

FIGURE 59: RIVER OAKS TRINITY TRAILS CONNECTION (MEANDERING ROAD AND ROBERTS CUT OFF ROAD)



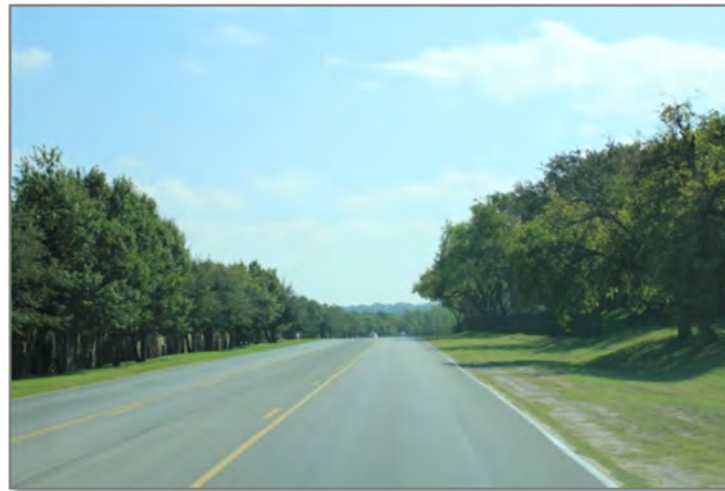
Source: NCTCOG



## RECOMMENDATION 5: SOUTHEAST CONNECTION TO BASE ENTRANCE

This trail was recommended based on the observation that Roaring Springs Road/Horne Street contains wide travel lanes along with wide parallel streetscaping and a lack of sidewalks, as shown in **Figure 60**. With additional planning and engineering studies, a possibility of an off-street sidepath along this corridor may be an option. There are benefits of this route to numerous residential areas along it and possible connections could be made to commercial areas and adjacent park facilities. The challenge will be to gather support from all the cities and private property owners to make a continuous path from Westworth Village, through Westover Hills to the city of Fort Worth. **Figure 61** shows the facilities surrounding the proposed path.

FIGURE 60: ROARING SPRINGS ROAD,  
WESTWORTH VILLAGE



Source: NCTCOG

FIGURE 61: SOUTHEAST CONNECTION TO BASE ENTRANCE (ROARING SPRINGS ROAD AND HORNE STREET)



Source: NCTCOG

## STRATEGIC REGIONAL BICYCLE AND PEDESTRIAN PRIORITIES FOR FURTHER STUDY

As **Figure 55** demonstrates, if all the PLMC study recommended regional and local routes in addition to the existing planned bike facilities were implemented, a significant system of bike facilities would serve the communities and larger sub-region. Bicycle and walking access to major employment centers, local and regional recreation and entertainment venues, and local community services would be greatly improved if these facilities were coordinated and implemented over time. This system of intra-jurisdictional bicycle and pedestrian connections would provide residents a safer, non-automobile option to travel between sub-regional destinations.

Implementing all of these bicycle recommendations would take several years and dedicated funding. Because of the costs associated with implementing a system of this size, several strategic regional bicycle and pedestrian routes are recommended for further study and emphasized as priorities in the study area. These priority studies and projects are recommended to improve strategic regional connections and serve as catalyst bicycle and pedestrian projects.

### BOMBER SPUR

The city of Benbrook has existing bicycle routes and additional routes planned throughout the city. However, multiple stakeholders have indicated a desire to provide a connection from the Benbrook area, through portions of Fort Worth and White Settlement, and terminating at Lockheed Martin. An off-street trail along the Bomber Spur abandoned rail tracks should be considered, as shown in **Figure 56**. The cities of Benbrook, Fort Worth, and White Settlement, in addition to Tarrant County, the Tarrant Regional Water District, NCTCOG, Lockheed Martin, TxDOT, and non-profits such as Streams and Valley, Inc. should work together to determine the most appropriate alignments and identify funding to engineer and construct this facility. Additional studies would need to occur to determine the appropriate on-street, off-street, or a combination of both facilities that could be implemented along the corridor.

### AIRFIELD FALLS AND WESTWORTH VILLAGE CONNECTION

The city of Westworth Village is actively working towards implementing strategic bicycle and pedestrian connections throughout the city including providing enhanced access to/from the existing Trinity Trails system. Furthermore, the Tarrant Regional Water District is actively working on a one-of-a-kind trailhead at the entrance to Tarrant County's only natural waterfall located in Westworth Village. The Airfield Falls Trailhead is located adjacent to Pumphrey Drive and near the entrance to NAS Fort Worth, JRB. A priority recommendation for additional study, engineering, and eventual construction is a connection from Roaring Springs Road in Westworth Village to the Airfield Falls Trailhead. Portions of the recommended regional SH 183 route in **Figure 58** shows this potential connection. The SH 183/Roaring Springs Road intersection in Westworth Village would be a critical consideration of this route in order to provide a safe access and crossing point for bicyclists and pedestrians. The cities of Westworth Village and Fort Worth, in addition to Tarrant County, the Tarrant Regional Water District; NCTCOG; NAS Fort Worth, JRB; TxDOT; and non-profits such as Streams and Valley, Inc. should work together to determine the most appropriate alignments and identify funding to engineer and construct this facility.

## RIVER OAKS/TRINITY TRAILS CONNECTION

There has been notable interest in connecting the existing Trinity Trails south and west of River Oaks to the mountain biking trails at Marian Sansom Park in the city of Fort Worth. One option is an off-street trail through the YMCA - Camp Carter to connect the end of the Trinity Trails east of the base directly to the Marian Sansom Park trails via the planned Lake Worth Trail. Because of valid security concerns associated with Camp Carter, an interim or alternative option would be a route through the River Oaks to connect to Marian Sansom Park and the Lake Worth Trail. This potential route could go east on Meandering Road and then north on Roberts Cut Off Road to access the park trails until further studies provide a firm route to access the Lake Worth Trail from the Trinity Trails trailhead. This segment is shown in a light purple line on **Figure 59**. The cities of River Oaks and Fort Worth, in addition to Tarrant County, the Tarrant Regional Water District, NCTCOG, YMCA - Camp Carter, Fort Worth Mountain Biker's Association, and TxDOT, should work together to determine the most appropriate alignments and identify funding to engineer and construct this facility.

## AREAS FOR FURTHER STUDY

A closer look into the areas with concentrated accidents such as Camp Bowie should be considered, as shown in **Figure 19**. Fourteen accidents have occurred on the corridor including:

- Bicycle Incapacitating Injury: 1
- Bicycle Non-Incapacitating: 1
- Bicycle Fatality: 1
- Pedestrian Possible Injury: 3
- Pedestrian Non-Incapacitating: 4
- Pedestrian Fatality: 3
- Pedestrian Incapacitating Injury: 1

This corridor contains many commercial uses. The road crosses the Veloweb planned Defensive Line Trail (also known as the Bomber Spur to the local community), but a closer look regarding on-street cycling on this busy arterial is needed. Sidewalks are available but additional study and coordination with TxDOT should occur to look at making it safer for cyclists and pedestrians. The causes for the accidents may vary from engineering, enforcement, or education. A more detailed safety analysis of the area should provide more clear direction on how accidents can be mitigated.

## NEXT STEPS

Cities individually, and together with their neighboring communities, should continue to plan for a system that addresses the safety needs of different types of bicycle users, from experienced cyclists on arterial roadways, to school-bound children walking and riding bicycles adjacent to local roads. Cities should continue to connect to the Veloweb and add the appropriate facilities for their area. Working with the surrounding communities to continue trails provide for not only regional connections but also better funding opportunities. Additionally, education, enforcement, and engineering tasks need to be completed to continue to bring safer bike facilities. Education for the public should occur at various levels and should include children to police so that bicyclist facilities are utilized correctly. Continue enforcement of speeds and traffic laws. Engineer connections such as Recommendations 1 through 5 so that

residents can connect to large employers, schools, and other destinations. **Figure 62** depicts recommended actions that the local communities can take individually or collectively to prepare to implement the recommendations identified through this planning effort.

FIGURE 62: RECOMMENDED ACTIONS: REGIONAL BICYCLE FACILITIES

<b>RECOMMENDED ACTIONS: REGIONAL BICYCLE FACILITIES</b>					
<b>Project/Initiative</b>	<b>Time<sup>1</sup></b>	<b>Cost<sup>2</sup></b>	<b>Responsible Entity</b>	<b>Participants</b>	<b>Primary Funding Source<sup>3</sup></b>
<b>POLICY: ENCOURAGE BICYCLE AND PEDESTRIAN EDUCATION AND ADDITIONAL PLANNING STUDIES</b>					
Include consistent language to describe the existing or planned bike facilities in the general descriptions and in maps as bike plans, thoroughfare plans, and comprehensive plans are being updated.	Short	Low	City, County	Private, Non-Profit	Local
Continue with regional partnerships to pursue all eligible federal and state funds for bicycle and pedestrian planning and development through grant programs/applications.	Short	Low	Cities, County	Private/Non-Profit, NCTCOG	Federal/State
Provide bike education regarding existing and planned facilities and safety via Websites, social media, paper publications/ brochures.	Short	Low/ Medium	Cities, Schools	Police Department, NCTCOG	Federal/State
Support and encourage regular and continuing bicycle and pedestrian training and safety programs in conjunction with local institutions, organizations, and bicycle and pedestrian interest groups.	Short	Low/ Medium	Cities, ISD	Police Department, County, Private, Non-Profit	Federal
Conduct an in depth safety analysis to get additional information on the reason(s) for bicycle/pedestrian accidents.	Medium	Medium/High	Cities, County	Hospitals, Police Department, NCTCOG	Federal
<b>POLICY: ENFORCE BICYCLE AND PEDESTRIAN PRIORITIES THROUGH PLANNING UPDATES</b>					
Include/adopt trail recommendations in this study, and Regional Veloweb and Bike Fort Worth plan into the city thoroughfare plan to ensure that future roadway and development accommodates the appropriate bike facility.	Short	Low	Cities		Local Funds
Coordinate with NCTCOG to consider bicycle route planning updates and funded projects during development and updates to the Regional Veloweb and Metropolitan Transportation Plan.	Ongoing	Low	Cities	City, NCTCOG	N/A
Submit requests for technical planning assistance to NCTCOG through the biannual Unified Planning Work Program process.	Ongoing	Low	Cities	NCTCOG	N/A
Coordinate with neighboring cities to ensure a continued and consistent bicycle network for all future planned routes.	Ongoing	Low	Cities	Private (if applicable)	N/A
Move forward with trail engineering plans to continue planning efforts to take opportunity of federal funding.	Medium	Medium	Cities		Federal/State

<sup>1</sup>Short-term can be referenced as 0 to 5 years; medium term as 5 to 10 years; long-term as 10+ years

<sup>2</sup>Low costs can be referenced as \$0 to \$10,000; medium as \$10,000 to \$50,000; high as \$50,000+

<sup>3</sup>For a more comprehensive list of possible funding sources please see Federal Bicycle and Pedestrian Funding Opportunities Broken Out by Eligible Activities (**Figure 49**)

**RECOMMENDED ACTIONS: REGIONAL BICYCLE FACILITIES**

<b>Project/Initiative</b>	<b>Time<sup>1</sup></b>	<b>Cost<sup>2</sup></b>	<b>Responsible Entity</b>	<b>Participants</b>	<b>Primary Funding Source<sup>3</sup></b>
Explore establishing a staff position to act as a technical resource for zoning, land use, and roadway design changes to promote bicycle and pedestrian-friendly development, as well as for grant writing.	Medium	Medium/High	Cities, County		Local Funds

**POLICY: PRIORITIZE BICYCLE AND PEDESTRIAN FACILITIES IN ENGINEERING PHASES**

Provide amenities and end-of-trip facilities such as bicycle parking and storage, lighting, landscaping, signing, pavement marking, and signalization to enhance the value and increase the utility and safety of the bicycle facilities.	Long	Medium	Cities	Private, Non-Profit	Local Funds & Federal/State
Include bicycle and pedestrian planning infrastructure in all transportation improvements (resurfacing, paving, new construction, intersection improvements, reconstruction, and maintenance).	Long	Medium	Cities		Local Funds
Establish a maintenance program and maintenance standards that ensure safe and usable bicycle and pedestrian facilities.	Long	Medium/High	Cities		Local Funds & Federal/State
Move recommended trails to implementation. When evaluating engineering solutions, each community should continue to vet each recommendation through the planning process to ensure the largest representation possible of public feedback and buy-in. Cost will also need to be considered and the physical viability through initial engineering.	Long	High	Cities	Private, Non-Profit	Local Funds & Federal/State

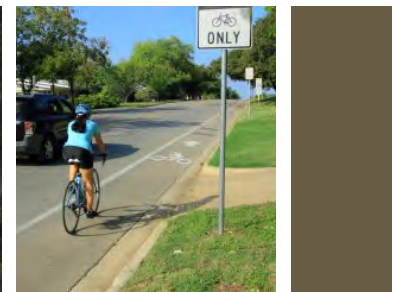
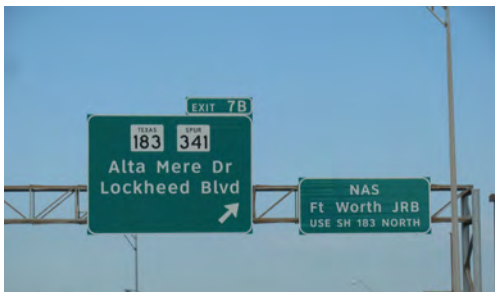
<sup>1</sup>Short-term can be referenced as 0 to 5 years; medium term as 5 to 10 years; long-term as 10+ years

<sup>2</sup>Low costs can be referenced as \$0 to \$10,000; medium as \$10,000 to \$50,000; high as \$50,000+

<sup>3</sup>For a more comprehensive list of possible funding sources please see Federal Bicycle and Pedestrian Funding Opportunities Broken Out by Eligible Activities (Figure 49)



# APPENDIX > | LOCALIZED PEDESTRIAN ACCESS AND SAFETY CONSIDERATIONS



## INTRODUCTION

Supporting accessibility and mobility is a critical step for promoting safety and quality of life for the people who live and work in a given area. One important component of mobility is the ability of people to access destinations such as stores, community centers, parks, schools, and other locations through active transportation modes like walking and bicycling. Active transportation is a broad definition intended to include various modes of non-motorized transportation like walking, jogging, bicycling, and skating. Active transportation is an important element of regional mobility and represents a way of thinking aimed at promoting physical activity, public health, safety, and equity in our transportation system. Accommodating persons with mobility impairments – including people who use motorized and/or manual wheelchairs – is also a key component of active transportation.

According to the 2012 *Regional Coordination Committee Transportation Assessment*, local government staff reported that a large portion of community members in the area surrounding NAS Fort Worth, JRB do not have access to a motor vehicle – whether by choice, necessity, or because of age – and these community members should have the ability to access facilities and destinations in a safe and efficient manner. **Figure 1** provides several images of pedestrians in the study area.

Active transportation inherently relies on the availability of facilities like sidewalks and other on- and off-street facilities like bike lanes or trails. Investing in active transportation facilities can encourage community

FIGURE 1: PEDESTRIAN ACTIVITY IN STUDY AREA



Source: NCTCOG/AECOM

members to be more active and reduce pollution and other health concerns. By providing a variety of options to community members, municipalities can encourage a more active lifestyle and decrease the reliance upon automobile use among residents in their community. Research shows that people are more likely to walk and bike if a safe, interconnected network is in place.<sup>1</sup> A more integrated, diverse network supporting active modes of transportation can allow for greater choice, improved health, and environmental benefits.

Two specific groups that can benefit the most from promoting active transportation in the communities surrounding NAS Fort Worth, JRB are school-aged children and seniors. **Figure 2** shows the age distribution in the area immediately surrounding NAS Fort Worth, JRB. Residents aged 60 and over accounted for over 17 percent of the total population, as opposed to a little more than 13 percent in Tarrant County as a whole. Children under the age of 15 years old represented over 21 percent of the population.

FIGURE 2: AGE DISTRIBUTION, 2010

Age	Study Area		Tarrant County	
	Number	Percent	Number	Percent
Under 5 years	9,740	8.0%	142,899	7.9%
5 to 14	16,080	13.2%	282,973	15.6%
15 to 24	16,155	13.3%	254,040	14.0%
25 to 59	58,482	48.2%	887,607	49.1%
60 and over	20,924	17.2%	241,515	13.4%
<b>Total</b>	<b>121,381</b>	<b>100.0%</b>	<b>1,809,034</b>	<b>100.0%</b>

Source: 2010 US Census

This section outlines some of the existing conditions and current barriers for pedestrians in the communities surrounding NAS Fort Worth, JRB and provides recommendations based on an analysis of existing facilities' inventory, safety data, and community feedback regarding areas of particular concern. It also explores some best practices for improving accessibility and safety for school children, as well as seniors, and introduces available funding sources for these types of projects. While specific attention is given to the population groups mentioned above, the recommendations and strategies proposed in this document are intended to have a much broader impact. Improvements like new sidewalks and safer street crossings – even if they are made through a program like Safe Routes to School – can provide additional benefits to the wider community by establishing safe and accessible connections for residents of all ages.

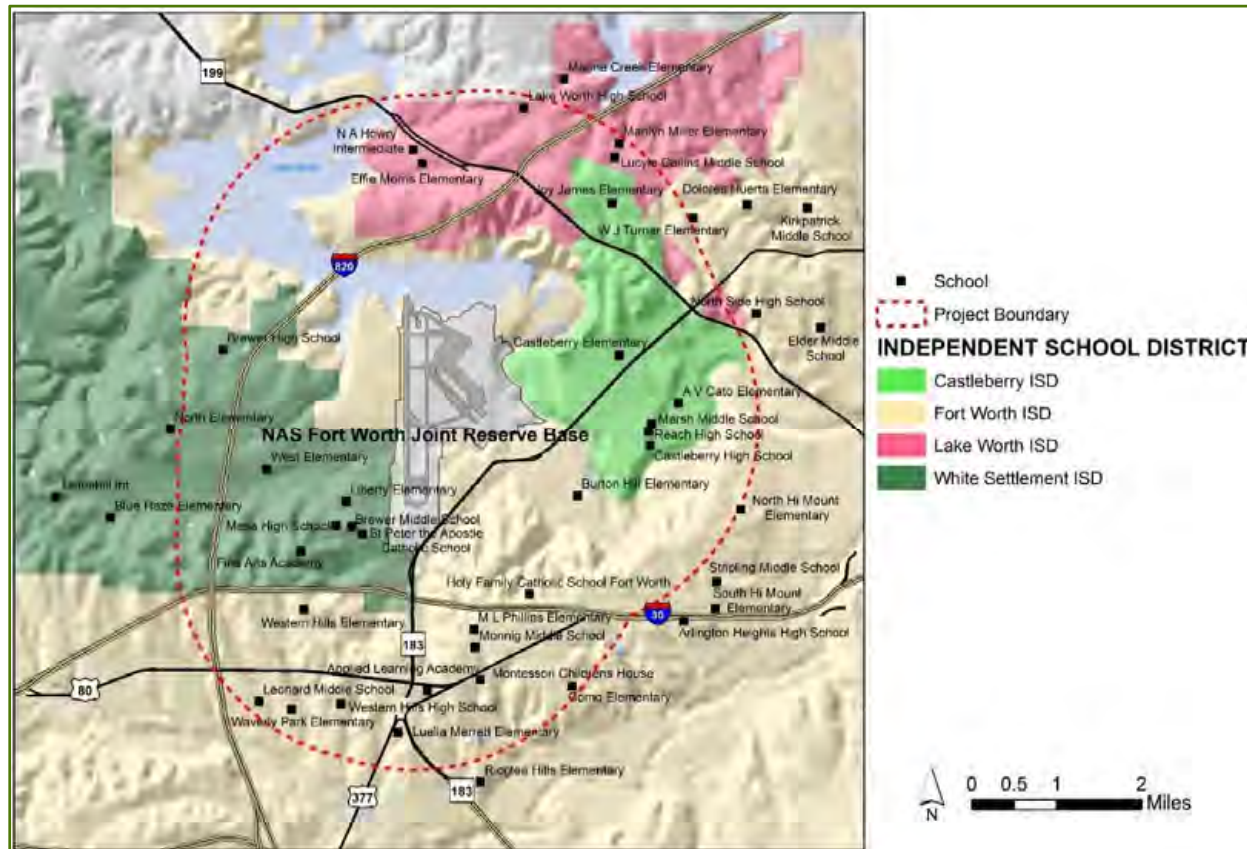
<sup>1</sup> United States Environmental Protection Agency (EPA), [TRAQ Technical Overview, Transportation Control Measures: Bicycle and Pedestrian Programs](#), July 1998.



## EXISTING CONDITIONS IN SCHOOL AREAS

Children walking and biking to and from school represent a specific group among whom active transportation can be effectively promoted. Portions of four independent school districts (ISD) serve the area surrounding NAS Fort Worth, JRB (Castleberry ISD, Fort Worth ISD, Lake Worth ISD, and White Settlement ISD), and there are currently 30 schools located within the study area, as shown in **Figure 3**. In addition to these schools, portions of attendance zones – the areas from which a school draws its enrollment – from 14 additional schools are located within or partially within the study area. **Figure 4** lists all 44 schools with attendance zones serving the study area. Among these schools are 22 elementary schools, 11 middle schools, 8 high schools, and 3 private schools.

FIGURE 3: INDEPENDENT SCHOOL DISTRICTS SERVING THE PROJECT AREA



Source: NCTCOG

FIGURE 4: SCHOOLS WITH ATTENDANCE ZONES LOCATED WITHIN OR PARTIALLY WITHIN THE STUDY AREA\*

Name	Level	ISD	Address	City
A. V. Cato Elementary	Elementary School	Castleberry ISD	1101 Merritt Street	Fort Worth
Blue Haze Elementary	Elementary School	White Settlement ISD	601 Blue Haze Drive	Fort Worth
Burton Hill Elementary	Elementary School	Fort Worth ISD	519 Burton Hill Road	Fort Worth
Castleberry Elementary	Elementary School	Castleberry ISD	5228 Ohio Garden Road	Fort Worth
Como Elementary	Elementary School	Fort Worth ISD	4000 Horne Street	Fort Worth
Dolores Huerta Elementary	Elementary School	Fort Worth ISD	3309 W. Long Avenue	Fort Worth
Effie Morris Elementary	Elementary School	Lake Worth ISD	3801 Merritt Drive	Lake Worth
Fine Arts Academy	Elementary School	White Settlement ISD	8301 Downe Drive	Fort Worth
Joy James Elementary	Elementary School	Castleberry ISD	5300 Buchanan Street	Fort Worth
Liberty Elementary	Elementary School	White Settlement ISD	7976 Whitney Drive	White Settlement
Luella Merrett Elementary	Elementary School	Fort Worth ISD	7325 Kermit Avenue	Fort Worth
M. L. Phillips Elementary	Elementary School	Fort Worth ISD	3020 Bigham Blvd.	Fort Worth
Marilyn Miller Elementary	Elementary School	Lake Worth ISD	5250 Estrella Drive	Fort Worth
Marine Creek Elementary	Elementary School	Lake Worth ISD	4801 Huffines Blvd.	Fort Worth
North Elementary	Elementary School	White Settlement ISD	9850 Legacy Drive	White Settlement
North Hi Mount Elementary	Elementary School	Fort Worth ISD	3801 W. Seventh Street	Fort Worth
Ridglea Hills Elementary	Elementary School	Fort Worth ISD	6817 Cumberland Road	Fort Worth
South Hi Mount Elementary	Elementary School	Fort Worth ISD	4101 Birchman Avenue	Fort Worth
W. J. Turner Elementary	Elementary School	Fort Worth ISD	3001 Azle Avenue	Fort Worth
Waverly Park Elementary	Elementary School	Fort Worth ISD	3604 Cimarron Trail	Fort Worth
West Elementary	Elementary School	White Settlement ISD	8901 White Settlement Road	White Settlement
Western Hills Elementary	Elementary School	Fort Worth ISD	2805 Laredo Drive	Fort Worth
Applied Learning Academy	Middle School	Fort Worth ISD	7060 Camp Bowie Blvd.	Fort Worth
Brewer Middle School	Middle School	White Settlement ISD	1000A S. Cherry Lane	White Settlement
Elder Middle School	Middle School	Fort Worth ISD	709 NW 21 <sup>st</sup> Street	Fort Worth
Kirkpatrick Middle School	Middle School	Fort Worth ISD	3201 Refugio Avenue	Fort Worth
Leonard Middle School	Middle School	Fort Worth ISD	8900 Chapin Road	Fort Worth
Lucyle Collins Middle School	Middle School	Lake Worth ISD	3651 Santos Drive	Fort Worth
Marsh Middle School	Middle School	Castleberry ISD	415 Hagg Drive	Fort Worth
Monnig Middle School	Middle School	Fort Worth ISD	3136 Bigham Blvd.	Fort Worth
N. A. Howry Intermediate	Middle School	Lake Worth ISD	4000 Dakota Trail	Lake Worth
Stripling Middle School	Middle School	Fort Worth ISD	2100 Clover Lane	Fort Worth

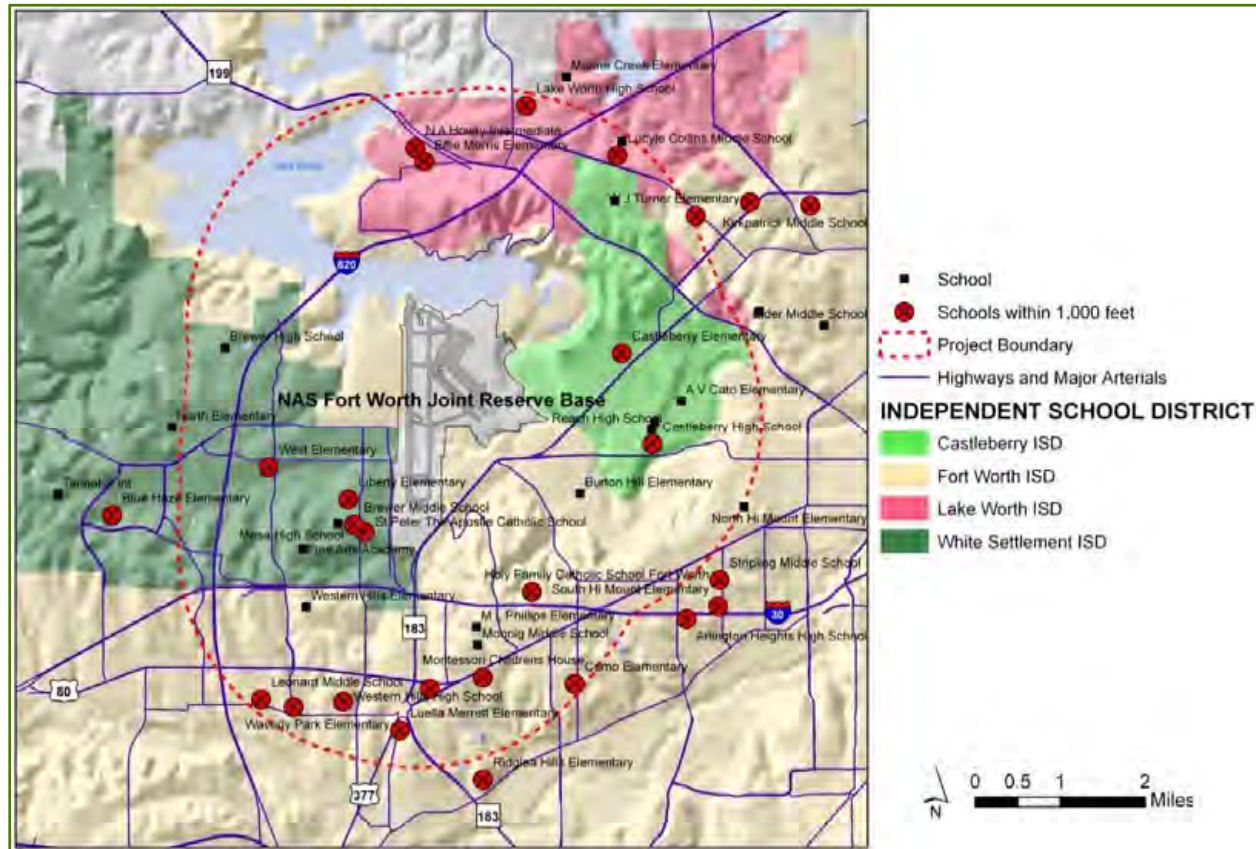
Name	Level	ISD	Address	City
Tannahill Intermediate	Middle School	White Settlement ISD	701 American Flyer Blvd.	Fort Worth
Arlington Heights High School	High School	Fort Worth ISD	4501 West Freeway	Fort Worth
Brewer High School	High School	White Settlement ISD	1025 West Loop 820 North	Fort Worth
Castleberry High School	High School	Castleberry ISD	215 Churchill Road	Fort Worth
Lake Worth High School	High School	Lake Worth ISD	4210 Boat Club Road	Lake Worth
Mesa High School	High School	White Settlement ISD	8041 Gibbs Drive	White Settlement
North Side High School	High School	Fort Worth ISD	2211 McKinley Avenue	Fort Worth
Reach High School	High School	Castleberry ISD	4800 Blackstone Drive	Fort Worth
Western Hills High School	High School	Fort Worth ISD	3600 Boston Avenue	Fort Worth
Holy Family Catholic School Fort Worth	Private School	-	6146 Pershing Avenue	Fort Worth
Montessori Children's House	Private School	-	3420 Clayton Road East	Fort Worth
St. Peter The Apostle Catholic School	Private School	-	1201 S Cherry Lane	White Settlement

\*This list includes all schools with attendance zones located within or partially within the study area. Some of the schools are located outside of the study area but enroll students living within the study area.

Twenty-six of the schools listed above are currently located within 1,000 feet (approximately 0.2 miles) of a highway or major arterial, as shown in **Figure 5**. These roadways are higher capacity roadways intended to accommodate high traffic volumes and vehicle speeds. Twelve of these schools are elementary schools, seven are middle schools, four are high schools, and three are private schools. According to a survey conducted among people living and/or working in the project area, nearly 60 percent of respondents agreed or strongly agreed that access to schools for children walking or biking is a major concern in the area, as shown in **Figure 6**. Less than nine percent responded that they disagreed or strongly disagreed.

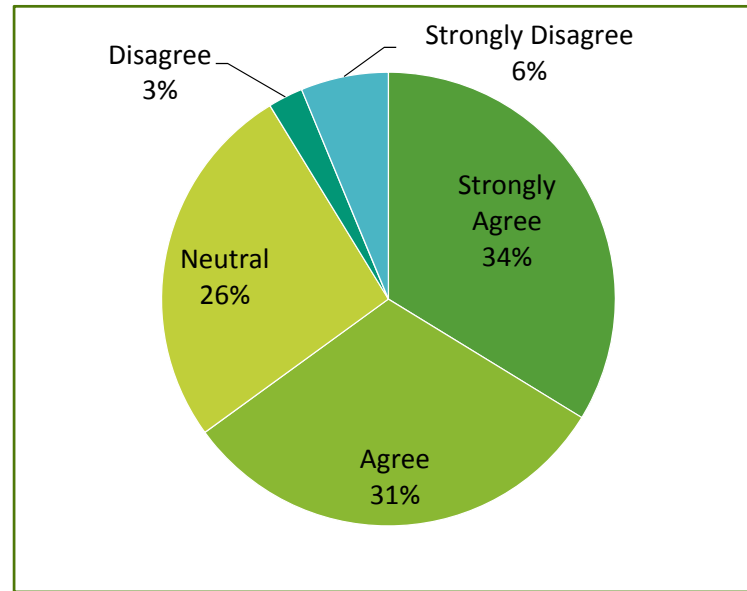


FIGURE 5: SCHOOLS WITHIN 1,000 FEET OF A HIGHWAY OR MAJOR ARTERIAL



Source: NCTCOG

FIGURE 6: ACCESS TO SCHOOLS FOR CHILDREN WALKING OR BIKING IS A MAJOR CONCERN



Source: NCTCOG

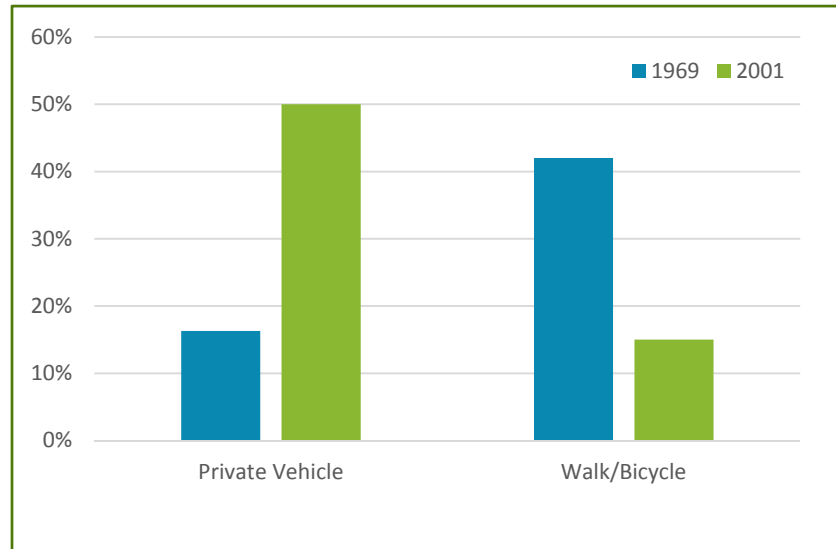
Primary education facilities in particular represent a higher priority for improved safety in school zones as younger, less experienced children are more at risk of injury. Coincidentally, primary schools and middle schools are also prime candidates for safety interventions and promoting active transportation precisely because they often draw enrollment from much smaller areas, and students therefore live within reasonable walking or biking distances from their school. Another factor contributing to the likely effectiveness of targeting these schools is that most ISDs in the state of Texas have “no bus zones”. These policies limit the availability of busing for students living within a specific walking radius of a school.

Among the four ISDs serving the study area, Fort Worth ISD and White Settlement ISD do not provide busing for students living within two miles of a school campus.

In the case of the elementary school attendance zones shown later in this section, the result of these policies is that most students must be driven to and from schools, particularly where adequate pedestrian facilities like sidewalks and crosswalks are not available. **Figure 7** shows the diminishing nationwide rate of children walking and biking to school over the past several decades. This shift away from students walking and biking to school contributes to local traffic congestion, especially during peak travel times. In 2007, the Federal Highway Administration noted that non-work travel constitutes 56 percent of trips during the AM peak period and 69 percent of trips during the PM peak period during an average weekday. Moreover, the study determined that 7 to

11 percent of these trips were school related, averaging nearly nine miles per trip.<sup>2</sup> Traffic congestion has also been shown to negatively impact local economies through longer commute times, lost productivity, and wasted fuel.<sup>3</sup>

FIGURE 7: MODE OF TRAVEL TO SCHOOL, CHILDREN AGES 6 THROUGH 12, 1969 AND 2001



Source: Federal Highway Administration, <http://www.fhwa.dot.gov/ohim/1969/q.pdf>

## EXISTING PEDESTRIAN FACILITIES INVENTORY AROUND SCHOOLS

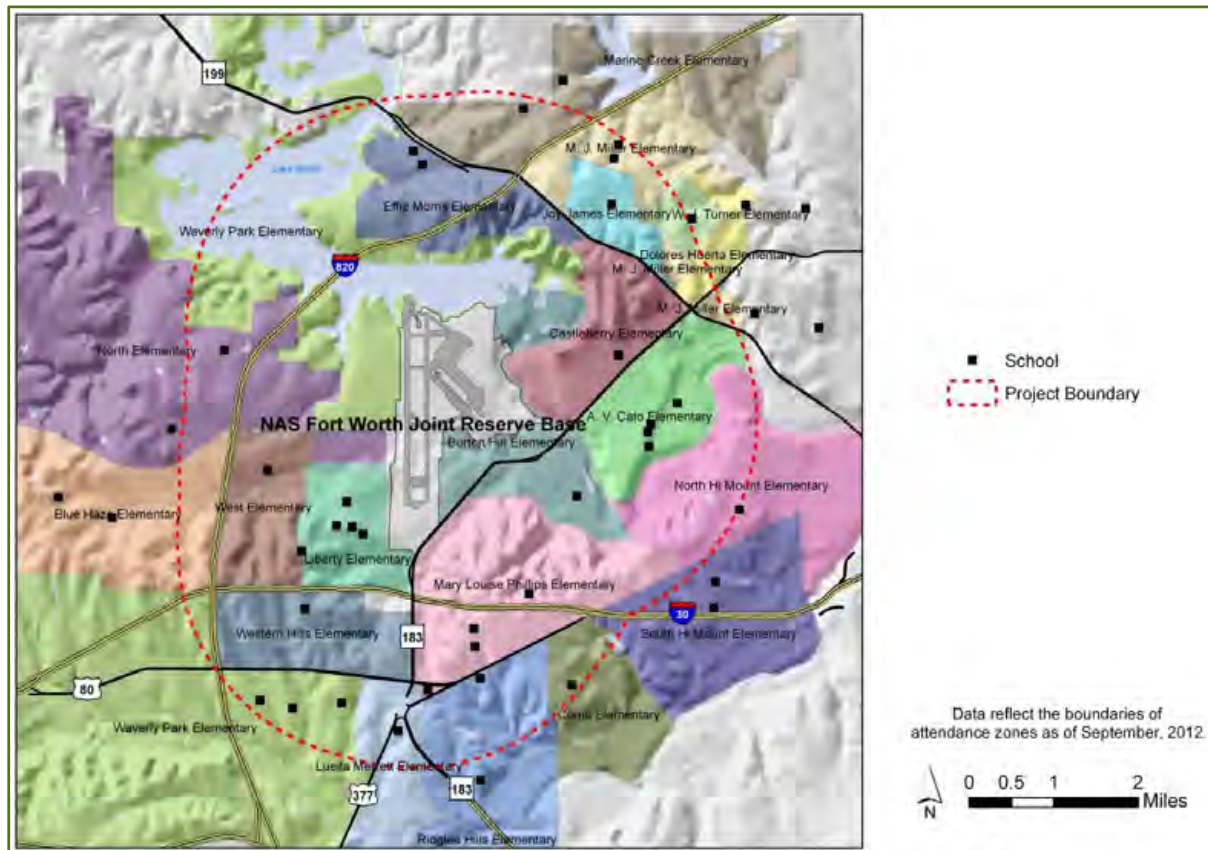
Because attendance zones for elementary schools are smaller than those for middle and high schools, and because there is greater potential for promoting walking and biking to school among younger children, a sidewalk inventory was performed for the 21 elementary schools with attendance zones within or partially within the study area. (Fine Arts Academy in White Settlement is not included because there is no specific attendance zone for this facility. However, the area surrounding this school is covered by the analysis of nearby elementary schools). The location of these zones in relation to the study area is shown in **Figure 8**. In most instances, the attendance zones also represent a reasonable walking distance.

<sup>2</sup> US Department of Transportation, *NHTS Brief: Congestion: Who is Traveling in the Peak?* (Washington, DC: US DOT, 2007), <http://nhts.orl.gov/briefs/Congestion%20-%20Peak%20Travelers.pdf>.

<sup>3</sup> Texas Transportation Institute, *2011 Urban Mobility Report* (College Station, TX: Texas A&M University, 2011), <http://tti.tamu.edu/documents/mobility-report-2011.pdf> (accessed February 3, 2012).

An analysis was performed to determine the “sidewalk density” of each area by measuring the total linear length of sidewalks in each attendance zone as a ratio of the linear length of the roadway network in each zone. By measuring the availability of sidewalks against the existing road network, the sidewalk density enables us to more accurately compare the existing pedestrian conditions in the attendance zones based on the level of development within each area. The sidewalk densities of zones with larger areas of undeveloped land, for instance, will not necessarily suffer from lower density calculations since the value is tied to the roadway network, not the total area of the attendance zone. (Note that it would be possible for this ratio to be greater than 1, since sidewalks on both sides of a given street were counted individually; therefore, the maximum possible sidewalk density for any attendance zone is 2.0.) The results of this analysis are displayed in **Figure 9**.

FIGURE 8: ELEMENTARY SCHOOL ATTENDANCE ZONES LOCATED WITHIN OR PARTIALLY WITHIN THE STUDY AREA



Source: NCTCOG

FIGURE 9: SIDEWALK DENSITY FOR ELEMENTARY SCHOOL ATTENDANCE ZONES

Name	Total Roadway Length (Feet) <sup>1</sup>	Total Sidewalk Length (Feet)	Sidewalk Density	Miles of Sidewalk Needed for Complete Network <sup>2</sup>
A. V. Cato Elementary	205,012	29,476	0.14	72.07
Blue Haze Elementary	283,212	116,584	0.41	85.20
Burton Hill Elementary	215,524	86,154	0.40	65.32
Castleberry Elementary	214,696	16,713	0.08	78.16
Como Elementary	159,683	57,442	0.36	49.61
Dolores Huerta Elementary	81,952	24,949	0.30	26.32
Effie Morris Elementary	148,381	12,093	0.08	53.91
Joy James Elementary	97,908	2,427	0.02	36.63
Liberty Elementary	138,737	37,811	0.27	45.39
Luella Merrett Elementary	197,711	36,820	0.19	67.92
M. L. Phillips Elementary	404,496	98,753	0.24	134.51
Marilyn Miller Elementary	138,660	20,385	0.15	48.66
Marine Creek Elementary	183,566	93,715	0.51	51.78
North Elementary	336,470	39,314	0.12	120.00
North Hi Mount Elementary	421,056	265,650	0.63	109.18
Ridglea Hills Elementary	532,411	79,477	0.15	186.61
South Hi Mount Elementary	370,263	277,538	0.75	87.69
W. J. Turner Elementary	58,133	10,469	0.18	20.04
Waverly Park Elementary	901,635	175,153	0.19	308.35
West Elementary	148,661	48,089	0.32	47.20
Western Hills Elementary	228,244	56,925	0.25	75.67
<b>Total</b>	<b>5,466,411</b>	<b>1,585,937</b>	<b>0.29</b>	<b>1,770.21</b>

<sup>1</sup>Total roadway length does not include roads classified as Interstate Highways or highway access ramps. Bicycling and pedestrian activity are prohibited on these roadways, and facilities like sidewalks are not included in their design.

<sup>2</sup>A complete sidewalk network assumes sidewalks on both sides of the roadway.



**Figure 10** shows some of the existing conditions for pedestrian accessibility in the study area.

FIGURE 10: EXISTING CONDITIONS FOR PEDESTRIANS WITHIN THE STUDY AREA



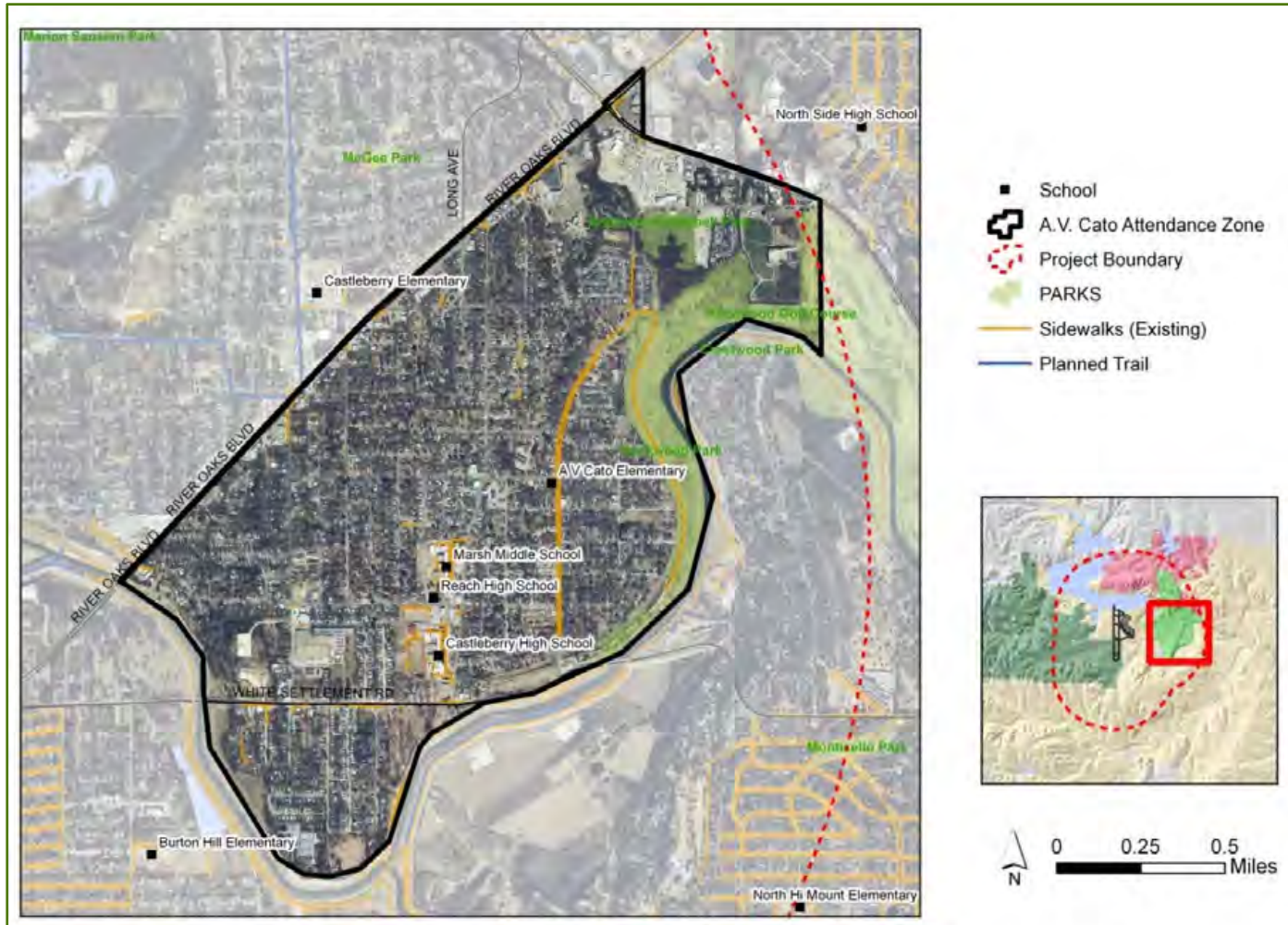
Source: NCTCOG

**Figures 11 through 31<sup>4</sup>** indicate the attendance zone boundary for each school, the location of existing sidewalks and planned trail facilities, proximity to highways and major arterials, and the location of any parks. The maps also include the location of middle schools, high schools, and private schools present within these boundaries. The sidewalk data used for the inventory is based on 2007 Planimetric data. Planimetric data shows the position of geographic objects on the Earth's surface through photogrammetric or other surveying procedures. In some areas, this data has been verified through site visits and comparisons to aerial imagery. Following the existing conditions analysis, the Recommendations section includes suggestions for updating sidewalk and other on- and off-street facilities in specific areas.

<sup>4</sup>In most instances, the maps show the entire school attendance zone and, where applicable, the boundary of the 2.5 mile area surrounding NAS Fort Worth, JRB. In a few cases, portions of the attendance zones were omitted for areas extending further beyond this boundary and containing mostly undeveloped or otherwise non-residential land. The areas omitted also extend beyond reasonable walking distances. These attendance zones are: Blue Haze Elementary School, White Settlement ISD; Luella Merrett Elementary School, Fort Worth ISD; Marine Creek Elementary School, Lake Worth ISD; North Elementary School, White Settlement ISD; Ridglea Hills Elementary School, Fort Worth ISD; and Waverly Park Elementary School, Fort Worth ISD. All attendance zones were drawn from online data available from each of the four ISDs. The data was accessed in September, 2012.

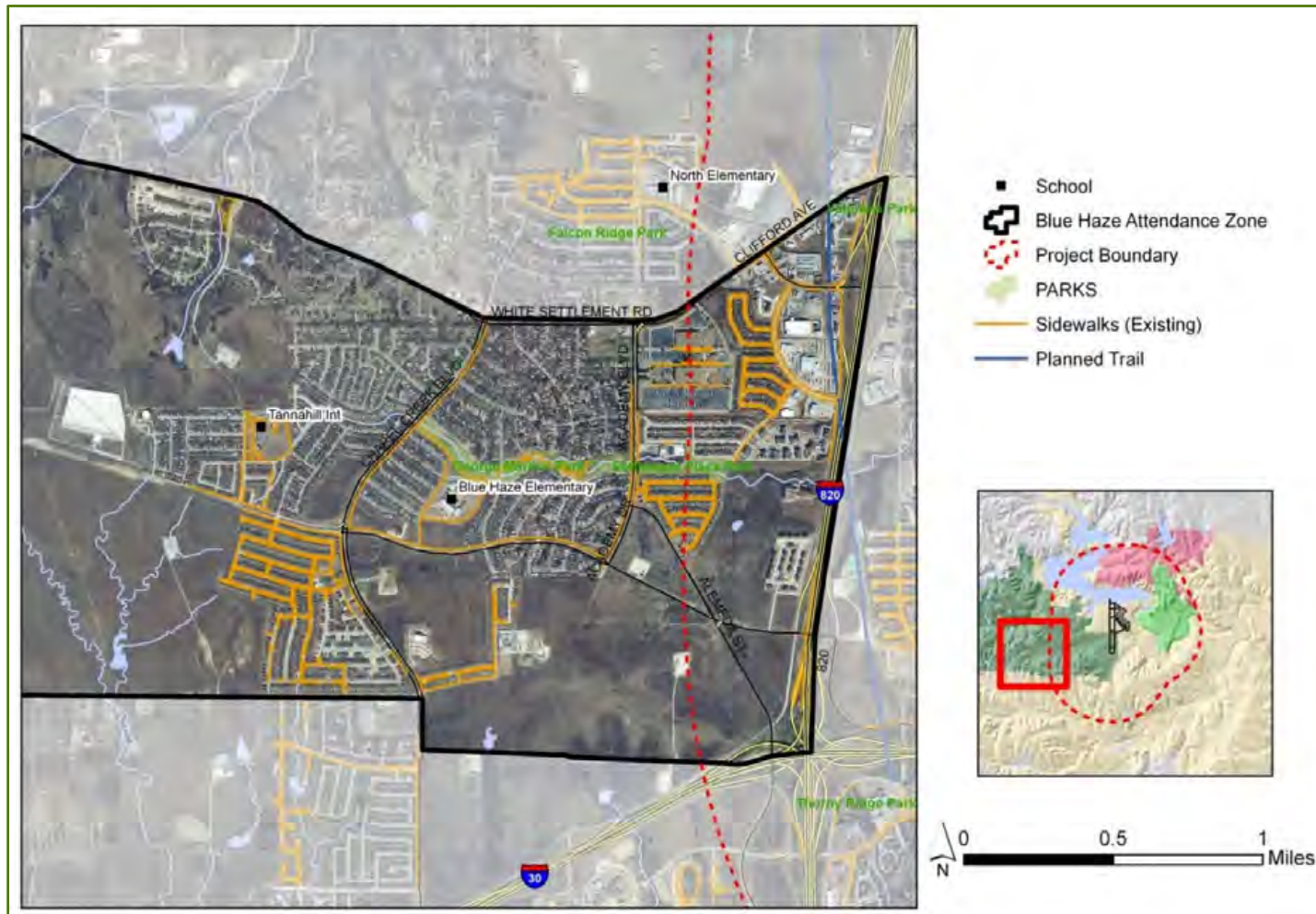


FIGURE 11: A. V. CATO ELEMENTARY SCHOOL (CASTLEBERRY ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

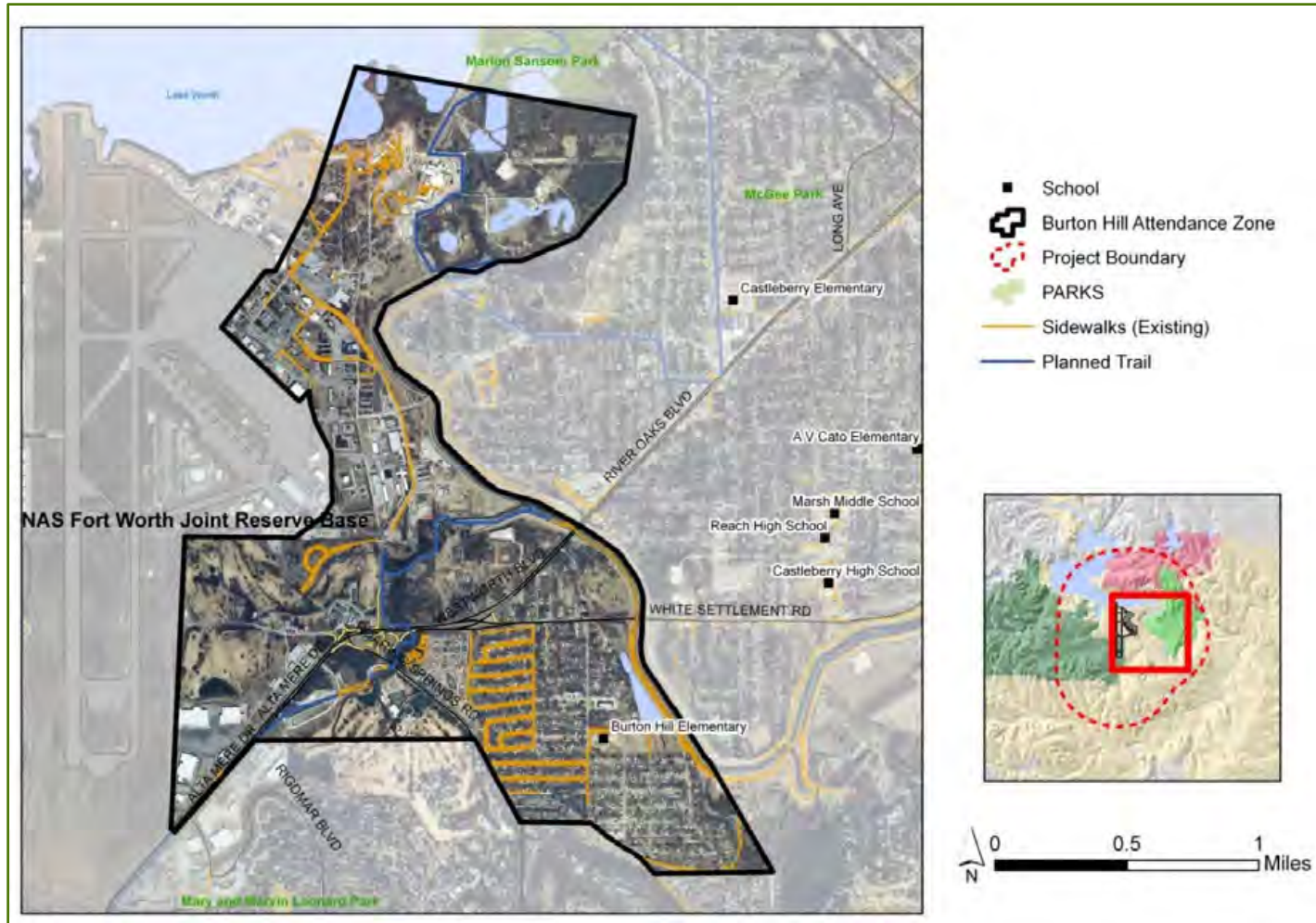
FIGURE 12: BLUE HAZE ELEMENTARY SCHOOL (WHITE SETTLEMENT ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

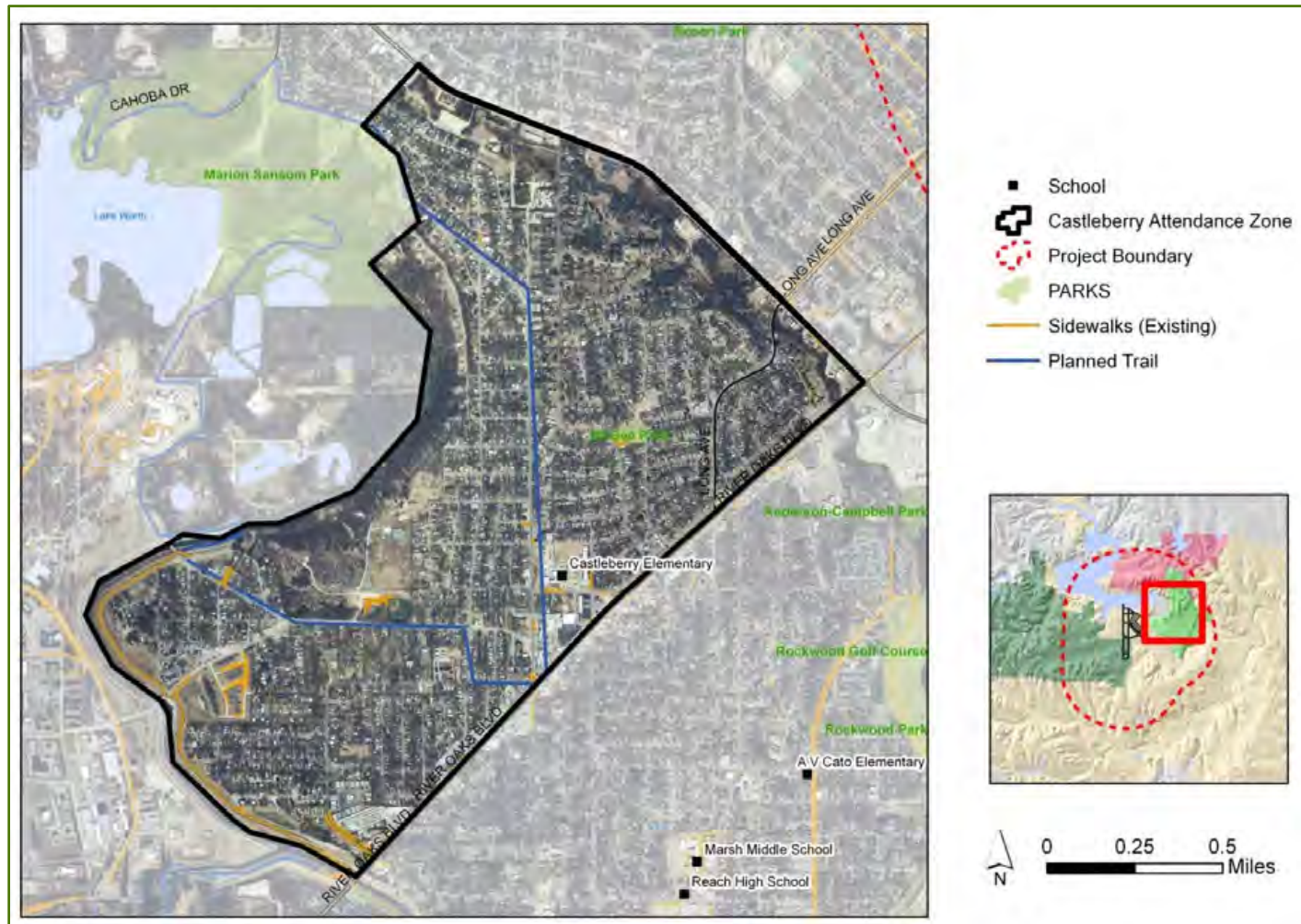


FIGURE 13: BURTON HILL ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

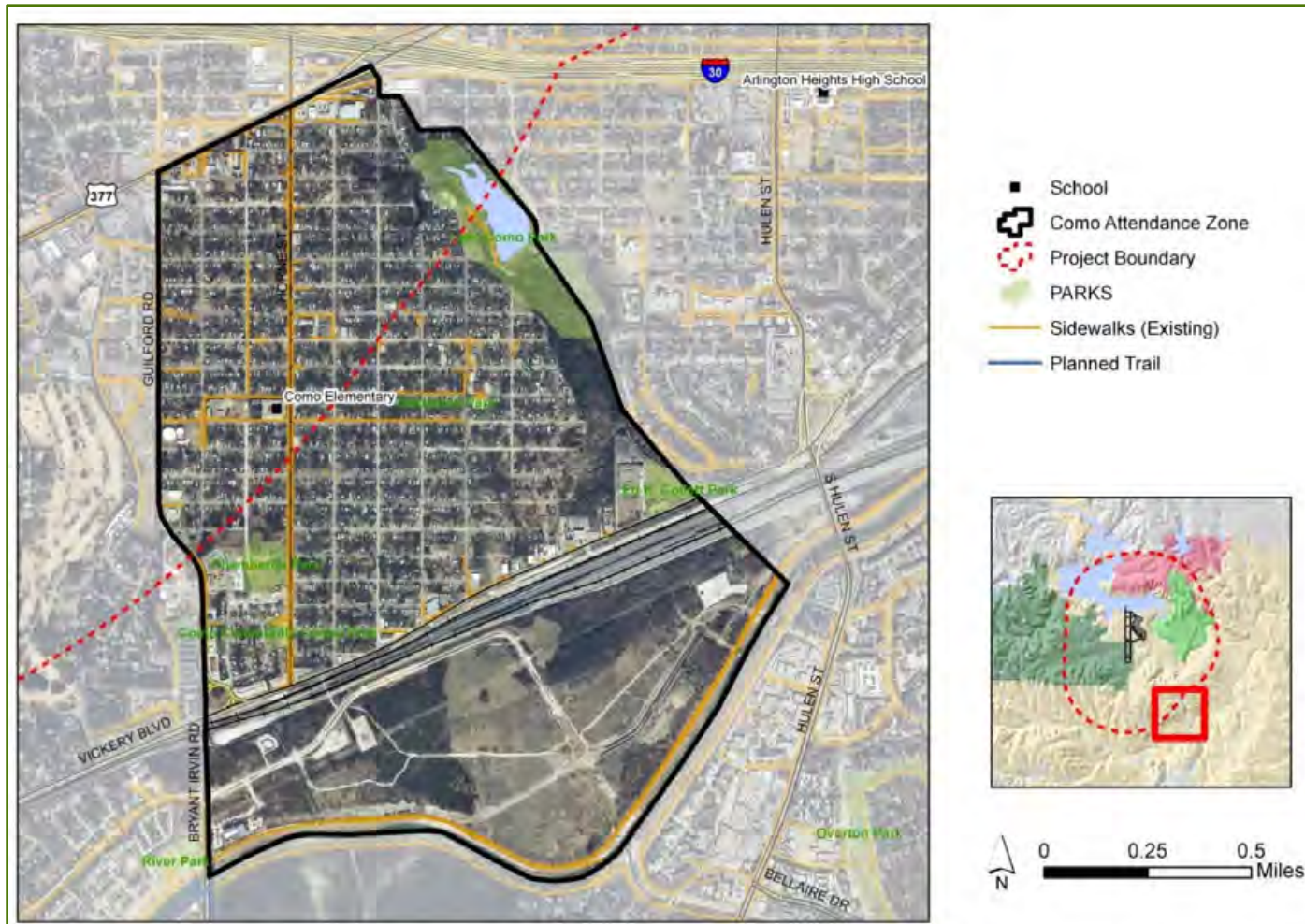
FIGURE 14: CASTLEBERRY ELEMENTARY SCHOOL (CASTLEBERRY ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

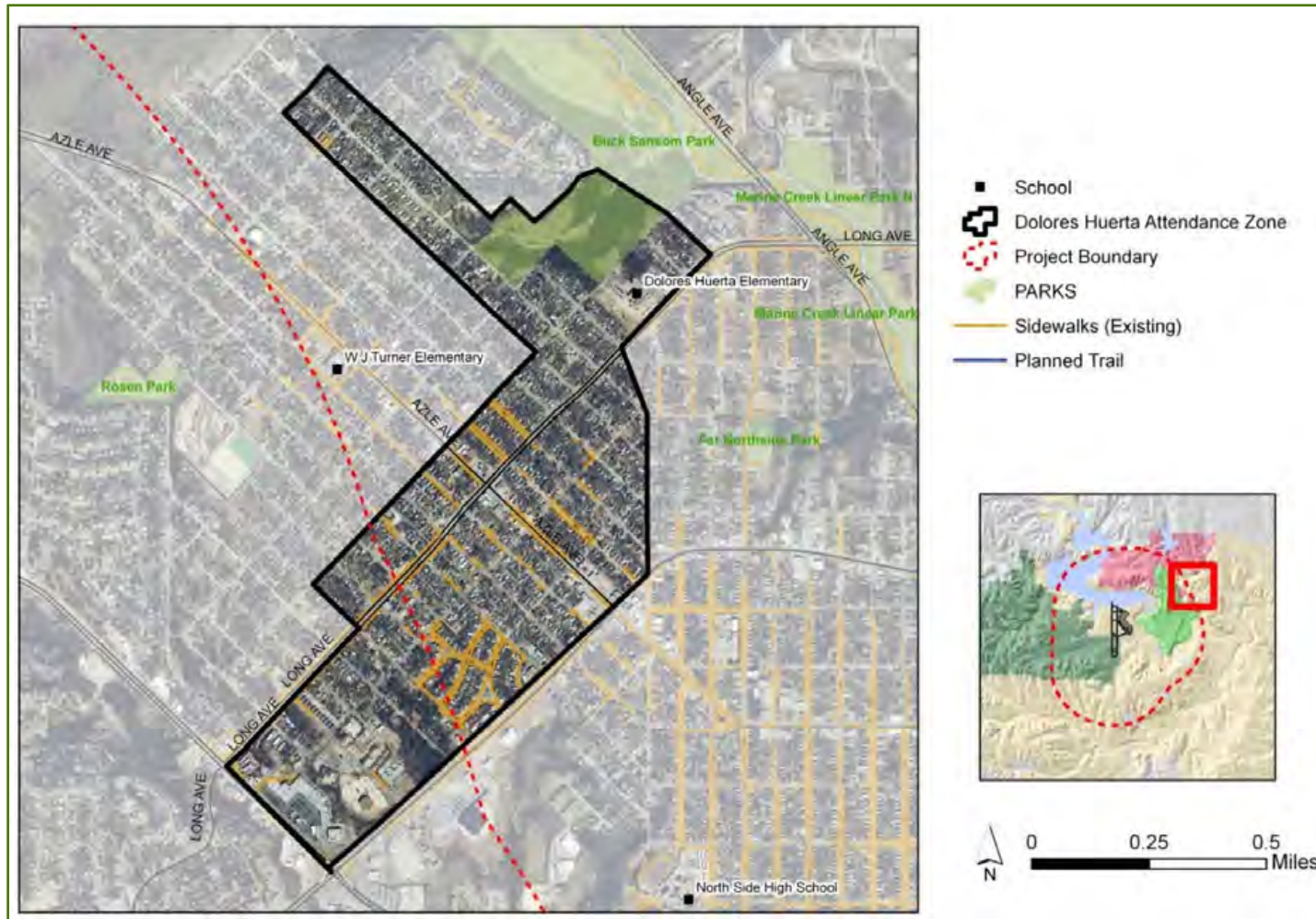


FIGURE 15: COMO ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

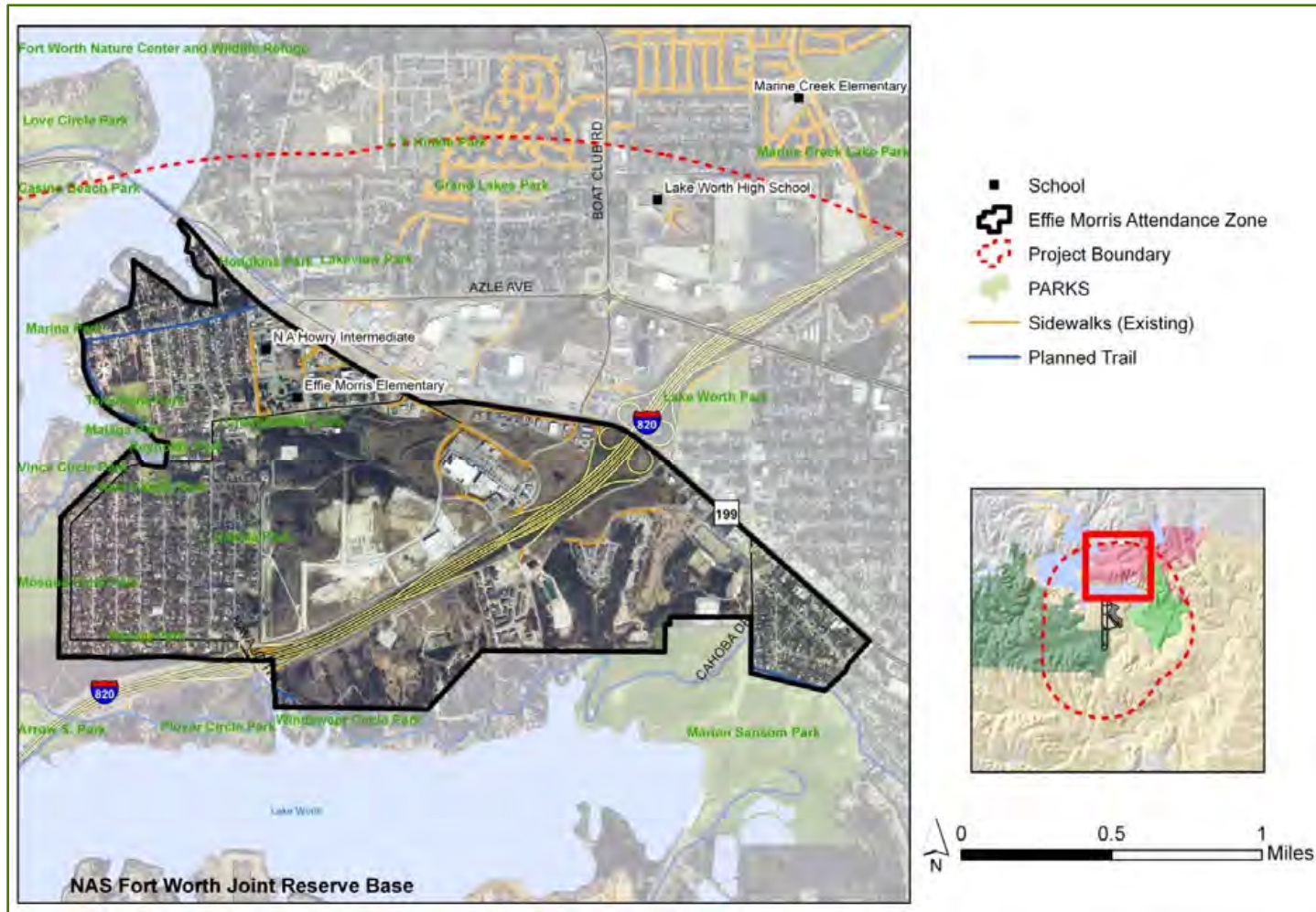
FIGURE 16: DOLORES HUERTA ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

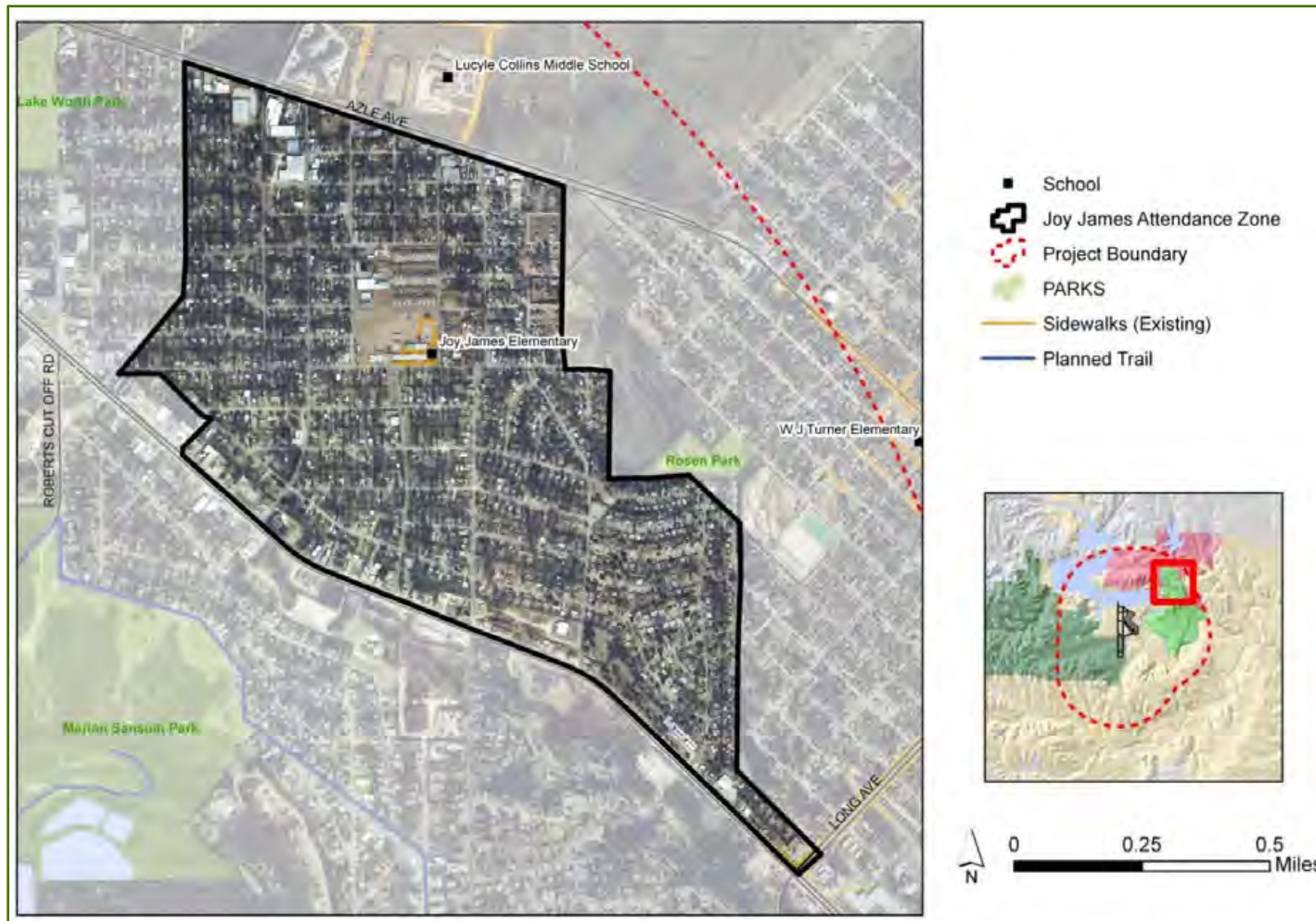


FIGURE 17: EFFIE MORRIS ELEMENTARY SCHOOL (LAKE WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

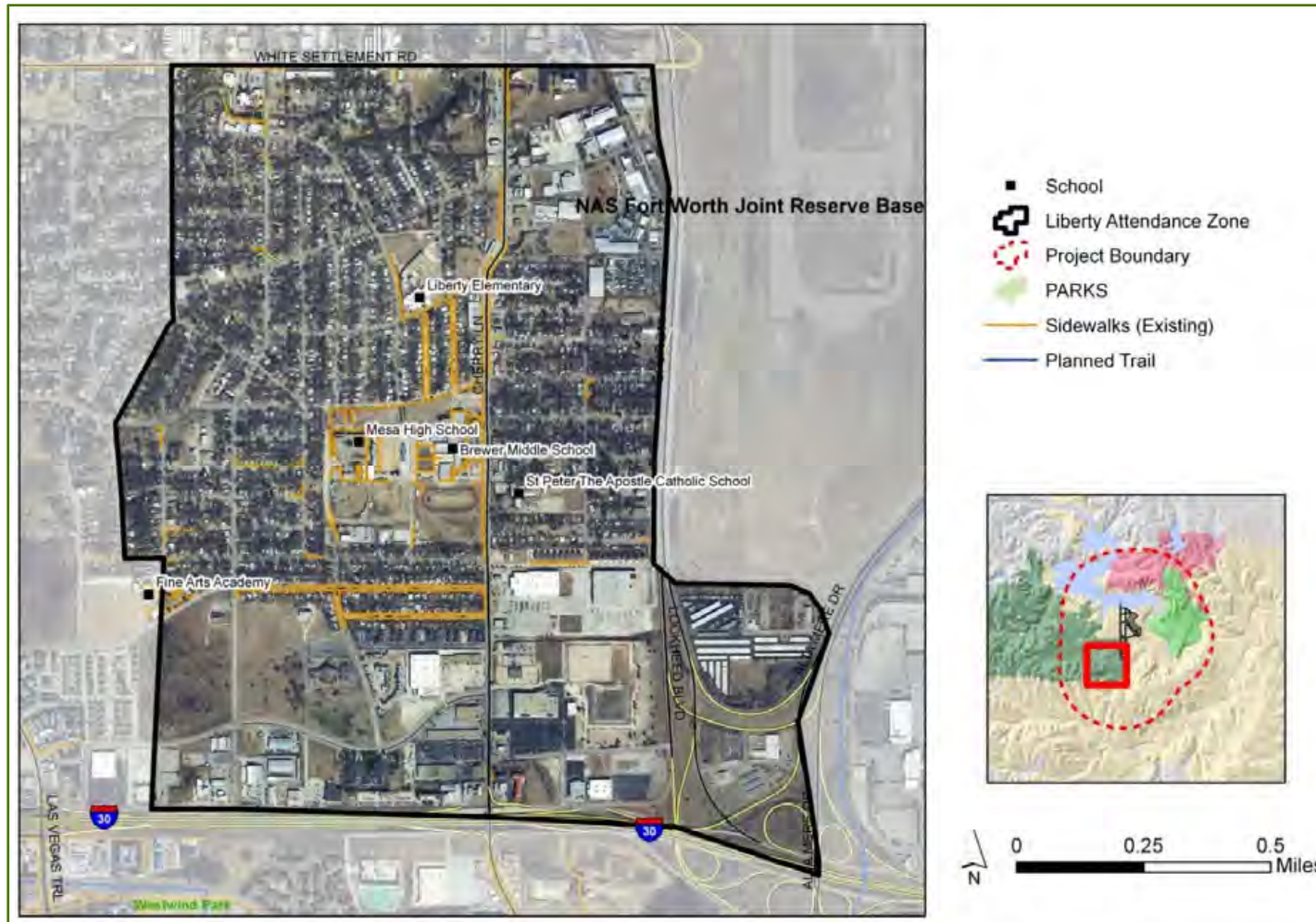
FIGURE 18: JOY JAMES ELEMENTARY SCHOOL (CASTLEBERRY ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

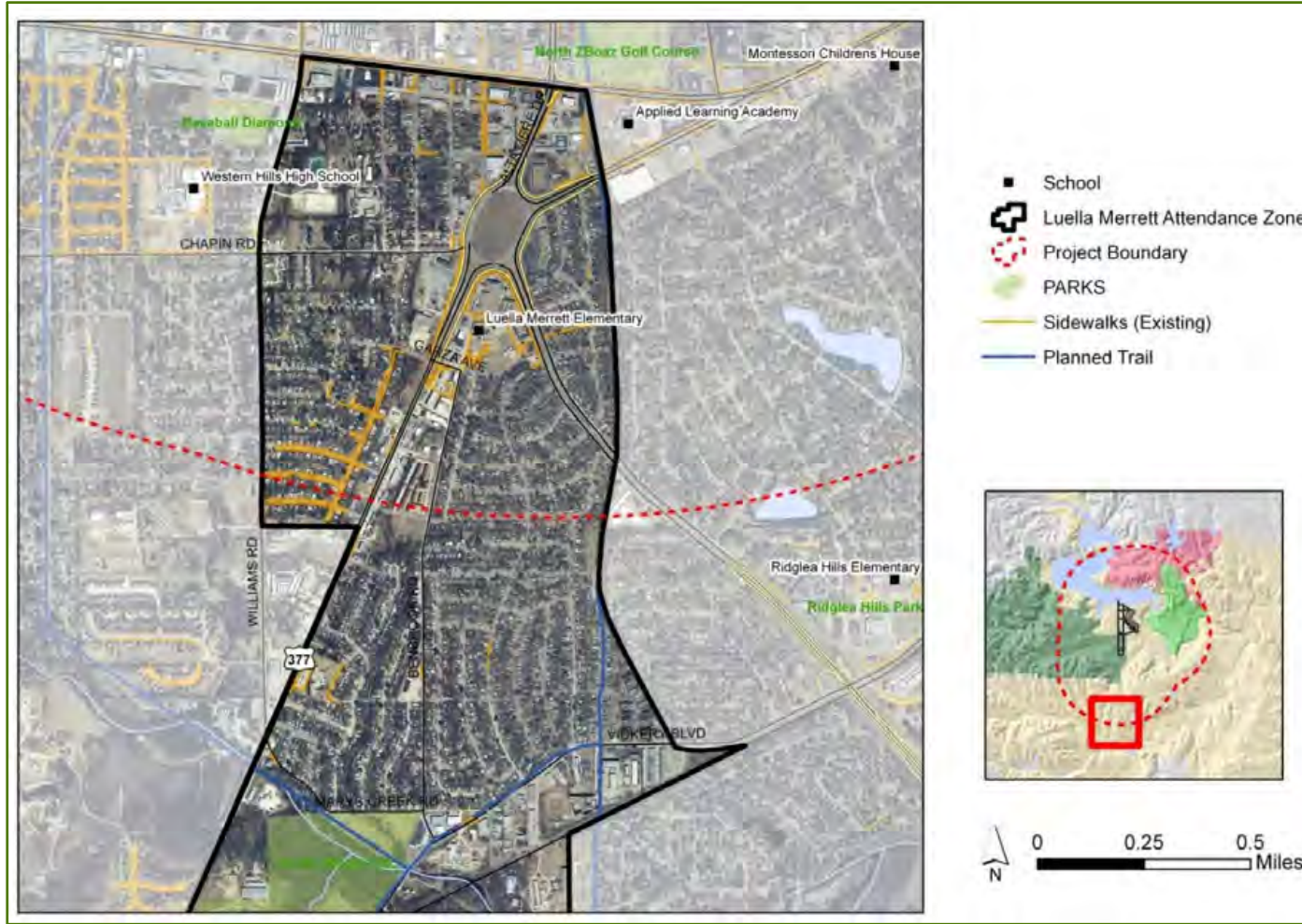


FIGURE 19: LIBERTY ELEMENTARY SCHOOL (WHITE SETTLEMENT ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

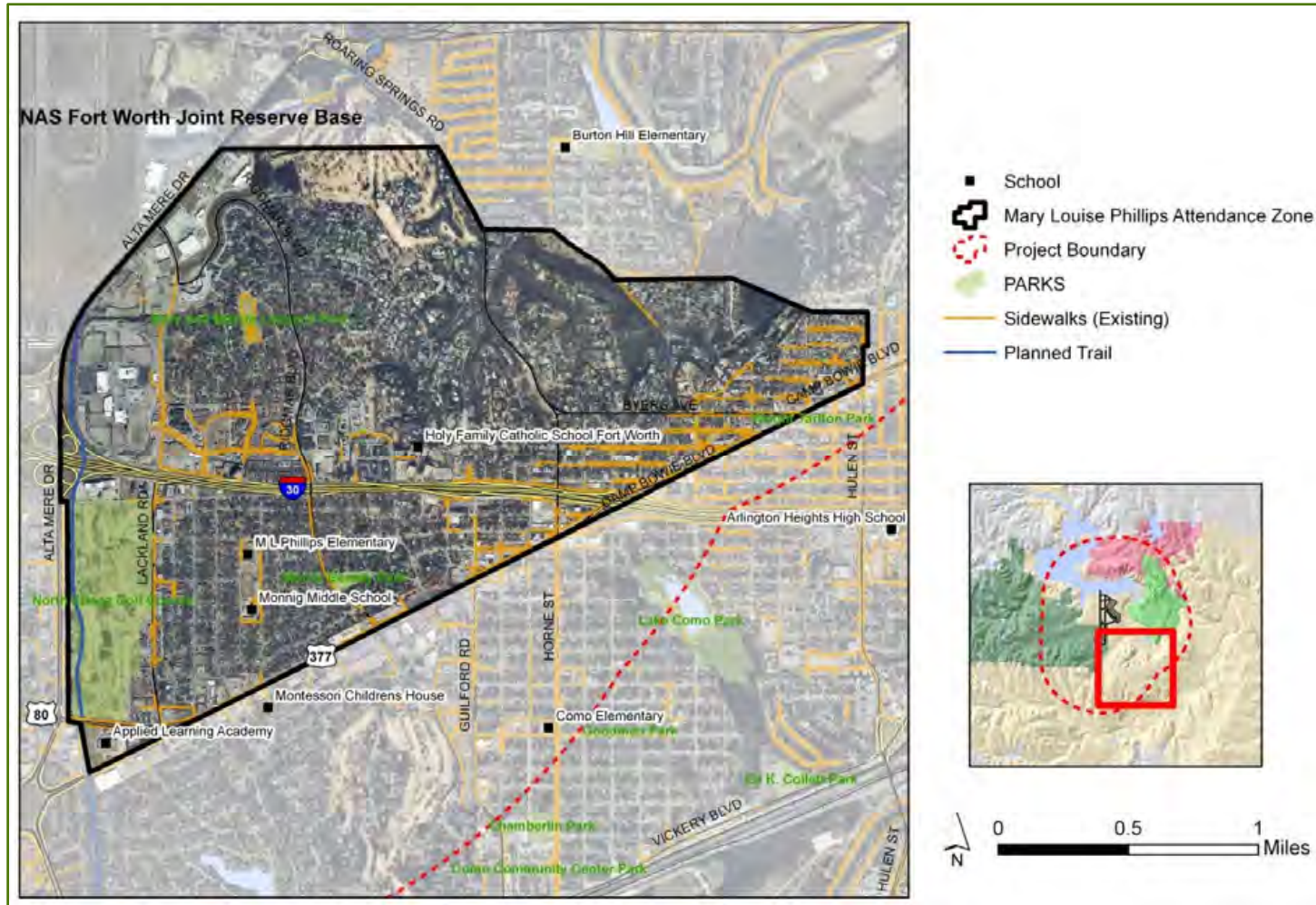
FIGURE 20: LUELLA MERRETT ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG



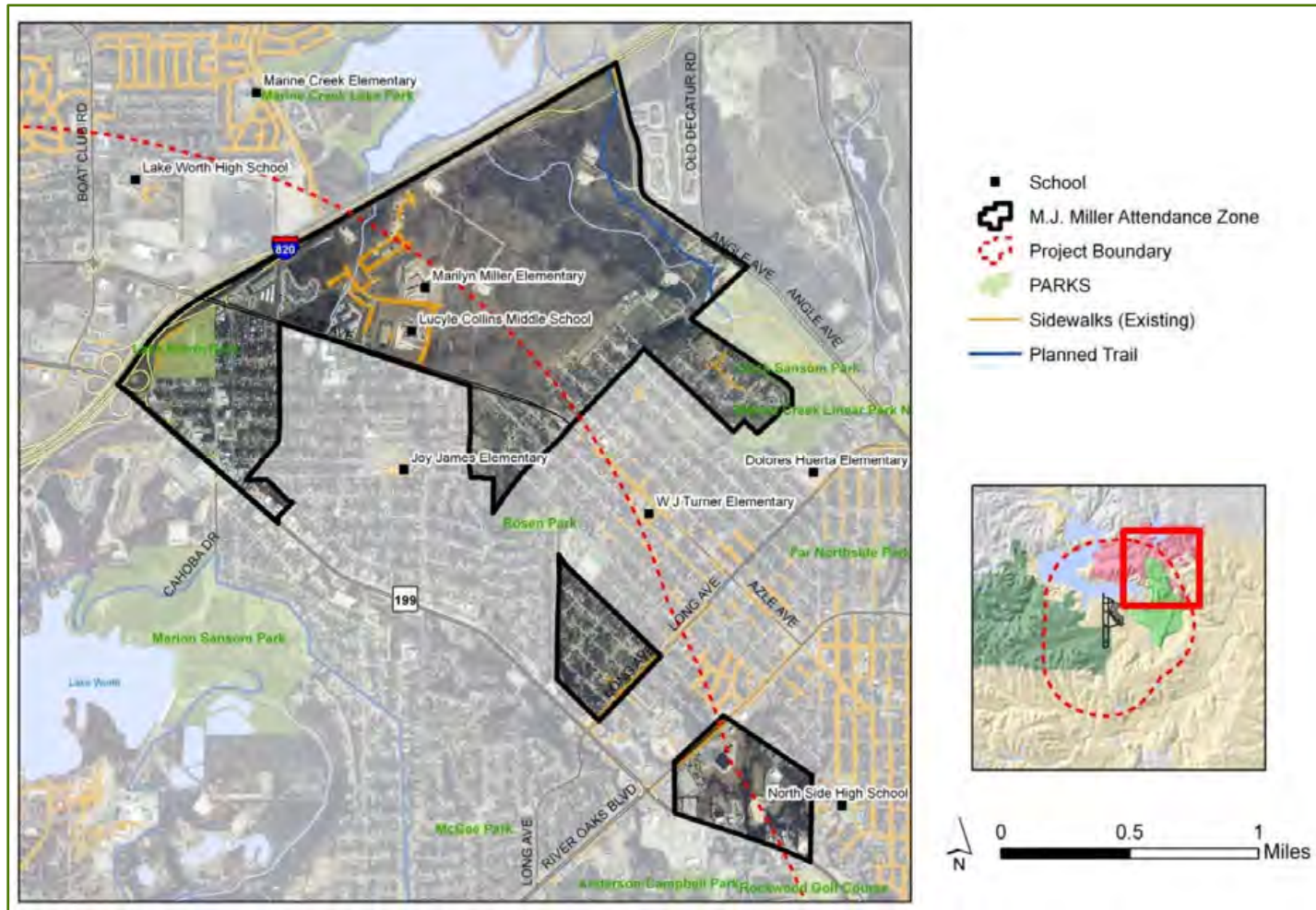
FIGURE 21: M. L. PHILLIPS ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

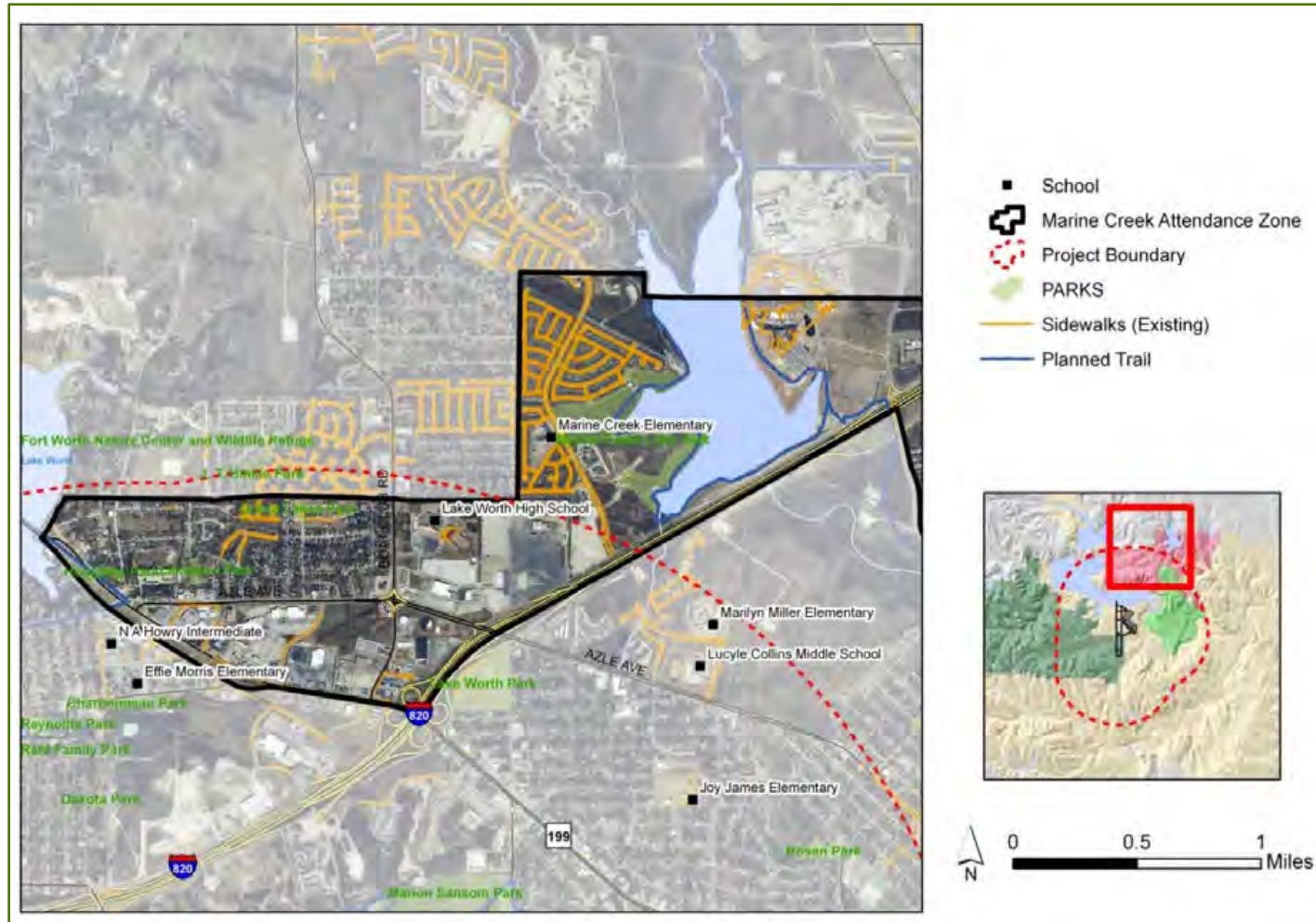


FIGURE 22: M. J. MILLER ELEMENTARY SCHOOL (LAKE WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

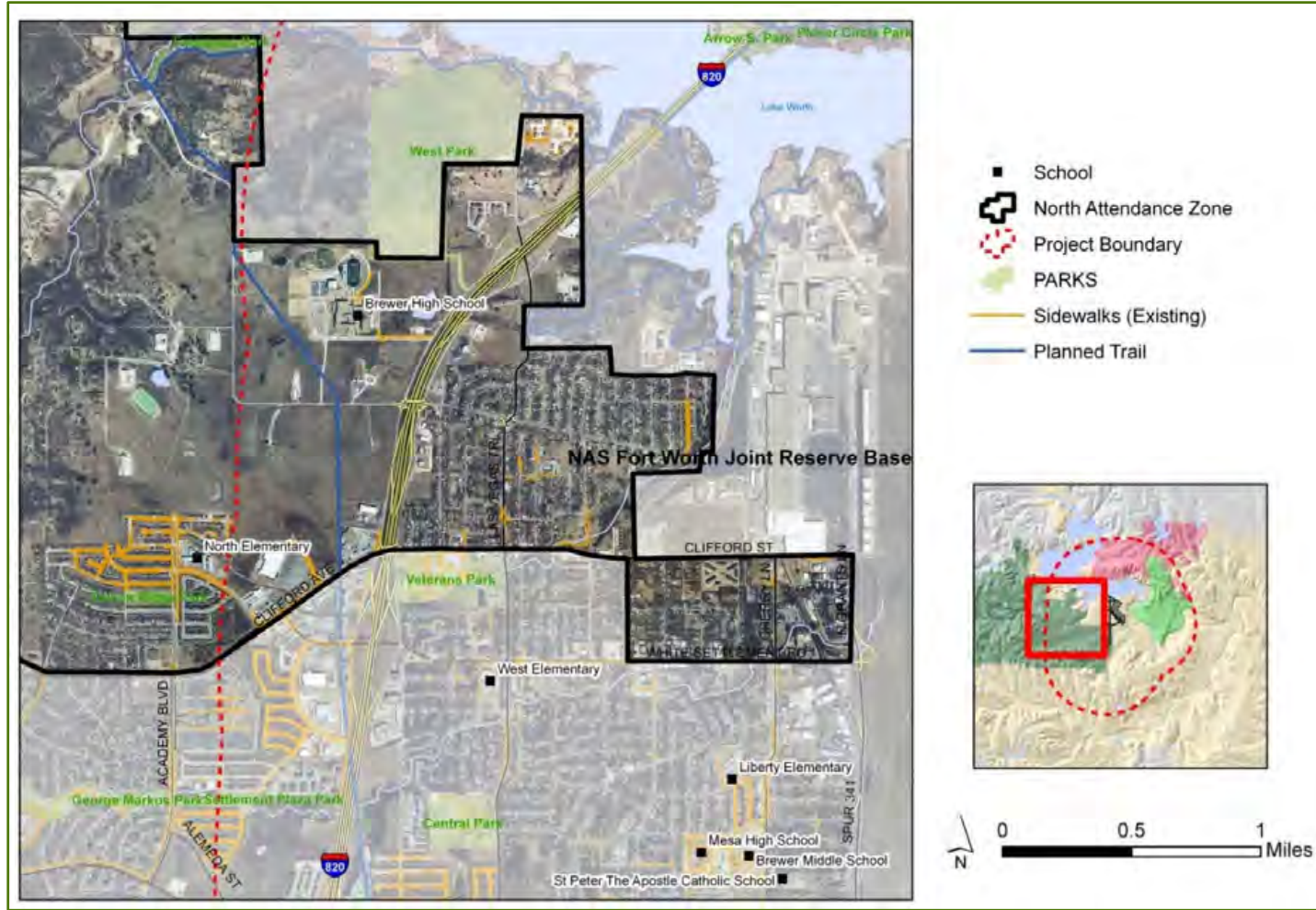
FIGURE 23: MARINE CREEK ELEMENTARY SCHOOL (LAKE WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

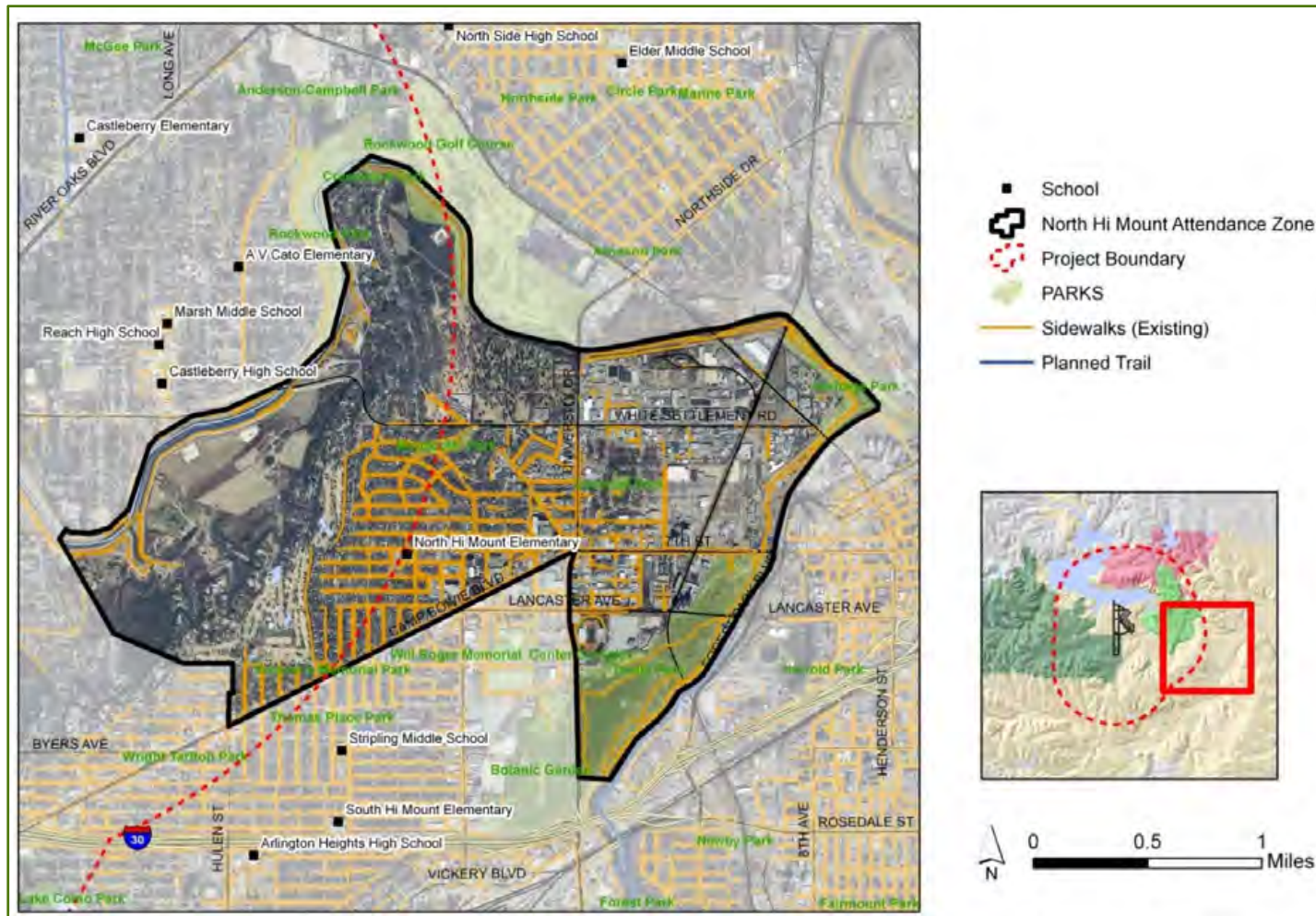


FIGURE 24: NORTH ELEMENTARY SCHOOL (WHITE SETTLEMENT ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

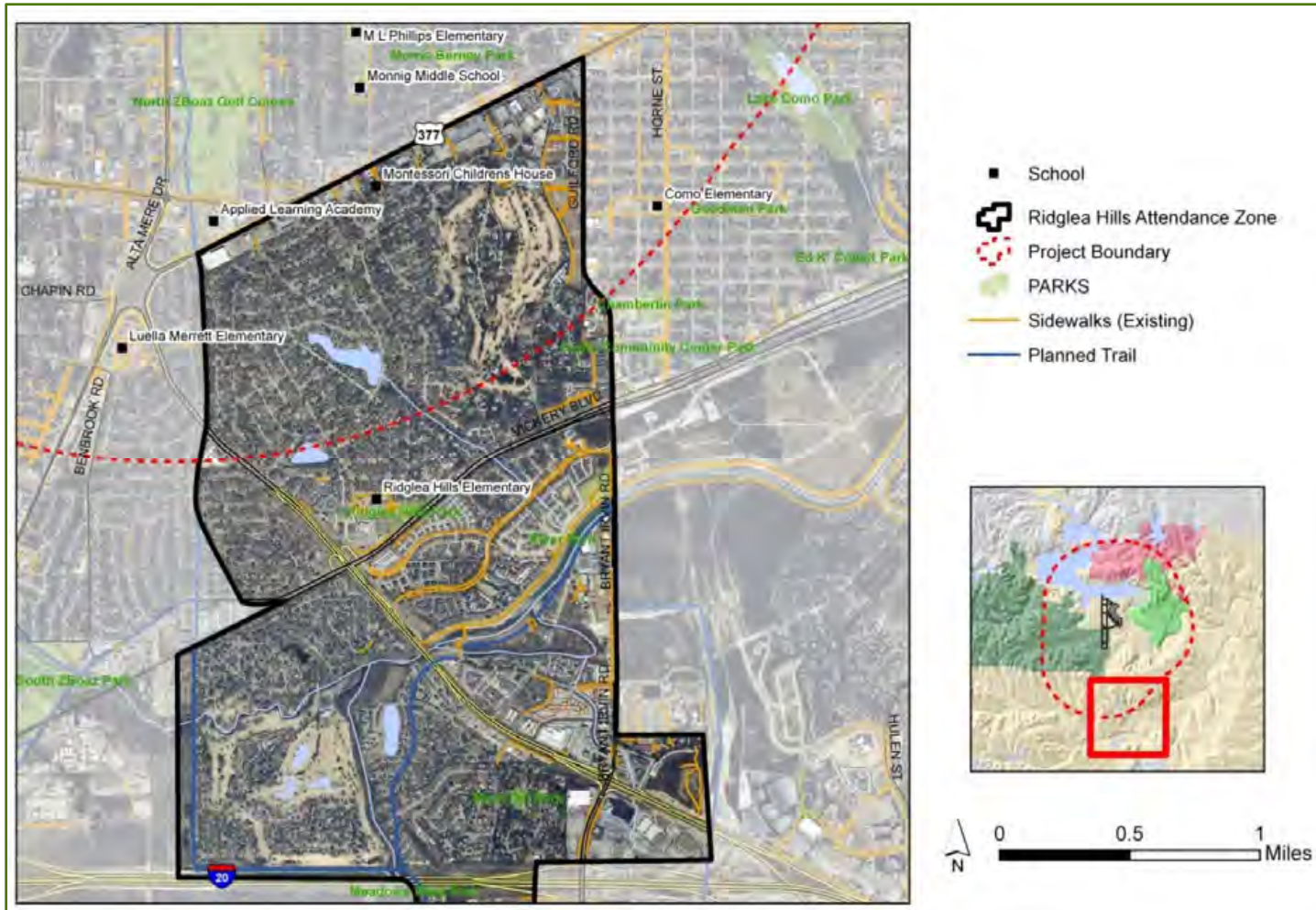
FIGURE 25: NORTH HI MOUNT ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG



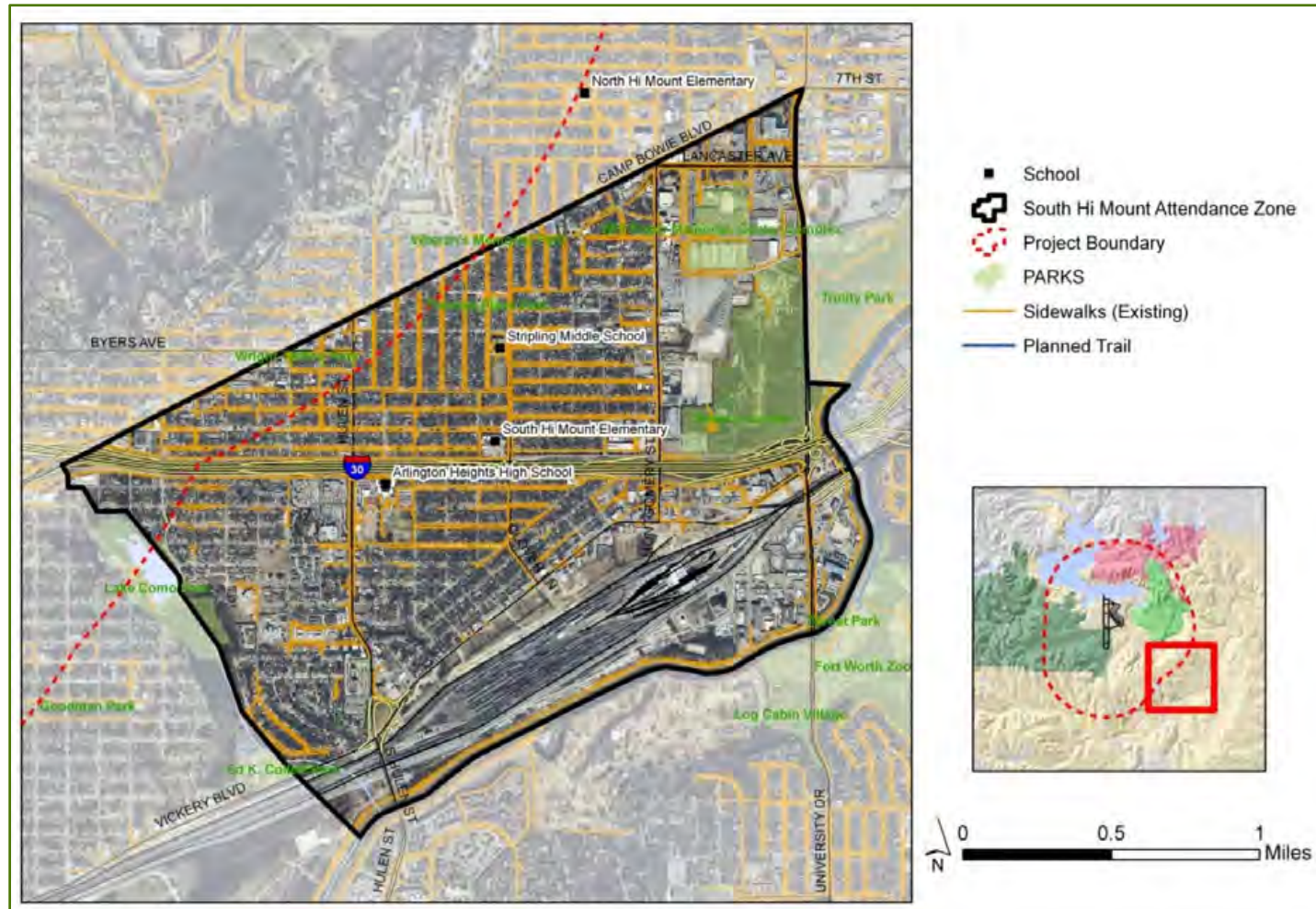
FIGURE 26: RIDGLEA HILLS ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

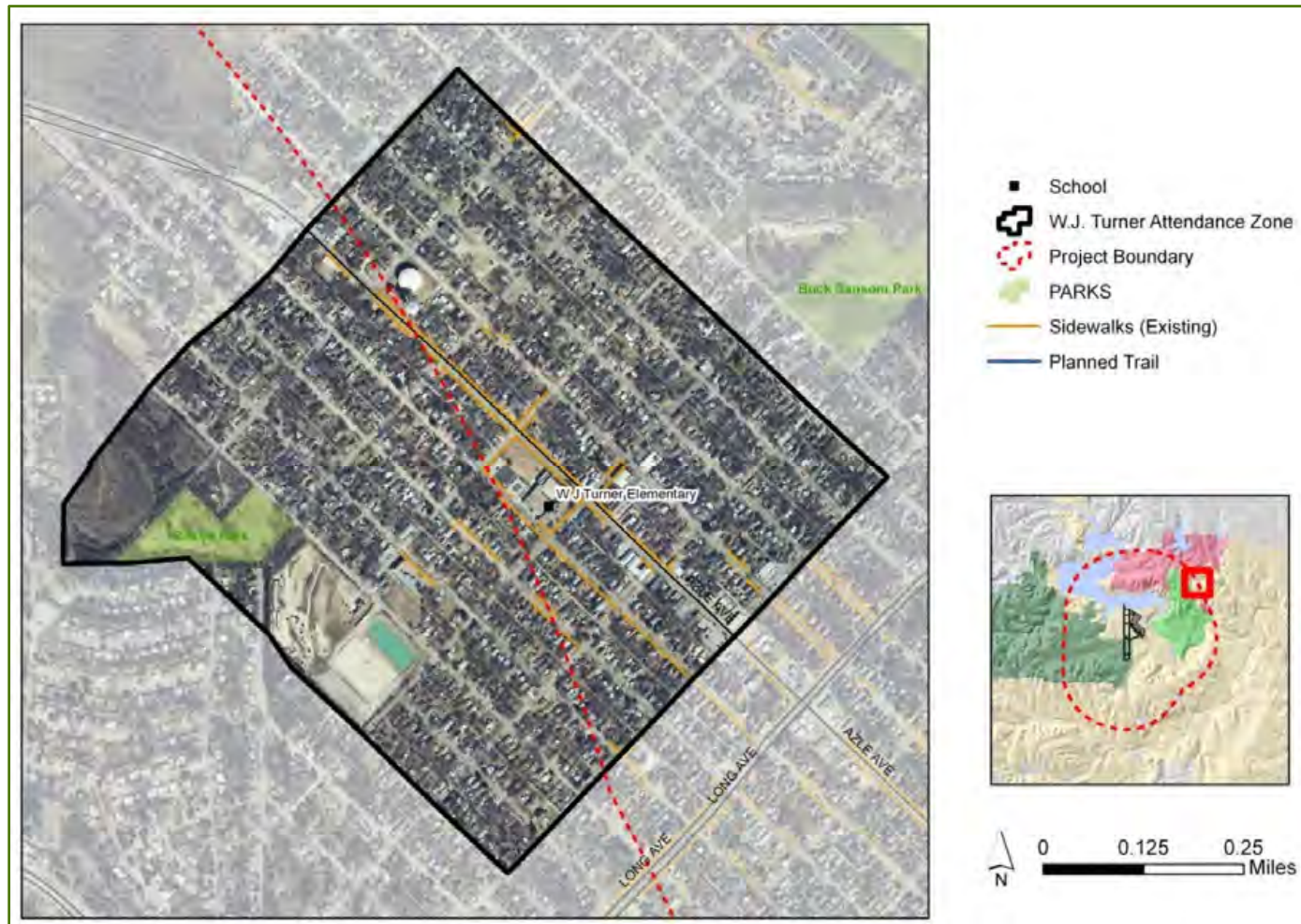


FIGURE 27: SOUTH HI MOUNT ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

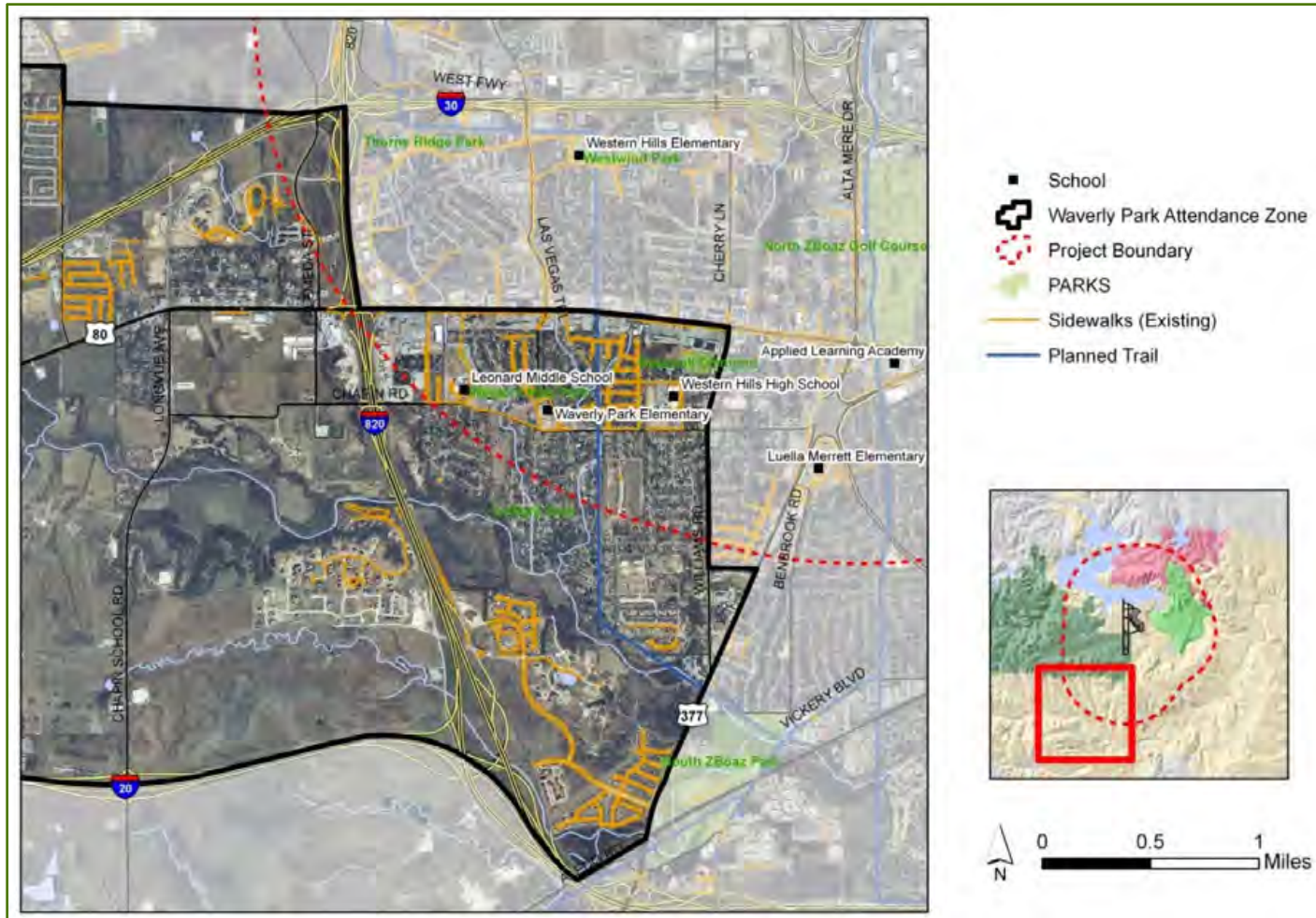
FIGURE 28: W. J. TURNER ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

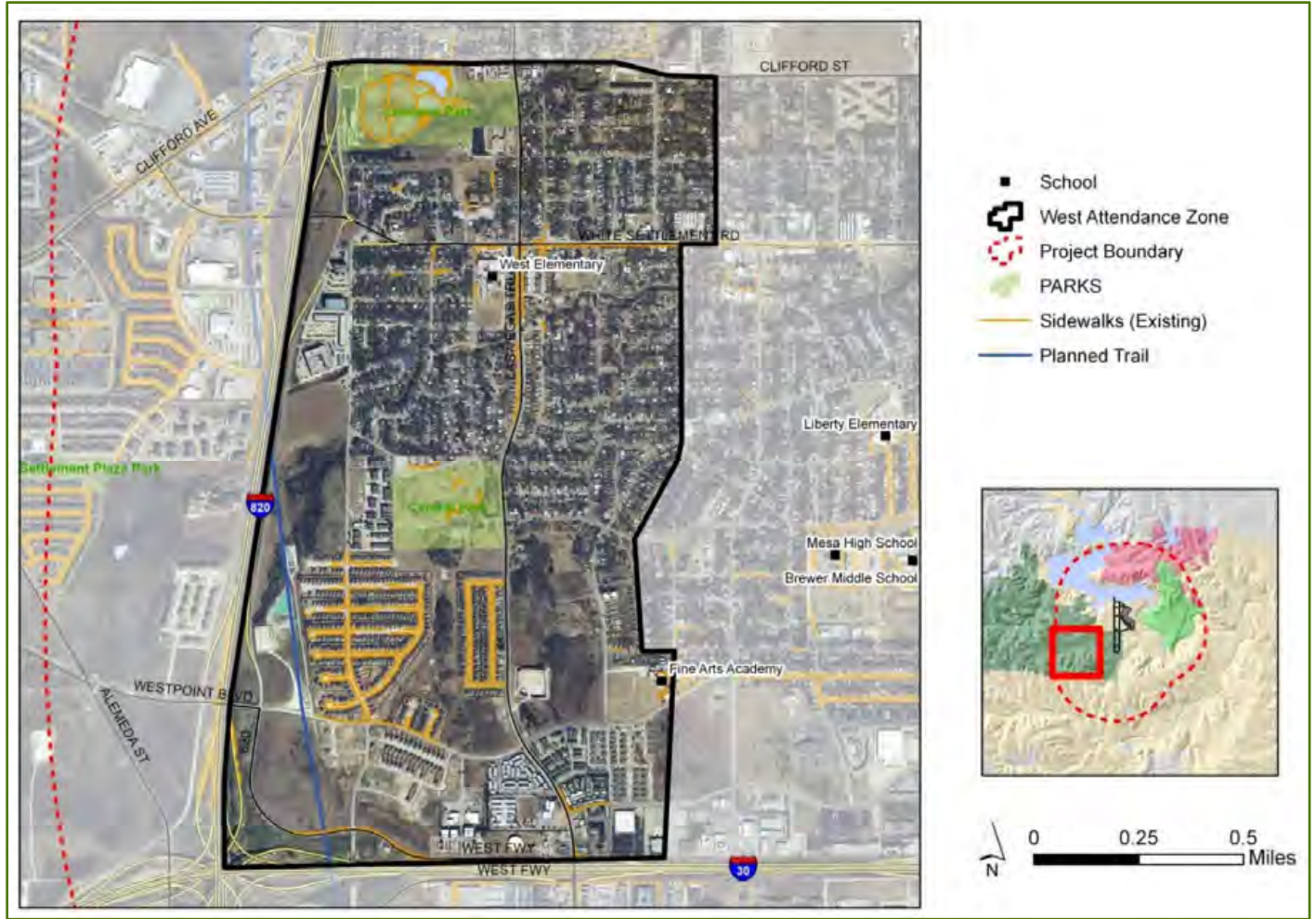


FIGURE 29: WAVERLY PARK ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG

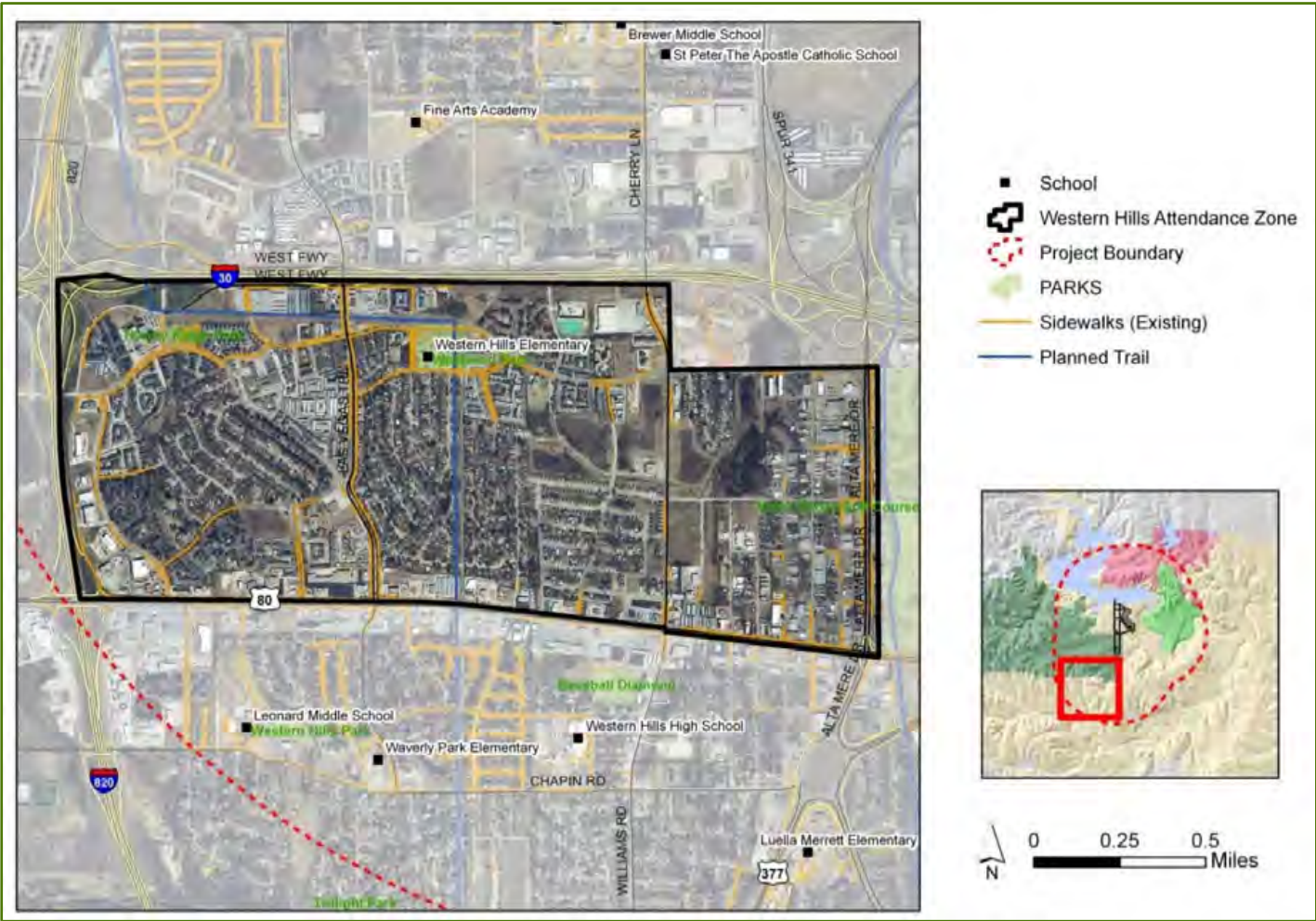
FIGURE 30: WEST ELEMENTARY SCHOOL (WHITE SETTLEMENT ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG



FIGURE 31: WESTERN HILLS ELEMENTARY SCHOOL (FORT WORTH ISD) EXISTING PEDESTRIAN FACILITIES



Source: NCTCOG



Some general conclusions from the existing pedestrian facilities maps include:

- Several of the schools (specifically elementary schools) are well sited in predominantly residential areas in the neighborhoods they serve.
- Many of the schools in the study area are located within 1,000 feet of a major arterial or highway, including 12 elementary schools and 7 middle schools. These roadways represent distinct barriers for children wishing to access schools by walking or bicycling.
  - The elementary schools currently located within 1,000 feet of a major arterial or highway are Blue Haze Elementary, Castleberry Elementary, Como Elementary, Dolores Huerta Elementary, Effie Morris Elementary, Liberty Elementary, Luella Merrett Elementary, Ridglea Hills Elementary, South Hi Mount Elementary, W.J. Turner Elementary, Waverly Park Elementary, and West Elementary.
  - The middle schools currently located within 1,000 feet of a major arterial or highway are Applied Learning Center, Brewer Middle School, Kirkpatrick Middle School, Leonard Middle School, Lucyle Collins Middle School, N.A. Howry Intermediate, and Stripling Middle School.
- Other schools not necessarily located on a major arterial or highway nevertheless have their attendance zones divided by one of these roadways, making it difficult for children residing in a given neighborhoods to access the school safely (e.g., M.L. Phillips Elementary, North Elementary).
- The cumulative area of all attendance zones included in the inventory is 97.9 square miles, and contains a population of approximately 205,006 people, including approximately 18,700 enrolled elementary and middle school students.
- A few instances exist where attendance zones are drawn such that some neighborhoods are geographically isolated from the school site (e.g., North Elementary and Waverly Park Elementary).
- The largest elementary school attendance zone in terms of area is Waverly Park Elementary (32 square miles). The smallest elementary school attendance zone is W.J. Turner Elementary (0.5 square miles). The average area of the attendance zones included in the analysis is 4.6 square miles.
- The total sidewalk density among all of the aggregated attendances zones is 0.29. The sidewalk densities range from 0.02 to 0.75, and the average sidewalk density for all of the attendance zones is 0.27.

PEDESTRIAN PATH NEAR INTERSECTION  
IN STUDY AREA



## SAFETY ANALYSIS (PEDESTRIAN AND BICYCLIST CRASH DATA NEAR SCHOOLS)

Safety is a primary concern in several locations throughout the study area. Improvements to safety, particularly in the areas immediately surrounding schools, can reduce accidents, promote active transportation, and contribute to a better quality of life. In addition to the existing facilities analysis, crash data provided by the Texas Department of Transportation (TxDOT) Crash Records Information System was analyzed to assess safety near school sites.

**Figures 33 through 53** supplement the existing pedestrian facilities data with the locations of crashes occurring in school areas from 2007 to 2011. The analysis includes reportable motor vehicle crashes defined by TxDOT as “any crash involving a motor vehicle in transport that occurs or originates on a traffic way, results in injury to or death of any person, or damage to the property of any one person to the apparent extent of \$1,000.” If an incident is not reported, or if the cost of the damage is less than \$1,000, it is not captured in the state dataset. Crashes involving pedestrians or cyclists are also indicated.

In order to better compare the frequency of crashes among the different attendance zones studies, an analysis was performed to determine the “crash density” showing the number of crashes per roadway mile for each attendance zone. The results of this analysis are shown in **Figure 32**. The crash density is similar to the sidewalk density in that it calculates crashes in relation to the existing road network. The resulting values, therefore, offer a more accurate comparison among the individual attendance zones examined in the analysis.

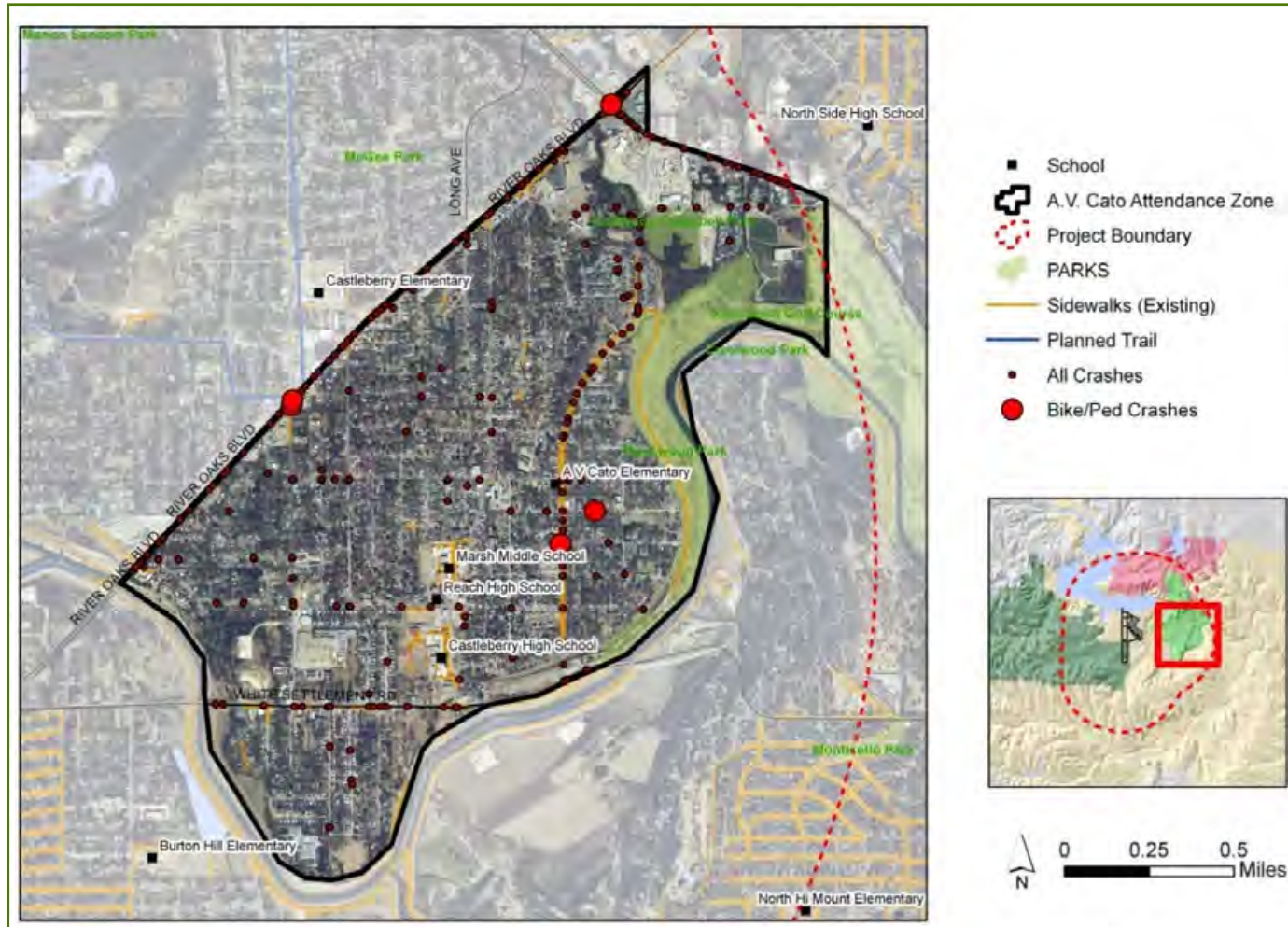
FIGURE 32: BICYCLE AND PEDESTRIAN CRASH DENSITY FOR ELEMENTARY SCHOOL ATTENDANCE ZONES

School	Total Area (Square Miles)	Total Roadway Length (Miles) <sup>1</sup>	Bike/Ped Crashes <sup>2</sup>	Bike/Ped Crash Density
A. V. Cato Elementary	2.3	39.01	5	0.13
Blue Haze Elementary	7.0	59.78	/	0.15
Burton Hill Elementary	3.1	42.00	3	0.07
Castleberry Elementary	2.2	40.82	3	0.07
Como Elementary	2.0	30.79	8	0.26
Dolores Huerta Elementary	0.7	15.54	11	0.71
Effie Morris Elementary	2.2	34.69	1	0.03
Joy James Elementary	0.9	18.54	7	0.38
Liberty Elementary	1.6	28.85	10	0.35
Luella Merrett Elementary	2.3	43.08	4	0.09
M. L. Phillips Elementary	2.2	85.29	12	0.14
Marilyn Miller Elementary	4.2	30.11	4	0.13
Marine Creek Elementary	4.2	43.27	7	0.16
North Elementary	12.0	69.61	8	0.11
North Hi Mount Elementary	4.4	79.98	14	0.18
Ridglea Hills Elementary	6.2	105.72	6	0.06
South Hi Mount Elementary	3.6	82.16	24	0.29
W. J. Turner Elementary	0.5	11.01	2	0.18
Waverly Park Elementary	32.2	170.00	17	0.10
West Elementary	1.9	30.59	4	0.13
Western Hills Elementary	2.2	45.92	20	0.44
<b>TOTAL</b>	<b>97.9</b>	<b>1,094.18</b>	<b>179</b>	<b>0.16</b>

<sup>1</sup>Unlike the “Sidewalk Density” table in Figure 9, the total roadway length in this table includes roads classified as Interstate Highways and highway access ramps.

<sup>2</sup>While bicycling and pedestrian activity are prohibited on these roadways, in some instances crashes involving bicyclists and pedestrians were reported. Since these crashes are included in the analysis above, the linear length for these roadway types is also included.

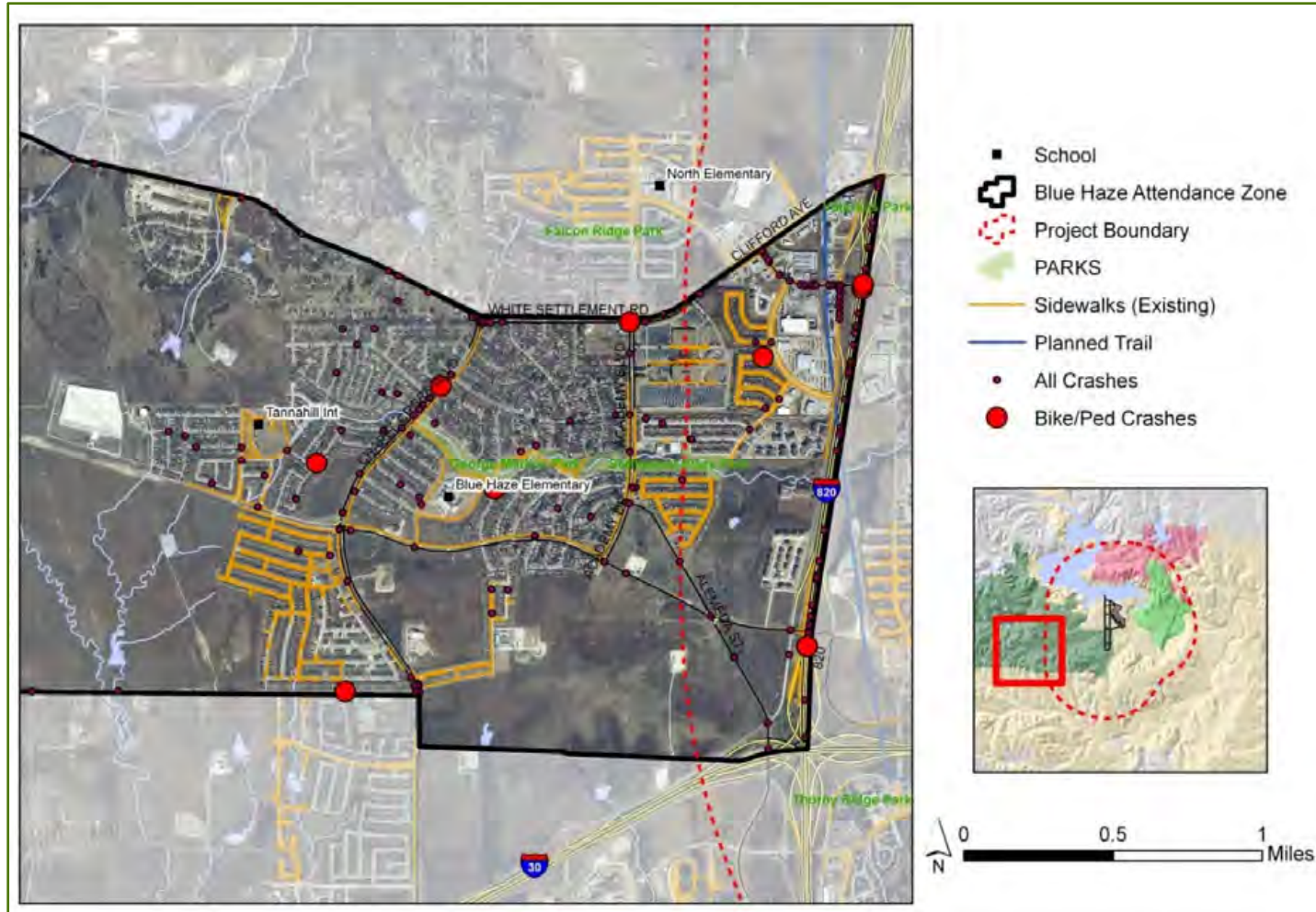
FIGURE 33: A. V. CATO ELEMENTARY SCHOOL (CASTLEBERRY ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System



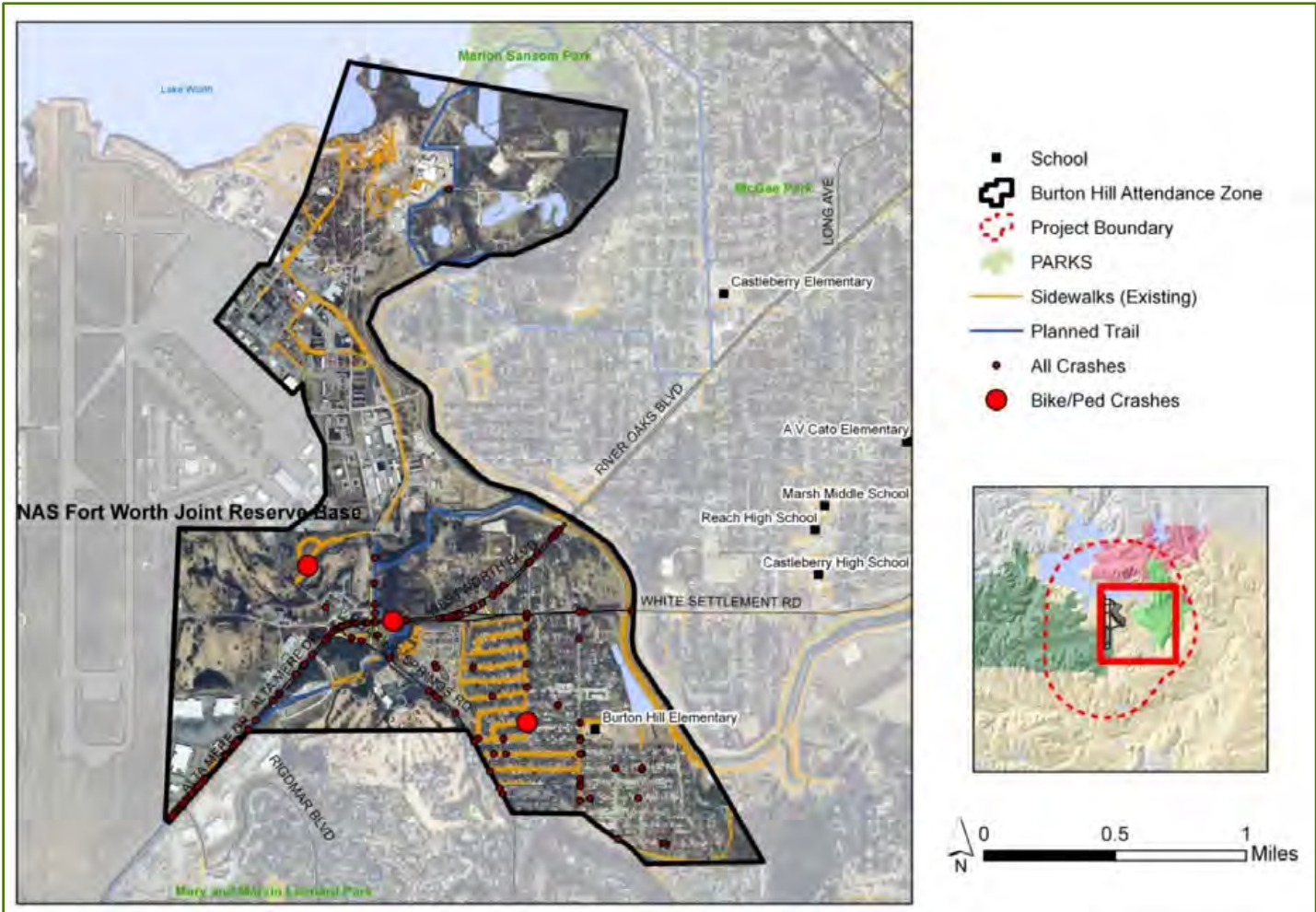
FIGURE 34: BLUE HAZE ELEMENTARY SCHOOL (WHITE SETTLEMENT ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

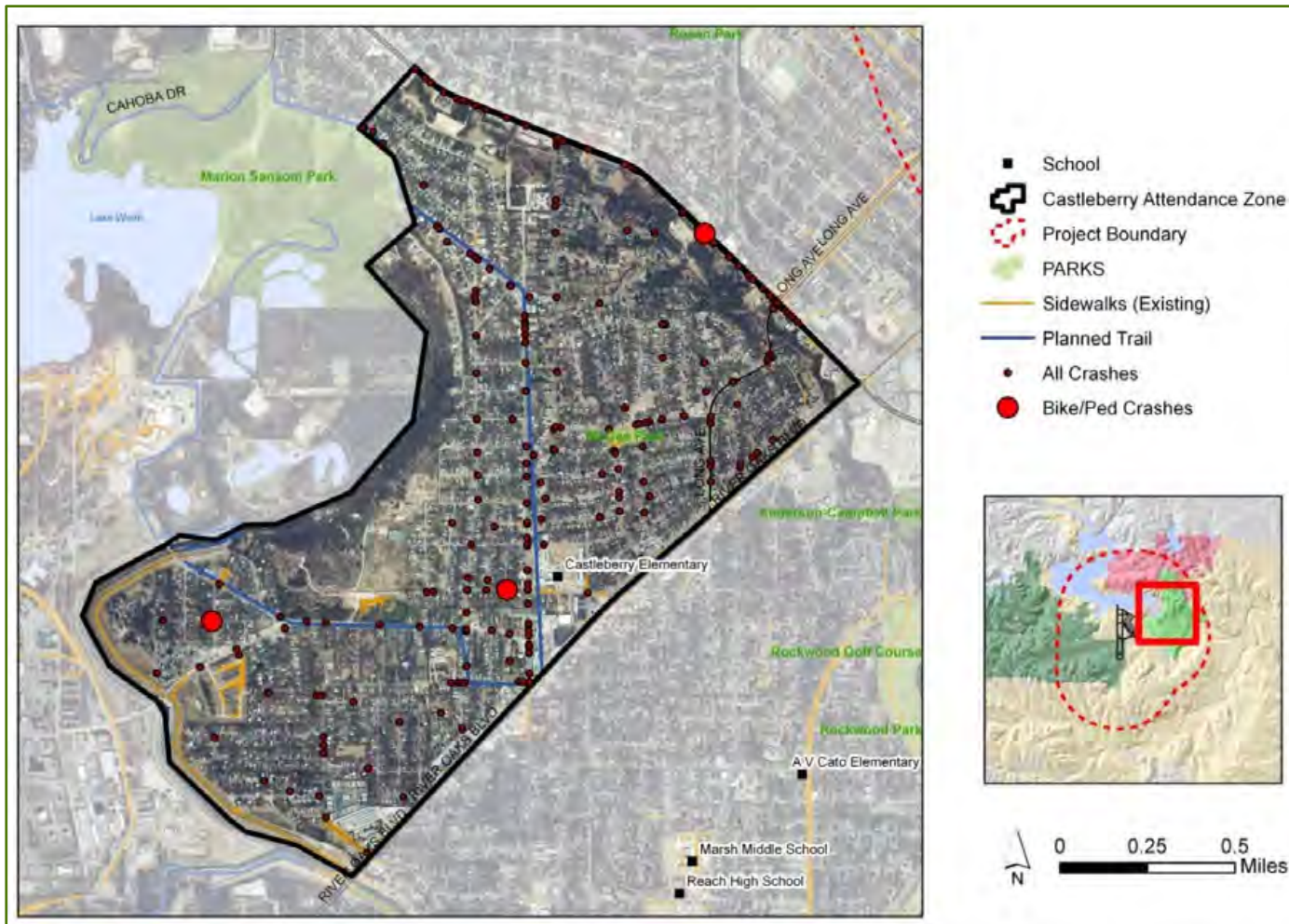


FIGURE 35: BURTON HILL ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

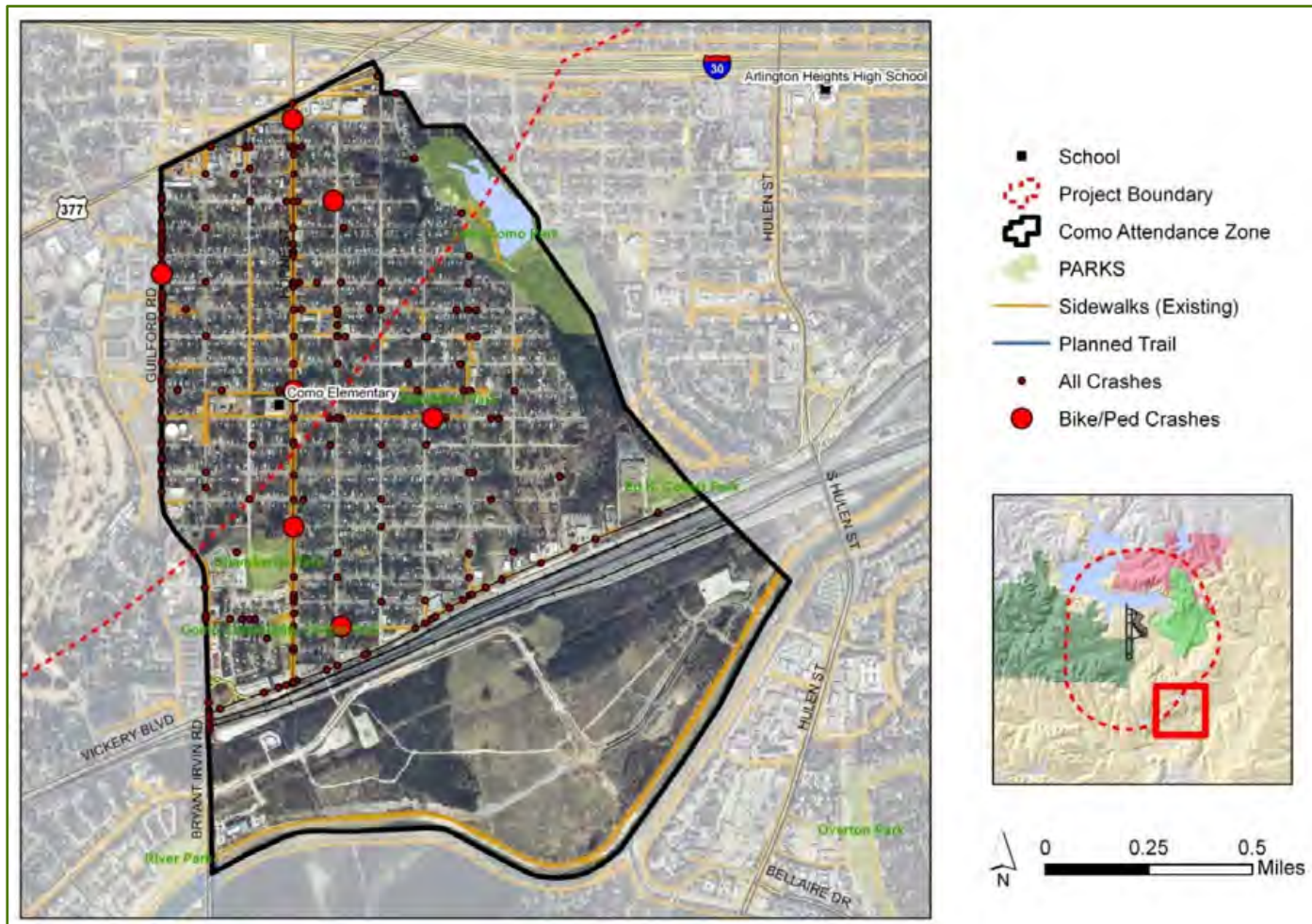
FIGURE 36: CASTLEBERRY ELEMENTARY SCHOOL (CASTLEBERRY ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

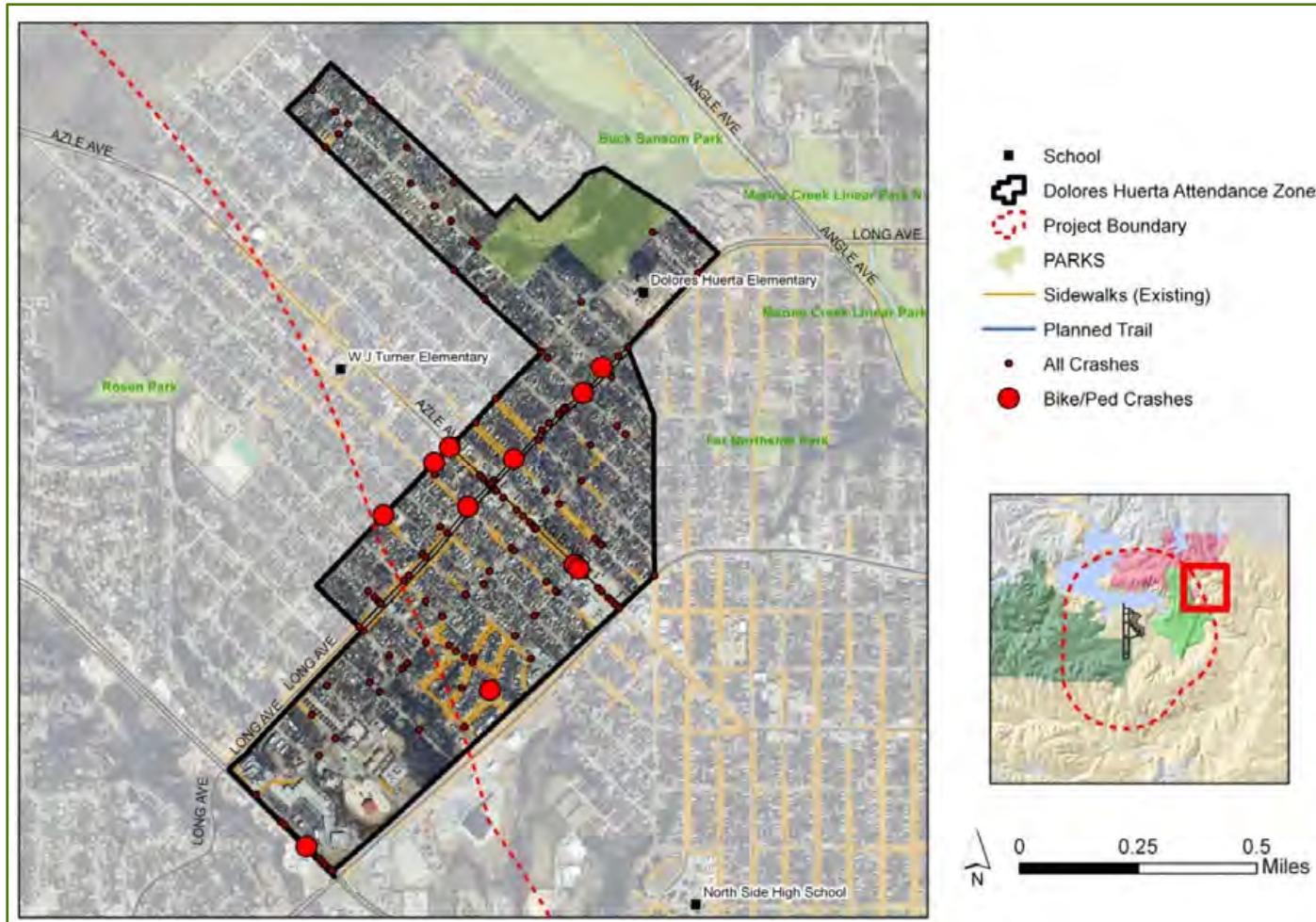


FIGURE 37: COMO ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

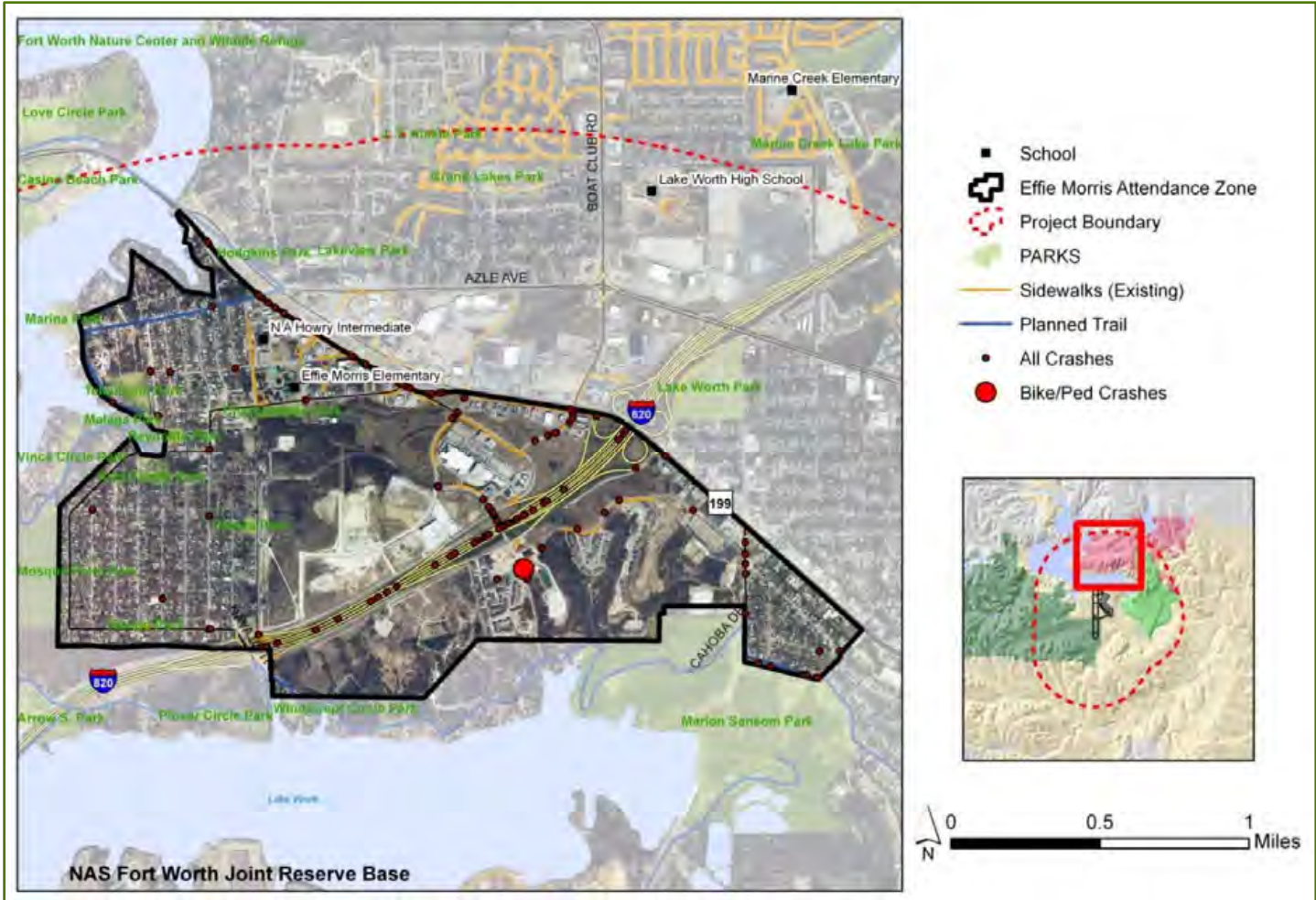
FIGURE 38: DOLORES HUERTA ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System



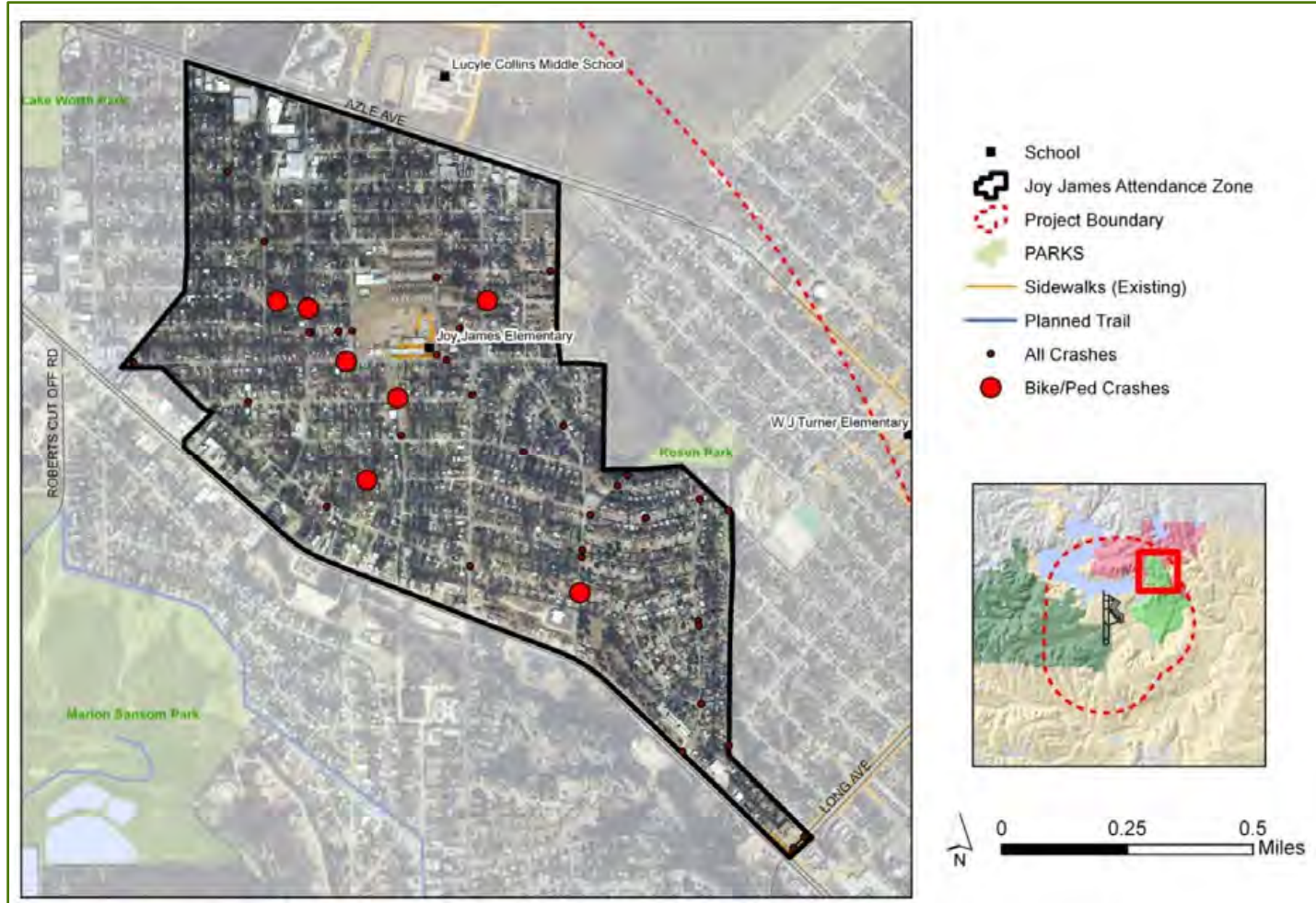
FIGURE 39: EFFIE MORRIS ELEMENTARY SCHOOL (LAKE WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

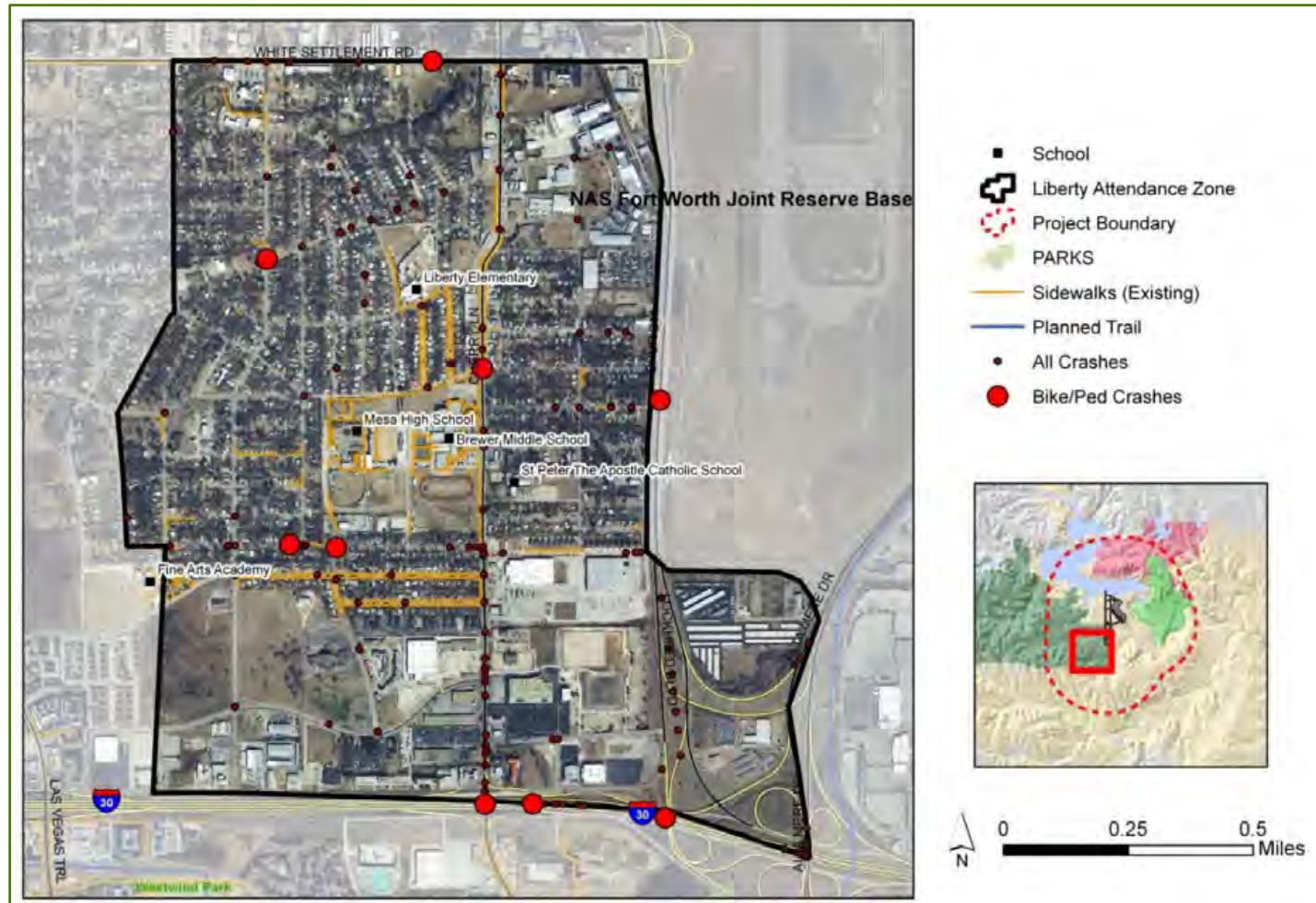


FIGURE 40: JOY JAMES ELEMENTARY SCHOOL (CASTLEBERRY ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

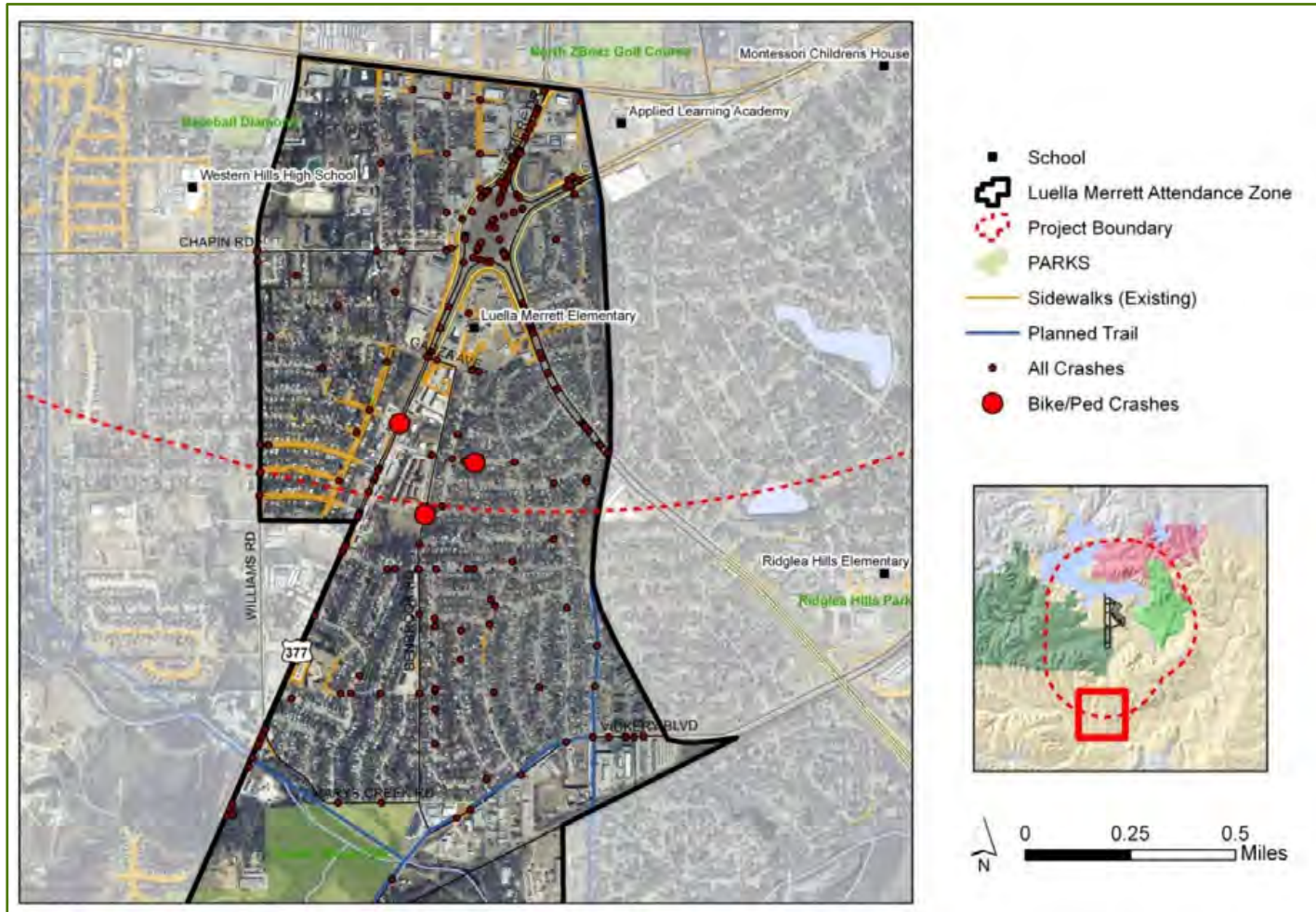
FIGURE 41: LIBERTY ELEMENTARY SCHOOL (WHITE SETTLEMENT ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

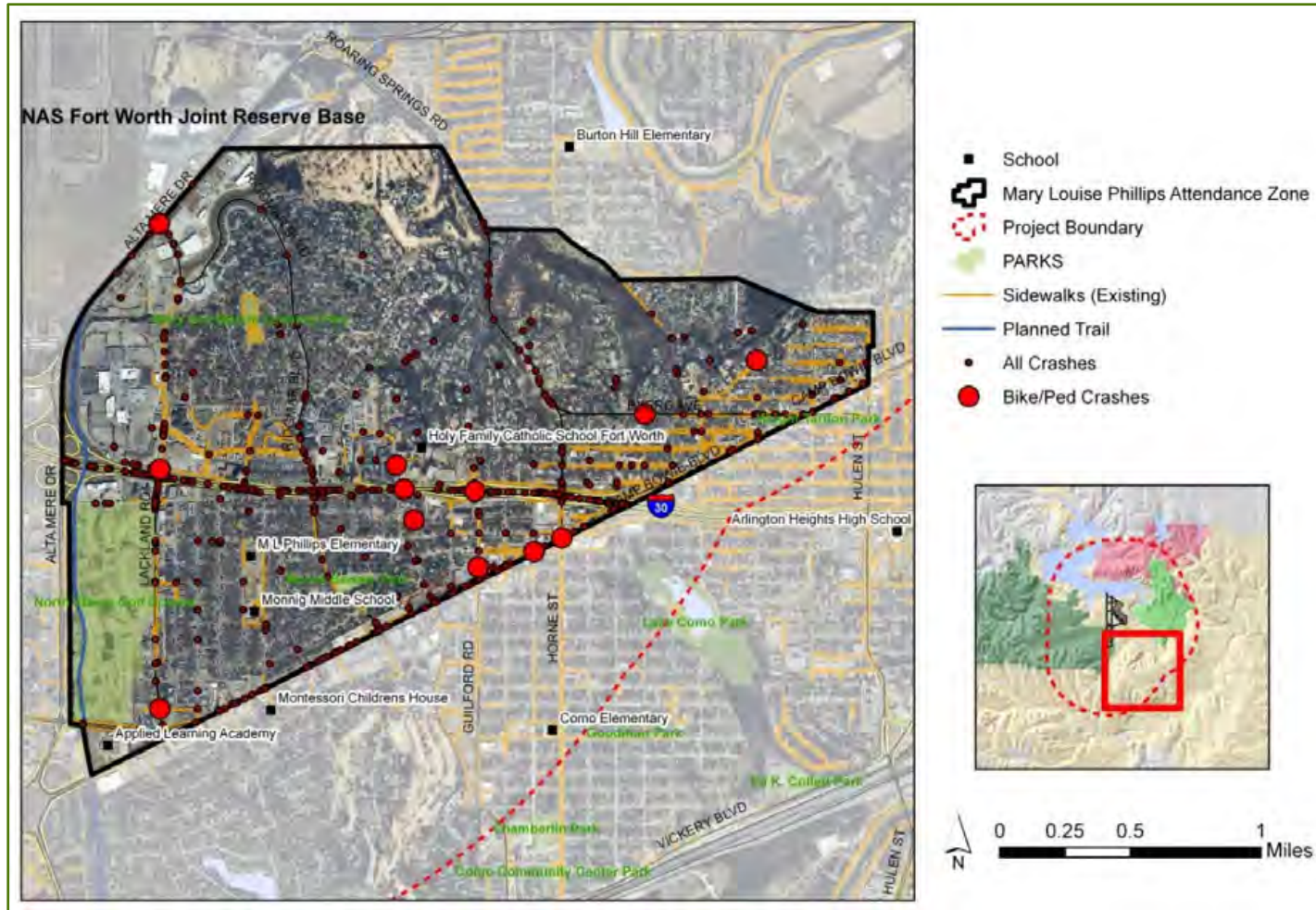


FIGURE 42: LUELLA MERRETT ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

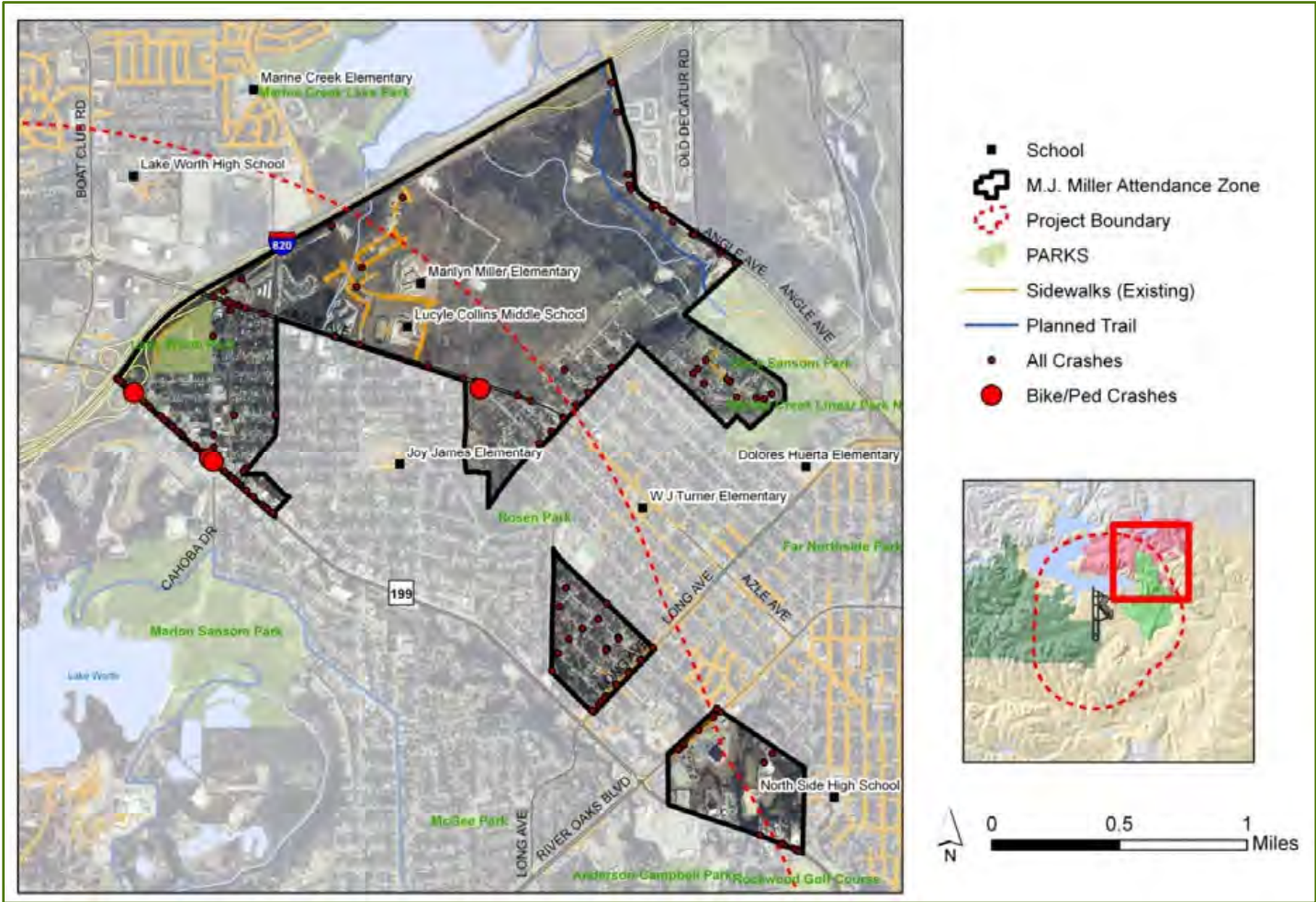
FIGURE 43: M. L. PHILLIPS ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System



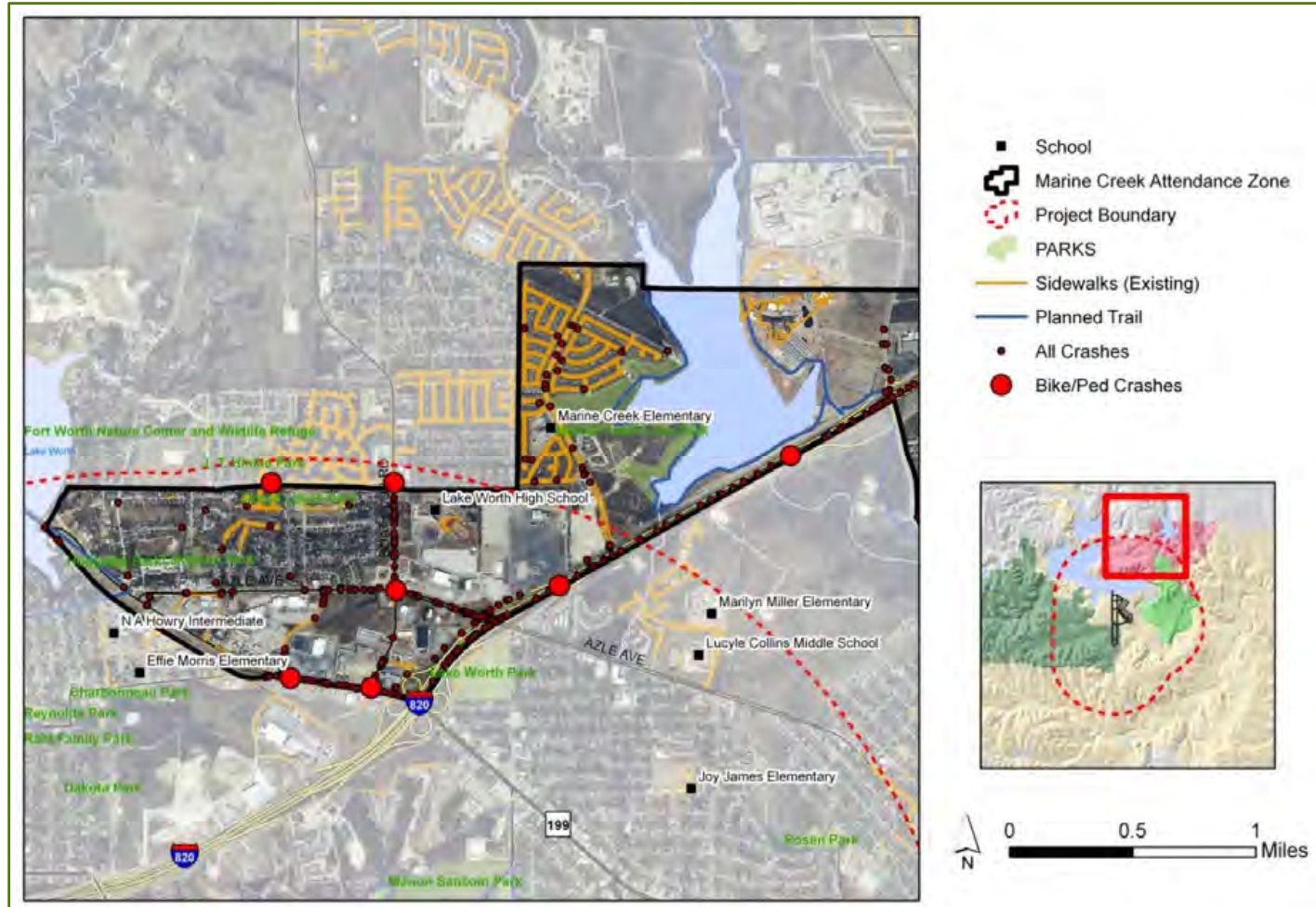
FIGURE 44: MARILYN MILLER ELEMENTARY SCHOOL (LAKE WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

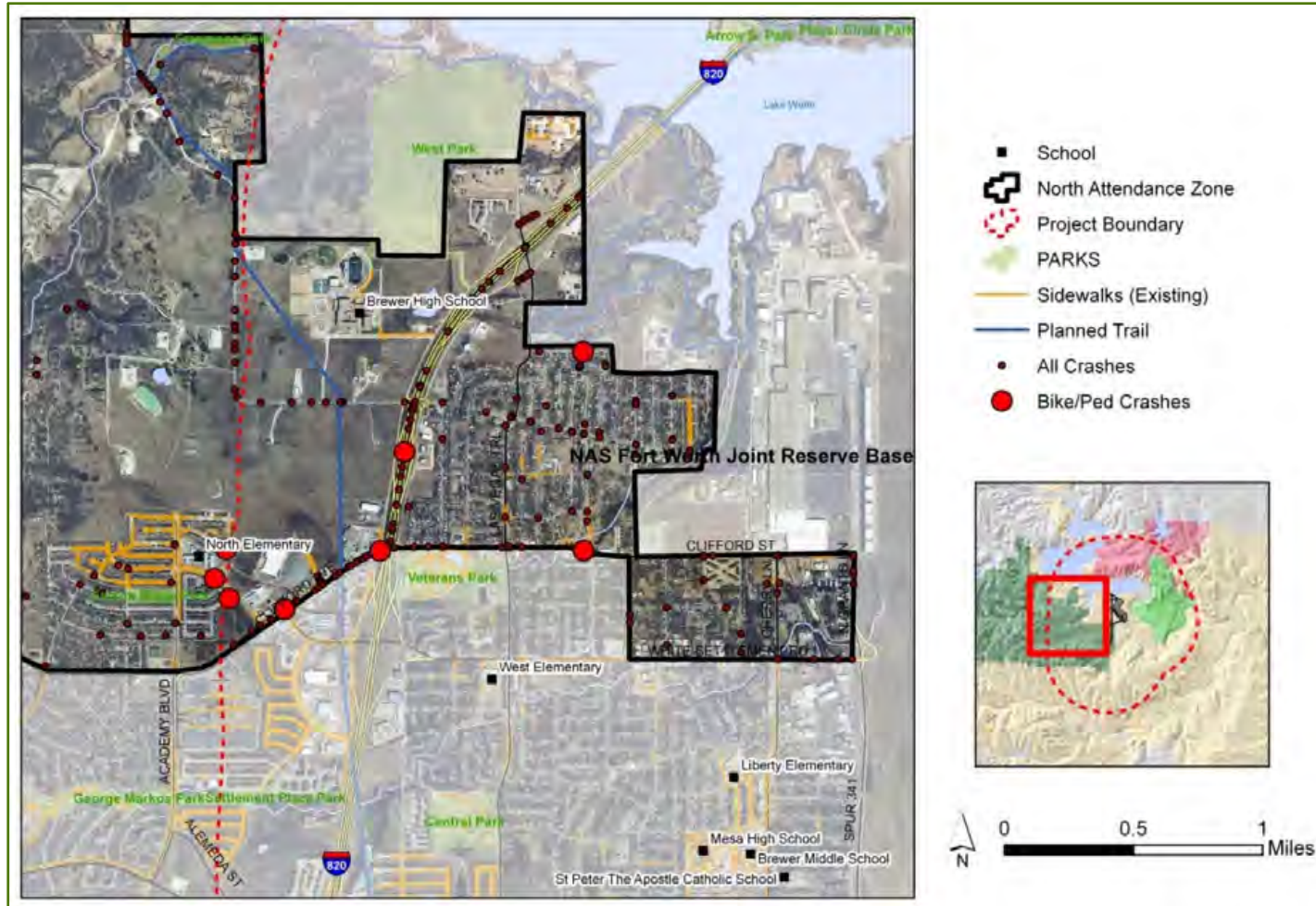


FIGURE 45: MARINE CREEK ELEMENTARY SCHOOL (LAKE WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

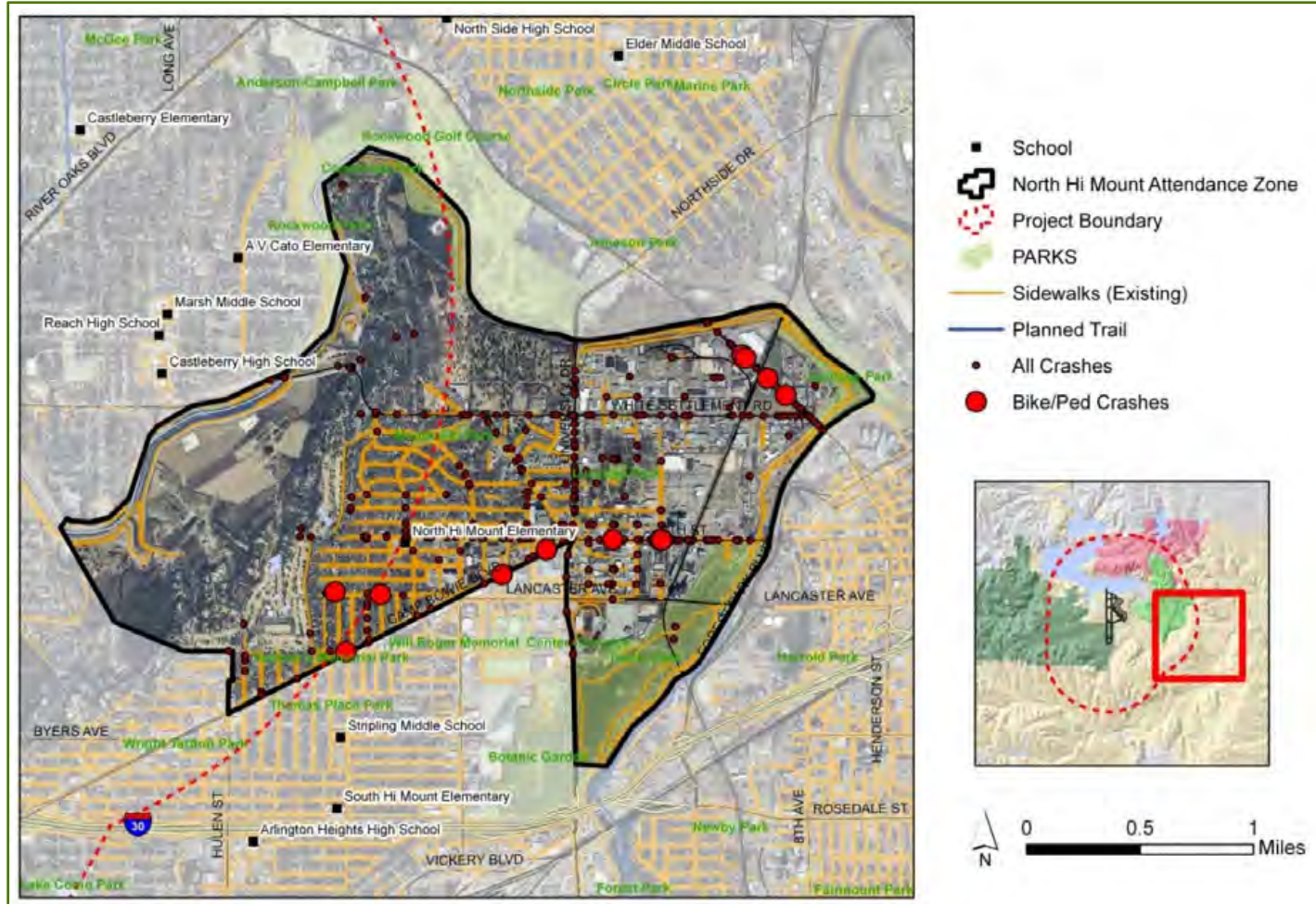
FIGURE 46: NORTH ELEMENTARY SCHOOL (WHITE SETTLEMENT ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

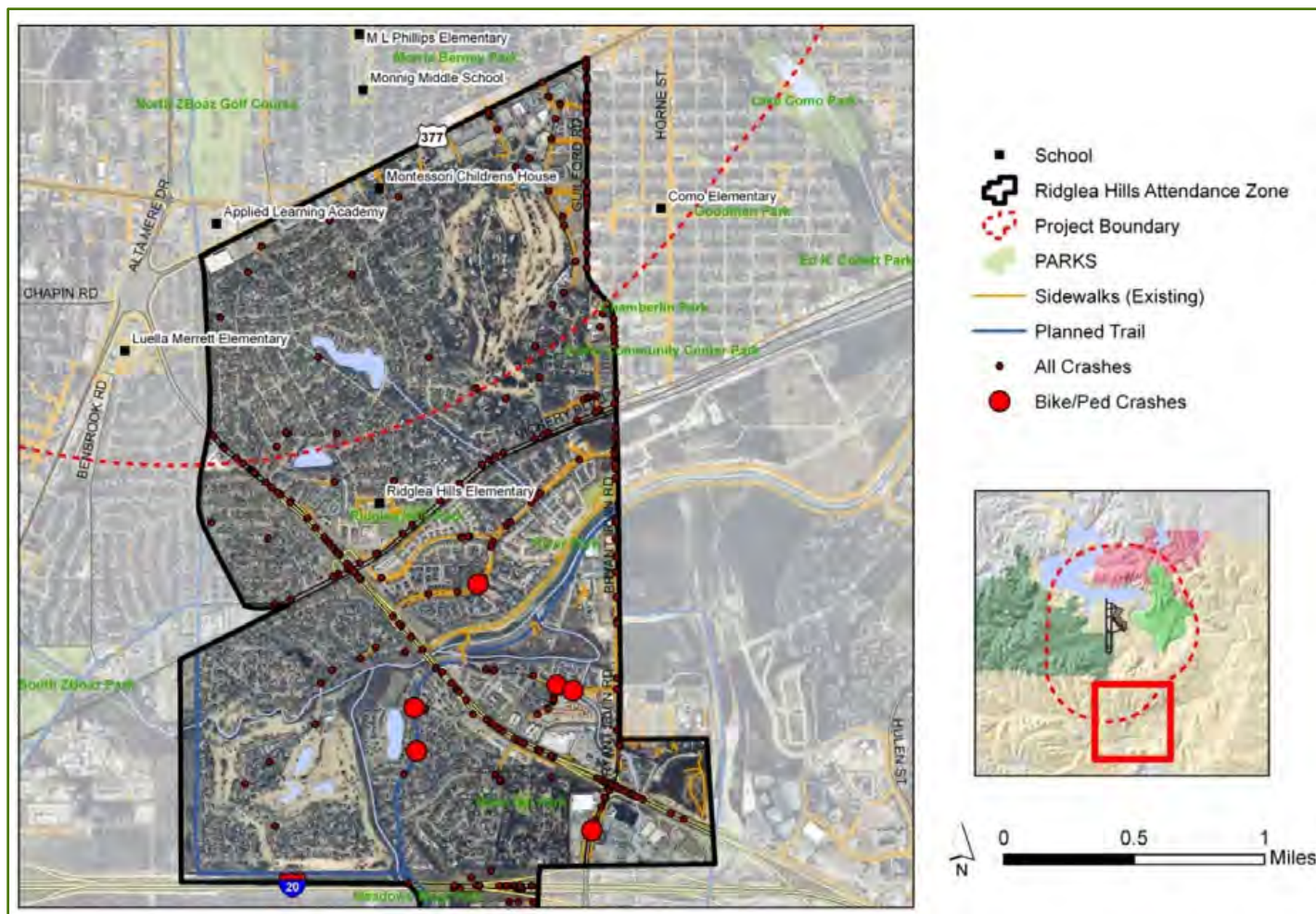


FIGURE 47: NORTH HI MOUNT ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

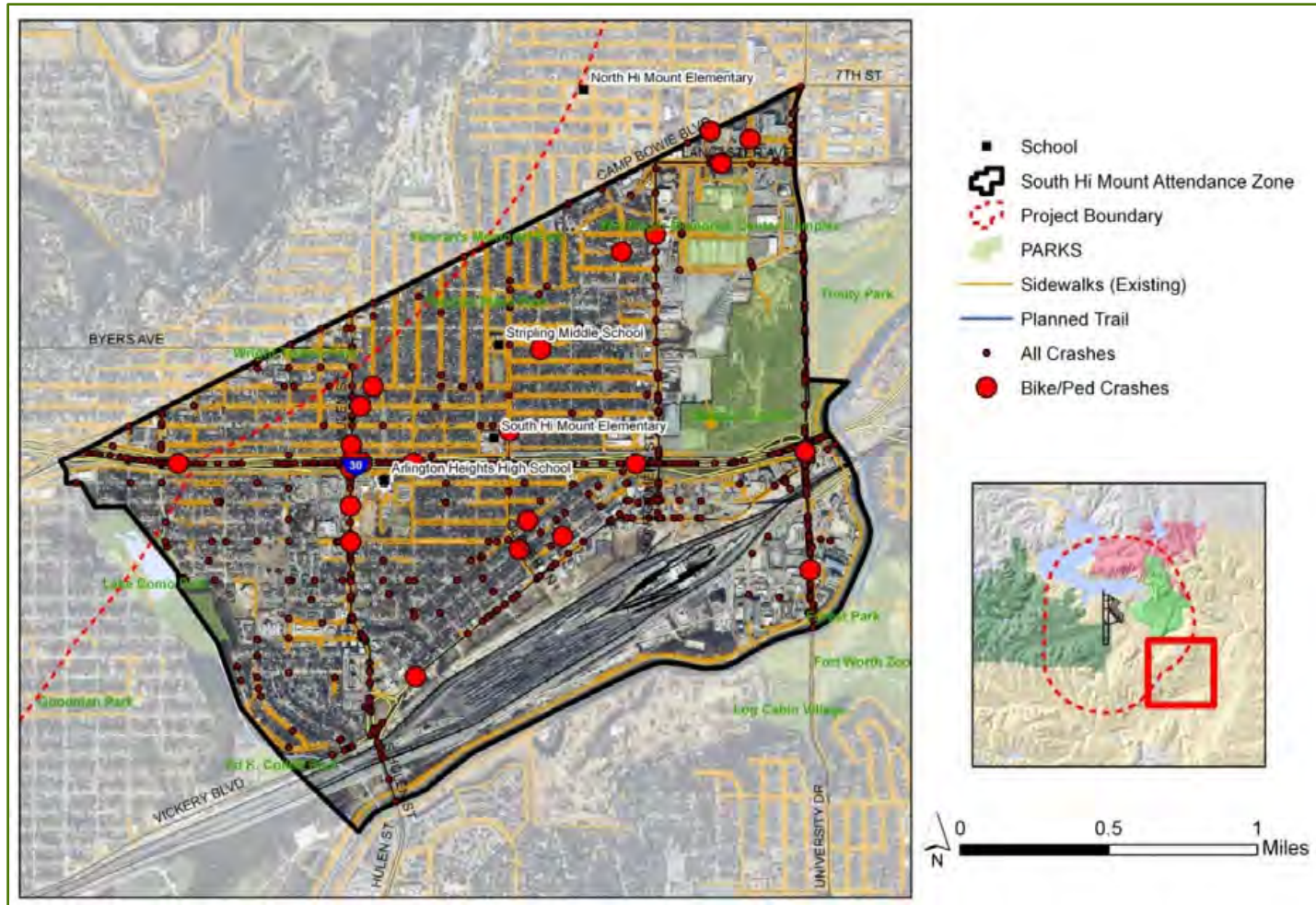
FIGURE 48: RIDGLEA HILLS ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System



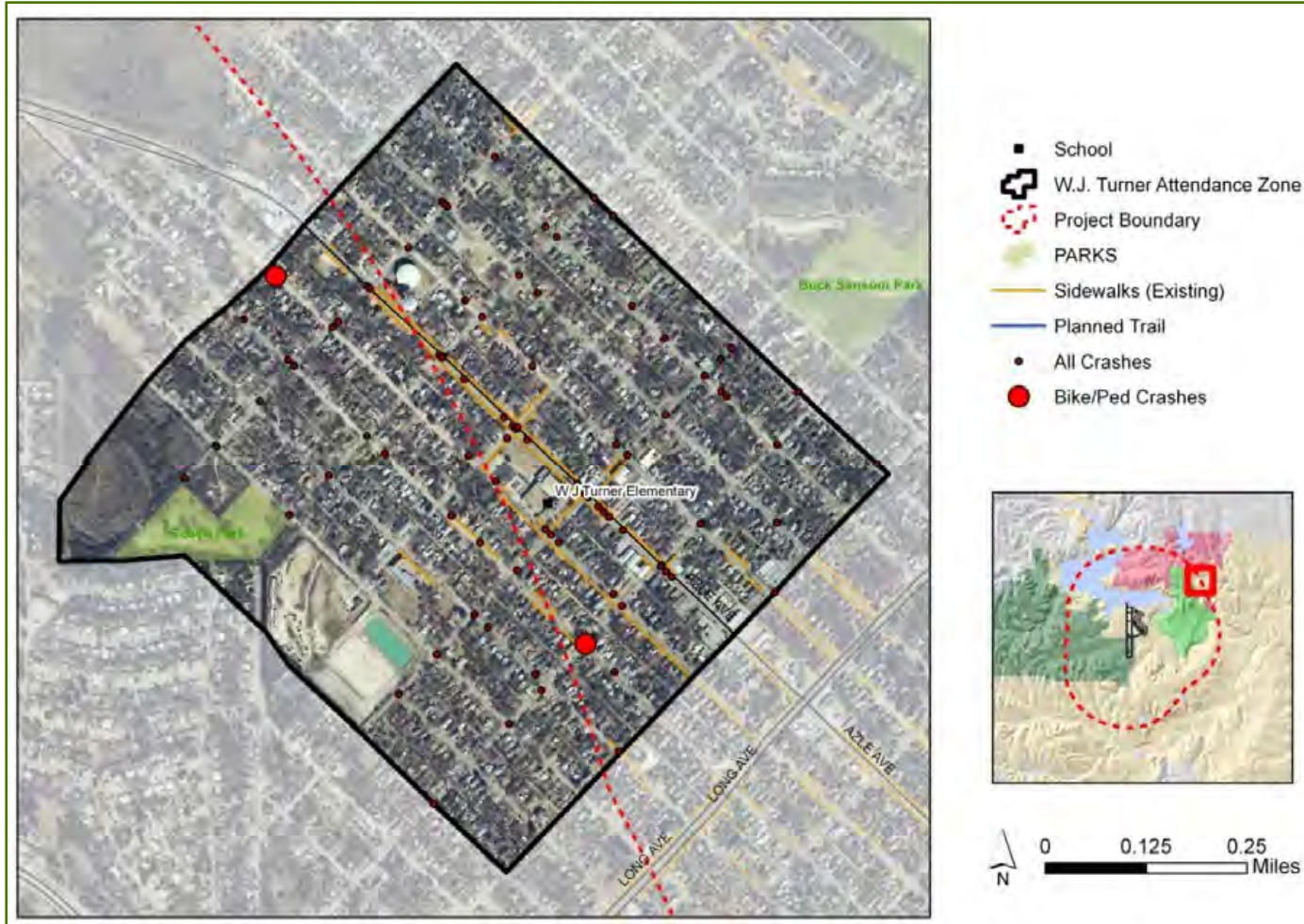
FIGURE 49: SOUTH HI MOUNT ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

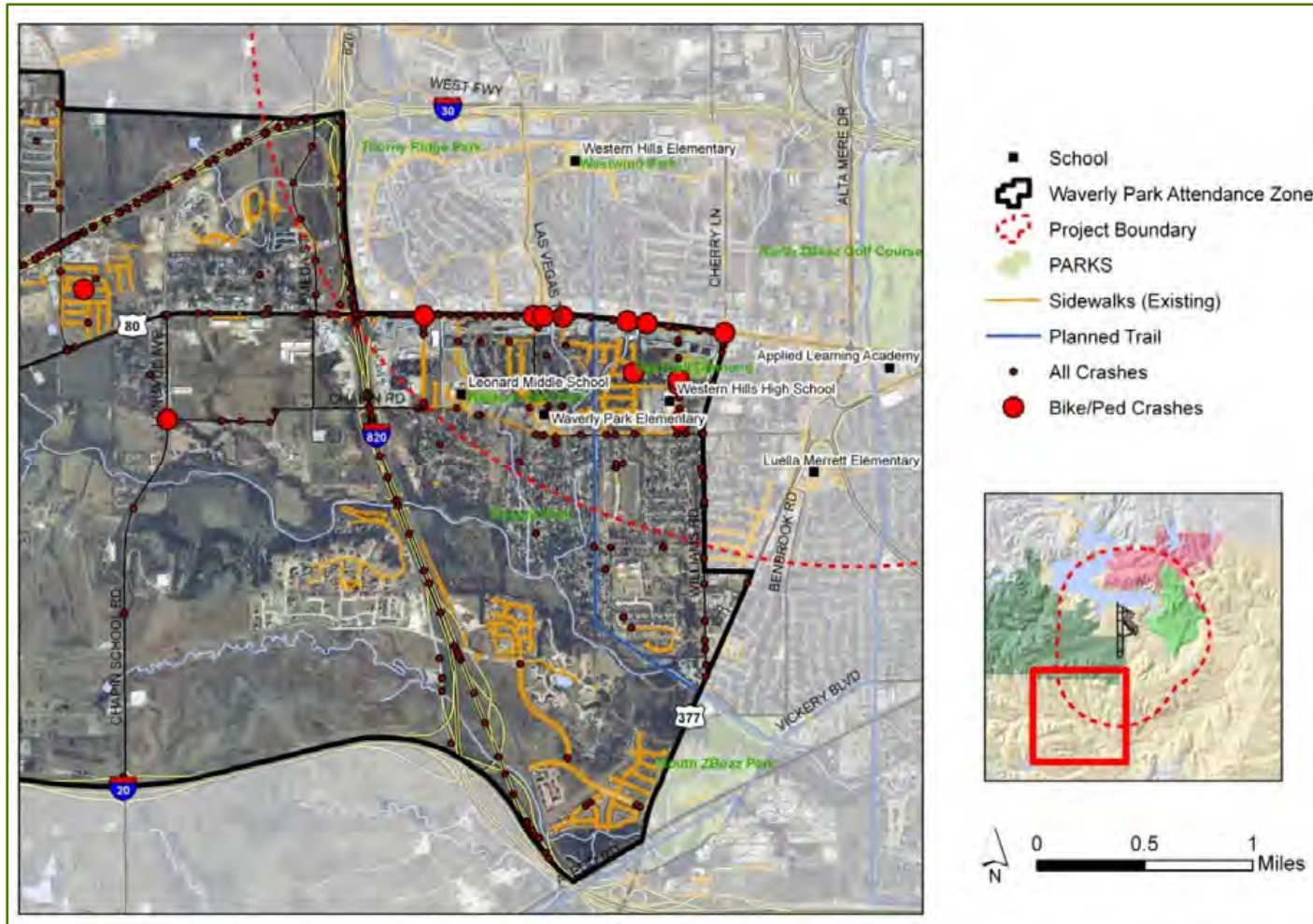


FIGURE 50: W. J. TURNER ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

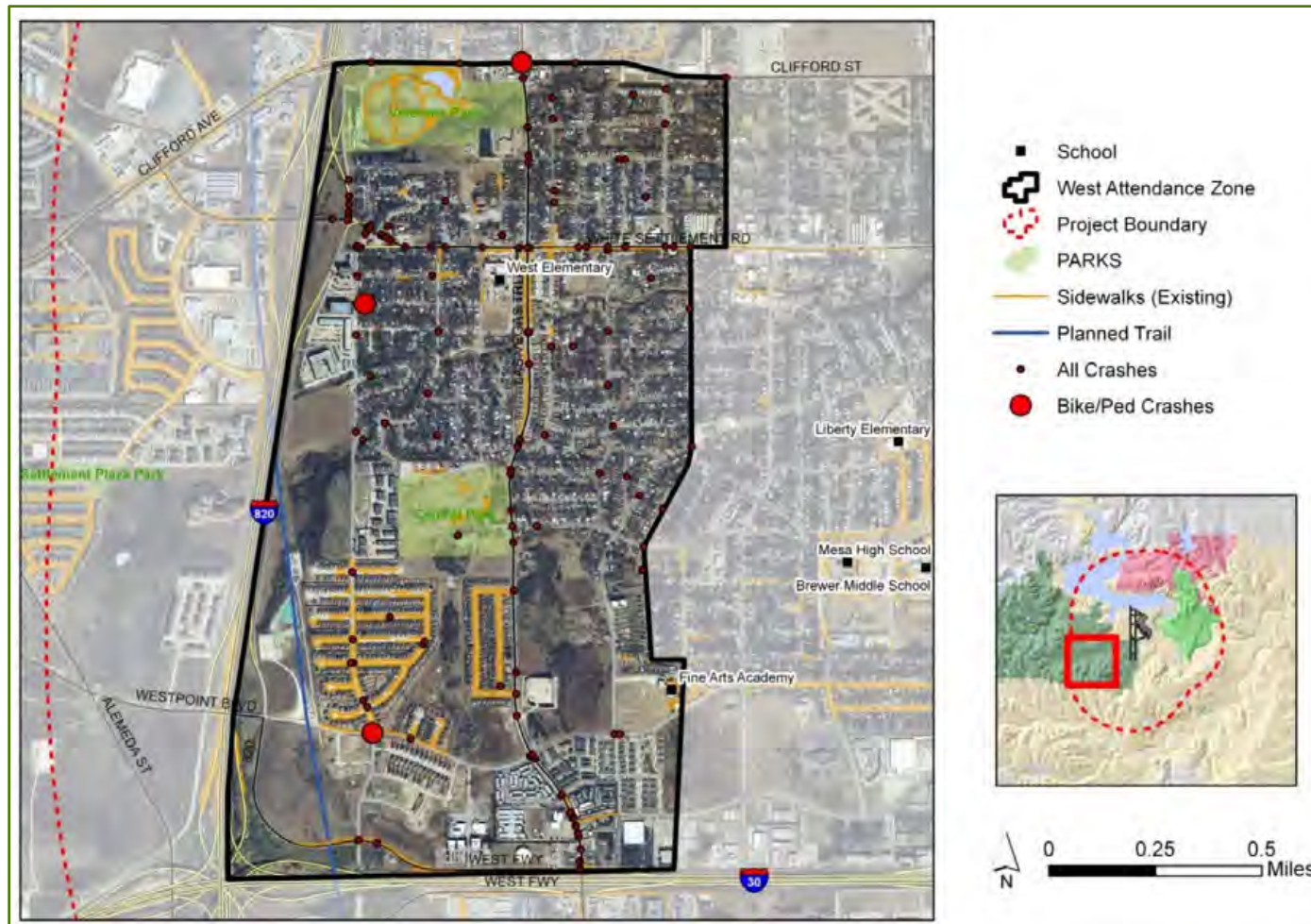
FIGURE 51: WAVERLY PARK ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

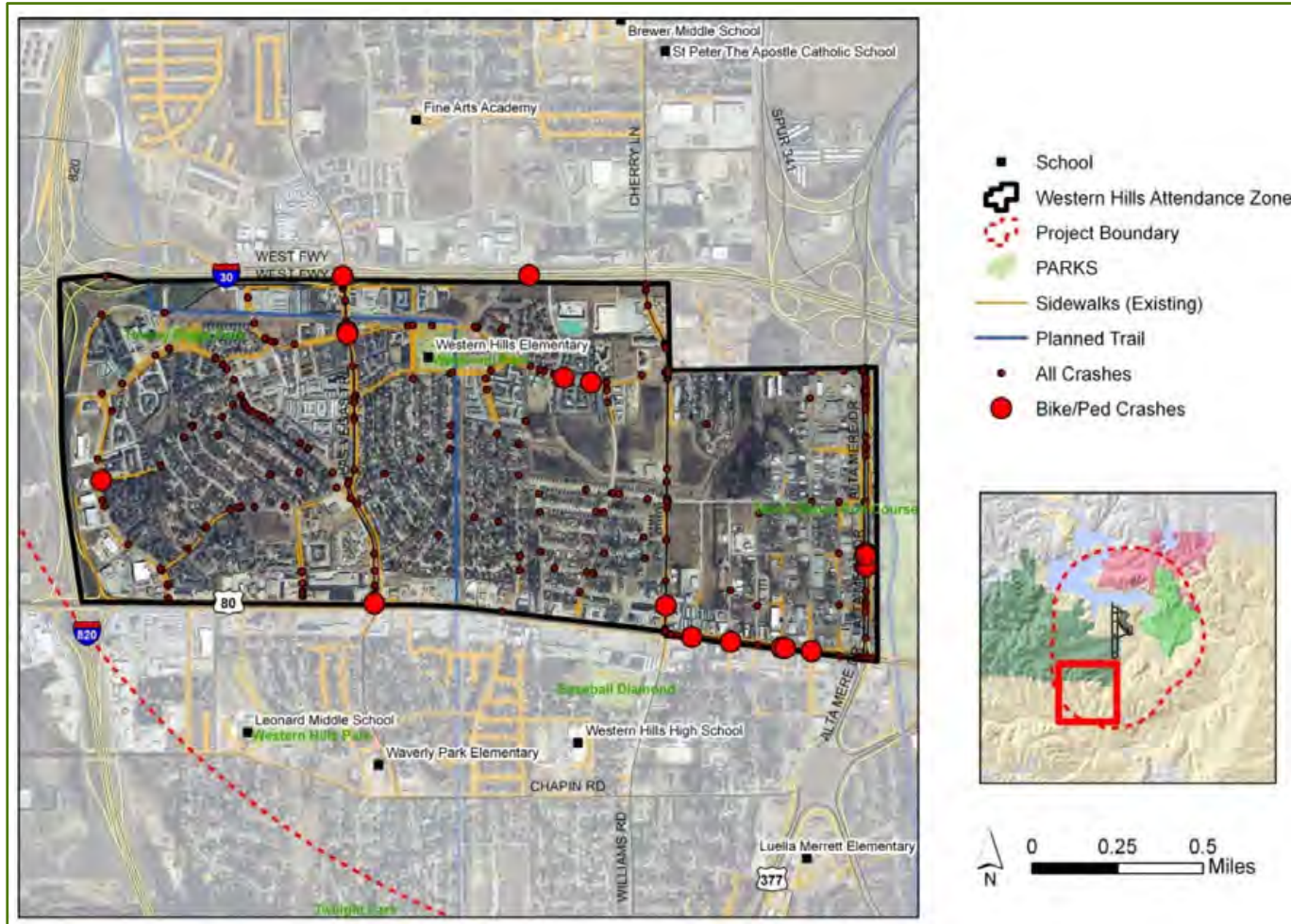


FIGURE 52: WEST ELEMENTARY SCHOOL (WHITE SETTLEMENT ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

FIGURE 53: WESTERN HILLS ELEMENTARY SCHOOL (FORT WORTH ISD) CRASH DATA, 2007-2011



Source: NCTCOG and TxDOT Crash Records Information System

Some general conclusions from the safety data maps include:

- The total number of crashes among all of the combined attendance zones was 10,970. The total number of crashes involving bicyclists or pedestrians among all of the combined attendance zones was 186 (1.7 percent).
- The total number of crashes occurring within one-fourth mile of a school was 1,311. The total number of crashes involving bicyclists or pedestrians occurring within one-fourth mile of a school was 41 (3.1 percent).
- Twenty-two percent of all bicyclist/pedestrian crashes in the study area occurred within one-fourth mile of a school.
- According to TxDOT, data, among all crashes involving bicyclists or pedestrians, 14 (7.5 percent) resulted in a fatality and 43 (23 percent) resulted in an incapacitating injury.
- Sixty-two percent (115) of all crashes involving bicyclists or pedestrians occurred during daylight conditions.
- The total crash density among all of the aggregated attendance zones was 0.16 for crashes involving bicyclists or pedestrians. (This means that during the analysis period from 2007 to 2011, 0.16 crashes involving bicyclists or pedestrians occurred for every roadway mile within the study area.) The crash densities ranged from 0.03 to 0.71, and the average crash density for all of the attendance zones was 0.20.
- **Figure 54** shows all crashes involving bicyclists or pedestrians documented by the day of the week:

FIGURE 54: ALL CRASHES INVOLVING BICYCLISTS OR PEDESTRIANS, 2007-2011

Day	Number of Crashes
Sunday	21
Monday	27
Tuesday	31
Wednesday	27
Thursday	26
Friday	29
Saturday	25
<b>TOTAL</b>	<b>186</b>

Source: TxDOT



## BEST PRACTICES FOR IMPROVING ACCESSIBILITY AND SAFETY AROUND SCHOOLS

A variety of programs exist to help communities promote safety and active transportation in school areas. One critical component to achieving these goals is coordination among various stakeholders. As noted at the beginning of this section, the boundaries of ISDs do not necessarily match those of the cities they serve. Confusion and uncertainty stemming from the overlapping boundaries of multiple municipalities and ISDs can often be a barrier to school siting and implementing effective safety measures. Cities must balance the individual needs of each of the districts within their boundaries, as well as respond to the infrastructure demands created by new and existing schools. Likewise, overlapping boundaries require ISDs to understand the local planning processes in multiple cities. However, when school districts, city staff, parents, and other members of the community are engaged on common interests, they can achieve mutual benefits.

Ongoing and institutionalized coordination among these stakeholders is a good first step to fostering safe transportation environments in school areas. The International City/County Management Association published *Local Governments and Schools: A Community-Oriented Approach* in 2008.<sup>5</sup> This guide provides a series of steps (paraphrased below) to help local governments familiarize themselves with the local school siting process:

- Obtain and review a copy of the school district's facility master plan to determine consistencies with the city's plan and whether the same data is being used.
- Understand how school investments are made by comparing school plans to the local capital improvements plan.
- Research what state and/or local policies affect school investment decisions and distinguish between rules and suggested guidelines.
- Find out how school districts allocate maintenance costs and figure out ways for the city to support maintenance at existing schools.
- Educate school board members and local planning officials on the challenges and shared benefits related to school siting. Help school officials understand the city's relationship with land developers.
- Collaborate with school districts on bond proposals that meet broader community needs. This collaboration can often lead to bond initiatives that have stronger support from local citizens.
- Encourage local planning officials to be proactive in reviewing school project proposals to ensure that the projects address community needs related to infrastructure, safety, and transportation.

### SAFE ROUTES TO SCHOOL – OVERVIEW

One proven program for promoting safety and encouraging active transportation among students traveling to and from school is the Safe Routes to School Program. Safe Routes to School (SRTS) is a movement aimed at creating safe, convenient, and fun ways for children to walk and bike to school. SRTS programs do more than simply encourage daily physical activity; successful programs integrate operational and physical improvements with education and Program to build public infrastructure like bike lanes, sidewalks, and paths, and to run education and encouragement programs that promote walking and

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<sup>5</sup> International City/Council Management Association. "Local Governments and Schools: A Community-Oriented Approach." *ICMA IQ Report* Volume 40/Special Edition (2008).

bicycling. A key component of a successful SRTS program requires cities and ISDs to form a plan of action that addresses specific barriers to accessibility for children bicycling or walking to and from school.

The Federal Highway Administration (FHWA) recommends that Safe Routes to School programs incorporate the five components listed below:

**Engineering:** Creating operational and physical improvements to the infrastructure surrounding schools that reduce speeds and potential conflicts with motor vehicle traffic, and establish safer and fully accessible crossings, walkways, trails, and bikeways.

**Education:** Teaching children about the broad range of transportation choices, instructing them in important lifelong bicycling and walking safety skills, and launching driver safety campaigns in the vicinity of schools.

**Encouragement:** Using events and activities to promote walking and bicycling.

**Enforcement:** Partnering with local law enforcement to ensure traffic laws are obeyed in the vicinity of schools (this includes enforcement of speeds, yielding to pedestrians in crossings, and proper walking and bicycling behaviors), and initiating community enforcement such as crossing guard programs.

**Evaluation:** Monitoring and documenting outcomes and trends through the collection of data, including the collection of data before and after the intervention(s).

Implementing a successful Safe Routes to School Program requires a network of people and agencies working together. The Safe Routes to School National Partnership published a guidebook, *Getting Students Active Through Safe Routes to School – Policies and Action Steps for Education Policymakers and Professionals*. The guide outlines some of the important strategies for developing a successful program at the local level:

1. Create a Safe Routes to School team and start planning. (Teams should include staff members from ISDs and cities, as well as members of the community like parents, teachers, and students.)
2. Document safety problems around the school and parental concerns.
3. Make needed short-term safety improvements.
4. Map “safer walking routes” or create “walking school buses”.
5. Hold pedestrian and bicycle safety education workshops.
6. Step up traffic safety enforcement.
7. Build excitement through small promotional contests and activities.
8. Apply for funding for longer term, more costly improvements.

#### PEDESTRIAN TREATMENTS NEAR SCHOOL SITE



Source: [www.bikepedimages.org/DanBurden](http://www.bikepedimages.org/DanBurden)

Many of the schools in the study area – particularly elementary schools – are good candidates for Safe Routes to School or other programs aimed at encouraging and enabling more children to walk or bike to and from school. First, many students live within a reasonable walking distance to school. In a 2004 study conducted by the US Centers for Disease Control and Prevention, parents reported that the two primary barriers to children walking to school were distance (62 percent) followed by traffic-related danger (30 percent).<sup>6</sup> As the existing pedestrian facilities maps in this section indicate, most of the elementary schools in the study area have relatively small attendance zones. This means that most of the students attending these schools live less than one mile from school. Second, the existing schools in the study area are primarily located in residential areas, as shown in **Figure 55**. These two factors indicate that a “target population” exists that would likely be well disposed to benefit from Safe Routes to School or other interventions that promote safe walking and biking to and from school.

FIGURE 55: EXAMPLES OF ELEMENTARY SCHOOLS IN THE STUDY AREA LOCATED IN PREDOMINANTLY RESIDENTIAL NEIGHBORHOODS



Source: NCTCOG

<sup>6</sup> US Centers for Disease Control and Prevention, “Barriers to Children Walking to or from School – United States 2004,” *Morbidity and Mortality Weekly Report* (September 30, 2005), <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5438a2.htm>.

## SAFE ROUTES TO SCHOOL – GETTING STARTED

The federal SRTS Program (administered by TxDOT) is divided into two primary project categories: infrastructure and non-infrastructure. The maximum allowable percentage of funds available for non-infrastructure projects is 30 percent. **Figure 56**, below, provides a general overview of these two funding categories.

FIGURE 56: SAFE ROUTES TO SCHOOL PROGRAM OVERVIEW

Maximum Award per Application	INFRASTRUCTURE PROJECTS	NON-INFRASTRUCTURE PROJECTS
	\$500,000	\$100,000
Eligible Applicants	<ul style="list-style-type: none"> <li>• Schools (public and private)</li> <li>• School Districts</li> <li>• Cities</li> <li>• Counties</li> <li>• State Agencies</li> <li>• Regional Planning Councils</li> <li>• Metropolitan Planning Organizations</li> <li>• Public and Non-Profit Entities Working on Behalf of Schools</li> <li>• For Profit Organizations</li> </ul>	<ul style="list-style-type: none"> <li>• Schools (public and private)</li> <li>• School Districts</li> <li>• Cities</li> <li>• Counties</li> <li>• State Agencies</li> <li>• Regional Planning Councils</li> <li>• Metropolitan Planning Organizations)</li> <li>• Public and Non-Profit Entities Working on Behalf of Schools</li> <li>• For Profit Organizations</li> </ul>
Eligible Projects <sup>1</sup>	<ul style="list-style-type: none"> <li>• Sidewalk Improvements</li> <li>• Pedestrian and Bicycle Crossing Improvements</li> <li>• On-Street Bicycle Facilities</li> <li>• Off-Street Bicycle and Pedestrian Facilities</li> <li>• Traffic Diversion Improvements</li> <li>• Traffic Calming and Speed Reduction Improvements (off-system roads only)</li> <li>• Secure Bicycle Parking Facilities</li> </ul>	<ul style="list-style-type: none"> <li>• Education on bicycle and pedestrian safety, health, and the environment</li> <li>• Traffic education and enforcement in the vicinity of identified school(s)</li> <li>• Creation and reproduction of promotional and educational materials</li> <li>• Public awareness campaigns and outreach efforts to the news media and community leaders</li> <li>• Modest incentives for SRTS contests and incentives that encourage more walking and bicycling over time</li> <li>• Safety and educational tokens that also advertise the program</li> <li>• Cost for additional law enforcement or equipment needed for enforcement activities</li> </ul>

<sup>1</sup>The list of eligible projects includes examples of both infrastructure and non-infrastructure SRTS projects and/or programs. For more information, refer to the *Texas Safe Routes to School Program Guidance and Application Instructions* available online at: [http://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/cit/srts\\_app\\_instructions.pdf](http://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/cit/srts_app_instructions.pdf)

There are many national and state-level resources available that outline the SRTS application process. The following list includes strategies and steps that schools, cities, or community members can undertake to develop successful SRTS applications and ultimately make walking and bicycling to school safer for children and increase the number of children who choose to walk and bicycle.

- 1. Form a Safe Routes team and start planning.** Identify the people in your community who want to make walking and bicycling to school safer for children. Ideally, members of this coalition will include school and ISD staff, community members (including students and parents), and representatives from local government and city staff. A diverse group of interested members can bring a wide range of expertise and insight into identifying and overcoming the challenges students face when walking and bicycling to school.
- 2. Hold a kickoff meeting.** In addition to gaining support and recognition for the SRTS initiative in your community, a kickoff meeting allows the coalition to discuss issues and develop a vision and action steps.
- 3. Gather information and identify safety and accessibility issues.** Do members of your community wish to improve safety around a particular school, or are there issues throughout the city or school district that should be addressed? Are there specific safety issues preventing students from walking to school? Does a lack of infrastructure create barriers to walking and biking, or is there an education component that needs to be addressed? To answer these questions, it is critical to collect information that can help to identify needed program elements and provide a means to measure the impact of the program later. Examples of activities that SRTS advocates can undertake to document existing conditions include:
  - Provide a walkability/bikeability survey to parents
  - Obtain a map of the neighborhood and school area
  - Complete a school site audit to assess the safety of the area to determine possible routes and conditions
- 4. Identify solutions.** Once the issues and existing conditions in a given neighborhood or community are identified, solutions should be crafted to addressing these items. Solutions may include a combination of education, encouragement, engineering, and enforcement strategies. Any proposed solutions should be prioritized according to the needs specific to each community.
- 5. Make a plan.** Based on the previous steps identified, the coalition should create a plan that reflects the specific issues, challenges, and solutions identified in their community. Plans should include encouragement, enforcement, education, and engineering strategies, and a timeline for implementing these strategies should be included. **It is important to note that the existing conditions analysis and the recommendations included in this report can be a basis for developing a specific SRTS plan in the NAS Fort Worth, JRB study area.** Mapping schools and neighborhood locations, inventorying existing facilities, identifying specific locations for safety purposes, and proposing evaluation criteria are all important SRTS plan elements that are specifically addressed in this document. For more information on preparing to apply for SRTS in Texas, please refer to the sample Safe Routes to School Plan available from TxDOT at: [http://www.dot.state.tx.us/safety/safe\\_routes/information.htm](http://www.dot.state.tx.us/safety/safe_routes/information.htm).
- 6. Evaluation.** Once an SRTS plan has been implemented, it is important to sustain the program through ongoing evaluation. Strategies for program evaluation and program continuation include: continuing to gather data regarding existing conditions and the number of students walking and biking to school; identifying additional program champions, publicizing achievements, encouraging any policy changes that promote children walking and biking to school; and creating a permanent Safe Routes team or committee that will continue to implement the community's plan.



## CONSIDERATIONS FOR OTHER PEDESTRIAN GROUPS

Access to schools notwithstanding, pedestrian facilities are unique facilities that must accommodate a wide variety of user types, needs, and abilities. Pedestrians also tend to be the most vulnerable road users. Therefore, special attention should be paid to pedestrian facility design and implementation to increase the safety and effectiveness of these facilities as all users are pedestrians at some point in each journey. This section highlights some of the needs and design considerations relevant to accommodating other groups of pedestrians within the NAS Fort Worth, JRB study area.

### ACCESSIBILITY FOR SENIORS

Seniors represent another population group in the study area that can benefit from safety interventions and other projects promoting active transportation and mobility. In 2010, roughly 17 percent of the residents living in the project area were aged 60 years and above. Improving accessibility to places like stores, community centers, and other venues can contribute to increased livability for seniors in these communities. In fact, a recent report produced by the American Association of Retired Persons (AARP) found that nationwide, one in eight persons over 50 and one in five persons over 65 do not drive. The report recommends that communities should take positive steps to enhance mobility options as a way to promote independence and community engagement among seniors.<sup>7</sup>

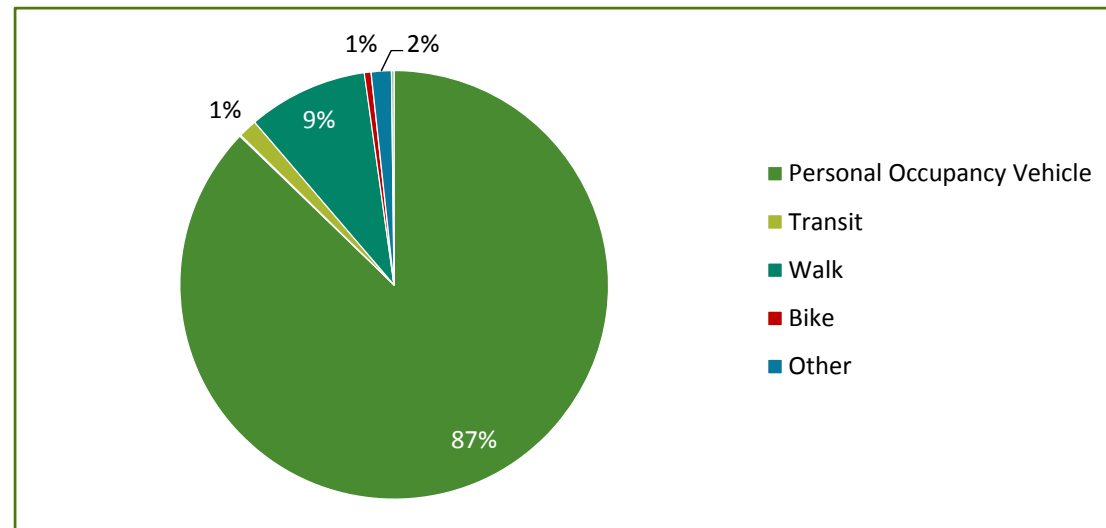
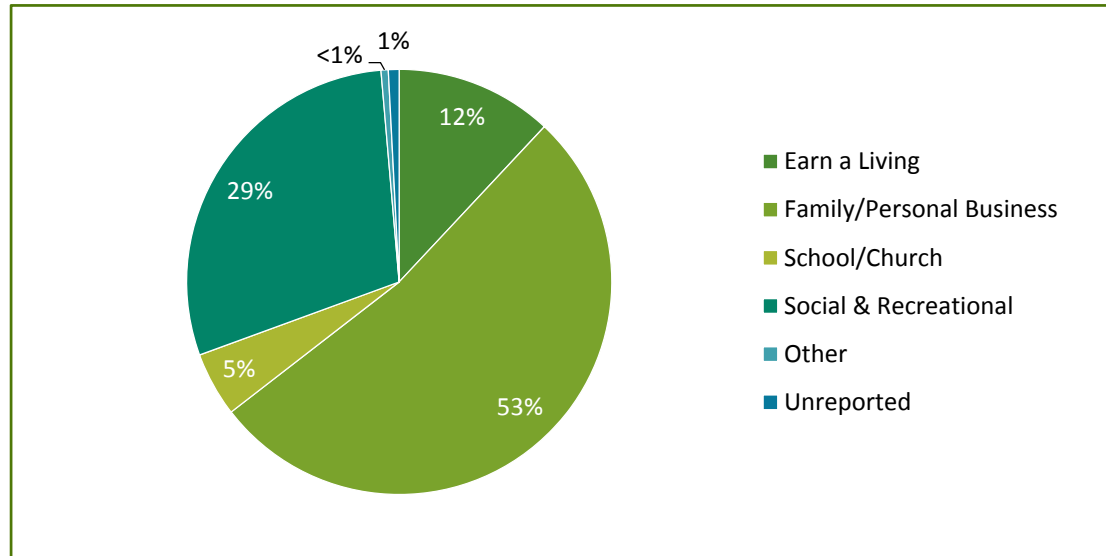
Promoting safety interventions and active transportation hold the promise of impacting much larger portions of a community than simply enabling children to walk and bike to schools. These measures can also improve the livability of communities. With specific regard to seniors, AARP defines a livable community as “one that has affordable and appropriate housing, supportive community features and services, and adequate mobility options, which together facilitate personal independence and the engagement of residents in civic and social life.”

**Figure 57** shows travel behaviors for adults 60 and over according to the 2009 National Household Travel Survey. The primary trip purpose is overwhelmingly personal/family business (53 percent), followed by social and recreational (29 percent). In terms of trip mode, automobile trips accounted for 87 percent of trips, followed by walking (9 percent).

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<sup>7</sup> Kochera, Andrew, Audrey Straight, and Thomas Guterbock. *Beyond 50.05: A Report to the Nation on Livable Communities: Creating Environments for Successful Aging*. AARP Public Policy Institute, 2005. [http://assets.aarp.org/rgcenter/il/beyond\\_50\\_communities.pdf](http://assets.aarp.org/rgcenter/il/beyond_50_communities.pdf) (accessed October 15, 2012).

FIGURE 57: TRIPS BY PURPOSE AND MODE FOR PERSONS AGED 60 AND OLDER, 2009



Source: Federal Highway Administration, 2009 National Household Travel Survey

## AMERICANS WITH DISABILITIES ACT TEXAS ACCESSIBILITY STANDARDS

The Americans with Disabilities Act of 1990 mandates guidelines for public buildings and facilities for users with disabilities. In addition, the state of Texas has adopted standards for accessibility to public buildings and facilities; privately owned buildings and facilities leased or occupied by state agencies; places of public accommodation; and commercial facilities by individuals with disabilities. These regulations are to be applied during the design, construction, and alteration of such buildings and facilities to the extent required by regulations issued by the Texas Department of Licensing and Regulation, under the *Texas Accessibility Standards* of the Architectural Barriers Act, codified as Article 9102, Texas Civil Statutes. These standards closely follow the *Americans with Disabilities Act Accessibility Guidelines* (ADAAG), and are intended to facilitate equivalency certification of the state program for the elimination of architectural barriers by the United States Department of Justice by bringing the state Architectural Barriers Act into alignment with the scoping requirements of the *Americans with Disabilities Act* (ADA). Additionally, the ADA required all city governments to complete a self-evaluation of their facilities, programs, policies, and practices in the early 1990s. Public agencies with more than 50 employees should have an ADA Transition Plan. The Transition Plan identifies needed structural changes and sets a schedule for implementing them. There are several resources available to local governments that are required to have a Transition Plan. One such resource is *ADA Transition Plans: A Guide to Best Management Practices* that provides seven steps for meeting the requirements of ADA.<sup>8</sup>

City governments and public agencies that do not meet the 50 employee threshold requirement for Transition Plans should still consider steps to improve access for persons with disabilities in their communities. State and local governments, regardless of whether they receive federal funds, are required to comply with the federal ADAAG, Title 24, USFAS, or Local Code, whichever provides the greatest access. Private-funded improvements are required to comply with ADAAG and with Title 24, whichever code offers the greatest access or protections to individuals with disabilities. The US Department of Transportation Federal Highway Administration: *Manual on Uniform Traffic Control Devices* (MUTCD) also provides national guidance in accordance with ADAAG.

Guidelines from ADAAG, Texas Accessibility Standards, and MUTCD for pedestrian facilities are outlined in this section. It is important to note that variations exist among the federal, state, and local codes relevant to design guidelines for pedestrian facilities, and new construction and improvements are required to comply with the code that offers the greatest access or protections to individuals with disabilities.

**Pedestrian Sidewalks.** ADAAG requires sidewalks to be constructed at a minimum of 36 inches for accessible travel by all users. Sidewalks constructed at 36 inches must not have any barriers such as signs, fire hydrants, etc., that impede the sidewalk. In addition, extra walkway width of 48 inches, the amount of space needed for a wheelchair to turn, is required at distances not to exceed 200 feet. Because of the guidelines requiring 36 inches of clear walkway, many guidelines today require six-foot sidewalks, the width needed for two wheelchairs to pass one another. TxDOT has recommended that all sidewalks built in the public right-of-way or with federal or state funds be constructed at a width of six feet.

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<sup>8</sup> National Cooperative Highway Research Program (NCHRP) Project Number 20-7 (232), May 2009

**Curb Ramps.** Curb ramps are the only item of right-of-way construction specifically required in the Department of Justice Title II regulation (see 35 CFR §35.150(c)(2) for existing facilities and §35.151(e) for new construction and alterations). “Where new sidewalks or streets are constructed or existing pedestrian or vehicular ways are altered, curb ramps or other sloped areas must be provided at intersections with curbs or other barriers to use.” Under program accessibility in existing facilities, the regulation also requires Title II entities to install curb ramps along existing pedestrian routes that are not otherwise being altered to provide the benefits of public sidewalks to people who have mobility impairments. Many jurisdictions consider resident requests in establishing priorities for new sidewalks and identifying locations where curb ramps are required. Department of Justice Title II regulations require that public entities give priority to providing curb ramps at walkways serving state and local government offices and facilities, transportation, places of public accommodation, and employees, followed by walkways serving other areas. Curb ramps must meet specific standards for width, slope, cross slope, placement, and other features.<sup>9</sup> ADA standards require that curb ramps include features called “detectable warnings”. Detectable warnings consist of a series of small domes that contrast in color with the surrounding sidewalk or street. They must be integrated into the walking surface, and there are specific measurements for the size and spacing of the domes. **Generally, you must provide curb ramps wherever a sidewalk or other pedestrian walkway crosses a curb.** Curb ramps must be placed to enable a person with a mobility disability to travel from a sidewalk on one side of the street, over or through any curbs or traffic islands, to the sidewalk on the other side of the street. Remember, walkways include areas where people must walk to access bus stops and other public transportation stops, so, where necessary, curb ramps must also be provided to enable people with disabilities to board and exit public transportation.

**Maintenance.** Maintenance of pedestrian routes should be considered a “program” of an entity covered by Title II of the ADA. This includes repairing damaged surfaces clearing curb ramps.

**Pedestrian Signals.** Countdown displays are required for all new pedestrian signals in the 2009 version of the MUTCD, which includes a countdown of the remaining time a pedestrian has to cross an intersection, in addition to the standard pedestrian figure indicating it is safe to “walk”, a flashing hand figure indicating the pedestrian should be cautious when crossing the intersection, and a solid hand signal indicating the pedestrian to “stop”. Positioning of pedestrian pushbuttons and legends on pushbutton signs that activate a crosswalk signal shall clearly indicate which crosswalk signal is activated by which pushbutton. In addition, new figures for locations of pedestrian pushbuttons for a variety of conditions are provided in the 2009 version of the MUTCD, including revisions to the requirements for the location of pedestrian pushbuttons and for accessible pedestrian signal pushbuttons, to make the button locations more consistent. To help clarify appropriate locations under different geometric conditions, a figure is included that shows eight examples of proper pedestrian pushbutton locations for various sidewalk, ramp, and corner configurations. Chapter 4E of the 2009 MUTCD provides additional guidelines for the installation of pedestrian signals. **Figure 58** provides an example of a pedestrian pushbutton signal.

FIGURE 58: PEDESTRIAN SIGNAL DEVICE



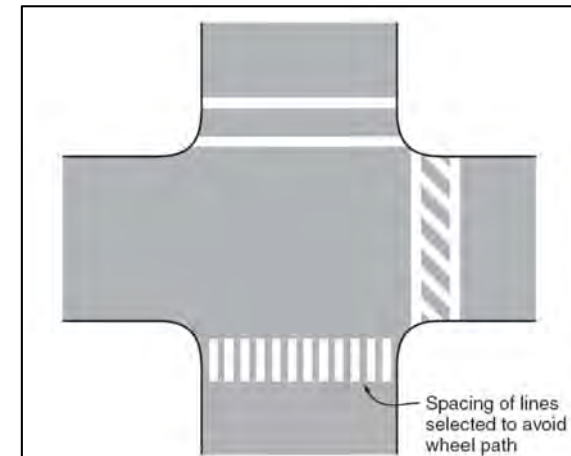
<sup>9</sup> The ADA Standards are located at 28 C.F.R. Part 36, Appendix A. They are also available on the ADA Home Page at [www.ada.gov](http://www.ada.gov). UFAS is located at 41 C.F.R. Part 101 - 19.6, Appendix A, and at the Access Board's website at [www.access-board.gov/ufas/ufas-html/ufas.htm](http://www.access-board.gov/ufas/ufas-html/ufas.htm).

**Signal Timing.** Recent research regarding pedestrian walking speeds has found that slower walking speeds are needed in the calculation of pedestrian clearance times to accommodate older and slower pedestrians. In the 2009 version of the MUTCD, the recommended walking speed for calculating the pedestrian clearance time was reduced from 4 feet per second to 3.5 feet per second, except where extended pushbutton presses or passive pedestrian detection has been installed for slower pedestrians to request additional crossing time. In addition, a recommendation was added that the total of the walk phase and pedestrian clearance time should be long enough to allow a pedestrian to walk from the pedestrian detector to the opposite edge of the traveled way at a speed of 3.0 feet per second. This change will ensure that slower pedestrians can be accommodated at longer crosswalks if they start crossing at the beginning of the walk phase. If this calculation finds that sufficient crossing time is not available, additional time should be added to the walk interval.

**Accessible Pedestrian Signals.** The 2009 MUTCD includes revisions regarding accessible pedestrian signals including requiring both audible and vibrotactile walk indications, changing the loudness of audible pedestrian walk signals to a standard, describing additional features that are available through an extended pushbutton press, adding new provisions regarding the use of audible beaconing, adding a new requirement that accessible walk signals have the same duration as the pedestrian walk signal unless the pedestrian signal rests in the walk phase, and revising the duration, tone, and speech messages of audible walk indications in order to clarify their use and application. A standard was also added that requires the use of locator tones, tactile arrows, speech walk messages, and a speech pushbutton informational message when two accessible pedestrian pushbuttons are placed on the same pole. Additionally, if the clearance time is sufficient to only cross to the median of a divided highway, an accessible pedestrian detector shall be provided on the median.

**Pedestrian Crosswalks.** Crosswalk markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within signalized intersections, and on approaches to other intersections where traffic stops. In conjunction with signs and other measures, crosswalk markings help to alert road users of a designated pedestrian crossing point across roadways at locations that are not controlled by traffic control signals or STOP or YIELD signs. At non-intersection locations, crosswalk markings legally establish the crosswalk. When crosswalk lines are used, they shall consist of solid white lines that mark the crosswalk. According to the 2009 version of the MUTCD, crosswalk lines shall not be less than 6 inches or greater than 24 inches in width. Section 3B.18 of Part 3 in the 2009 MUTCD provides additional guidelines for the installation of crosswalks. **Figure 59** provides examples of pedestrian crosswalk markings.

FIGURE 59: PEDESTRIAN CROSSWALK MARKINGS EXAMPLE



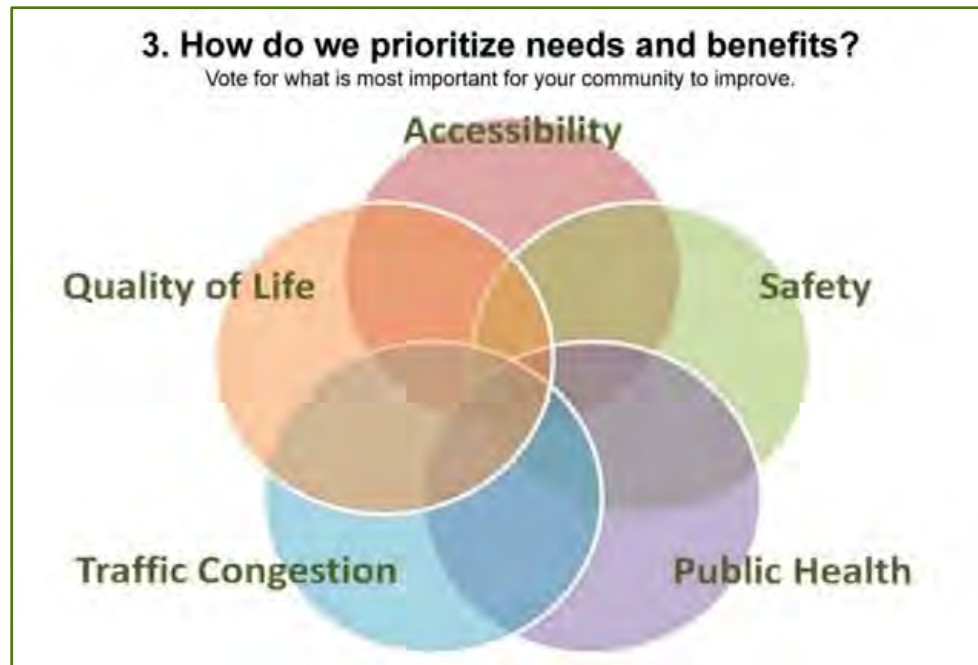


## PUBLIC PARTICIPATION

Gathering feedback from a broad group of community stakeholders was an integral part of transforming existing conditions data into tangible goals and recommendations. Throughout the planning process, a variety of outreach tools were employed to solicit input from residents, business owners, public officials, and other stakeholders. Surveys, presentations, open house and public meeting events, charrettes, and other events held throughout the study area all contributed to a robust public participation process that helped to identify the most important community issues and shape key strategies intended to achieve these goals.

Public participation specifically regarding pedestrian access and safety was arranged around five principles relevant to overall community health: Accessibility, Safety, Public Health, Traffic Congestion, and Quality of Life (see **Figure 60**).

FIGURE 60: ORGANIZING PRINCIPLES FOR PRIORITIZING PEDESTRIAN IMPROVEMENTS



Source: NCTCOG

Generally speaking, the communities involved in the planning process exhibited strong support for improving safety and accessibility for pedestrians in the study area. More specifically, however, the following items represent some of the most common concerns and ideas voiced during the public participation process:

- Access to schools for children walking or biking is a major concern in several communities throughout the study area.
- Sidewalks are needed to accommodate pedestrian traffic on the main thoroughfares/corridors in the area, particularly along US 377, SH 183, and SH 199 (where current bus stops exist).
- Connectivity is important. Sidewalks should facilitate pedestrian connections to destinations within neighborhoods and communities. Specific destinations noted by community members included grocery store, pharmacy, post office, parks, schools, library, and places of employment, among others.
- Sidewalk access to local parks and trails is very desirable.

## RECOMMENDATIONS

Each of the cities included in the study area has its own particular set of strengths and weaknesses with regard to pedestrian accessibility and each city will have its own set of priorities for meeting its needs. The following recommendations set forth a broad outline of strategies that each individual city can pursue to improve the quality and safety of pedestrian accessibility within their communities. Because pedestrian activity is focused on connections within communities – as opposed to across or among communities – these strategies should be tailored to the specific needs and priorities of each city. In Sansom Park, for instance, elementary schools are located within predominantly residential neighborhoods and are thus already well suited to walking. A modest amount of infrastructure such as sidewalks, curb cuts, and crosswalks located along key routes could potentially facilitate more (and safer) accessibility for entire neighborhoods. On the other hand, a community like Lake Worth benefits from a large number of parks and other active public spaces. Connecting neighborhoods to these places through a thoughtful network of pedestrian facilities could potentially improve quality of life by making these community assets more accessible.

**Figure 61** outlines recommendations for improving pedestrian safety and accessibility in the NAS Fort Worth, JRB area. The recommendations are grouped according to the five “Es” specified by the Federal Highway Administration for Safe Routes to School: Engineering, Education, Encouragement, Enforcement, and Evaluation. In addition, general notes regarding the cost and timeframe for implementing each item is provided, as well as an indication of the participating agencies. Following the table, there is a discussion of more general strategies that can be applied to successfully implementing and facilitating the recommendations.

FIGURE 61: PEDESTRIAN SAFETY AND ACCESS RECOMMENDATIONS

<b>RECOMMENDED ACTIONS: LOCALIZED PEDESTRIAN ACCESS AND SAFETY FACILITIES</b>				
<b>Project/Initiative</b>	<b>Time</b>	<b>Cost</b>	<b>Responsible Entity</b>	<b>Participants</b>
<b>POLICY: DEVELOP PLANS AND BUILD PARTNERSHIPS</b>				
Develop a Pedestrian Safety Action Plan. At a minimum, the Pedestrian Safety Action Plan should: <ul style="list-style-type: none"> <li>• Include data that identifies safety issues and challenges</li> <li>• Analyze and prioritize concerns</li> <li>• Identify funding opportunities for implementation of safety solutions</li> <li>• Evaluate the effectiveness of proposed implementation solutions</li> </ul>	Short Term	Medium	City	ISD, School, Community Stakeholders
Create a Safe Routes to School team to identify needs and work towards applying for funding opportunities.	Short Term	Medium	City, ISD	Community Stakeholders
Work with school districts to site future school sites to capitalize on existing pedestrian facilities.	Long Term	High	City	ISD
Develop ADA Transition Plans for local governments and public agencies with 50 or more employees.	Short Term	Medium	Cities/ISDs/Tarrant County/Tarrant Regional Water District/Other Public Agencies in Study Area	Community Stakeholders/Health and Human Services Agencies/Seniors and Persons with Disabilities Stakeholders
Coordinate with the North Central Texas Council of Governments and other transportation partners for training, technical assistance, planning updates, data, and funding opportunities	Short Term	Low	City and ISDs	TxDOT, other public agencies
<b>POLICY: PROMOTE SAFE WALKING AND BIKING OPTIONS THROUGH ENGINEERING</b>				
Partner with local governments on a comprehensive assessment of infrastructure and safety issues around schools to help prioritize investments.	Mid Term	Medium	City	ISD, School
Develop school transportation safety policies at the district or campus level that include considerations specific to safety for students walking and biking.	Mid Term	Medium	ISD	City, School, Law Enforcement
Develop a sidewalk maintenance program to ensure facilities are safe and operational for all users including individuals with mobility impairments.	Mid Term	Medium	City	
Require proposed developments to include pedestrian facilities on their property to promote pedestrian connectivity among major origin/destination land uses.	Long Term	Medium	City	
Preserve right-of-way for proposed sidewalks and other off-street facilities, particularly near school sites, parks, and residential areas.	Long Term	Medium	City	TxDOT
Develop a connected system of pedestrian facilities that can serve major origin and destination points, linking compatible land uses like residential areas, commercial zones, civic centers, schools, parks, and other recreational facilities.	Long Term	High	City	NCTCOG, TxDOT, Community Stakeholders

**RECOMMENDED ACTIONS: LOCALIZED PEDESTRIAN ACCESS AND SAFETY FACILITIES**

<b>Project/Initiative</b>	<b>Time</b>	<b>Cost</b>	<b>Responsible Entity</b>	<b>Participants</b>
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**POLICY: PROMOTE SAFE WALKING AND BIKING OPTIONS THROUGH ENGINEERING**

Include pedestrian planning considerations in all transportation improvements (i.e., new construction, intersection improvements, and maintenance).	Long Term	High	City	TxDOT
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**POLICY: ENHANCE EDUCATION INITIATIVES AT SCHOOLS**

Create after-school clubs or programs that reinforce walking and bicycling safety through fun excursions that are both educational and recreational.	Short Term	Low	School	ISD
Incorporate lessons and messages about bicycling and walking into health curricula, physical education, lessons, school announcements, and other events at school.	Short Term	Low	ISD	School
Engage students (and families) in activities to assess traffic safety issues and needed infrastructure improvements near schools.	Mid Term	Low	ISD	School, Community Stakeholders, Law Enforcement
Create safe walking route maps for every school with input from city officials, school personnel, parents, and students.	Mid Term	Low	ISD	City, School, Community Stakeholders

**POLICY: ENCOURAGE WALKING AND BIKING THROUGH SCHOOL AND COMMUNITY EVENTS**

Promote walk and bike to school days combined with health and safety messaging to students and parents. (Schools and ISDs can participate in International Walk and Bike to School Day, or hold campus/district level events like “walking Wednesdays” to encourage more active transportation.)	Short Term	Low	ISD	School, Law Enforcement, Community Stakeholders, NCTCOG
Encourage walking and biking through school-based events. Encourage parents and staff members to model active transportation behaviors whenever possible.	Short Term	Low	ISD	School, Community Stakeholders
Coordinate community-based events like walking school buses to encourage students to walk to school.	Short Term	Low	School	ISD, Community Stakeholders
Engage students and community members in the process of assessing their environment through traffic counts, hazard assessments, photo documentation, air quality sampling, and community surveys.	Mid Term	Medium	School	City, ISD, Community Stakeholders

**POLICY: ENFORCE SAFETY AND SCHOOL ZONE POLICIES**

Work with local governments and law enforcement to patrol areas around schools during arrival and dismissal and place crossing guards at key intersections.	Short Term	Medium/High	City	ISD, School, Law Enforcement
Coordinate with local governments and law enforcement personnel to expand the radius protected by school zones into the neighborhoods adjacent to schools.	Mid Term	Low/Medium	City	ISD, School, Law Enforcement
Advocate for policies that reduce speed limits in designated school zones, increase fines/sanctions against drivers who disobey school zone laws, and dedicate additional fines to fund safety programs and/or infrastructure improvements near schools.	Mid Term	Low/Medium	State/County Agencies	TxDOT, City, ISD, School, Law Enforcement

## RECOMMENDED ACTIONS: LOCALIZED PEDESTRIAN ACCESS AND SAFETY FACILITIES

Project/Initiative	Time	Cost	Responsible Entity	Participants
<b>POLICY: CONTINUE EVALUATION OF NEEDS AND UPDATE PLANS</b>				
Begin collection counts of pedestrians and bicyclists in target areas that can provide a baseline of data regarding active transportation and serve as an objective analysis to support investment in active transportation facilities for the future. This data is important for evaluation of changes made and projects constructed.	Short Term	Low	City	NCTCOG, ISD, School
Conduct surveys among students and parents to determine current commuting habits and identify barriers to active transportation.	Short Term	Low	School	ISD, Community Stakeholders
Create and maintain a comprehensive inventory of sidewalks and other local pedestrian facilities to aid in future planning and assessment.	Mid Term	Low/Medium	City	NCTCOG

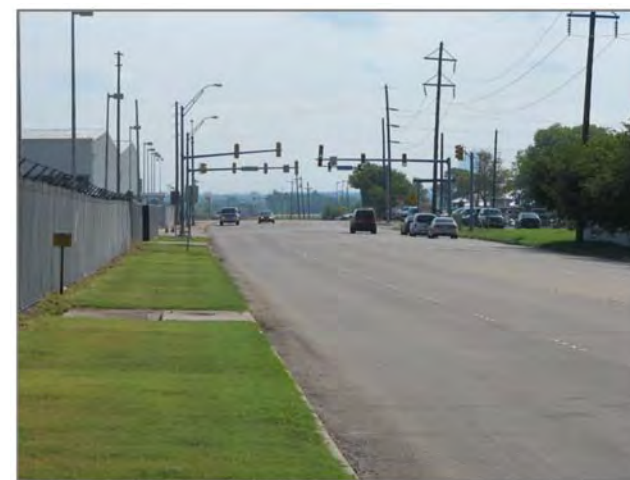
## PARTNERSHIPS AND COMMUNICATION

The best way to ensure that the needs of a community are properly balanced against the fiscal realities of any capital improvements is to engage city staff, elected officials, and outside interest groups in effective communication. A prime example involving multiple parties would be whether to implement a signalized mid-block crossing across from a school site. Brewer Middle School is located adjacent to a major arterial (Cherry Lane) in White Settlement. While most of the students attending the school do not encounter serious barriers to accessing the school, a residential neighborhood served by the school lies directly across this major arterial roadway. Fortunately, a signalized crosswalk exists to provide a direct link between the neighborhood and the school and businesses along the road. In an instance like this, communication among city planning staff, ISD personnel, and even involved parents and business owners is critical to ensuring that gaps in accessibility that might be simply overlooked by one group can be properly addressed.

## IDENTIFYING DESTINATIONS AND BARRIERS

Based on the existing pedestrian facilities inventory included in this section, it is abundantly clear that the amount of pedestrian facilities (i.e. sidewalks) is lacking throughout the study area. Since it is not economically feasible to plan and construct hundreds of miles of sidewalks throughout all portions of these communities, identifying key routes is critical. As part of the public participation process, community members identified the several “destinations” that would be desirable for pedestrian trips. These include:

LACK OF PEDESTRIAN FACILITIES ALONG CLIFFORD STREET; WHITE SETTLEMENT, TX



Source: NCTCOG



- Local retail establishments (grocery stores, shops, pharmacies, etc.)
- Parks and other public spaces
- Civic institutions (libraries, post offices, city hall, etc.)
- Employment (Lockheed Martin, NAS Fort Worth JRB, etc.)
- Schools

Additionally, certain barriers were identified as well, including:

- Lack of facilities like sidewalks, crosswalks, etc.
- Lack of ADA accessibility
- Highways, arterials roadways, and other corridors (IH 30, IH 20, SH 183, SH 199, US 377, etc.)

As part of the public participation process, community members offered valuable feedback on how to better connect pedestrian destinations within their communities. The example from River Oaks in **Figure 62** identified strategic routes connecting residential areas to community assets like schools and River Oaks Boulevard.

The example below illustrates the importance of collecting input on how best to plan for pedestrian connectivity while operating within fiscal constraints. Automobile traffic within a residential neighborhood like the one shown in the example is relatively light. However, it builds as more vehicles filter onto arterial roadways. Using the same principle, pedestrian activity can be collected along designated routes to better connect residential neighborhoods to places like elementary schools and recreational trails, and ultimately provide a safer environment for all pedestrians within the community. Planning to identify the specific routes for pedestrians is best done at the local level and should include as much input from community members as possible. As the existing conditions analysis shows, however, the importance of identifying destinations and barriers is a critical first step in this process.



FIGURE 63: EXAMPLE IMPROVEMENT ZONES FOR DIFFERENT DESTINATIONS WITHIN THE STUDY AREA



*Half-mile improvement zone surrounding a park in River Oaks*



*Half-mile improvement zone surrounding a park in White Settlement*



*Half-mile improvement zone surrounding a civic building in Lake Worth*



*Half-mile improvement zone surrounding a library in Benbrook*



*Half-mile improvement zone surrounding a grocery store in Fort Worth*



*Half-mile improvement zone surrounding a health clinic in Fort Worth*

## COORDINATED PLANNING

There are certain instances in which the study area communities stand to benefit from coordinating planning efforts, specifically with regard to pedestrian safety and accessibility. One example involves the creation of a Pedestrian Safety Action Plan (PSAP). A PSAP is a plan developed by community stakeholders that is intended to improve pedestrian safety in a given community.<sup>10</sup> PSAPs can help focus attention on the need for improved pedestrian safety and provide guidance for future transportation investments and policy decisions. Recently, FHWA has provided funding and technical expertise to cities and regions for completing PSAPs as part of a larger effort to reduce pedestrian deaths by focusing extra resources on the cities and states with the highest pedestrian fatalities and/or fatality rates.

America Walks is a national nonprofit organization that works collaboratively to share knowledge, advance policies, and implement effective campaigns to promote safe, convenient, and accessible walking conditions for all. The organization recommends that at a minimum, PSAPs should:<sup>11</sup>

- Involve a wide range of professional and community stakeholders
- Collect data to identify safety issues and challenges
- Analyze and prioritize concerns
- Select policies, programs, projects, and other safety solutions that include the “5 Es” – Engineering, Education, Enforcement, Encouragement and Emergency Services
- Provide funding for implementation of the safety solutions
- Evaluate the efficacy of implementation solutions

While much attention has been focused on the handful of cities selected by FHWA, all communities seeking to reduce pedestrian injuries and deaths and create more walkable environments can develop their own PSAPs. There is also an opportunity for communities like the ones involved in this plan to coordinate resources on developing and implementing a PSAP for the study area.

FHWA has funding and technical expertise available for cities to complete a PSAP. Additionally, a PSAP training guide, “How to Develop a Pedestrian Safety Action Plan”, has been developed to present an overview and framework for state and local agencies to develop and implement a PSAP tailored to their specific needs. Working with FHWA presents a promising opportunity for these cities to coordinate on shared needs, goals, and outcomes for enhancing walkability and the quality of life in the communities surrounding NAS Fort Worth, JRB and each city can work to adopt the PSAP in conjunction with their Comprehensive Plan.

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<sup>10</sup> Zegeer, Charles V. Et al. *How to Develop a Pedestrian Safety Action Plan*. Chapel Hill, NC: Pedestrian and Bicycle Information Center, Highway Safety Research Center, University of North Carolina, 2006. [http://safety.fhwa.dot.gov/ped\\_bike/ped\\_focus/docs/fhwasa0512.pdf](http://safety.fhwa.dot.gov/ped_bike/ped_focus/docs/fhwasa0512.pdf) (accessed January 7, 2013).

<sup>11</sup> "America Walks' Position Statement: Pedestrian Safety Action Plans." America Walks. [https://www.google.com/url?q=http://www.americawalks.org/wp-content/upload/Pedestrian-Action-Safety-Plans.pdf&sa=U&ei=6k\\_rULeVD-bG0AHyjICIBw&ved=0CacQFjAA&client=internal-uds-cse&usg=AFQjCNFX7vVVRcl7CkzF3NFGW2DKS9alw](https://www.google.com/url?q=http://www.americawalks.org/wp-content/upload/Pedestrian-Action-Safety-Plans.pdf&sa=U&ei=6k_rULeVD-bG0AHyjICIBw&ved=0CacQFjAA&client=internal-uds-cse&usg=AFQjCNFX7vVVRcl7CkzF3NFGW2DKS9alw) (accessed January 7, 2013).



## IMPROVEMENTS NEAR SCHOOL SITES

Based on the existing pedestrian facilities inventory and the analysis of crash data, as well as community feedback gathered at the open house meetings, the following school sites represent specific areas where safety interventions and other best practices might positively impact safety and active transportation. **Figure 64** denotes the sidewalk density and number of bicycle/pedestrian crashes for each of the highlighted elementary schools. The list includes schools from all seven local governments and four ISDs serving the project area.

FIGURE 64: EXAMPLE IMPROVEMENT ZONES FOR DIFFERENT DESTINATIONS WITHIN THE STUDY AREA

School	District	Jurisdiction	Existing Sidewalk Density	Number of Bicycle/Pedestrian Crashes	Additional Comments
Burton Hill Elementary	FWISD	Westworth Village	0.40	3	High rate of motorized traffic crashes along SH 183.
Castleberry Elementary	CISD	River Oaks	0.08	3	Roberts Cut Off Road represents a significant barrier to safely access the school.
Effie Morris Elementary	LWISD	Lake Worth	0.08	1	Lack of pedestrian infrastructure connecting school site to nearby residential areas.
Joy James Elementary	CISD	Sansom Park	0.02	7	Bicycle and pedestrian crash rate more than double the study area average.
Waverly Park Elementary	FWISD	Benbrook	0.19	17	Attendance zone is drawn in a noncontiguous manner, making non-motorized access difficult.
West Elementary	WSISD	White Settlement	0.32	4	Proximity to White Settlement Road and Las Vegas Trail creates safety concerns.
W.J. Turner Elementary	FWISD	Fort Worth	0.18	2	High rate of motorized traffic crashes along Azle Avenue.

Note: This is not a prioritized list, rather it represents priority schools for each community to focus on pedestrian improvements.

**Burton Hill Elementary (Fort Worth ISD).** Relative to other schools in the study area, there are a high number of sidewalks in the Westworth Village residential areas near Burton Hill Elementary. However, from 2007 to 2011, there has been a high rate of motorized traffic crashes along SH 183, which bisects the school attendance zone. Roughly 65 miles of sidewalk is needed to have a complete pedestrian network in the school attendance zone, which is just under the average number of miles needed in the study area. Future efforts should focus on adding pedestrian amenities along SH 183, such as crosswalks or pedestrian signals, to facilitate students coming to the school from the north.

**Castleberry Elementary (Castleberry ISD).** During the public meeting process, the area around Castleberry Elementary School was noted for safety concerns. Specifically, access along Roberts Cut Off Road and Meandering Road was noted as being particularly unsafe. No sidewalks currently exist along these routes, and a significant portion of the attendance zone lies to the west of Roberts Cut Off Road, creating a barrier for students in these neighborhoods to safely access the school. Castleberry Elementary is located within 1,000 feet of a major arterial (River Oaks Boulevard) and between 2007



and 2011, the attendance zone experienced 9.77 crashes per roadway mile (above average for the study area) and 0.07 bike/pedestrian crashes per roadway mile (below average).

**Effie Morris Elementary (Lake Worth ISD).** The attendance zone for Effie Morris Elementary includes the southern and western portions of Lake Worth, as well as parts of Fort Worth between the city of Lake Worth and the lake. Currently, there are few sidewalks that serve these primarily residential areas. Since Effie Morris Elementary is located near the Lake Worth civic complex, providing sidewalks near the school would also benefit residents wanting to access the municipal buildings.

**Joy James Elementary (Castleberry ISD).** Despite the presence of no major arterials or highways near the school, Joy James Elementary exhibited a high proportion of crashes involving bicyclists or pedestrians. In an area of less than one square mile, seven crashes involving bicyclists or pedestrians occurred between 2007 and 2011, resulting in a rate of 0.38 per roadway mile (over twice the rate of the study area average). The area also has the lowest sidewalk density of all the attendance zones studied with 0.02 miles of sidewalk per roadway mile. In fact, the only sidewalks in the entire study area are those immediately surrounding the school.

**Waverly Park Elementary (Fort Worth ISD).** The attendance zones for Waverly Park Elementary, as well as Leonard Middle School and Western Hills High School are drawn in a noncontiguous manner. A large portion of the attendance zone surrounds Lake Worth on the northern portion of the study area and is physically separate from the rest of the attendance zone and the schools themselves. Elementary students living in this section, for example, must pass through either White Settlement or Lake Worth and River Oaks to get to school. The distance between some of these areas and the schools naturally precludes any students from walking or biking to school. Moreover, students necessarily travel through other (sometimes multiple) attendance zones and ISD boundaries to get to school. Further discussion with the Fort Worth ISD should occur to investigate the feasibility of updating these attendance zones.

**West Elementary (White Settlement ISD).** West Elementary was also noted for safety issues. The school is located adjacent to two major arterials (White Settlement Road and Las Vegas Trail). Overall the area surrounding the school has sidewalk coverage slightly above the study area average (0.30 miles per roadway mile, and 0.27 miles per roadway mile, respectively). Between 2007 and 2011, 178 crashes occurred within the attendance zone, including four crashes involving bicyclists or pedestrians.

**W.J. Turner Elementary (Fort Worth ISD).** W.J. Turner Elementary School accounts for a very small area compared to most of the others analyzed. The attendance zone for the school is only 0.5 square miles. However, the area experienced 153 crashes from 2007 to 2011, resulting in 13.9 crashes per roadway mile, well above the study area average of 9.32. Crashes involving bicyclists and pedestrians were slightly above average. The school is located adjacent to Azle Avenue, a major arterial, and the area is poorly served by sidewalks with only 0.18 linear feet of sidewalk per roadway foot.

Additional schools in the study area that could benefit from improved pedestrian and safety access:

**Arlington Heights High School (Fort Worth ISD).** Arlington Heights High School in Fort Worth is located adjacent to IH 30. (The school is located within the South Hi Mount Elementary School attendance zone.) The area surrounding the school is well served by sidewalks and other pedestrian infrastructure;

however, the presence of highways and other arterials near the school create barriers for active transportation. Between 2007 and 2011; 1,434 traffic crashes occurred in the South Hi Mount attendance zone, for an average of 17.45 per roadway mile. (Many of these crashes occurred along IH 30.) The area also experienced a rate well above the study area average for crashes involving bicyclists or pedestrians: 0.29 crashes per roadway mile (24 crashes total).

**Brewer Middle School (White Settlement ISD).** Brewer Middle School was also noted during public meetings as a particularly unsafe area. Brewer Middle School is located within the Liberty Elementary attendance zone. The area is fairly well served by sidewalks compared to the overall study area (total sidewalk length for the attendance zone was 0.25 feet per roadway foot; the study area average was 0.27). Brewer Middle School is located adjacent to a major arterial (Cherry Lane); however, a signalized crosswalk exists on Cherry Lane between Longfield Drive and Carlos Street.

**Dolores Huerta Elementary (Fort Worth ISD).** Dolores Huerta Elementary also has a relatively small attendance zone (0.7 square miles). The sidewalk density is slightly above average (0.3 miles per roadway mile; however, the frequency of crashes involving bicyclists or pedestrians is the highest of all the areas included in the study. Between 2007 and 2011, eleven crashes involving bicyclists or pedestrians occurred in the school's attendance zone, resulting in a rate of 0.71 crashes per roadway mile.

Generally speaking, communities and ISDs should meet to discuss the specific needs at these (or other) locations. Through a coordinated effort, they can develop area-specific plans for implementation, and associated cost estimates can be developed and funding sources can be identified.

## GENERAL RECOMMENDATIONS FOR FURTHER STUDY AND ANALYSIS

General recommendations for further analysis related to pedestrian safety and accessibility not specifically noted above include:

- Additional survey of existing sidewalks and other pedestrian facilities in the study area should be completed via site visits. This inventory can aid in planning by helping to update the datasets depicted in the preceding maps and note current sidewalk conditions, gaps in the pedestrian network (including curb cuts and crosswalks), and necessary improvements to comply with Americans with Disabilities Act guidelines. Updating this inventory should be a priority, and cities can partner with NCTCOG to complete this work.
- Update local policies to incorporate bicycle and pedestrian facilities as elements in roadway construction and reconstruction projects. The Texas Department of Transportation Policy on Accommodations requires cities to plan for, design, and implement appropriate bicycle and pedestrian facilities as part of road construction or improvement projects.
- Cities should preserve right-of-way for proposed sidewalks and other off-street facilities, particularly near school sites, parks, and residential areas. Additionally, safety can be encouraged in these areas by improving motorist visibility of pedestrians through on-street pavement markings, appropriate signage, and other treatments.

## IMPLEMENTATION/FUNDING

The sections below outline some of the likely funding sources that can be applied to pedestrian improvements within the study area, as well as a brief discussion of design guidance and performance measures related to bicycle and pedestrian projects.

## FUNDING SOURCES

**Safe Routes to School Program:** SRTS provides funds to states to substantially improve the ability of primary and middle school students to walk and bicycle to school safely. Funds are apportioned to each state based on their relative share of enrollment in primary and middle schools. The program establishes two distinct types of funding opportunities: infrastructure projects (engineering improvements) and non-infrastructure related activities (such as education, enforcement, and encouragement programs). Infrastructure funds can be utilized for on- and off-street bicycle and pedestrian facilities on any public right-of-way within a two-mile radius of an eligible school. Seventy to 90 percent of funds are dedicated to infrastructure projects, with the remaining 10 to 30 percent of funds dedicated to non-infrastructure projects.

*MATCHING FUNDS: 100 percent federal.*

**Transportation Enhancement Program:** TE activities offer funding opportunities to help expand transportation choices and enhance the transportation experience through 12 eligible TE activities related to surface transportation, including pedestrian and bicycle infrastructure and safety programs. TxDOT administers the federally funded program, which provides opportunities for non-traditional transportation-related activities. Projects should go above and beyond standard transportation activities and be integrated into the surrounding environment in a sensitive and creative manner that contributes to the livelihood of the communities, promotes the quality of our environment, and enhances the aesthetics of our roadways.

*MATCHING FUNDS: 80 percent federal; 20 percent non-federal.*

**Congestion Mitigation and Air Quality Improvement Program (CMAQ):** CMAQ funding from the Federal Highway Administration assists areas designated as nonattainment or maintenance under the Clean Air Act Amendments of 1990 to achieve and maintain healthful levels of air quality by funding transportation projects and programs. Projects must be likely to contribute to the attainment of national ambient air quality standards (or the maintenance of such standards where this status has been reached) based on an emissions analysis. A major source of funding for many bicycle-related construction and safety projects, CMAQ is administered locally by NCTCOG and its Transportation Improvement Program. Eligible activities include the construction of bicycle and pedestrian facilities, non-construction projects related to safe bicycle use, and many other projects and programs related to the implementation of bicycle and pedestrian transportation.

*MATCHING FUNDS: 80 percent federal; 20 percent non-federal.*

**Surface Transportation Program – Metropolitan Mobility (STP-MM):** STP-MM funding (also from FHWA) provides states with flexible funds which may be used for a wide variety of projects on any federal-aid highway including the National Highway System, bridges on any public road, and transit facilities. Bicycle and pedestrian improvements are eligible activities under STP-MM. This covers a wide variety of projects such as on-road facilities, off-road trails, sidewalks, crosswalks, bicycle and pedestrian signals, parking, and other ancillary facilities. The modification of sidewalks to comply with the requirements of the Americans with Disabilities Act is an eligible activity. STP-MM-funded bicycle and pedestrian facilities may be located on local and collector roads

which are not part of the federal-aid highway system. In addition, bicycle-related non-construction projects such as maps, coordinator positions, and encouragement programs are eligible for STP-MM funds.

MATCHING FUNDS: *80 percent federal; 20 percent non-federal.*

**NCTCOG’s Sustainable Development Call for Projects:** NCTCOG’s Sustainable Development Funding Program was created by its policy body, the Regional Transportation Council, to encourage public/private partnerships that positively enhance existing transportation system capacity, rail access, air quality concerns, and/or mixed land uses. The Sustainable Development Funding Program has awarded a total of 100 projects in excess of \$125 million since 2001. Projects selected through both of these funding initiatives must demonstrate an air quality benefit and include bicycle and pedestrian components.

MATCHING REQUIREMENTS: *80 percent regional; 20 percent local.*

## DESIGN GUIDANCE

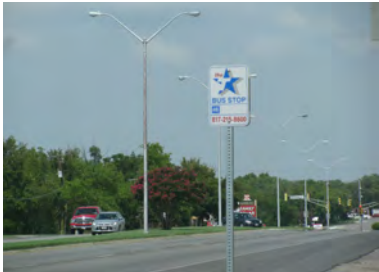
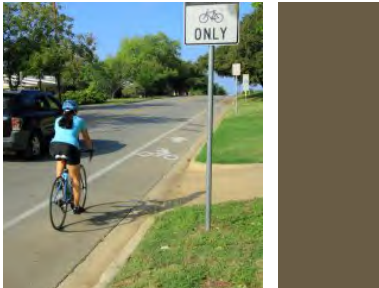
Certain standards should be followed by cities planning and/or implementing facilities for bicyclists and pedestrians. Design guidance for these facilities is available from the following sources: the *2009 Manual on Uniform Traffic Control Devices*, the 2012 American Association of State Highway and Transportation Officials *Guide for the Development of Bicycle Facilities*, the *Americans with Disabilities Act Accessibility Guidelines, Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*, *An ITE Recommended Practice*, and the *Association of Pedestrian and Bicycle Professionals Bicycle Parking Guidelines, 2<sup>nd</sup> Edition*.

## PERFORMANCE MEASURES

A key component to increasing accessibility and improving safety for active transportation in a given area is *evaluation*. Data collection is critical for measuring the success of interventions intended to promote active transportation. This includes monitoring and documenting outcomes and trends through the collection of data, including the collection of data before and after the interventions. Measurable trends related to active transportation include:

- An increase in users on active transportation facilities.
- A reduction in the rates of crashes, specifically crashes involving bicyclists and/or pedestrians.
- A reduction in the number of crashes and citations in school zones.
- An increase in the number of students walking and/or bicycling to school.
- An increase in the number of roadway projects that include active transportation facilities.

# APPENDIX M | PUBLIC TRANSPORTATION





## REGIONAL AND COMMUNITY NEEDS

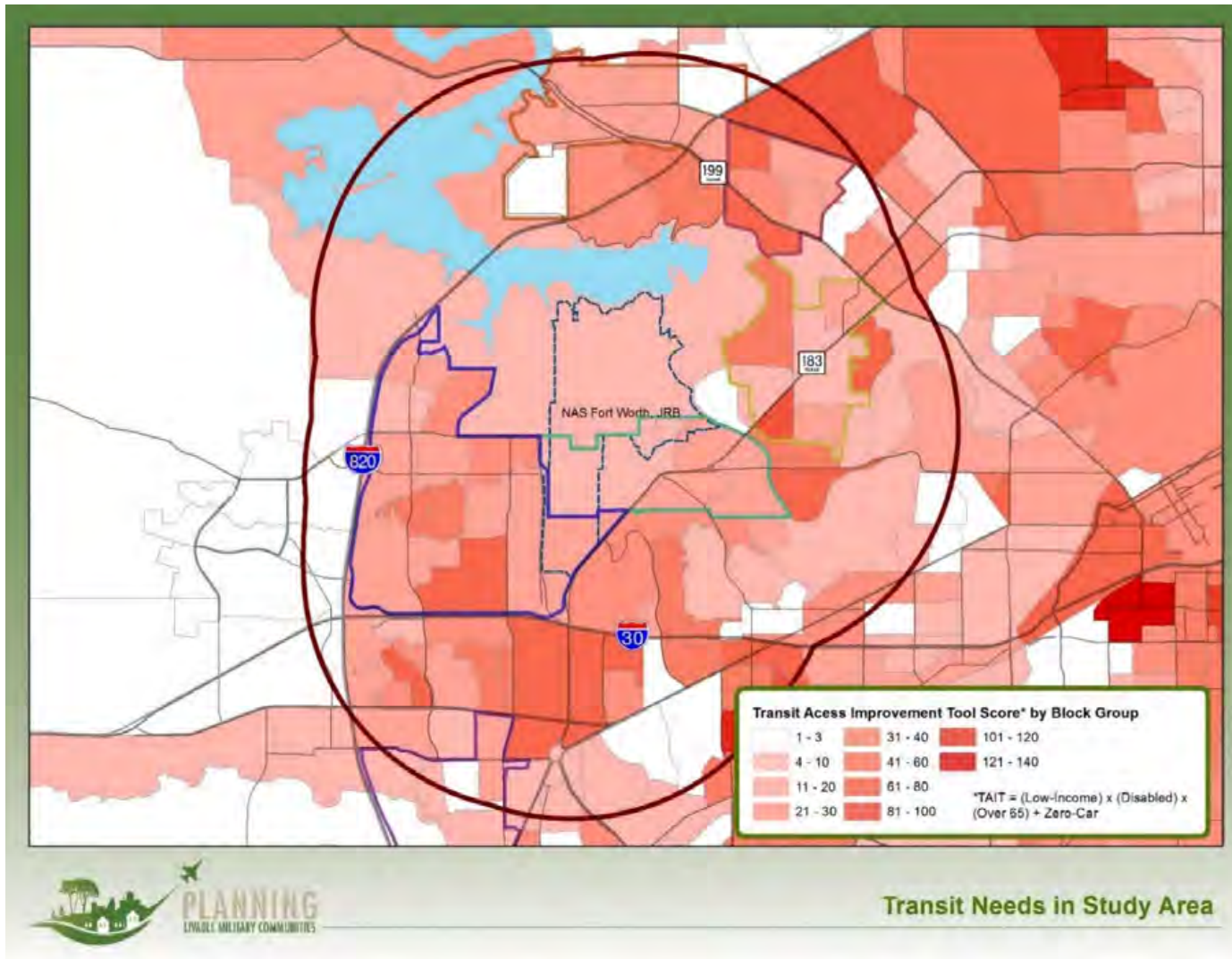
In addition to the regional and community needs identified by Access North Texas and outlined in the Planning Livable Military Communities Regional Comprehensive Plan, additional analysis was conducted for specific demographic groups. This analysis informs the planning process and provides evidence that portions of the study area may have very specific transportation needs that could be met through several different types of public transportation services outlined in the Regional Plan.

### *Transit Access Improvement Tool*

Certain demographic groups may be more likely to utilize transit than others, such as non-drivers, low-income persons, and disabled persons. These individuals may be unable to drive or do not have access to a working vehicle. In order to more effectively locate and plan for these potentially transit dependent populations, the North Central Texas Council of Governments developed the Transit Access Improvement Tool (TAIT). The TAIT index is meant to identify areas that support demographic traits that may determine transit need, not to establish the type of service that is appropriate for a given area. The index is calculated at the block group level and is comprised of four variables: percent of population below poverty, percent disabled, percent over 65, and percentage of zero car households.

A map of TAIT scores in the study area is included as **Figure 1**. All of the study area local governments include areas that indicate some sort of potential transit need based on demographics. The cities of River Oaks, Sansom Park, and White Settlement have the greatest concentration of potential transit need in the study area. For this study, the TAIT is used in conjunction with other demographic analysis and outreach to determine the most appropriate transit recommendations for the study area. **Figure 2** demonstrates the four individual variables that comprise the TAIT.

FIGURE 1: TRANSIT ACCESS IMPROVEMENT TOOL RESULTS



Source: NCTCOG

FIGURE 2: TITLE VI/ENVIRONMENTAL JUSTICE CONSIDERATIONS FOR PUBLIC TRANSPORTATION ANALYSIS

