3. Extent of Adverse Impacts

Detailed descriptions of potential impacts of the Build Alternatives are described in **Chapter 4 Environmental Consequences**. **Table 4-65 (Comparison of SDEIS Alternatives)**, presented at the end of this chapter provides a summary of the environmental impacts.

The impacts with the greatest relevance to the identified EJ neighborhoods are relocation/displacements, noise impacts, visual intrusion, and transportation impacts. **Table 4-9** shows which Build Alternatives affect each neighborhood along with the types of impacts anticipated to occur.

TABLE 4-9. POTENTIAL IMPACTS TO AFFECTED MINORITY AND/OR LOW INCOME NEIGHBORHOODS

Neighborhood District/ Neighborhood	Inclusive Census Tracts/Block Groups	Affected by Alternatives	Types of Impacts
Middle Stemmons/Brookhollow ND			
Residential area east of IH-35E/south of Record Crossing	100/2	All	P, N, V, T
Trinity Industrial District, Brookhollow Industrial Park	100/1	All	R, P, V, T
Lower Stemmons ND			
Design District	100/3	4B	P, V, T
		2A, 2B, 3A, 3B, 3C, 4A, 5	R, P, V, T
Market/Technology Center	100/3	3A, 3B, 3C, 4A, 4B, 5	P, V, T
		2A, 2B	R, P, V, T
Lower Stemmons ND	100/3	3A, 3B, 3C, 4A, 4B	P,V,T
		2A, 2B, 5	R, P, V, T
Cedars/Fair Park/East Dallas ND			
The Cedars	33/2	3A, 4A, 4B, 5	P, V, T
		2A, 2B, 3B, 3C	R, P, V, T
South Dallas ND			
South Dallas HOA	34/2, 40/1, 40/2	All	R, P, N, V, T
Ideal	39.02/2	All	P, N, V, T
Rochester Park	39.02/3	All	P, N, V, T
South Dallas ND	34/2	All	R, P, V, T
West Dallas - West of Hampton ND			
West Dallas HOA	102/1	4A, 4B, 5	P, N, V, T
West Dallas - East of Hampton ND			
West Dallas HOA	101.01/1, 101.01/2, 101.02/2	4A, 4B, 5	P, N, V, T
La Bajada	43/1, 101.02/1	4A, 4B, 5	R, P, N, V, T
North Oak Cliff ND			
Lake Cliff HOA	20/2	4A, 4B, 5	P, V, T
North Oak Cliff ND	20/2	4A, 4B	P, V, T
		5	R, P, V, T
East Oak Cliff ND	41/1	4A, 4B	P, N, V, T
		5	R, P, N, V, T

Key to Terms: R = Relocation; **P** = Proximity; **N** = Noise; **V** = Visual; **T** = Traffic increase
Notes: ND = Neighborhood District; **HOA** = Home Owners Association
It should be noted that Alternatives 3A, 3B, and 4A i are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.

As shown in **Table 4-9**, the primary impacts to EJ neighborhoods include:

- Acquisition of property, and residential and business relocations (see **Section 4.5**);
- Increased in traffic on local arterials and collector streets at new access road locations (see **Section 4.4**);
- Proximity impacts, such as noise (see **Section 4.15**) and visual intrusion (see **Section 4.16**); and
- Construction impacts, such as noise and additional traffic (see **Section 4.20**).

The impacts experienced by the affected areas containing minority and low income populations are discussed in detail in the above-referenced sections. A summary of the primary impacts is presented below.

All of the Build Alternatives would result in displacements in minority and/or low income neighborhoods. Residential displacements, ranging from six (Alternatives 2B, 3A, 3B, and 3C) to 20 (Alternative 5), would primarily occur in the South Dallas neighborhood district and in West Dallas - East of Hampton/Inwood Road. No schools, community or recreation centers, or places of worship, which may be considered especially important community and public resources to minority or low income populations would be displaced by any of the Build Alternatives (see **Section 4.3.4**). A large number of commercial displacements would occur with Alternatives 2A and Alternative 2B. These displacements would not result in a shortage of employment opportunities in the project area and surrounding areas (see **Sections 4.5.3** and **4.6.2.2**).

In regards to traffic impacts, some new traffic would be introduced in the immediate vicinity of interchanges associated with the Build Alternatives. However, the proposed action would have an overall beneficial impact by improving public safety, mobility, and access in the project area. The Build Alternatives are expected to improve congestion on the major arterial streets and would also manage congestion on other major highways in the project area (see **Section 4.4 Transportation Impacts**).

Residential areas containing minority and low income populations located at the north and south ends of the project area (South Dallas and Middle Stemmons/Brookhollow neighborhood districts) would be noise impacted by all of the Build Alternatives. In addition, residential areas along the west levee (West Dallas and East Oak Cliff neighborhood districts) would be noise impacted by Alternatives 4A, 4B, and 5. No community or public resources (i.e. schools, recreation centers, or places of worship) identified in the neighborhoods of EJ concern would be noise impacted. For additional details on what constitutes a noise impact, see **Section 4.15**.

All of the Build Alternatives would cause visual changes. Alternatives 2A, 2B, and 5 would be highly visible to commercial and residential areas along the immediate corridor. Visual impacts along the majority of Alternatives 3A, 3B, 3C, 4A, and 4B would be limited due to the east and west levees acting as a visual barrier for viewers outside of the Dallas Floodway. The southern terminus, which is common to all of the Build Alternatives, would be a dominant visual feature to adjacent viewers within the South Dallas neighborhood district.

Impacts during construction, such as noise and visual changes, would be temporary and would not be expected to result in a disruption of normal activities for minority or low income populations.

As shown in **Table 4-9**, the alternatives with the least degree of adverse impacts to minority and low income populations are Alternatives 3A, 3B, and 3C. The alternatives with a higher degree of impacts are Alternatives 2A, 2B, 4A, 4B, and 5.

4. Public Involvement

Extensive public involvement has been an integral part of the proposed action during the Trinity Parkway Corridor Major Transportation Investment Study (MTIS) (TxDOT, 1998a)/DEIS (FHWA, 2005) process. The purpose of the public involvement has been to establish and maintain communication with the public and various affected or interested parties. These public involvement activities included a formal DEIS scoping meeting and informal presentations to a wide range of organizations, agencies, and individuals (see **Chapter 10 Comments and Coordination** and **Appendices A-2** and **G-7**). Representative examples include:

- A formal public scoping meeting held in July 1999;
- A Community Advisory Work Group (CAWG);
- An Interagency Executive Team;
- A project office telephone number;
- Project newsletters;
- Media outreach;
- Meetings with local institutions, civic groups, business associations, neighborhood groups, and other local organizations;
- A project-specific internet web page; and
- A public hearing.

The Interagency Executive Team is comprised of representatives from local governments, resource agencies, and the project consultant team. The CAWG is comprised of members of the community to provide a broad-based representation of the community at-large. CAWG members have included

representatives from project area neighborhoods/districts, the Dallas Black Chamber of Commerce, and Dallas Hispanic Chamber of Commerce (see **Appendix A-2**). During both the Trinity Parkway Corridor MTIS and the DEIS process, public meeting announcements were published in local newspapers, including the *Dallas Weekly*, a local Black citizen newspaper, *El Sol de Texas*, a local Spanish language newspaper, and *The Dallas Morning News*. Additional efforts for public involvement have included meetings and presentations at forums hosted by the City of Dallas, the Dallas City Council, and other civic groups.

Table 4-10 shows key public outreach activities that have occurred in an effort to involve the affected minority and low income populations of communities/neighborhoods identified in **Table 4-9**. These activities were conducted in an effort to inform the public regarding the proposed project, provide an opportunity for participation in the planning process, and identify impacts or issues of concern. These activities also served as a forum to obtain input concerning potential mitigation measures for the project. The Neighborhood District column of **Table 4-10** lists the neighborhoods where the public outreach has occurred thus far. The neighborhood names are identified at the bottom of the table.

TABLE 4-10. KEY PUBLIC OUTREACH ACTIVITIES FOR MINORITY AND LOW-INCOME POPULATIONS

Date	Event	Neighborhood District with Opportunity for Involvement*	Major Issues/Concerns Discussed
October 4, 1999	Conducted first in a series of Community Advisory Work Group (CAWG) meetings	1, 2, 3, 4, 5, 6, 7, 8, and 9	Role of the CAWG Overview of engineering and environmental issues
October 30 and November 10, 1999	Study corridor tours for CAWG members	1, 2, 3, 4, 5, 6, 7, 8, and 9	Preferences and times for future CAWG meetings Site conditions within Trinity Parkway study area
November 17, 1999 February 8, 2000	Presentations to West Dallas Business Associations	1 and 2	Presentation of Trinity Parkway EIS process and preliminary schematics for alternative alignments
December 13, 1999	Conducted second CAWG meeting	1, 2, 3, 4, 5, 6, 7, 8, and 9	Alternative alignments Overview of Trinity River MIP access points and types
January 10, 2000	Conducted third CAWG meeting	1, 2, 3, 4, 5, 6, 7, 8, and 9	Engineering design developments Ramp connections to IH-35E
February 14, 2000	Conducted fourth CAWG meeting; topics discussed included Environmental Justice	1, 2, 3, 4, 5, 6, 7, 8, and 9	Hazardous materials Cultural resources and parklands Community impacts (land use, displacements) Environmental Justice
February 24, 2000	Meeting with T.R. Hoover (South Dallas) Neighborhood Association	6	History of Ideal Neighborhood/TR Hoover Community Development Corporation Partnership opportunities with NTTA, TxDOT, City of Dallas Review of alternatives - focus on southern terminus at US 175, proposed Gateway parks Establishing adjacent neighborhood associations
March 13, 2000	Conducted fifth CAWG meeting	1, 2, 3, 4, 5, 6, 7, 8, and 9	Utility relocations Natural resource impacts Visual impacts
March 23, 2000	Public Meeting conducted in South Dallas	6	Number of displacements and impacts Compensation for value of time in establishing a home and preferred way of life, trust issues Noise and air quality Traffic congestion Dividing existing neighborhoods (community cohesion)

TABLE 4-10. KEY PUBLIC OUTREACH ACTIVITIES FOR MINORITY AND LOW-INCOME POPULATIONS

Date	Event	Neighborhood District with Opportunity for Involvement*	Major Issues/Concerns Discussed
April 10, 2000	Conducted sixth CAWG meeting	1, 2, 3, 4, 5, 6, 7, 8, and 9	Visual impacts Transportation impacts Temporary impacts during construction Water quality
May 8, 2000	Conducted seventh CAWG meeting	1, 2, 3, 4, 5, 6, 7, 8, and 9	Traffic Toll rates and collection methods Toll plaza layout and design
May 23, 2000	Meeting with the TR Hoover Community Development Corporation (Ideal Neighborhood Association)	6	Project overview
June 12, 2000	Conducted eighth CAWG meeting	1, 2, 3, 4, 5, 6, 7, 8, and 9	Hydraulic analysis Air quality Noise
July 25, 2000	Conducted Public Meeting for Industrial Corridor Businesses	6, 7, 8, and 9	Project overview
September 11, 2000	Conducted CAWG meeting	1, 2, 3, 4, 5, 6, 7, 8, and 9	Traffic Hydraulic analysis Cost estimates Right-of-way needs Overview of alternatives evaluation
May 3 - 31, 2001	Trinity River Corridor Comprehensive Land Use Plan stakeholders meetings (16 Meetings)	1, 2, 3, 4, 5, 6, 7, 8, and 9	Project overview
July 2 and 19, 2001	Presentations to the Oak Cliff Chamber of Commerce	3 and 4	Project overview
February 17, 2004	Conducted CAWG meeting	1, 2, 3, 4, 5, 6, 7, 8, and 9	Project overview (changes since 2000) Incorporation of Balanced Vision Plan into the DEIS
February 24, 2004	Public Meeting conducted in West Dallas	1 and 2	Project design within the Dallas Floodway Impacts from Build Alternatives and related displacements Design speeds and vehicle-class restrictions Flood protection and management Financing by TxDOT and/or City of Dallas
February 26, 2004	Public Meeting conducted in South Dallas	6	Noise reduction measures (roadway materials used, noise walls, reduction in traffic on SM Wright) Revenue sharing with community Economic impacts and possible remedies Contract labor for project from the community Community betterment during and after project Air quality impacts
March 9, 2004	TR Hoover Neighborhood Association Presentation	6	Project overview
March 9, 2004	New Hope Baptist Church Presentation	6	Project alignment and design decisions (ramp locations, accessibility, number of lanes) Decisions on parks, availability, recreational amenities Notices/displacements for affected property owners
March 18, 2004	Bus tour for South Dallas elected official's staff and neighborhoods	6	Project overview
March 27, 2004	Booth at TR Hoover Neighborhood Association Community Fair	6	Project overview
March 27, 2004	Clean South Dallas Joint Neighborhood Associations' meeting	6	Project overview
June 23, 2004	New Hope Church - Presentation to Trustees	6	Project overview
September 09, 2004	St. Phillips Neighborhood Development Corporation briefing		Project overview
September 16-17 2004	South Dallas local and state elected officials briefing	6	Accessibility to/from Trinity Parkway and surrounding community Staged construction Reclassification of adjacent highways Recreational facilities in southern portion of project

TABLE 4-10. KEY PUBLIC OUTREACH ACTIVITIES FOR MINORITY AND LOW-INCOME POPULATIONS

Date	Event	Neighborhood District with Opportunity for Involvement*	Major Issues/Concerns Discussed
September 18, 2004	West Dallas Chamber of Commerce presentation	1 and 2	Land use planning Design elements (building materials, traffic management, design standards) Community cohesion
November 16, 2004 December 16, 2004 January 28, 2005	Briefings for South Dallas local and state elected officials	6	Project overview
February 15, 2005	Conducted CAWG meeting	1, 2, 3, 4, 5, 6, 7, 8, and 9	Project overview
March 29, 2005	Public Hearing and Open House at the Dallas Convention Center Arena Notices published prior to the Public Hearing in *The Dallas Morning News*, *Al Dia* (Spanish), *Dallas Weekly*, and *El Sol de Texas* (Spanish), and mailed to community leaders, agencies, interested groups, and potential affected property owners	1, 2, 3, 4, 5, 6, 7, 8, and 9	Project design and operation Relocations and displacements Impacts to floodplains, waters of the U.S., including wetlands, wildlife habitat, air quality, and cultural resources Indirect and cumulative impacts
October 24, 2005	South Dallas Planning Workshop	6	Project overview
September 20, 2007	Meeting hosted by Senator Royce West and Commissioner John Wiley Price on Trinity Project	4	Project overview Cost estimates

Notes: The CAWG consists of 54 representatives from neighborhoods (including West Dallas, East Oak Cliff, Magna Vista/Cedar Crest [Cadillac Heights], North Oak Cliff, South Dallas, and the Cedars), businesses, civic groups, landowners, and environmental groups. CAWG meetings are open to the public.

***Key to Neighborhood Districts:**

1 - West Dallas West of Hampton	4 - East Oak Cliff	7 - Cedars/Fair Park/East Dallas
2 - West Dallas East of Hampton	5 - Magna Vista/Cedar Crest	8 - Lower Stemmons
3 - North Oak Cliff	6 - South Dallas	9 - Middle Stemmons/Brookhollow

During the Trinity Parkway Corridor MTIS and DEIS public involvement process, alternatives were revised to reflect concerns expressed by neighborhoods (see **Chapter 2 Alternatives Considered**). Comments on alternatives and appropriate options were used to modify or eliminate alternatives. The SDEIS Build Alternatives were identified based on their ability to satisfy the project's need and purpose, goals and objectives, community input, and to minimize the project's social, economic, and environmental impacts. To date, neighborhood group representatives and individuals from the affected minority and low income populations have indicated major issues of concern to be:

- Housing displacements;
- Loss of affordable housing;
- Relocation of businesses;
- Air quality, noise levels, and noise wall location;
- Increased traffic; and
- Construction impacts, such as noise and additional traffic.

These issues have been addressed in this SDEIS. Specific impacts are described throughout this chapter, and proposed mitigation measures are further described later in this section and in **Chapter 7**

Mitigation Measures and Commitments. Future public outreach activities are planned and will continue throughout the EIS and design phases of the project. Future activities will include, but are not limited to:

- A formal Public Hearing;
- Additional Interagency Executive Team and CAWG meetings;
- Project newsletters;
- Media outreach;
- Traveling kiosk;
- Additional meetings with local institutions, civic groups, business associations, neighborhood groups, and other local organizations; and
- Continued coordination with the City of Dallas.

NCTCOG Transportation Public Involvement Process

As previously described in **Section 1.10** in **Chapter 1 Need and Purpose for Proposed Action**, the NCTCOG *Mobility 2030: The Metropolitan Transportation Plan (MTP) for the Dallas-Fort Worth Area* (2007a) includes the Trinity Parkway as a major element of the freeway/toll road plan. Public involvement and outreach efforts to reach low-income and minority communities continue to be an important component of the NCTCOG MTP development process. One of the primary goals of *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* plan is to provide a balanced transportation system that is responsive to all residents, including historically underserved populations.

The NCTCOG is committed to incorporating EJ (EO 12898) elements and Title VI considerations into its public involvement process. This is accomplished through an EJ and Title VI analysis, which measures mobility and accessibility for the identified protected class populations and non-protected class populations. The plan also reflects the continued recognition of quality-of-life issues and the relationship between community development and transportation in the sustainable development initiatives, documented in *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*.

During the public involvement process, populations that have been traditionally underserved by existing transportation systems, including but not limited to low-income and minority households, are sought out and their needs considered. Other fundamental concepts of EJ included in NCTCOG's policy are to ensure the full and fair participation by all potentially affected communities in the transportation decision making process; and to prevent the denial of, reduction in, or substantial delay in receipt of benefits by minority and low-income populations.

5. Limited English Proficiency Considerations

Executive Order (EO) 13166 (2000), *"Improving Access to Services for Persons with Limited English Proficiency (LEP),"* requires federal agencies to examine the services they provide and identify any need for services to those with limited English proficiency. The EO requires federal agencies to work to ensure that recipients of federal financial assistance provide meaningful access to their LEP applicants and beneficiaries. Failure to ensure that LEP persons can effectively participate in or benefit from federally assisted programs and activities may violate the prohibition under Title VI of the Civil Rights Restoration Act of 1987 and Title VI regulations against national origin discrimination.

An analysis was conducted to identify residents in the project area that may have LEP, since these residents may not understand outreach materials. This analysis was conducted at the block group level. The results are presented in **Table 4-11**.

TABLE 4-11. LANGUAGE SPOKEN AT HOME STATISTICS

Area		Population[1]	Percent who Speak English "less than very well"
City of Dallas		1,188,580	21.8
Project Area		63,005	12.3
Project Area Census Tracts	**Project Area Block Groups [2]**		
20	---	7,271	56.8
---	1	234	70.5
	2	1,391	41.9
	5	2,188	68.7
33	---	2,066	32.8
---	2	503	17.5
34	---	1,460	12.5
---	2	629	18.6
38	---	2,754	4.8
---	4	792	3.9
39.02	---	2,099	5.9
---	2	888	5.0
	3	635	11.2
40	---	1,496	6.0
---	1	498	4.0
	2	865	7.2
41	---	1,440	16.5
---	1	388	7.7
	2	984	19.9
42.01	---	5,449	36.4
---	1	762	0.0
43	---	2,860	39.8
---	1	607	41.7
	2	827	36.9
86.03	---	1,687	18.5
---	1	99	12.1
	2	808	31.3
89	---	2,730	6.7
---	1	998	8.9
	2	682	13.2
100	---	9,614	4.3
---	1	324	9.6

TABLE 4-11. LANGUAGE SPOKEN AT HOME STATISTICS

Area		Population[1]	Percent who Speak English "less than very well"
City of Dallas		1,188,580	21.8
Project Area		63,005	12.3
Project Area Census Tracts	**Project Area Block Groups [2]**		
	2	981	4.9
	3	8,215	4.1
101.01	---	3,766	17.6
---	1	617	15.7
	2	858	9.4
	3	426	0.0
	5	974	40.6
101.02	---	3,460	41.4
---	1	956	45.9
	2	1,451	38.1
	3	683	42.0
102	---	2,356	9.8
---	1	1,751	9.9
105	---	2,378	14.7
---	1	1,203	16.6
106.01	---	5,163	39.5
---	1	2,777	39.8
115	---	4,956	18.8
---	5	845	9.2

Source: U.S. Census Bureau, 2000.
Notes: 1 - Population age 5 and older; and 2 - Individual block groups within census tracts that fall within the study area boundary.

The percentages of residents within the project area block groups who speak English "less than very well" range from 0 percent (42.01/1 and 101.01/3) to 70.5 percent (20/1). LEP persons were identified within the block groups throughout the majority of the project corridor, although higher percentages of LEP persons are concentrated in the West Dallas - East of Hampton, West Dallas - West of Hampton, and North Oak Cliff neighborhood districts, and the Cadillac Heights neighborhood. According to 2000 Census data, of the residents who speak English "less than very well" located in the project area, the predominant language spoken is Spanish (approximately 37 percent). Other representative languages (less than 0.5 percent each) include German, French, Arabic, and Vietnamese. In addition, DISD personnel indicated that project area schools (see **Section 3.1.4**) have English as a Second Language (ESL) programs for both school age children and adults. Languages spoken in project area schools include a wide variety of European, African, and Asian dialects.

A field reconnaissance indicated English was the primary language used for building signage and other forms of posted information and advertisement along areas where impacts are likely to occur. Included were scattered areas of Spanish language signage, postings, and advertisements. These areas were primarily located in the Cedars/Fair Park/East Dallas, West Dallas - East of Hampton, West Dallas - West of Hampton, and North Oak Cliff neighborhood districts.

As previously described, efforts have been made to include all affected communities and populations, including potential minority and low-income populations, in the public involvement and decision making process. Public outreach efforts have included announcements in local English and Spanish media, the CAWG (which included representatives from project area neighborhoods), a public scoping meeting, and neighborhood meetings. Future public outreach activities will include additional announcements in local English and Spanish media, CAWG meetings, neighborhood meetings, public hearings, project newsletters, and a project web site. A proactive public involvement program will continue for the proposed project and all populations affected will have a continuing opportunity to participate in the development of the project. Translators have been present at several of the public meetings and at the public hearings and will continue to be utilized in future meetings with LEP communities.

6. Title VI of the Civil Rights Act of 1964, as amended

EO 12898 is an administrative directive to federal agencies and does not create any judicially enforceable rights; therefore, environmental justice proponents also look to the judicial system for guidance. Federal court decisions under Title VI have provided several criteria by which compliance with EO 12898 can be assessed. The following section deals with the application of these Title VI criteria, as well as EO 12898, to the case of the Trinity Parkway.

Among the most important environmental justice criteria that have evolved out of Title VI litigation are the requirements that:

- Defendants justify their actions by showing a legitimate non-discriminatory purpose; and
- Plaintiffs demonstrate that there is a reasonable alternative to the proposed action that is also non-discriminatory.

(See *Georgia State Conference of Branches of NAACP v. State of Georgia*, 775 F.2d 1403, 1417 [11th Cir. 1985]).

Due to the demographic composition and spatial distribution of minority populations within the project area, the proposed action would have unavoidable impacts to minority populations regardless of which Build Alternative may be identified as the preferred alternative. Therefore, the Title VI analysis suggests that it must be demonstrated that a legitimate, non-discriminatory purpose in implementing the proposed action would be achieved. The Title VI criteria would similarly require that the question of whether there is a reasonable, non-discriminatory alternative to the proposed action be addressed.

With respect to the above criteria, there are a number of environmental and transportation issues which have led to the recommendation of the proposed action in this area of Dallas over other transportation alternatives. Throughout the Trinity Parkway Corridor MTIS/EIS process, one of the goals has been to

minimize impacts on local residents, while accomplishing the primary purpose of the roadway: managing congestion in the Canyon/Mixmaster/Lower Stemmons corridors. The transportation planning, economic, and land use considerations that determined the location for the proposed action are manifest and have been discussed in **Chapter 1 Need and Purpose for Proposed Action**. Alternatives that were considered (e.g., mass transit, improvements to existing roadways, etc.) during the MTIS/EIS process have been discussed in **Chapter 2 Alternatives Considered**. There are well supported environmental and transportation planning considerations that demonstrate the reasonableness of the proposed action.

7. Toll Road Considerations

Electronic Toll Collection (ETC) Systems

Various methods of toll collection have been considered for the Trinity Parkway. The NTTA Board has recently directed (August 2007) that future facilities, including the proposed Trinity Parkway, implement ETC systems to promote operational safety and efficiency. This means that cash would not be accepted while driving on the Trinity Parkway. As discussed below and in *Methods of Toll Charge Collections*, NTTA offers two methods to obtain an active toll tag account (NTTA TollTag® "credit user" and "cash user" accounts) and an additional method which would allow motorists without an active toll account to accrue electronic toll charges in the form of mailed monthly statements (NTTAs ZipCash®).

In Texas, most of the ETC applications to date are based on installation of Radio Frequency Identification (RFID) tags inside vehicles, such as the TollTag® used by NTTA, TxTag® used by TxDOT and EZ TAG® used by the Harris County Toll Road Authority (HCTRA). All of the Texas tags are interoperable, meaning a Texas driver need only maintain one tag to use all of the Texas agency toll roads. With an ETC system, motorists pass through electronic readers, without stopping, and are automatically assessed a toll charge.

The NTTA and TxDOT are implementing marketing programs aimed at educating the public on where to purchase electronic toll tags and how to use them on area toll roads and managed lanes. The objective is to establish interoperable toll accounts. Any ETC account set up with a local toll authority in Austin, Dallas, or Houston would be able to access toll roads or managed lanes in any of toll authority areas while having the tolls charged to the user's home account. To achieve this objective, toll tags or stickers issued by a toll authority in one area of the state would be capable of being read by the toll system in another area of the state. Each toll authority would be capable of registering toll transactions to the user's home toll account.

Recent advances have allowed ETC systems to accommodate non-tagged vehicles, through use of Automatic License Plate Recognition (ALPR). In this method, license plates are photographed and

scanned by computers. The registered vehicle owners are then sent a monthly billing statement based on activity, with an additional fee included for billing and handling. This "video billing" program allows motorists to travel the tolled lanes without needing a transponder and without needing to stop and pay. NTTA has recently installed the video billing system (branded as ZipCash®) on a temporary basis during the Main Lane Plaza reconstruction at the southern end of the Dallas North Tollway. TxDOT and HCTRA have used RFID tags supplemented with ALPR to create ETC toll roads, where there are no change booths. Westpark Tollway in Houston, SH 130 in Austin and SH 121 in Denton/Carrollton are examples of ETC toll roads.

Method of Toll Charge Collections

For those who maintain an active toll account, the Dallas area TollTag®, TxTag® stickers, and the Houston area EZ TAG® would be accepted on the Trinity Parkway facility. Toll charges would be automatically deducted from a prepaid credit account. The account would be a prepay account which means the driver must maintain sufficient funds in his/her account to cover incurred toll charges, such as for accounts currently in use for existing toll roads.

Although cash would not be accepted while driving on the Trinity Parkway, the NTTA's ZipCash® system would allow motorists without an active toll account to accrue electronic toll charges in the form of mailed monthly statements. Under the ZipCash® system, a photograph would record the vehicle's license plate as it travels through a toll gantry. The license plate information would then be used to identify the registered owner who would be sent an invoice for the incurred tolls. The charges for the ZipCash® method are as follows:

- Within one and 30 days after use of the facility: 21 cents per mile toll rate only, no additional charge.
- Within 30 days and 45 days after use of the facility: 21 cents per mile toll rate plus $1.50 one time administrative fee.
- After 45 days of use of the facility: 21 cents per mile toll rate plus $25 per gantry utilized.

As further described below, cash payment options are available for each payment method; however, only those users who maintain prepaid accounts would benefit from reduced toll rates. Toll rates are one-third higher for drivers who do not have an electronic toll transponder to offset the costs related to processing the license plate information associated with ZipCash®.

Bilingual (English and Spanish) information on payment methods is available on the NTTA (www.ntta.org) and TxDOT (www.TxTag.org) websites and over the phone (Customer Service Centers).

NTTA TollTag® Account Payment Methods

With a TollTag® prepaid "credit user" account, for example, the driver would pay a minimum $40 installment through a credit or debit card. The account would then be established with a $40 credit, which would be reduced each time the transponder passes through an operating toll gantry. When the driver's account reaches $10 or less, the "credit user's" credit or debit card would again be charged $40 to automatically increase the available balance. Should the "credit user" lose or fail to surrender the TollTag® when the account is closed, the credit or debit card would be charged $25 to cover the cost of the transponder.

The NTTA also allows cash payments. For those who choose to maintain a prepaid "cash user" account, an initial deposit of $25 would be required for the toll transponder as well as a $40 payment to establish the account. Per NTTA policy, this automatic deposit is required of "credit user" accounts. The "cash user" deposit can be refunded without interest if the user returns the transponder in good condition or if the "cash user" account is converted into a "credit user" account. The prepaid "cash user" account would require the driver to maintain sufficient funds in his/her account to cover incurred toll charges. Toll rates would be the same as "credit user" account toll rates. When passing through a toll lane equipped with a traffic signal, a yellow light on the traffic signal indicates that the account balance is at or below $10. A red light indicates that the account balance is $0. The NTTA must receive payment at one of the TollTag® locations before the account reaches $0 to avoid the incurrence of toll violations.

The TollTag® may only be displayed in the vehicle specifically assigned to that TollTag®. The license plate number of a vehicle listed on the TollTag® account cannot be registered on another TollTag® account. Regardless of the user type, TollTag® accounts may be monitored free of charge via the internet. Should the user request a monthly invoice, a $1.50 charge would be incurred each month.

TollTag® account payments may be made by cash, check, money order, or credit card. TollTag® "cash user" accounts may be established and payments may be submitted in person at the NTTA Customer Service Center (5900 West Plano Parkway, Suite 200, Plano, TX 75093) or at the NTTA TollTag® Store (12300 Inwood Road, Suite 110, Dallas, TX 75244). Both locations provide a night drop for after-hours convenience. In addition, the NTTA also offers the convenience of making a payment by phone with a credit card.

ZipCash® is a "drive through now, pay later" initiative provided by the NTTA for those without a TollTag® account. The ZipCash® method of payment is synonymous with "video billing." Customers without a toll transponder account who travel through the gantry would have a photograph taken of their license plate. When the toll fee associated with the license plate has reached a designated level, NTTA would send a bill to the address associated with that license plate. The customer has 30 days to pay the "first notice."

The rate on the "first notice" is the normal cash rate which is approximately 30 percent more than the TollTag® price. If there is no response from the customer, the customer is offered an opportunity to pay the cash rate and an invoice fee is included to offset the cost of the processing. The customer is then allowed 15 days to provide payment. If the balance is not resolved, then a violation notice is issued. An administrative fee plus the original toll fee is included as a deterrent and to cover the expenses incurred in the process. The customer has 30 days to pay the violation notice. If the violation notice is not resolved, the NTTA may forward the unpaid transaction for the issuance of a citation for failure to pay the toll. The Department of Public Safety would issue the citation, and the exact costs vary depending on how the case is adjudicated. Examples of how toll charges may affect individual households are presented under the "Toll Pricing" subsection, below.

Comparison of Payment Methods

Not maintaining a prepaid account would impact any user, including low-income users, because the cost of paying the accumulated toll charges without an account would represent a higher toll rate than toll charges affiliated with a prepaid account. Cash payment options are available for each payment method; however, only those users who maintain prepaid accounts would benefit from reduced toll rates. In summary, toll rates are one-third more for drivers who do not have an electronic toll transponder to offset the costs related to processing the license plate information associated with ZipCash®. Although certain toll transponder account holders are required to pay up-front fees or deposits for toll transponders ($25 deposit for TollTag "cash users" accounts and $9.65 fee per transponder for TxTag® accounts), the toll transponder account holders would benefit from reduced toll rates compared to the total toll rates associated with ZipCash®.

Toll Pricing

The toll rates for the Trinity Parkway would be consistent with other toll rates in the region. The exact toll rate would be determined prior to facility opening and is subject to ongoing consideration by the NTTA. The regional toll rates, per the RTC, are 17 cents per mile in peak periods and 12.5 cents per mile during off-peak periods. At this time the Trinity Parkway is expected to operate as a "fixed rate" facility (i.e. all vehicles would be tolled at the same rate all the time). For the following discussion, the toll rate was set at the regional average toll rate of 14.5 cents per mile for toll-tag users (TollTag®) and 21 cents per mile for non-toll-tag users (ZipCash®).

The potential economic effects of tolling the Trinity Parkway on individual households can be illustrated using the following scenario.

For example, assume that the toll rate would be set at 14.5 cents per mile (2010) for TollTag® users and 21 cents per mile for non-TollTag® users, and that the average household would make 250 round-trips

per year (this is the average number of work trips per year based on industry observations provided by NTTA). Under this scenario, the annual cost to use the entire 9-mile tolled section would be approximately $625 and $945 per year respectively. A TollTag® user with an annual household income equal to the median household income of Dallas County ($49,062) would spend approximately 1.3 percent of the household income on Trinity Parkway tolls, while a non-TollTag® user would spend 1.9 percent of the household income. However, households with a TollTag® and incomes at the poverty level of $21,200 (for a family of four) would spend 2.9 percent of household income on tolls or, approximately 1.6 percent more than the average household income user. Households without a TollTag® and incomes at the 2008 U.S. Department of HHS poverty level of $21,200 (for a family of four) would spend 4.4 percent of their household income, or approximately 2.5 percent more than the average household income user, when paying within 30 days after use of the facility.

A worst case scenario would occur if no payment is made within the first 45 days after of use the facility. As stated in the *Methods of Toll Charge Collection* section, the 21 cents per mile toll rate plus $25 per gantry utilized would be charged to non-TollTag® users. If a low-income non-TollTag® user were to delay the payment over 45 days after the first month of using the facility for which 20 round-trips are made, the cost for using a maximum of four toll gantries per round trip would be $176 per month. Assuming 250 round-trip per year and payment delay of 45 days every month, the cost would be $2,112 per year, which equates to 10 percent of a household income (at the 2008 HHS poverty level) under a worst case scenario.

Toll road users might decide to reduce their personal economic impact of tolls by carpooling, where tolls would be divided among many travelers.

Project Level Analysis

Overview

Origin-destination (O&D) data secured from the NCTCOG was used for analysis of “user impacts” of the proposed Trinity Parkway project on low-income and minority populations. Studying O&D data can determine travel patterns of traffic along a transportation facility during a typical day. This form of analysis is useful in assessing “user impacts” as the number of trips associated with specific population characteristics can be studied to provide general travel assumptions of those specific populations. Trips are defined as a one-way movement from where a person starts (origin) to where the person is going (destination). Assessing “user impacts” in the form of an O&D analysis is an integral component of the environmental justice analysis for the tolling aspects of the Trinity Parkway.

Traffic Survey Zones, Study Area, and Data Sources

The information associated with the O&D analysis is organized by traffic survey zones (TSZs) which are small geographic units of area that are developed as a basis for estimate of travel. TSZs may vary in size, are determined by the roadway network and homogeneity of development, and directly reflect demographic data generated by the U.S. Census Bureau. Delineated by state and/or transportation officials for tabulating traffic-related data, TSZs usually consist of one or more census blocks, block groups, or census tracts.

The NCTCOG metropolitan planning area (MPA) consists of 5,000 square miles and encompasses five entire counties (Collin, Dallas, Denton, Rockwall, and Tarrant Counties) and four partial counties (Ellis, Johnson, Kaufman, and Parker Counties). A total of 4,874 TSZs comprise the NCTCOG MPA study area. Given the regional operating characteristics of Trinity Parkway, it is reasonable to assume the NCTCOG MPA contains the proposed project daily users and therefore is considered the project study area.

TransCAD®, a GIS-based transportation planning software, was utilized by the NCTCOG to generate the traffic data analyzed during the O&D analysis. NCTCOG conducted a "select-link analysis" based on 2030 AM peak period traffic to generate O&D data associated with the proposed project. Traffic data exported directly from TransCAD® select-link matrices was correlated with U.S. Census Bureau data to provide a demographic profile of users anticipated to utilize the proposed Trinity Parkway toll road. The data identified anticipated users and associated travel patterns related to the proposed project and identified environmental justice populations in order to assess the intensity of use by those populations. This analysis is subject to change pending the 2009 update to the MTP.

Analysis Assumptions and Limitations

To clarify the intent of the O&D analysis, the analysis does not attempt to identify specific users (low-income and minority populations) but instead identifies the origins and intensity of trips based on collective socio-economic characteristics at the TSZ level for the proposed project. In other words, the O&D analysis predicts the potential users of the Trinity Parkway facility in 2030 by correlating the general socio-economic characteristics of the future users based on *Census 2000* data to the intensity of use quantified by the number of trips per TSZ generated by TransCAD®. Because the proposed Build Alternatives for the Trinity Parkway are all tolled, only the numbers for the build-toll scenario were determined and no comparison with any other scenario (i.e. build-toll vs. build-non-toll) was necessary. NCTCOG conducted a "select link analysis" based on 2030 AM peak period traffic for the build-toll scenario to generate the number of trips per TSZ. The correlation of *Census 2000* and TransCAD® data is the best available method to identify which TSZs would originate trips anticipated to utilize the Trinity Parkway facility and the general demographics of the population associated with those TSZs. The model

identifies the Trinity Parkway tolled links and these “toll links” are assigned a cost per mile for the Build scenario. The model then assigns vehicle trips based on user cost, trip distance, time of day, and other factors to achieve system equilibrium in the network. However, the vehicle trip assignment process does not consider relative income differences or the differences in relative costs to potential users in the population when making trip assignments. Because no definitive data exists on the future users of the Trinity Parkway or similar type facilities, the O&D analysis cannot predict the specific race, ethnicity, or economic status associated with the predicted trips on tolled or non-tolled facilities.

Analysis of TSZs and Number of Trips Predicted to Utilize the Trinity Parkway in 2030

Analysis of the O&D data for TSZs is discussed below and summarized in **Table 4-12**.

Of the total 4,874 TSZs located within the MPA study area, motorists from 2,314 TSZs are anticipated to utilize the Trinity Parkway with at least one trip per day. These TSZs are projected to generate 28,815 trips per day on the Trinity Parkway. The number of projected trips from these TSZs varied from a high of 565 trips per day to a low of one trip per day. 2,560 of the TSZs would have less than one trip per day on the Trinity Parkway. The TSZs were color-coded and mapped based on the number of trips per day from each TSZ that are predicted to utilize Trinity Parkway (**Plate 4-2**). Data analysis indicates that slightly less than half of the TSZs within the MPA study area are expected to have at least one trip per day along the Trinity Parkway.

Identification of Environmental Justice TSZs

The threshold for an environmental justice TSZ (“EJ TSZ”) was defined as a TSZ with an environmental justice population (specifically low-income and minority populations) equal to or greater than 51 percent of the total TSZ population. This percentage indicates a majority presence of environmental justice populations for that TSZ. A total of 1,685 EJ TSZs were identified within the MPA study area (see **Plate 4-3A**).

Analysis of EJ TSZs and Number of Trips Predicted to Utilize the Trinity Parkway in 2030

Analysis of the O&D data for EJ TSZs is discussed below and summarized in **Table 4-12**.

Of the total 1,685 EJ TSZs within the MPA study area, there are 893 EJ TSZs anticipated to utilize the Trinity Parkway with at least one trip per day. These EJ TSZs are projected to generate 14,030 trips per day on the Trinity Parkway (48.7% of total trips). The number of projected trips from these EJ TSZs varied from a high of 565 trips per day to a low of one trip per day in 2030. 792 of the study area EJ TSZs would have less than one trip per day along the Trinity Parkway. The EJ TSZs predicted to utilize the Trinity Parkway facility were color-coded and mapped based on the number of trips per day from each EJ TSZ (**Plate 4-3**).

Summary Analysis Results

Table 4-12 summarizes the 2030 O&D analysis results for the Trinity Parkway. The analysis indicates that motorists from EJ TSZs would contribute approximately 48.7% of daily trips on the Trinity Parkway.

TABLE 4-12. ORIGIN-DESTINATION DATA FOR THE TRINITY PARKWAY

Total TSZs Anticipated to Utilize the Trinity Parkway	Total TSZ trips	Total EJ TSZs Anticipated to Utilize the Trinity Parkway	Total EJ TSZ trips	% of EJ TSZ Trips of Total Trips
2,314	28,815	893	14,030	48.7%
Source: NCTCOG TransCAD® data for 2030 utilization of the Trinity Parkway. The study area (NCTCOG MPA) is comprised of 4,874 total TSZs and 1,685 EJ TSZs.				

Effects of Tolling to EJ Populations

The O&D analysis indicates that EJ TSZs would contribute nearly one-half of the daily trips on the Trinity Parkway. There would be an economic impact to any motorist who uses the Trinity Parkway; however, the economic impact would be higher for low-income populations because the cost of paying tolls would represent a higher percentage of household income than for non-low-income users. Additionally, the requirement to prepay for a toll tag, keep money in a deductible account, and replenish that account may be too great of a financial burden for low-income populations. Of the 2,314 TSZs and 893 EJ TSZs anticipated to have at least one trip per day on the Trinity Parkway, 26 TSZs (1.1% of the total TSZs and 2.9% of the EJ TSZs) had low-income populations greater than 51 percent of the TSZ total population. These low-income TSZs were predicted to have a total of 519 trips (1.8% of the total trips and 3.7% of the total EJ population trips on the Trinity Parkway).

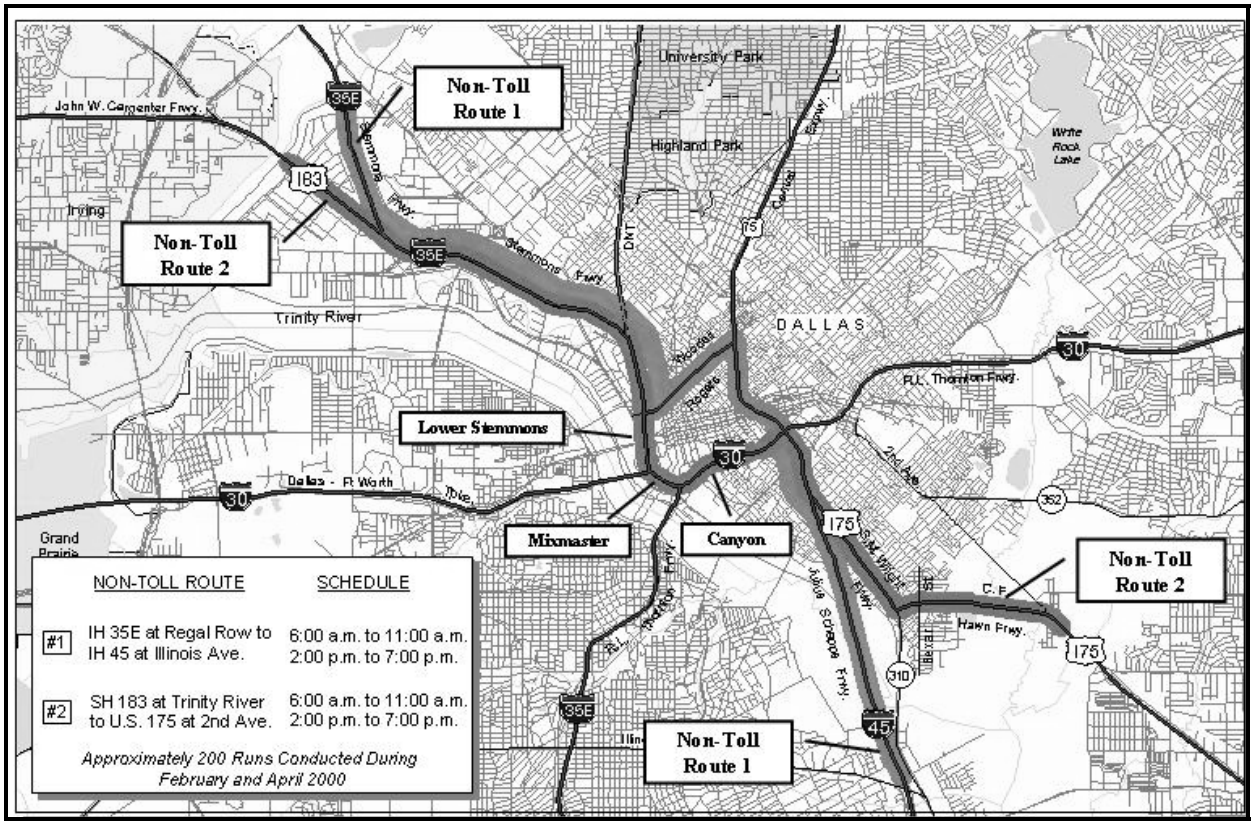
Due to the greater economic burden of paying a toll, low-income motorists would likely be more reluctant to utilize the Trinity Parkway and instead use other non-tolled alternative routes. As discussed below in Non-Toll Alternatives, there are two existing alternative non-tolled routes on major highways that would serve the motorists traveling between the northwest and southeast Trinity Parkway project limits (**Figure 4-1**). For motorists who utilize the non-tolled alternative routes, the difference in travel times would likely be highest during peak hours of travel when traffic congestion would be the greatest. As described in **Chapter 1 Need and Purpose for Proposed Action**, the Trinity Parkway project is intended to provide one component of a transportation solution to better manage traffic congestion and improve safety in the area of the Dallas CBD, particularly congestion in the IH-30/IH-35E (Mixmaster) interchange on the west edge of downtown Dallas; the depressed segment of IH-30 (Canyon) south of the CBD; and the segment of IH-35E from the Mixmaster north to the DNT (Lower Stemmons). These major roadways make up critical segments of the non-tolled alternative routes likely to be utilized by low-income motorists

traveling through the study area. These congestion management improvements would benefit all motorists, including low-income motorists.

Non-Toll Alternatives

Should motorists not utilize the Trinity Parkway toll road, they can use the extensive network of toll-free roadways in the area (see **Section 3.2 Transportation Setting**). As shown in **Figure 4-1**, there are two primary alternative non-tolled routes that could be used in lieu of the Trinity Parkway. These are major roadways (IH-35E, IH-30, IH-45, and US-175) that connect to the same general endpoints as the proposed Trinity Parkway in the northwest and southeast portions of the study area and would not require venturing onto frontage roads or side streets within neighboring residential and commercial areas. These alternative non-tolled routes are similar, but diverge within the Dallas CBD, where traffic flow is at a consistent congested state. An analysis performed by Wilbur Smith Associates (2000) compared travel times along the Trinity Parkway and the two non-tolled alternative routes. The analysis cited an additional travel time expenditure of 7 minutes for Non-Toll Route 1 during peak A.M. and P.M. travel times in the peak travel direction. The study also showed an additional time expenditure of 7 minutes during the A.M. and 17 minutes during the P.M. for Non-Toll Route 2 in the peak travel direction. For both non-toll alternative routes in the peak direction, travel speeds during the A.M. peak period ranged on average from 20 to 40 mph within the Dallas CBD and 40 to 60 or more mph traveling through the West and South Dallas areas. During the P.M. peak period, average travel speeds throughout the Dallas CBD in the peak direction ranged from 20 to 50 mph, with special exception to East-bound I-30 within the CBD, where travel speeds were consistently between from 20-29 mph. P.M. peak travel speeds throughout West and South Dallas ranged from 40 to 60 mph.

FIGURE 4-1. NON-TOLL ALTERNATIVE ROUTES



Source: Wilbur Smith Associates, 2000.

Transit

Because the Trinity Parkway does not currently exist, no transit service is currently provided along this route. Any of the Build Alternatives could provide a new route for buses and taxis, thus expanding the existing transit service in the study area. Should transit service be provided along the proposed Trinity Parkway in the future, the transit vehicles would not be exempt from tolling per current policy. Per an existing contract between NTTA and DART, DART would be responsible for a fixed monthly rate for utilization of the Trinity Parkway facility. If a new transit route is implemented along the proposed Trinity Parkway, it can be anticipated that over the long-term, as the regional toll network develops, the increased user cost may make transit a more competitive option.

8. Mitigation and Compensation Options

FHWA Order 6640.23 states that the agency shall avoid disproportionately high and adverse impacts on minority and/or low-income populations by

> "…proposing measures to avoid, minimize, and/or mitigate disproportionately high and adverse environmental health effects and interrelated social and economic effects, and

providing offsetting benefits and opportunities to enhance communities, neighborhoods, and individuals affected by FHWA programs, policies, and activities…"

Due to the high concentration of minority and low income populations in the study area (see **Tables 4-5** through **4-7** and **Plate 4-1**), consideration of mitigation options is warranted. As previously described, the principal impacts of the proposed action on these populations are expected to be relocation/displacements of residences and businesses and proximity impacts (e.g., noise and visual intrusion). When it is determined that a project may have disproportionately high and adverse impacts on minority or low-income populations, mitigation and enhancement measures and potential offsetting benefits to the affected minority and/or low-income population should be taken into account. The proposed action should only be carried out if further mitigation measures or alternatives that would avoid or reduce any disproportionately high and adverse impacts are not practicable.

Total avoidance of project impacts to the identified minority and low income populations in the project area would require construction of the proposed facility at a different location away from the affected population or the recommendation of a No-Build Alternative. There are no undeveloped corridors that exist in the study area in which a facility meeting the project need and purpose could be constructed without similar impacts to other minority and/or low-income populations. In addition, a location too far removed from the project area would not satisfy the need and purpose of the proposed action (see **Chapter 1 Need and Purpose for Proposed Action**). As currently proposed, construction of the Trinity Parkway would result in displacements in commercial/industrial areas and on the edges of residential neighborhoods along the Build Alternatives. While the Build Alternatives would result in social impacts to residents displaced and to those remaining, the impacts would likely be fewer and of less magnitude than if the facility were to be constructed at a different location.

The No-Build Alternative would avoid the impacts of the Build Alternatives, but would not provide:

- Improvement in corridor mobility;
- New points of access to neighborhoods;
- Aesthetic improvements, such as landscaping;
- Access/service roads that would facilitate improved transit; or
- Sidewalks and/or trails.

Implementation of the Build Alternatives would result in some beneficial impacts, including:

- Improved access to some neighborhoods;
- The opportunity for improved transit;
- Possible inclusion of sidewalks and/or trails adjacent to access roads for pedestrians/bicyclists;

- Landscaping;
- Improved congestion management; and
- Economic revitalization.

Mitigation in the form of landscaping, sidewalks/trails, and aesthetic improvements would be included in the project as needed by adhering to the concepts and principles of FHWA's "Context-Sensitive Solutions" (CSS) approach. The CSS approach seeks to enhance the positive values of both the local community and the natural environment. CSS provides community benefits as it seeks to:

- Incorporate feedback from the local populace affected by proposed transportation facilities;
- Encourage collaboration between neighborhoods and local, state, and federal public officials;
- Enhance not only the roadway and transit communities, but the bicycle and pedestrian communities as well;
- Assist in the development of strategies for smart growth or sustainable development;
- Encourage assessments and design of alternatives consistent with local needs; and
- Help effectively merge transportation, engineering, architectural, historical, and natural environmental systems into transportation decision-making.

CSS contributes to community, safety, and mobility and considers the total context within which a transportation improvement project will exist. It is a collaborative and interdisciplinary approach to developing and re-designing transportation facilities that fit into their physical and human environment while preserving its aesthetic, historic, community, and environmental values (FHWA, 2007).

A possible mitigating measure would be the inclusion of aesthetic enhancements along stretches of right-of-way in the Trinity Parkway design. The enhancements might include upgrades in the design and construction of retaining walls that improve their aesthetic appearance, including selection of wall materials, lighting, manipulation of structural design, and the use of native vegetation for the purposes of softening and enriching the wall surfaces. Similar improvements could be incorporated into the design of bridge structures and open areas underneath the elevated sections. These enhancements have been employed in and around the City of Dallas (e.g., President George Bush Turnpike and US-75 Central Expressway) and have generally met with positive responses by neighboring residents.

The NTTA/City of Dallas would provide relocation advisory assistance to any person, business, or non-profit organization displaced as a result of the acquisition of real property for public use. Those displaced would be relocated with assistance in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. More information about how this would be accomplished is provided in **Section 4.5 Relocation and Displacement Impacts** and **Appendix C Displacement/Relocation Assistance Information**.

Other possible mitigation measures or offsetting benefits that could directly improve conditions at these locations include implementation of noise abatement measures, such as noise walls, if a determination is made that such measures are effective, reasonable, and feasible (see **Section 4.15**). The final decision to construct any proposed noise walls would be made upon completion of the public involvement process and the final design for the proposed action.

Plate 4-4 shows a conceptual representation of the southern terminus area (US-175/SH-310) as an example of proposed enhancements to mitigate community impacts. Included are proposed noise wall locations, bicycle/pedestrian access improvements, and landscaping improvements. In key public outreach meetings (see **Table 4-10**), neighborhood stakeholders (which included elected officials) provided preliminary suggestions on the conceptual design of the proposed connection at US-175/SH-310 in the form of recommendations for pedestrian and automobile circulation, and landscaping to enhance the facility and to minimize impacts to adjacent properties. As previously described throughout this SDEIS, this southern terminus area is common to all Build Alternatives and would be affected no matter which Build Alternative may be identified as the preferred alternative. Similar mitigation enhancements would be developed for any additional locations where mitigation is deemed warranted, such as the minority areas located west of the Dallas Floodway. It should be noted that the features shown on **Plate 4-4** are conceptual in nature and may be revised based on community input.

Potential mitigation measures planned for the proposed action may be eligible for funding and implementation through the DOT's TE program (see **Section 7.9 Potential Mitigation Enhancements**). These and other possible mitigation measures would be further considered by FHWA/TxDOT/NTTA with the solicited involvement of neighborhood residents and other interested parties, during and after the public hearing on this SDEIS. A detailed list of specific mitigation commitments would be included in the Trinity Parkway FEIS.

9. Summary of Environmental Justice Considerations

The proposed Trinity Parkway Build Alternatives were evaluated for compliance with EO 12898 and FHWA 6640.23. As discussed in the *Methodology and Approach* section above, a three-tiered approach was used to support a determination:

- Identify whether minority or low-income populations exist in the project area. The terms "minority populations" and "low-income populations" were defined. Sources of data used included census data; anecdotal information from coordination with local officials; and public involvement.
- Identify adverse impacts that would potentially affect any minority and low-income communities of concern.
- Identify mitigation strategies for any identified adverse impacts.

As reported in the series of impact evaluations prepared for this SDEIS, the project has the potential for disproportionate impacts on minority and low income populations within the project area. With the proposed mitigation previously discussed (also see **Chapter 7.0**) it is anticipated that the impacts would be adequately mitigated and, therefore, would not be high or adverse. The proposed action is similarly consistent with Title VI in that there is no evidence of discriminatory intent or effect. The proposed action offers the possibility of long-term benefits to these areas and their residents.

Based on appropriate and adequate mitigation resulting in no disproportionately high or adverse impacts, the analysis concludes that the Trinity Parkway project can therefore be considered consistent with the policy established in EO 12898 and FHWA Order 6640.23.

4.3.4 Impacts to Various Community or Public Resources

4.3.4.1 No-Build Alternative

The No-Build Alternative could have adverse impacts on community and public resources within the Trinity Parkway study area. Increases in traffic congestion and travel delays could have adverse impacts for schools, emergency services, recreational facilities, and businesses as mobility and access within the study area worsen. School buses and emergency service vehicles could experience increasing amounts of delay.

4.3.4.2 Build Alternatives

Several different types of adverse impacts to community and public resources may occur as a result of the proposed action. These impacts may include relocations or proximity impacts, such as noise impacts, visual intrusion, or increased traffic on local arterials and residential collector streets (see **Table 4-13**). The impacts reported here are generalized and would not be uniform for all of the community or public resources specified. Impacts may be more pronounced or less pronounced depending on the proximity of each resource to a proposed alternative. Although noise levels are expected to increase near all resources that are adjacent, or in close proximity to, one of the Build Alternatives, none of the identified community or public resources would be noise impacted. For information on what constitutes a noise impact, see **Section 4.15 Noise Impacts**.

The impacts to community and public resources range from building impacts and relocations (see **Section 4.5**) to proximity impacts such as visual intrusion (see **Section 4.16**) and increased traffic on adjacent streets (see **Section 4.4**). Alternatives 2A and 2B have the most community/public building relocations with four facilities impacted. Alternative 5 would result in building relocations at three facilities. Alternatives 3A, 3B, 3C, 4A, and 4B have no community/public building relocations.

TABLE 4-13. POTENTIAL IMPACTS TO COMMUNITY OR PUBLIC RESOURCES

Plate ID No.	Facility	Address	Trinity Parkway Build Alternatives							
			2A	2B	3A	3B	3C	4A	4B	5
Police and Fire Facilities										
1	Lew Sterrett Justice Center Parking Garage	133 N. Industrial Boulevard	P (V, T)	P (V, T)	P (V, T)	P (V ,T)	P (V ,T)	P (V, T)	P (V ,T)	P (V, T)
1A	Lew Sterrett Justice Center Gas Pump Building	111 W. Commerce	R (1 Bldg.)	R (1 Bldg.)	---	---	---	---	---	---
3	Fire Station No. 1	1901 Irving Boulevard	R (1 Bldg.)	R (1 Bldg.)	---	---	---	---	---	---
Schools/DISD Facilities										
9	Priscilla L. Tyler Elementary School	2333 Calypso Street	---	---	---	---	---	P (V, T)	P (V, T)	P (V, T)
6	DISD Facility (Storage and Maintenance Facility)	3701 South Lamar	R (2 Bldgs.)	R (4 Bldgs.)	P (V, T)	P (V, T)	P (V, T)	P (V, T)	P (V, T)	P (V, T)
Community and Recreation Centers										
12	West Dallas Community Center	2215 Canada Drive	---	---	---	---	---	P (V, T)	P (V, T)	P (V, T)
Places of Worship										
19	Trinity Valley Church of God in Christ	2043 Canada Drive	---	---	---	---	---	P (V, T)	P (V, T)	P (V, T)
20	Dallas 7th Day Adventist	2050 Canada Drive	---	---	---	---	---	P (V, T)	P (V, T)	P (V, T)
22	Canada Drive Christian Church	2035 Canada Drive	---	---	---	---	---	P (V, T)	P (V, T)	P (V, T)
23	Macedonia Baptist Church	1967 Canada Drive	---	---	---	---	---	P (V, T)	P (V, T)	P (V, T)
24	Canada Drive Church of God in Christ	1833 Canada Drive	---	---	---	---	---	P (V, T)	P (V, T)	P (V, T)
25	Leath Street Baptist Church	1831 Canada Drive	---	---	---	---	---	P (V, T)	P (V, T)	P (V, T)
28	Victory Mission Baptist Church	2313 Canada Drive	---	---	---	---	---	P (V, T)	P (V, T)	P (V, T)
39	Shiloh Missionary Baptist Church	1114 Comal Street	---	---	---	---	---	P (V, T)	P (V, T)	P (V, T)
45	St. Paul Baptist Church	1600 Pear Street	P (V)	P (V)	---	---	---	---	---	---
Pump Stations/Offices										
LO	City and County Levee Operations - Levee Operations Office	2255 Irving Boulevard	R (1 Bldg.), P (V, T)	R (5 Bldgs.)	---	---	---	---	---	P (V)
A	City and County Levee Operations - Pump Station A	830 Houston Street Viaduct	P (V, T)	P (V, T)	---	---	---	---	---	R (1 Bldg.)
B	City and County Levee Operations - Pump Station B	2255 Irving Boulevard	P (V, T)	P (V, T)	---	---	---	---	---	R (1 Bldg.)
C	City and County Levee Operations - Pump Station C	600 East Brazos	---	---	---	---	---	---	---	R (1 Bldg.)

Key to Terms:
R = relocation(s) anticipated at this location
P = proximity effect
V = visual intrusion
T = increased traffic expected on local streets
--- = no impacts anticipated for alternative.
Note: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
Plate ID numbers correspond with **Table 3-8** and **Plate 3-10** in **Chapter 3** and **Plates 4-5** through **4-12** in **Chapter 4**.

THIS PAGE INTENTIONALLY LEFT BLANK

Table 4-13 shows that each of the Build Alternatives would have some degree of adverse impact on a number of community and/or public resources, including displacement and required relocation of one or more facilities, and/or proximity impacts such as visual intrusion and increased traffic on local streets. Depending on the preferred alternative identified, some of these community and/or public resources may benefit somewhat due to improved access from the proposed major transportation facility.

4.4 TRANSPORTATION IMPACTS

The Trinity Parkway is a proposed north-south reliever route that would serve as an alternate route around downtown Dallas. Currently, the major north-south route in the study area is IH-35E, located east of the proposed Trinity Parkway. Based on traffic models, if the Trinity Parkway is not built as currently proposed, congestion on alternative routes in this section of Dallas would continue to rise (see **Section 4.4.1.1**). The existing IH-35E is a parallel highway facility, which already operates with unacceptable levels of congestion during peak commuting periods. As previously described in **Chapter 1 Need and Purpose for Proposed Action**, drivers would be required to tolerate more congestion and longer travel times if the Trinity Parkway is not built.

The information in this section is primarily based on *Mobility 2030: The Metropolitan Transportation Plan (MTP) for the Dallas-Fort Worth Area*. It should be noted that the analysis presented here is subject to change pending the 2009 update to the MTP. The MTP serves as a guide for the expenditure of state and federal transportation funds for the region through the year 2030. *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* was developed in accordance with the planning transportation requirements established in SAFETEA-LU, TEA-21, ISTEA of 1991, and the CAAA of 1990.

This section describes the impacts of the proposed action on the transportation system (see **Section 3.2 Transportation Setting**). Roads and highways, public transportation, freight activities, and pedestrian/bicycle issues are discussed in the following sections. Although each of these elements plays an important role in making up the overall use characteristics of the transportation system, each has unique characteristics and requirements. Included are discussions concerning the anticipated impacts related to traffic and public safety, travel patterns and accessibility, and toll road impacts.

4.4.1 Roads and Highways

Any of the eight Build Alternatives would have a similar impact on road and highway travel in the Trinity Parkway study area. The following sections describe the impacts the Build Alternatives would have on

traffic volumes, congestion levels, safety, and general roadway system performance in the project study area.

4.4.1.1 Traffic Volumes

The traffic study completed for this project developed 2030 traffic volume projections based on *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* for the Build Alternatives using the DFW Regional Travel Model (DFWRTM). This model was validated to existing traffic volumes on the roadway network throughout the DFW area and then was used to project future traffic conditions for the Trinity Parkway under the alternative scenarios described in **Chapter 2 Alternatives Considered**. Forecasts generated by this model are based on population, employment, and land use projections developed by the NCTCOG and used in all of the region's transportation planning activities. To determine LOS, the model first calculates a peak-hour volume based on an average weekday travel forecast along with appropriate time-of-day, directional, and heavy vehicle factors. This volume is then used to define the lane warrants, using LOS E as the minimum acceptable LOS. LOS E represents traffic operation at or near capacity with varied densities (number of passenger vehicles per mile per lane) depending on the free-flow-speed. Under LOS E, vehicles are typically operating with minimum spacing and disruptions often cause queues to form.

The No-Build Alternative and the Build Alternatives assume that all programmed projects are completed by the year 2030. These projects include improvements to the Canyon/Mixmaster/Lower Stemmons corridors (i.e., Project Pegasus) as well as other transportation improvement projects previously described in **Chapter 1 Need and Purpose for Proposed Action** and **Chapter 3 Affected Environment** (**Section 3.2 Transportation Setting**). The No-Build Alternative provides a point of comparison for evaluating the impacts of constructing the Trinity Parkway. **Table 4-14** shows the existing and projected traffic volumes along with LOS characteristics for the No-Build Alternative and eight Build Alternatives.

Table 4-14 shows that the Trinity Parkway provides congestion relief benefits within the study area where traffic, mobility, and access issues are the most acute (i.e., the Canyon/Mixmaster area). There are some roadway segments where congestion would not be improved with the Build Alternatives. However, congestion on the roadway segments within the distressed Canyon/Mixmaster area would generally be improved by the Build Alternatives compared to the No-Build Alternative. For instance, traffic volumes on IH-35E, from the DNT to IH-30, would be reduced ranging from 19,500 ADT (Alternatives 2A and 2B) to 34,900 ADT (Alternatives 4A, 4B, and 5). This reduction in traffic volume, along with a reduced ADT on IH-30 east of IH-35E, would manage congestion through the Canyon/Mixmaster area. The differences in interchange locations and configurations accounts for the primary differences in traffic projections between alternatives (see **Chapter 2** and **Section 4.4.6**).

Table 4-14 also shows a projected increase in traffic on US-175 ranging from 21,900 ADT (Alternatives 2A and 2B) to 27,300 ADT (Alternatives 3B and 3C) compared to the No-Build Alternative. This can be attributed to the Trinity Parkway because it would provide a regionally important connecting link to US-175 at SH-310. This connection creates an attractive and more efficient way for motorists traveling to and from communities in South Dallas, southern Dallas County, and beyond to access the major roadway network within the study area and surrounding the Dallas CBD. In contrast, traffic volumes on US-175 (SM Wright Freeway) north of SH-310 would be substantially reduced. With the Trinity Parkway in-place, the major bottle neck that occurs for motorists traveling between US-175 (CF Hawn Freeway) and US-175 (SM Wright Freeway) would be substantially improved.

TABLE 4-14. EXISTING AND PROJECTED TRAFFIC VOLUMES AND LOS

Roadways	Existing Conditions (2007)		No-Build Alternative (2030)		Trinity Parkway Build Alternatives (2030)							
					2A, 2B		3A		3B, 3C		4A, 4B, 5	
	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS
IH-35E												
North of SH-183	138,131	D-E	184,263	C-D	194,200	E-F	194,500	D-E	194,000	C-F	193,100	D-E
SH-183 to DNT	264,756	F	326,109	F	278,400	E-F	290,200	E-F	291,300	F	288,600	E-F
DNT to IH-30	274,747	F	375,501	D-F	356,000	D-F	353,500	D-F	358,000	D-F	340,600	D-F
South of IH-30	195,602	F	263,945	F	267,200	E-F	265,300	E-F	263,900	E-F	264,300	E-F
IH-30												
West of IH-35E	160,073	F	207,057	D-E	206,700	D-E	208,000	D-E	204,200	C-D	202,900	C-D
East of IH-35E	253,952	F	332,986	F	310,400	E-F	306,400	E-F	305,000	E-F	311,400	E-F
East of IH-45	228,004	F	334,131	E-F	340,400	E-F	339,900	F	334,900	E-F	340,000	E-F
SH-183												
West of IH-35E	183,047	F	247,927	E-F	256,900	D-F	313,500	D-E	291,400	D-F	312,100	D-E
US-175												
East of SH-310	102,227	E-F	129,037	D-E	150,900	F	154,500	F	156,300	E-F	152,700	F
North of SH-310	107,980	F	140,665	F	24,600	C-D	21,600	C-D	20,500	C-D	23,800	C-D
IH-45												
North of Trinity River	94,239	D-E	147,685	A-C	168,300	C-D	161,700	C-D	160,900	C-D	167,500	C-D
US-75												
North of IH-30	173,618	F	214,631	D-E	187,500	E-F	184,400	E-F	181,700	E-F	193,000	E-F
North of Woodall Rodgers	254,664	F	298,866	F	302,600	F	297,700	F	302,000	F	284,600	F
Industrial Boulevard												
North of Woodall Rodgers	35,989	F	38,665	F	34,300	E-F	27,300	D-E	27,400	C-D	29,300	E-F
Irving Boulevard												
West of Sylvan Avenue	28,717	D-E	32,025	F	35,200	D-F	29,300	D-E	27,400	D-E	28,600	D-E
West of Westmoreland	38,482	D-E	37,887	C-D	34,700	ABC	36,500	C-D	39,100	A-C	36,100	A-C
Trinity Parkway												
Commonwealth to Hampton/Inwood	---	---	---	---	122,200	E-F	127,000	F	94,900	D-E	126,000	F
Hampton/Inwood to Wycliff/Sylvan	---	---	---	---	100,900	D-E	118,800	C-D	128,300	C-F	111,100	E-F

TABLE 4-14. EXISTING AND PROJECTED TRAFFIC VOLUMES AND LOS

Roadways	Existing Conditions (2007)		No-Build Alternative (2030)		Trinity Parkway Build Alternatives (2030)							
					2A, 2B		3A		3B, 3C		4A, 4B, 5	
	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS	ADT	LOS
Wycliff/Sylvan to Woodall Rodgers	---	---	---	---	111,600	D-E	127,900	C-D	127,800	C-F	119,000	E-F
Woodall Rodgers to Houston/Jefferson	---	---	---	---	100,400	D-E	112,600	E-F	106,900	D-E	113,600	E-F
Houston/Jefferson to Corinth	---	---	---	---	107,000	D-E	103,800	C-D	113,200	F	106,300	D-E
Corinth to MLK	---	---	---	---	96,100	D-E	89,300	C-D	105,100	C-E	99,700	C-D
MLK to IH-45	---	---	---	---	100,200	D-E	119,500	C-D	124,900	D-E	105,100	E-F
IH-45 to US-175	---	---	---	---	127,900	F	109,000	E-F	111,400	C-D	101,300	C-D

Source: NCTCOG, 2007a.
Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
ADT = Average Daily Traffic; **LOS** = Level of Service; **---** = None

In order to further analyze the affects of traffic redistribution on the local transportation network, the major and minor arterials in the project area were analyzed for predicted changes in traffic volume due to the proposed Trinity Parkway. The following 14 arterials were analyzed:

- South Lamar Street
- Industrial Boulevard
- Irving Boulevard
- Canada Drive
- Houston Street
- Jefferson Boulevard
- Corinth Street
- Sylvan Avenue
- Singleton Boulevard
- Hampton Road
- Inwood Road
- Martin L. King Boulevard
- Hatcher Street
- Malcolm X Boulevard

The individual links of each of these 14 arterials (ranging from 127 links to 151 links depending on the alternative) were analyzed for changes in volume between the No Build scenario and each Build Alternative. The largest increase in volume, regardless of the Build Alternative, occurred on Jefferson Boulevard with volume increases ranging from 36,608 vehicles under Alternatives 4A, 4B, and 5 to 46,302 vehicles under Alternatives 2A and 2B. The largest decrease in volume under each Build Alternative occurred on Corinth Street, with volume decreases ranging from 19,337 vehicles under Alternatives 2A and 2B to 21,026 vehicles under Alternatives 3A, 3B, and 3C. A detailed table listing of the traffic volume changes for each alternative and graphic maps showing the predicted increase and decrease in traffic redistribution are presented in **Appendix L-6.** Overall, the analysis indicated the redistribution of traffic would be evenly dispersed along the local transportation network, with only a limited number of roadways experiencing a substantial increase or decrease in vehicular traffic.

4.4.1.2 Congestion

Substantial growth in area traffic volumes by the year 2030 would result in increased capacity deficiencies on the area transportation system. As shown in **Table 4-14**, under the No-Build Alternative both IH-35E and IH-30 are projected to operate at LOS F conditions during the peak hour. All of the Trinity Parkway Build Alternatives would manage congestion on IH-35E, IH-30, and other major highways in the study area. Congestion on the major arterial streets is anticipated to improve, due to local street and access road improvements associated with the proposed action.

Additional TSM improvements to the local transportation system, although not sufficient by themselves to solve the congestion problem in the region, would further ease traffic congestion. TSM strategies include better access and land use management to reduce turning movement conflicts and optimizing traffic signals to accommodate changes in traffic patterns after the facility was built. **Table 1-9** in **Chapter 1** provides a summary of the various TSM improvements and additional CMP strategies (i.e., signalization/intersection improvements, pedestrian/bicycle facilities, rail transit, ITS, HOV, etc.) programmed for the Trinity Parkway study area.

4.4.1.3 Measures of Effectiveness

The DFWRTM provides methods to measure the effectiveness to describe the existing and future performance of the roadway network throughout the study area. Measures of Effectiveness (MOEs) include the total daily VMT, total daily vehicle-hours of travel (VHT), average travel speed (mph), congestion delay (vehicle-hours), and the percent of lane miles at LOS D, E, or F. **Table 4-15** shows MOEs calculated for the Trinity Parkway study area roadway network.

TABLE 4-15. MEASURES OF EFFECTIVENESS

MOE [1] Parameter	2007 Existing Condition	2030 No-Build	2030 (Alts. 2A, 2B)	2030 (Alt. 3A)	2030 (Alts. 3B, 3C)	2030 (Alt. 4A, 4B, 5)
Vehicle Miles of Travel [2]	7,640,842	10,271,372	10,466,507	10,503,443	10,499,887	10,447,530
Vehicle Hours of Travel [3]	227,861	293,784	288,936	288,983	291,131	289,344
Average Speed (mph) [4]	33.53	34.96	36.22	36.35	36.07	36.11
Lane Miles	1,184	1,349	1,366	1,389	1,399	1,379
Congestion Delay (vehicle-hours) [5]	33,558	44,917	41,097	40,412	41,679	41,167
Percent Lane Miles at LOS D, E or F [6]	39.61	46.03	42.69	41.83	43.08	42.31

Source: NCTCOG DFWRTM.
Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
LOS = level of service; **mph** = miles per hour

1. MOEs focus on the identified project needs and also provide a method to determine the degree that traffic conditions, such as congestion and mobility, could be improved by each of the Build Alternatives.
2. VMT = the total number of miles driven by all vehicles in the area on an average day.
3. Vehicle Hours of Travel (VHT) = the total time spent driving vehicles in the area on an average day.
4. Average Speed (mph) = VMT divided by the VHT.
5. Congestion Delay (vehicle hours) = hours per day of increased travel time or delay due to congestion; determines whether vehicles are experiencing substantial delays on the roadways and gauges the degree that congestion could be managed by the various alternatives.
6. Percent Lane Miles at LOS D, E or F = percent of lane miles operating in congested conditions at LOS D, E or F.

As shown in **Table 4-15**, the total VMT would increase in 2030 for all of the alternatives, including the No-Build Alternative; and correspondingly, the VHT would increase for all of the alternatives. The No-Build Alternative would have less VMT and greater VHT compared to the Build Alternatives, indicating increased congestion on the roadway network under the No-Build Alternative. Furthermore, the average speed traveled for the No-Build Alternative would be less than the average speed traveled for the Build Alternatives. Under the No-Build Alternative, traffic would move slower (average speed) and people would spend more time in their vehicles (VHT), all while traveling shorter distances (VMT).

4.4.2 Public Transportation

DART provides bus and rail transit service throughout the study area (see **Section 3.2 Transportation Setting**). In addition, Amtrak operates passenger rail service through the study area. Taxi service is provided on demand. None of the Build Alternatives would have any substantial adverse impact on DART operations or taxi service providers in the study area. Each Build Alternative would manage congestion through the creation of alternative routes and additional capacity in the study area.

Because the Trinity Parkway does not currently exist, no transit service is currently provided along this route. The Build Alternatives could provide a new route for buses and taxis, thus expanding the existing transit service in the study area. Should transit service be provided along the proposed Trinity Parkway in the future, the transit vehicles would not be exempt from tolling per current policy. Per an existing contract between NTTA and DART, DART would be responsible for a fixed monthly rate for utilization of the Trinity Parkway facility. If a new transit route is implemented along the proposed Trinity Parkway, it can be anticipated that over the long-term, as the regional toll network develops, the increased user cost may make transit a more competitive option.

Low-income residents within the study area who rely on public transportation or who may be eligible for ride subsidies or “welfare-to-work” programs may also benefit from the Trinity Parkway. Access to jobs located within and outside the study area would be improved by each Build Alternative.

4.4.3 Movement of Freight

All of the Build Alternatives would generally improve conditions for the various types of freight traffic within the study area, as described in **Section 3.2.4**, in comparison to the No-Build Alternative. This includes through rail freight; through truck freight on IH-35E, IH-30, US-75, IH-45, and other major routes; and local delivery truck traffic.

4.4.3.1 Trucking

IH-35E, IH-30, IH-45, and other major roadways are heavily traveled routes for freight truck movements. IH-35E is a part of the NAFTA Superhighway from Mexico to Canada. Reduced congestion on IH-35E would allow NAFTA-related commercial truck traffic to travel more quickly and efficiently through the study area. Because the Trinity Parkway is being planned as a toll facility, it is expected that the majority of trucks would continue to utilize IH-35E and other major freeways and arterials to travel into and out of the study area. However, the prohibition of heavy trucks (greater than two axles) is being considered for this project, which would require consensus by FHWA, TxDOT, RTC, NTTA, and the Dallas City Council. If heavy trucks were prohibited, truck traffic would continue to use the proposed roadway system as described by the 2030 plan in the study area.

4.4.3.2 Freight Railroads

All of the Build Alternatives would cross existing railroad lines in the study area. At all such crossings, the Trinity Parkway mainlanes would be grade separated from the rail lines to ensure no interruption of rail service and no conflicts between trains and motor vehicles. None of the Build Alternatives would have any substantial impact on freight railroad operations through the study area.

4.4.4 Bicycle/Pedestrian

Bicycle and pedestrian facilities would be enhanced by the Trinity Parkway Build Alternatives. Many of the proposed bicycle/pedestrian facilities in the study area are being planned and may be developed concurrently with the proposed action (see **Section 3.3.2.3**). Sections of the Trinity Parkway with adjacent access roads may also have pedestrian walkways (i.e., sidewalks) within the right-of-way, outside of the access road. In other areas where existing or proposed sidewalks would be crossed by the Trinity Parkway right-of-way, provisions for safely connecting the walkway on either side of the facility would be considered. As previously described in **Section 4.3.3.2**, Subsection 8, some bicycle/pedestrian facilities would be constructed where necessary as a measure to mitigate impacts to neighborhoods. Additional pedestrian walkways/bicycle trails may be added to the Trinity Parkway right-of-way through partnerships between local sponsors and the NTTA. Any new pedestrian facilities, including pedestrian signals, would be in compliance with the Americans with Disabilities Act (ADA).

4.4.5 Traffic and Public Safety

Some traffic safety improvements can be expected to occur as a result of making planned transportation improvements within the study area. However, by not constructing the proposed action, traffic congestion

on IH-35E, IH-30, and other major roadways would continue to worsen. The accident rate for certain sections of these roadways can also be expected to remain unacceptably high, or possibly worsen, under the No-Build Alternative (see **Section 1.7.7** for discussion congestion impacts on safety within the study area).

The proposed action would have an overall beneficial impact on the level of public safety in the study area. This improvement in public safety would be attributable to the diversion from local roads of motorists who would use the new tollway because of greater convenience and faster travel time. Similarly, any reduction in peak, weekday, weekend, and holiday local and non-local auto traffic on existing area roads would have beneficial public safety implications for the local area. Management of congestion on local roads could facilitate a reduction in response time for police, fire protection, and medical services.

Chapter 1 Need and Purpose for Proposed Action presented data from TxDOT that suggested managed congestion could contribute to a decrease in traffic accidents along major roadways, such as the Canyon/Mixmaster/Lower Stemmons corridors (i.e., Project Pegasus). Safety for slow-moving vehicles (e.g., bicycles) and pedestrians would also increase on existing roadways as fast-moving traffic would be directed to the Trinity Parkway.

4.4.6 Travel Patterns and Accessibility

Travel patterns within the study area would remain largely unchanged if the proposed action is not constructed. This would result in a continuation of vehicular travel delays and access constraints that currently characterize the Trinity Parkway study area. Under the No-Build Alternative, the insufficient and underdeveloped transportation network within the study area would continue to pose mobility and access constraints. The adverse effect of impaired mobility in the study area would continue to be felt mainly by residents, commercial establishments, and other interests in the form of increased commute time and other costs of congestion. The lack of accessibility to key public facilities and centers of economic activity negatively affects interests located for the most part outside of the study area. This includes residents and commercial transporters trying to get to and from major regional transportation facilities, such as Dallas Love Field and DFW International Airport; major tourist and visitor destinations, such as the Victory Development, West End Historic District and Dallas Convention Center; and major business and employment centers throughout the DFW metropolitan area. Additionally, the No-Build Alternative fails to address congestion and safety concerns, resulting in a negative impact on regional communities and a negative impact on IH-35E's ability to function efficiently as a national and international trade corridor.

The Build Alternatives offer improvements to travel patterns and accessibility within the study area. As an alternate route to IH-35E, especially in the more congested areas, the Trinity Parkway would present an attractive option for regional travel. Access to regional destinations would be improved by all of the Build Alternatives. Many of the vehicle trips bound for regional destinations that currently rely on IH-35E and other local roadways would have a convenient alternative in the Trinity Parkway, especially those trips that originate from the Dallas CBD and the communities, and towns/cities located south of the downtown area. Also, access to major employment centers in the study area would be improved by the Trinity Parkway.

Each of the Build Alternatives would cross numerous existing roadways. The highway design incorporates some form of connection or interchange on most of these intersections to provide uninterrupted service on existing roadways. Some alternative connections to existing roadways were not carried forward primarily due to right-of-way and engineering constraints, excessive costs, impacts to residential/commercial properties, and/or other socioeconomic and environmental impacts. Of the relatively smaller roadways that are not provided with bridges or interchanges, connections are provided via access roads in order to maintain property access.

Finally, the Trinity Parkway would improve access for emergency vehicles responding to calls within the study area. In some instances, the new roadway would provide access into and out of the study area with a more direct and rapid route for emergency vehicles (see **Chapter 2**, **Figures 2-4**, **2-7**, **2-10**, **2-13**, **2-16**, **2-19**, **2-22**, and **2-25**; also see **Plates 2-1** through **2-8** and **Plates 2-10, 2-11A**, and **2-11B**). In addition, NTTA policies permit the toll-free use of toll lanes by emergency vehicles in emergencies.

4.5 RELOCATION AND DISPLACEMENT IMPACTS

This section describes the potential relocation and displacement impacts for each of the Trinity Parkway alternatives. Displacements were determined from project mapping and aerial photography with alignment overlays. Impacts were confirmed through field inspections in the project area. Demographic characteristics of neighborhoods and their corresponding census block groups are provided in **Section 4.5.1.2**.

The NTTA/City of Dallas would provide relocation advisory assistance to any person, business, or non-profit organization displaced as a result of the acquisition of real property for public use. This would be done in accordance with the Uniform Relocation Assistance and Real Property Acquisition Polices Act of 1970, as amended (see **Section 4.5.2**).

4.5.1 Estimated Number and Description of Relocations or Displacements

4.5.1.1 No-Build Alternative

The No-Build Alternative would not result in the displacement of any existing residence, business, or other type of facility; therefore, no relocations are required with this alternative.

4.5.1.2 Build Alternatives

Table 4-16 summarizes the displacement impacts of each Build Alterative on existing buildings in the project area. Impacts are characterized by potentially displaced single-family residential buildings, commercial/industrial buildings, community/public facilities, schools, places of worship, and cemeteries. No schools, community centers, places of worship (including churches, temples, mosques, and synagogues), public health care facilities, or cemeteries would be displaced by any of the project alternatives. Additional details concerning impacts to community/public facilities are provided in **Section 4.3.4**. **Plates 4-5** through **4-12** show the location of anticipated building displacements for each alternative. **Table C-1** in **Appendix C** provides a list of building displacements by address.

TABLE 4-16. ESTIMATED NUMBER AND DESCRIPTION OF DISPLACEMENTS

Alt.	Residential Buildings	Commercial/ Industrial Buildings[1]	Community / Recreation Centers	Pump Stations/ Levee Operations Office Buildings	Police and Fire Station Buildings	Public Health Care Facilities	Schools	DISD Facility Buildings	Places of Worship	Cemeteries	Total
2A	8	272	---	1	2	---	---	2	---	---	285
2B	6	228	---	5	2	---	---	4	---	---	245
3A	6	27	---	---	---	---	---	---	---	---	33
3B	6	34	---	---	---	---	---	---	---	---	40
3C	6	29	---	---	---	---	---	---	---	---	35
4A	11	30	---	---	---	---	---	---	---	---	41
4B	11	24	---	---	---	---	---	---	---	---	35
5	20	39	---	3	---	---	---	---	---	---	62

Notes: --- = no impact
The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
1. The number of displaced buildings/structures is shown in this table; however, the number of individual businesses displaced may be higher due to multiple tenants in some buildings.

As shown in **Table 4-16**, each of the Build Alternatives would result in varying degrees of residential and commercial displacements. For residential displacements, five are common to all Build Alternatives. These are located near the southern terminus along Colonial Avenue and Starks Street between Lamar Street and US-175 (southern terminus). In addition to this common area, residential displacements occur as follows:

- Alternative 2A has one additional residential displacement at the south end along Colonial Avenue, one along Parnell Street near Lamar Street, and one at Metropolitan Avenue and Lamar Street. Alternative 2A has a total of eight residential displacements.

- Alternative 2B has one additional residential displacement at the south end along Colonial Avenue (same displacement as Alternative 2A). Alternative 2B has a total of six residential displacements.

- Alternatives 3A, 3B, and 3C have one additional residential displacement at the south end along Colonial Avenue. Alternatives 3A, 3B, and 3C each have a total of six residential displacements.

- Alternatives 4A and 4B have one additional residential displacement at the south end along Colonial Avenue (same displacement as Alternatives 3A, 3B, and 3C). Alternatives 4A and 4B also have five residential displacements along Gulden Lane, located west of the west levee at the Canada Drive/Beckley Avenue and Continental Avenue interchange. Alternatives 4A and 4B each have a total of 11 residential displacements.

- Alternative 5 has one additional residential displacement at the south end along Colonial Avenue (same as Alternatives 3A, 3B, 3C, 4A, and 4B). Alternative 5 also has 10 residential displacements along Gulden Lane (five of these are the same as Alternative 4A and 4B), two along Pastor Street, one along Canada Drive, and one along Millard Street. Alternative 5 has a total of 20 residential displacements.

No multi-family residential units would be displaced by the Trinity Parkway Build Alternatives. All of the displaced residential housing units represent affordable housing. According to personnel with the Dallas Housing Authority (DHA), none of these represent DHA low-income housing (e.g., tenants who qualify for federal Section 8 assistance).

For community/public facility displacements (see **Section 4.3.4**), Alternatives 2A and 2B have common displacements of Fire Station No. 1 along Irving Boulevard, two small buildings at the DISD storage and maintenance facility along South Lamar Boulevard, and a gas pump building associated with the Lew Sterrett Justice Center. Alternative 2B requires the additional displacement of one large building and one smaller building at the DISD facility. Alternatives 2A and 2B also require the displacement of one or more buildings at the City of Dallas Levee Operations office along Irving Boulevard. Alternative 5 requires the displacement of Pump Stations A, B, and C along the levees.

For commercial facilities, 13 displacements are common to all alternatives. Five of these occur at the south end of the project, while the remainder occur at the north end of the project near the IH-35/SH-183 interchange. Alternatives 2A and 2B have the most commercial displacements with 272 and 228, respectively. These displacements occur along the entire length of these alignments. Alternatives 3A, 3B, 3C, 4A, 4B, and 5 have commercial displacements of 27, 34, 29, 30, 24, and 39, respectively. These occur at the south end, north end, the IH-35/SH-183 interchange, and at the proposed Woodall Rodgers interchange.

The following paragraphs provide additional details concerning displacements associated with each of the Build Alternatives. The affected neighborhood districts and neighborhoods are described in detail in **Section 3.1.3**. In general, these districts and neighborhoods have demographic characteristics substantially different from the City of Dallas as a whole. Demographic characteristics of neighborhood census block groups with displacements are provided below (see **Tables 4-17** through **4-24**). The FEIS will provide more specific information about the direct displacement/relocation impacts once a preferred alternative has been identified.

Alternative 2A

Alternative 2A would result in the displacement of 8 single-family residences, 272 commercial/industrial buildings, and five community/public facility buildings. Alternative 2A would have the highest number of commercial/industrial building displacements (272) of all the Build Alternatives. The majority of these displacements would occur in the Middle Stemmons/Brookhollow and Lower Stemmons neighborhood districts. The displaced single-family residents would be within the South Dallas HOA neighborhood. There are high percentages of minority and low-income populations present in this neighborhood (see **Section 4.4.3**). **Table 4-17** shows neighborhood census block groups with displacements under Alternative 2A and their demographic characteristics (see **Plates 4-5A** and **4-5B**).

TABLE 4-17. DEMOGRAPHIC CHARACTERISTICS OF ALTERNATIVE 2A DISPLACEMENTS BY CENSUS BLOCK GROUPS

Neighborhood or Neighborhood District	Census Tract/ Block Group(s)	Displacements				Demographic Characteristics							
		Residential Building[1]	Commercial/ Industrial Building[2]	Community /Public Facility Buildings	Other[3]	Total Pop.	Percent White	Percent Racial Minority[4]	Percent Ethnic Minority[5]	Percent Elderly[6]	Median Household Income	Median Value of Owner-Occupied Housing Units	Median Contract Rent [7]
Middle Stemmons/Brookhollow ND													
Trinity Industrial District	100/1	---	2	---	---	338	32.8	67.2	15.7	29.3	$15,208	$36,300	NA
	100/3	---	23	---	---	8,255	54.3	45.7	18.2	0.8	$48,750	$85,000	NA
Middle Stemmons/ Brookhollow ND	100/1	---	18	---	---	338	32.8	67.2	15.7	29.3	$15,208	$36,300	NA
Sub Total		**---**	**43**	**---**	**---**								
Lower Stemmons ND													
Design District	100/3	---	59	1	---	8,255	54.3	45.7	18.2	0.8	$48,750	$85,000	NA
Market/Technology Center		---	41	---	---								
Lower Stemmons ND		---	66	2	---								
Sub Total		**---**	**166**	**3**	**---**								
Cedars/Fair Park/East Dallas ND													
Cedars/Fair Park/ East Dallas ND	34/2	---	0	---	---	693	8.9	91.1	16.7	16.2	$19,444	$46,700	$367
	33/2	---	25	---	---	516	41.1	58.9	62.6	2.3	$27,589	$37,500	$435
Sub Total		**---**	**25**	**---**	**---**								
South Dallas ND													
South Dallas HOA	34/2	1	3	---	---	693	8.9	91.1	16.7	16.2	$19,444	$46,700	$367
	40/1	1	3	2	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
	40/2	6	24	---	---	949	3.6	96.4	10.0	17.5	$15,781	$26,300	$298
South Dallas ND	34/2		8	---	---	693	8.9	91.1	16.7	16.2	$19,444	$46,700	$367
Sub Total		**8**	**38**	**2**	**---**								
Project Area Total		**8**	**272**	**5**	**---**								

Source: U.S. Census Bureau, 2000.

Notes: **ND** = Neighborhood District; **NA** = Not Available; **---** = No Impact

Census tracts/block groups are shown on **Plate 3-8** and neighborhoods/districts are shown on **Plate 3-9** at the end of **Chapter 3**, respectively.

Neighborhood and district boundaries do not correspond exactly with census tracts or block groups. A rough correlation has been established so that census data can be used to provide a general description of population, income, and housing characteristics. All Census figures shown are at the block group level.

1. Displacement counts are individual single-family residential buildings.
2. Displacement counts are individual buildings/structures; however, the number of individual businesses potentially affected may be higher due to multiple tenants in some buildings.
3. This category represents schools, places of worship, and cemeteries.
4. Total of persons reporting in non-white racial categories, including Black or African American, American Indian, Asian or Pacific Islander, some other race, or two or more races.
5. Total of persons reporting as Hispanic or Latino ethnic origin. As race and ethnic origin are two separate and distinct concepts, these persons may be of any race.
6. 65-years of age or older.
7. Median contract rent is the monthly rent agreed to or contracted for, regardless of any furnishings, utilities, fees, meals, or services that may be included.

Alternative 2B

Displacement impacts under Alternative 2B would be less than under Alternative 2A, although many of these displacements are common with Alternative 2A. Alternative 2B would result in the displacement of six single-family residences, 228 commercial/industrial buildings, and 11 community/public facility buildings. Similar to Alternative 2A, the displaced single-family units would be from the South Dallas HOA. This alternative would have the highest number of impacted community/public facilities of all the Build Alternatives. **Table 4-18** shows the neighborhood census block groups with displacements under Alternative 2B and their demographic characteristics (see **Plates 4-6A** and **4-6B**).

TABLE 4-18. DEMOGRAPHIC CHARACTERISTICS OF ALTERNATIVE 2B DISPLACEMENTS BY CENSUS BLOCK GROUPS

Neighborhood or Neighborhood District	Census Tract/ Block Group(s)	Displacements				Demographic Characteristics							
		Residential Building[1]	Commercial/ Industrial Building[2]	Community /Public Facility Buildings	Other[3]	Total Pop.	Percent White	Percent Racial Minority[4]	Percent Ethnic Minority[5]	Percent Elderly[6]	Median Household Income	Median Value of Owner-Occupied Housing Units	Median Contract Rent [7]
Middle Stemmons/Brookhollow ND													
Trinity Industrial District	100/1	---	7	---	---	338	32.8	67.2	15.7	29.3	$15,208	$36,300	NA
	100/3	---	24	---	---	8,255	54.3	45.7	18.2	0.8	$48,750	$85,000	NA
Middle Stemmons/ Brookhollow ND	100/1	---	14	---	---	338	32.8	67.2	15.7	29.3	$15,208	$36,300	NA
Sub Total		**---**	**45**	**---**	**---**								
Lower Stemmons ND													
Design District	100/3	---	42	1	---	8,255	54.3	45.7	18.2	0.8	$48,750	$85,000	NA
Market/Technology Center		---	17	---	---								
Lower Stemmons ND		---	44	6	---								
Sub Total		**---**	**103**	**7**	**---**								
Cedars/Fair Park/East Dallas ND													
Cedars/Fair Park/ East Dallas ND	34/2	---	0	---	---	693	8.9	91.1	16.7	16.2	$19,444	$46,700	$367
	33/2	---	49	---	---	516	41.1	58.9	62.6	2.3	$27,589	$37,500	$435
Sub Total		**---**	**49**	**---**	**---**								
South Dallas ND													
South Dallas HOA	40/1	---	1	4	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
	40/2	6	24	---	---	949	3.6	96.4	10.0	17.5	$15,781	$26,300	$298
South Dallas ND	34/2	---	6	---	---	693	8.9	91.1	16.7	16.2	$19,444	$46,700	$367
Sub Total		**6**	**31**	**4**	**---**								
Project Area Total		**6**	**228**	**11**	**---**								

Source: U.S. Census Bureau, 2000.
Notes: **ND** = Neighborhood District; **NA** = Not Available; **---** = No Impact
Census tracts/block groups are shown on **Plate 3-8** and neighborhoods/districts are shown on **Plate 3-9** at the end of **Chapter 3**, respectively.
Neighborhood and district boundaries do not correspond exactly with census tracts or block groups. A rough correlation has been established so that census data can be used to provide a general description of population, income, and housing characteristics. All Census figures shown are at the block group level.
1. Displacement counts are individual single-family residential buildings.
2. Displacement counts are individual buildings/structures; however, the number of individual businesses potentially affected may be higher due to multiple tenants in some buildings.
3. This category represents schools, places of worship, and cemeteries.
4. Total of persons reporting in non-white racial categories, including Black or African American, American Indian, Asian or Pacific Islander, some other race, or two or more races.
5. Total of persons reporting as Hispanic or Latino ethnic origin. As race and ethnic origin are two separate and distinct concepts, these persons may be of any race.
6. 65-years of age or older.
7. Median contract rent is the monthly rent agreed to or contracted for, regardless of any furnishings, utilities, fees, meals, or services that may be included.

Alternative 3A

Alternative 3A would have the smallest amount of displacements (33) of all the Build Alternatives. Alternative 3A would result in the displacement of six single-family residences and 27 commercial/industrial buildings. No community/public facility buildings would be displaced by this alternative. Similar to Alternatives 2A and 2B, the displaced single-family residences would be from the South Dallas HOA. **Table 4-19** shows the neighborhood census block groups with displacements under Alternative 3A and their demographic characteristics (see **Plates 4-7A** and **4-7B**).

TABLE 4-19. DEMOGRAPHIC CHARACTERISTICS OF ALTERNATIVE 3A DISPLACEMENTS BY CENSUS BLOCK GROUPS

Neighborhood or Neighborhood District	Census Tract/ Block Group(s)	Displacements				Demographic Characteristics							
		Residential Building[1]	Commercial/ Industrial Building[2]	Community /Public Facility Buildings	Other[3]	Total Pop.	Percent White	Percent Racial Minority[4]	Percent Ethnic Minority[5]	Percent Elderly[6]	Median Household Income	Median Value of Owner-Occupied Housing Units	Median Contract Rent [7]
Middle Stemmons/Brookhollow ND													
Trinity Industrial District	100/1	---	2	---	---	338	32.8	67.2	15.7	29.3	$15,208	$36,300	NA
Middle Stemmons/ Brookhollow ND		---	12	---	---								
Sub Total		**---**	**14**	**---**	**---**								
Lower Stemmons ND													
Design District	100/3	---	1	---	---	8,255	54.3	45.7	18.2	0.8	$48,750	$85,000	NA
Sub Total		**---**	**1**	**---**	**---**								
South Dallas ND													
South Dallas HOA	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
	40/2	6	7	---	---	949	3.6	96.4	10.0	17.5	$15,781	$26,300	$298
South Dallas ND	34/2	---	3	---	---	693	8.9	91.1	16.7	16.2	$19,444	$46,700	$367
	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
Sub Total		**6**	**12**	**---**	**---**								
Project Area Total		**6**	**27**	**---**	**---**								

Source: U.S. Census Bureau, 2000.
Notes: The information for Alternative 3A is shaded to denote for the reader that this alternative is not considered feasible by the USACE due to concerns detailed in **Section 2.3.9**.
ND = Neighborhood District; **NA** = Not Available; **---** = No Impact
Census tracts/block groups are shown on **Plate 3-8** and neighborhoods/districts are shown on **Plate 3-9** at the end of **Chapter 3**, respectively.
Neighborhood and district boundaries do not correspond exactly with census tracts or block groups. A rough correlation has been established so that census data can be used to provide a general description of population, income, and housing characteristics. All Census figures shown are at the block group level.
1. Displacement counts are individual single-family residential buildings.
2. Displacement counts are individual buildings/structures; however, the number of individual businesses potentially affected may be higher due to multiple tenants in some buildings.
3. This category represents schools, places of worship, and cemeteries.
4. Total of persons reporting in non-white racial categories, including Black or African American, American Indian, Asian or Pacific Islander, some other race, or two or more races.
5. Total of persons reporting as Hispanic or Latino ethnic origin. As race and ethnic origin are two separate and distinct concepts, these persons may be of any race.
6. 65-years of age or older.
7. Median contract rent is the monthly rent agreed to or contracted for, regardless of any furnishings, utilities, fees, meals, or services that may be included.

Alternative 3B

Alternative 3B would have a total of 40 displacements. Alternative 3B would result in the displacement of six single-family residences and 34 commercial/industrial buildings. No community/public facility buildings would be displaced by this alternative. Similar to Alternatives 2A, 2B, and 3A, the displaced single-family residences would be from the South Dallas HOA. **Table 4-20** shows the neighborhood census block groups with displacements under Alternative 3B and their demographic characteristics (see **Plates 4-8A** and **4-8B**).

TABLE 4-20. DEMOGRAPHIC CHARACTERISTICS OF ALTERNATIVE 3B DISPLACEMENTS BY CENSUS BLOCK GROUPS

Neighborhood or Neighborhood District	Census Tract/ Block Group(s)	Displacements				Demographic Characteristics							
		Residential Building[1]	Commercial/ Industrial Building[2]	Community/ Public Facility Buildings	Other[3]	Total Pop.	Percent White	Percent Racial Minority[4]	Percent Ethnic Minority[5]	Percent Elderly[6]	Median Household Income	Median Value of Owner-Occupied Housing Units	Median Contract Rent [7]
Middle Stemmons/Brookhollow ND													
Trinity Industrial District	100/1	---	5	---	---	338	32.8	67.2	15.7	29.3	$15,208	$36,300	NA
Middle Stemmons/ Brookhollow ND		---	12	---	---								
Sub Total		**---**	**17**	**---**	**---**								
Lower Stemmons ND													
Design District	100/3	---	2	---	---	8,255	54.3	45.7	18.2	0.8	$48,750	$85,000	NA
Sub Total		**---**	**2**	**---**	**---**								
Cedars/Fair Park/East Dallas ND													
Cedars/Fair Park/ East Dallas ND	33/2	---	4	---	---	516	41.1	58.9	62.6	2.3	$27,589	$37,500	$435
Sub Total		**---**	**4**	**---**	**---**								
South Dallas ND													
South Dallas HOA	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
	40/2	6	7	---	---	949	3.6	96.4	10.0	17.5	$15,781	$26,300	$298
South Dallas ND	34/2	---	2	---	---	693	8.9	91.1	16.7	16.2	$19,444	$46,700	$367
	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
Sub Total		**6**	**11**	**---**	**---**								
Project Area Total		**6**	**34**	**---**	**---**								

Source: U.S. Census Bureau, 2000.
Notes: The information for Alternative 3B is shaded to denote for the reader that this alternative is not considered feasible by the USACE due to concerns detailed in **Section 2.3.9**.
ND = Neighborhood District; **NA** = Not Available; **---** = No Impact
Census tracts/block groups are shown on **Plate 3-8** and neighborhoods/districts are shown on **Plate 3-9** at the end of **Chapter 3**, respectively.
Neighborhood and district boundaries do not correspond exactly with census tracts or block groups. A rough correlation has been established so that census data can be used to provide a general description of population, income, and housing characteristics. All Census figures shown are at the block group level.
1. Displacement counts are individual single-family residential buildings.
2. Displacement counts are individual buildings/structures; however, the number of individual businesses potentially affected may be higher due to multiple tenants in some buildings.
3. This category represents schools, places of worship, and cemeteries.
4. Total of persons reporting in non-white racial categories, including Black or African American, American Indian, Asian or Pacific Islander, some other race, or two or more races.
5. Total of persons reporting as Hispanic or Latino ethnic origin. As race and ethnic origin are two separate and distinct concepts, these persons may be of any race.
6. 65-years of age or older.
7. Median contract rent is the monthly rent agreed to or contracted for, regardless of any furnishings, utilities, fees, meals, or services that may be included.

Alternative 3C

Alternative 3C would have the second smallest amount of displacements (35) of all the Build Alternatives. Alternative 3C would result in the displacement of six single-family residences and 29 commercial/industrial buildings. No community/public facility buildings would be displaced by this alternative. Similar to Alternatives 2A, 2B, and 3A, and 3B, the displaced single-family residences would be from the South Dallas HOA. **Table 4-21** shows the neighborhood census block groups with displacements under Alternative 3C and their demographic characteristics (see **Plates 4-9A** and **4-9B**).

TABLE 4-21. DEMOGRAPHIC CHARACTERISTICS OF ALTERNATIVE 3C DISPLACEMENTS BY CENSUS BLOCK GROUPS

Neighborhood or Neighborhood District	Census Tract/ Block Group(s)	Displacements				Demographic Characteristics							
		Residential Building[1]	Commercial/ Industrial Building[2]	Community /Public Facility Buildings	Other[3]	Total Pop.	Percent White	Percent Racial Minority[4]	Percent Ethnic Minority[5]	Percent Elderly[6]	Median Household Income	Median Value of Owner-Occupied Housing Units	Median Contract Rent [7]
Middle Stemmons/Brookhollow ND													
Trinity Industrial District	100/1	---	2	---	---	338	32.8	67.2	15.7	29.3	$15,208	$36,300	NA
Middle Stemmons/ Brookhollow ND		---	12	---	---								
Sub Total		**---**	**14**	**---**	**---**								
Lower Stemmons ND													
Design District	100/3	---	2	---	---	8,255	54.3	45.7	18.2	0.8	$48,750	$85,000	NA
Sub Total		**---**	**2**	**---**	**---**								
Cedars/Fair Park/East Dallas ND													
Cedars/Fair Park/ East Dallas ND	33/2	---	4	---	---	516	41.1	58.9	62.6	2.3	$27,589	$37,500	$435
Sub Total		**---**	**4**	**---**	**---**								
South Dallas ND													
South Dallas HOA	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
	40/2	6	7	---	---	949	3.6	96.4	10.0	17.5	$15,781	$26,300	$298
South Dallas ND	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
Sub Total		**6**	**9**	**---**	**---**								
Project Area Total		**6**	**29**	**---**	**---**								

Source: U.S. Census Bureau, 2000. **Notes:** **ND** = Neighborhood District; **NA** = Not Available; **---** = No Impact
Census tracts/block groups are shown on **Plate 3-8** and neighborhoods/districts are shown on **Plate 3-9** at the end of **Chapter 3**, respectively.
Neighborhood and district boundaries do not correspond exactly with census tracts or block groups. A rough correlation has been established so that census data can be used to provide a general description of population, income, and housing characteristics. All Census figures shown are at the block group level.
1. Displacement counts are individual single-family residential buildings.
2. Displacement counts are individual buildings/structures; however, the number of individual businesses potentially affected may be higher due to multiple tenants in some buildings.
3. This category represents schools, places of worship, and cemeteries.
4. Total of persons reporting in non-white racial categories, including Black or African American, American Indian, Asian or Pacific Islander, some other race, or two or more races.
5. Total of persons reporting as Hispanic or Latino ethnic origin. As race and ethnic origin are two separate and distinct concepts, these persons may be of any race.
6. 65-years of age or older.
7. Median contract rent is the monthly rent agreed to or contracted for, regardless of any furnishings, utilities, fees, meals, or services that may be included.

Alternative 4A

Alternative 4A would result in a total of 41 displacements. Unlike Alternatives 2A, 2B, 3A, 3B, and 3C, this alternative would have displacements on both sides of the Dallas Floodway. Alternative 4A would result in the displacement of 11 single-family residences and 30 commercial/industrial buildings. No community/public facility buildings would be displaced by this alternative. Similar to Alternatives 2A, 2B, 3A, 3B, and 3C, six of the displaced single-family residences would be from the South Dallas HOA. However, this alternative would also displace five single-family residences in the La Bajada neighborhood within the West Dallas - East of Hampton Neighborhood District. **Table 4-22** shows the neighborhood census block groups with displacements under Alternative 4A and their demographic characteristics (see **Plates 4-10A** and **4-10B**).

TABLE 4-22. DEMOGRAPHIC CHARACTERISTICS OF ALTERNATIVE 4A DISPLACEMENTS BY CENSUS BLOCK GROUPS

Neighborhood or Neighborhood District	Census Tract/ Block Group(s)	Displacements				Demographic Characteristics							
		Residential Building[1]	Commercial/ Industrial Building[2]	Community /Public Facility Buildings	Other[3]	Total Pop.	Percent White	Percent Racial Minority[4]	Percent Ethnic Minority[5]	Percent Elderly[6]	Median Household Income	Median Value of Owner-Occupied Housing Units	Median Contract Rent [7]
Middle Stemmons/Brookhollow ND													
Trinity Industrial District	100/1	---	4	---	---	338	32.8	67.2	15.7	29.3	$15,208	$36,300	NA
Middle Stemmons/ Brookhollow ND		---	12	---	---								
Sub Total		**---**	**16**	**---**	**---**								
Lower Stemmons ND													
Design District	100/3	---	1	---	---	8,255	54.3	45.7	18.2	0.8	$48,750	$85,000	NA
Sub Total		**---**	**1**	**---**	**---**								
South Dallas ND													
South Dallas HOA	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
	40/2	6	7	---	---	949	3.6	96.4	10.0	17.5	$15,781	$26,300	$298
South Dallas ND	34/2	---	3	---	---	693	8.9	91.1	16.7	16.2	$19,444	$46,700	$367
	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
Sub Total		**6**	**12**	**---**	**---**								
West Dallas - East of Hampton ND													
La Bajada	101.02/1	5	1	---	---	1,133	45.7	54.3	93.5	9.7	$27,159	$35,100	$324
Sub Total		**5**	**1**	**---**	**---**								
Project Area Total		**11**	**30**	**---**	**---**								

Source: U.S. Census Bureau, 2000.
Notes: The information for Alternative 4A is shaded to denote for the reader that this alternative is not considered feasible by the USACE due to concerns detailed in **Section 2.3.9**.
ND = Neighborhood District; **NA** = Not Available; **---** = No Impact
Census tracts/block groups are shown on **Plate 3-8** and neighborhoods/districts are shown on **Plate 3-9** at the end of **Chapter 3**, respectively.
Neighborhood and district boundaries do not correspond exactly with census tracts or block groups. A rough correlation has been established so that census data can be used to provide a general description of population, income, and housing characteristics. All Census figures shown are at the block group level.
1. Displacement counts are individual single-family residential buildings.
2. Displacement counts are individual buildings/structures; however, the number of individual businesses potentially affected may be higher due to multiple tenants in some buildings.
3. This category represents schools, places of worship, and cemeteries.
4. Total of persons reporting in non-white racial categories, including Black or African American, American Indian, Asian or Pacific Islander, some other race, or two or more races.
5. Total of persons reporting as Hispanic or Latino ethnic origin. As race and ethnic origin are two separate and distinct concepts, these persons may be of any race.
6. 65-years of age or older.
7. Median contract rent is the monthly rent agreed to or contracted for, regardless of any furnishings, utilities, fees, meals, or services that may be included.

Alternative 4B

Alternative 4B would result in fewer displacements than Alternative 4A (35). Similar to Alternative 4A, this alternative would have displacements on both sides of the Dallas Floodway. Alternative 4B would result in the displacement of 11 single-family residences and 24 commercial/industrial buildings. No community/public facility buildings would be displaced by this alternative. Similar to Alternatives 2A, 2B, 3A, 3B, 3C, and 4A, six of the displaced single-family residences would be from the South Dallas HOA. However, this alternative would also displace five single-family residences in the La Bajada neighborhood within the West Dallas - East of Hampton Neighborhood District. **Table 4-23** shows the neighborhood census block groups with displacements under Alternative 4A and their demographic characteristics (see **Plates 4-11A** and **4-11B**).

TABLE 4-23. DEMOGRAPHIC CHARACTERISTICS OF ALTERNATIVE 4B DISPLACEMENTS BY CENSUS BLOCK GROUPS

Neighborhood or Neighborhood District	Census Tract/ Block Group(s)	Displacements				Demographic Characteristics							
		Residential Building[1]	Commercial/ Industrial Building[2]	Community /Public Facility Buildings	Other[3]	Total Pop.	Percent White	Percent Racial Minority[4]	Percent Ethnic Minority[5]	Percent Elderly[6]	Median Household Income	Median Value of Owner-Occupied Housing Units	Median Contract Rent [7]
Middle Stemmons/Brookhollow ND													
Trinity Industrial District	100/1	---	3	---	---	338	32.8	67.2	15.7	29.3	$15,208	$36,300	NA
Middle Stemmons/ Brookhollow ND		---	11	---	---								
Sub Total		**---**	**14**	**---**	**---**								
South Dallas ND													
South Dallas HOA	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
	40/2	6	7	---	---	949	3.6	96.4	10.0	17.5	$15,781	$26,300	$298
South Dallas ND	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
Sub Total		**6**	**9**	**---**	**---**								
West Dallas - East of Hampton ND													
La Bajada	101.02/1	5	1	---	---	1,133	45.7	54.3	93.5	9.7	$27,159	$35,100	$324
Sub Total		**5**	**1**	**---**	**---**								
Project Area Total		**11**	**24**	**---**	**---**								

Source: U.S. Census Bureau, 2000.
Notes: **ND** = Neighborhood District; **NA** = Not Available; **---** = No Impact
Census tracts/block groups are shown on **Plate 3-8** and neighborhoods/districts are shown on **Plate 3-9** at the end of **Chapter 3**, respectively.
Neighborhood and district boundaries do not correspond exactly with census tracts or block groups. A rough correlation has been established so that census data can be used to provide a general description of population, income, and housing characteristics. All Census figures shown are at the block group level.
1. Displacement counts are individual single-family residential buildings.
2. Displacement counts are individual buildings/structures; however, the number of individual businesses potentially affected may be higher due to multiple tenants in some buildings.
3. This category represents schools, places of worship, and cemeteries.
4. Total of persons reporting in non-white racial categories, including Black or African American, American Indian, Asian or Pacific Islander, some other race, or two or more races.
5. Total of persons reporting as Hispanic or Latino ethnic origin. As race and ethnic origin are two separate and distinct concepts, these persons may be of any race.
6. 65-years of age or older.
7. Median contract rent is the monthly rent agreed to or contracted for, regardless of any furnishings, utilities, fees, meals, or services that may be included.

Alternative 5

Displacements under Alternative 5 (62) are lower than Alternatives 2A and 2B, but higher than Alternatives 3A, 3B, 3C, 4A, and 4B. As with Alternatives 4A and 4B, this alternative would have displacements on both sides of the Dallas Floodway. Alternative 5 would result in the displacement of 20 single-family residences, 39 commercial/industrial buildings, and three community/public facility buildings. Similar to the other Build Alternatives, six of the displaced single-family residences would be from the South Dallas HOA. Similar to Alternatives 4A and 4B, this alternative would also displace single-family residences (13) in the La Bajada neighborhood. In addition, Alternative 5 would displace one single-family residence from the East Oak Cliff Neighborhood District. **Table 4-24** shows neighborhood census block groups with displacements under Alternative 5 and their demographic characteristics (see **Plates 4-12A** and **4-12B**).

TABLE 4-24. DEMOGRAPHIC CHARACTERISTICS OF ALTERNATIVE 5 DISPLACEMENTS BY CENSUS BLOCK GROUPS

Neighborhood or Neighborhood District	Census Tract/ Block Group(s)	Displacements				Demographic Characteristics							
		Residential Building[1]	Commercial/ Industrial Building[2]	Community /Public Facility Buildings	Other[3]	Total Pop.	Percent White	Percent Racial Minority[4]	Percent Ethnic Minority[5]	Percent Elderly[6]	Median Household Income	Median Value of Owner-Occupied Housing Units	Median Contract Rent [7]
Middle Stemmons/Brookhollow ND													
Trinity Industrial District	100/1	---	4	---	---	338	32.8	67.2	15.7	29.3	$15,208	$36,300	NA
Middle Stemmons/ Brookhollow ND		---	12	---	---								
Sub Total		**---**	**16**	**---**	**---**								
Lower Stemmons ND													
Design District	100/3	---	1	---	---	8,255	54.3	45.7	18.2	0.8	$48,750	$85,000	NA
Lower Stemmons ND		---	---	2	---								
Sub Total		**---**	**1**	**2**	**---**								
South Dallas ND													
South Dallas HOA	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
	40/2	6	7	---	---	949	3.6	96.4	10.0	17.5	$15,781	$26,300	$298
South Dallas ND	34/2	---	2	---	---	693	8.9	91.1	16.7	16.2	$19,444	$46,700	$367
	40/1	---	1	---	---	547	5.5	94.5	15.9	18.3	$15,938	$35,600	$423
Sub Total		**6**	**11**	**---**	**---**								
West Dallas - East of Hampton ND													
La Bajada	43/1	---	8	---	---	776	36.9	63.1	66.5	6.7	$23,950	$12,000	$436
	101.02/1	13	3	---	---	1,133	45.7	54.3	93.5	9.7	$27,159	$35,100	$324
Sub Total		**13**	**11**	**---**	**---**								
North Oak Cliff ND													
North Oak Cliff ND	20/2	---	---	1	---	1,659	39.4	60.6	64.4	9.4	$15,877	$162,500	$421
Sub Total		**---**	**---**	**1**	**---**								
East Oak Cliff ND	41/1	1	---	---	---	396	9.6	90.4	21.0	22.9	$14,205	$24,400	$355
Sub Total		**1**	**---**	**---**	**---**								
Project Area Total		**20**	**39**	**3**	**---**								

Source: U.S. Census Bureau, 2000.
Notes: ND = Neighborhood District; **NA** = Not Available; **---** = No Impact
Census tracts/block groups are shown on **Plate 3-8** and neighborhoods/districts are shown on **Plate 3-9** at the end of **Chapter 3**, respectively.
Neighborhood and district boundaries do not correspond exactly with census tracts or block groups. A rough correlation has been established so that census data can be used to provide a general description of population, income, and housing characteristics. All Census figures shown are at the block group level.
1. Displacement counts are individual single-family residential buildings.
2. Displacement counts are individual buildings/structures; however, the number of individual businesses potentially affected may be higher due to multiple tenants in some buildings.
3. This category represents schools, places of worship, and cemeteries.
4. Total of persons reporting in non-white racial categories, including Black or African American, American Indian, Asian or Pacific Islander, some other race, or two or more races.
5. Total of persons reporting as Hispanic or Latino ethnic origin. As race and ethnic origin are two separate and distinct concepts, these persons may be of any race.
6. 65-years of age or older.
7. Median contract rent is the monthly rent agreed to or contracted for, regardless of any furnishings, utilities, fees, meals, or services that may be included.

4.5.2 Compliance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970

To ensure that decent, safe, and sanitary dwellings would be available to all affected residents, relocation assistance would be available to all those displaced as a result of the construction of the proposed action. Relocation assistance would be conducted in accordance with PL 96-146, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Relocation resources would be made available to all individuals without discrimination and in accordance with the requirements of Title VI and the HUD Amendment Act of 1974. Special relocation considerations would be made to accommodate residents in need of additional assistance. Last Resort Housing would also be available in the event of a housing shortage or for residents who cannot find comparable housing within their means. This may involve the use of replacement housing payments that exceed the Uniform Relocation Assistance Act maximum amounts or the use of other methods of providing comparable decent, safe, and sanitary housing within a person's financial means (HUD, 2005). Similar provisions in the Uniform Relocation Assistance Act apply to all businesses displaced by the proposed action. Refer to **Chapter 7 Mitigation Measures and Commitments** and **Appendix C** for a more detailed discussion of the relocation assistance process.

4.5.3 Available Replacement Properties

Residential Housing

The City of Dallas administers a multitude of programs and funds directed toward the creation and maintenance of affordable housing. Throughout this discussion, the term "affordable housing" is used with reference to the standards established by the Department of Housing and Urban Development (HUD) based on family size and median income, which are primary factors for determining eligibility for government housing assistance programs. For example, HUD provides funding to the City of Dallas to promote partnerships with local nonprofit groups to develop affordable housing through the Community Housing Development Organization (CHDO) Program. CHDO-certified nonprofit groups are eligible to apply to the Dallas Housing Department for annual Home CHDO funds that may be used to build, buy, or rehabilitate affordable housing that may be rented or sold. In addition, the Housing Department administers the Land Transfer Program, which makes tax foreclosed and surplus vacant lots available for acquisition and development by participating nonprofit groups. In conjunction with this, the Urban Land Bank Demonstration Program produces affordable single-family homes on properties that meet certain criteria. A review of the Land Bank interactive map and consultation with housing officials revealed approximately 285 land bank lots within the neighborhoods in which displacements could occur.

The Dallas Housing Authority, the Residential Development Acquisition Loan Program, the Dallas Mortgage Assistance Program (Enterprise), and the Neighborhood Investment Program (NIP) all strive to provide affordable housing and assistance throughout the City. Enterprise provides mortgage assistance loans to borrowers whose incomes and available assets fall below certain threshold values and meet Eligible Borrower Requirements. Current NIP recommendations include improvements to the Ideal and Rochester Park neighborhoods adjacent to the South Dallas HOA in the South Dallas neighborhood district. Private developers are also actively involved in the creation or improvement of affordable housing within the project study area and surrounding areas. The Dallas Area affiliate of Habitat for Humanity International (HFHI) works to provide affordable housing for those individuals who cannot be assisted by other local non-profit and lending services. Examples of HFHI homes in the project area are present in the Ideal community within the South Dallas neighborhood district, and the Bon Ton community near US-175 and Bexar Street.

A survey of on-line real estate services for the DFW metropolitan area revealed an adequate supply of affordable housing available in the study area (as of September 2007). **Table 4-25** lists the number of units available (for sale and rental) in various zip codes located within, and adjacent to, the study area in a variety of price ranges. The study area zip codes are shown on **Plate 4-13**. Within the three neighborhoods (South Dallas HOA, La Bajada, and East Oak Cliff) in which residential displacements would occur, the median value of owner-occupied housing units ranges from $23,550 to $30,950 (see **Table 3-7**). According to the data in **Table 4-25**, 54 homes within the zip codes representing these neighborhoods were available for purchase at a cost of $40,000 or less. The data suggest that sufficient vacancies exist to accommodate the relocations required by the proposed action. Within recent history, there have not been substantial housing shortages in the DFW metropolitan area. Barring dramatic changes in the local and regional economy, housing supply is expected to keep pace with demand.

TABLE 4-25. AVAILABLE HOUSING IN THE TRINITY PARKWAY STUDY AREA

Price Range ($)	Zip Codes											
	75201	**75202**	**75203**	**75207**	**75208**	**75212**	**75215**	**75216**	**75219**	**75226**	**75235**	**75247**
Homes (for Sale)												
0 to 20,000	0	0	4	0	0	0	13	12	0	0	0	0
20,000 to 40,000	0	0	6	0	0	2	29	53	0	0	0	0
40,000 to 60,000	0	0	11	0	4	5	15	65	0	0	1	0
60,000 to 75,000	0	0	5	0	5	4	7	60	0	0	1	0
75,000 to 100,000	0	0	4	0	22	17	5	63	0	1	5	0
100,000 to 150,000	0	0	4	0	11	17	3	12	0	0	9	0
150,000 to 200,000	0	1	1	0	10	1	0	1	2	0	3	0
Condominiums/Town Homes (for Sale)												
0 to 20,000	0	0	0	0	0	0	0	0	0	0	0	0
20,000 to 40,000	0	0	0	0	0	0	1	0	0	0	0	0
40,000 to 60,000	0	0	0	0	0	0	0	0	0	0	0	0
60,000 to 75,000	0	0	0	0	0	0	0	0	4	0	2	0
75,000 to 100,000	0	0	0	0	0	0	2	0	3	0	3	0
100,000 to 150,000	0	2	1	0	2	0	2	0	37	0	10	0
150,000 to 200,000	3	20	3	0	9	0	10	0	68	0	12	0
Duplexes (for Sale)												
0 to 200,000	0	0	4	0	4	0	4	6	1	0	0	0
Triplexes (for Sale)												
0 to 200,000	0	0	1	0	1	0	0	0	0	0	0	0
Fourplexes (for Sale)												
0 to 200,000	0	0	3	0	5	0	0	0	0	0	0	0
Total (for Sale)	**3**	**23**	**47**	**0**	**73**	**46**	**91**	**272**	**115**	**1**	**46**	**0**
Housing for Rent												
0 to 500	0	0	0	0	1	0	0	1	0	0	0	0
500 to 700	0	0	3	0	3	0	5	11	6	0	2	0
700 to 1,000	0	3	3	0	4	1	2	4	11	1	2	0
1,000 to 1,400	2	18	2	0	3	2	1	0	18	0	1	0
1,400 to 2,000	12	7	0	0	3	0	0	0	34	1	2	0
2,000 to 5,000	11	9	0	0	2	0	0	0	66	0	0	0
5,000 to 10,000	6	0	0	0	0	0	0	0	19	0	0	0
Total (for Rent)	**31**	**37**	**8**	**0**	**16**	**3**	**8**	**16**	**154**	**2**	**7**	**0**
Average Home Characteristics*												
Price (Dollars)	100,900	434,783	189,500	N/A	414,258	99,900	N/A	60,254	325,000	504,956	29,000	125,000
Age (Years)	62	82	N/A	20	70	N/A	N/A	49	N/A	65	N/A	N/A
Square Feet	1,379	1,885	2,500	N/A	2,506	1,346	N/A	1,103	1,642	5,085	992	N/A

Source: Realtor.com, September 2007.
Notes: N/A = Not Available
Zip codes within and/or adjacent to the study area were used to identify available housing and average home characteristics.
*These statistics - Home Price, Age of Home, and Square Footage - are intended to provide general characteristics of the homes in a given zip code area. They are calculated using property data on REALTOR.com over a rolling 6-month period.

Commercial Properties

Similarly, there is no shortage of commercial sites in the DFW metropolitan area. According to Grubb & Ellis Co., the DFW area was ranked nationally for its commercial property sector, placing fourth among the top 10 office markets for 2007 (City of Dallas, 2007h). Although the availability of vacant land for new business development and/or relocation is relatively limited within the project area, building occupancy is not 100 percent and the turnover of commercial space is typical as for any major U.S. urban area.

The Second Quarter 2007 *Dallas Industrial Market View* published by the CB Richard Ellis Group for the DFW Metropolitan Area indicates that approximately 20.4 percent of the office market, 9.4 percent of the industrial market (warehouse, distribution, manufacturing facilities, etc.), 11.6 percent of the flex market (i.e., buildings accommodating to both office and other uses, such as manufacturing), and 8 percent of the warehouse sector were vacant at the time of review. These vacancy rates demonstrate the opportunity for displaced businesses to be relocated to comparable locations in the general area.

In addition, improved access and mobility resulting from the proposed action would be an incentive to future development or redevelopment within the project area and beyond. Over the long term, the project area would benefit from the proposed action because of improved access and mobility, managed traffic congestion, and increased safety. Due to the opportunities for business redevelopment and relocation in the area, re-employment opportunities for affected employees would likely occur in the vicinity of their current employment or at other similar business establishments. Assistance would also be available from both the public and private sectors for those who may need new employment.

Toll Road Impacts

As previously described in **Section 4.1 Land Use Impacts**, the Trinity Parkway may require additional right-of-way to accommodate ancillary toll facilities. The amount of additional right-of-way, if any, is subject to design. The FEIS would describe whether and how much additional right-of-way is required at such locations and provide more specific information about the direct displacement/relocation impacts, if any.

4.6 ECONOMIC IMPACTS

This section describes the economic impact of the proposed Build Alternatives on the immediate region, defined by the U.S. Bureau of Economic Analysis (BEA) as the eight county Dallas Metropolitan Division (Dallas MD). Economic activities that may be affected include employment, income, housing, and taxes. The primary impacts of the proposed action on the local economy are associated with right-of-way acquisition and the resulting relocations of businesses and employees (see **Section 4.5 Relocation and Displacements Impacts** for potential relocation and displacement impacts).

The construction and operation of any of the Build Alternatives would affect both employment and income within the region. In the short term, project construction would provide direct economic benefits to the region by increasing employment and earnings in the construction industry and through economic multiplier impacts, which would provide benefits to the broader economy as well. In addition, by facilitating access to local areas, any of the Build Alternatives may induce long-term growth in the region

through an improved transportation infrastructure. Other long-term benefits would result from the operation and maintenance of any of the Build Alternatives.

When a construction project such as the Trinity Parkway is undertaken there are direct expenditures which “trickle down” through the economy, producing a much larger effect than that simply resulting from the direct expenses. The methodology used to evaluate the effect of construction and operation of any of the Build Alternatives was regional input-output analysis, which estimates the costs of construction and maintenance of the proposed Trinity Parkway to yield economic impact expected in the region. The Regional Input-Output Modeling System (RIMS II) developed by the U.S. Department of Commerce BEA (2003) was utilized for the region of impact. The model provides multipliers for output, earnings, and employment computed for the Dallas Metropolitan Division.

4.6.1 No-Build Alternative

The No-Build Alternative would not involve construction expenditures and as a result, no benefits to employment and income would be experienced. Under the No-Build Alternative, the local and regional economies of the area are likely to continue growth trends described in **Section 3.1.2.2 Economic Conditions**. However, in the future, travel delay costs associated with the existing and anticipated congestion would be borne by roadway users and businesses that are dependent on corridor roadways for employment and commerce activities. Negative economic impacts of the No-Build Alternative may include reductions in workplace productivity due to excessive congestion and higher per-mile costs for vehicles idling in traffic.

4.6.2 Build Alternatives

The construction of the Trinity Parkway would create positive impacts on the statewide, regional, and local economies. The following subsections summarize the estimated economic impacts associated with construction of the Trinity Parkway Build Alternatives.

4.6.2.1 Statewide and Regional Economic Impacts

Statewide Economic Impacts

The statewide economic impacts of the Trinity Parkway project can be estimated using the Texas Input/Output Model prepared by the Economic Analysis Center of the Texas Comptroller of Public Accounts. This model uses statewide multipliers for final demand, employment, and income related to new road/highway construction. The construction cost multiplied by these factors produces estimates of statewide economic impacts.

Direct benefits result from purchases made for equipment, materials, and supplies needed for road/highway construction, as well as wages and salaries paid to workers engaged in the project's construction. The total of labor and capital costs is shown as output in **Table 4-26**. Added benefits are the sum of expenditures by all interrelated sectors of the state's economy. The total estimated statewide impacts from project construction range from approximately $3.98 billion to $7.67 billion, as shown in **Table 4-26**, which reflects the comparative results of each construction alternative.

TABLE 4-26. ESTIMATES OF STATEWIDE ECONOMIC IMPACTS

Build Alt	Construction Cost Estimate ($)	Income[1]			Employment[2]			Statewide Final Demand[3] ($)
		Direct ($)	Added ($)	Total ($)	Direct	Added	Total	
2A	2,079,000,000	601,094,970	1,205,307,653	1,806,402,623	56,715	55,025	111,740	7,666,455,557
2B	1,606,000,000	464,351,666	931,111,796	1,395,463,462	43,813	42,508	86,320	5,922,410,918
3A	1,079,000,000	311,997,925	625,614,097	937,612,022	29,438	28,561	57,998	3,979,268,413
3B	1,142,000,000	330,083,915	661,879,883	991,963,798	31,144	30,216	61,361	4,209,939,842
3C	1,290,000,000	373,012,763	747,960,239	1,120,973,002	35,195	34,146	69,341	4,757,460,819
4A	1,216,000,000	349,508,611	700,830,026	1,050,338,638	32,977	31,995	64,971	4,457,685,338
4B	1,384,000,000	400,130,468	802,336,302	1,202,466,771	37,753	36,629	74,382	5,103,324,110
5	1,479,000,000	424,468,384	851,138,367	1,275,606,750	40,049	38,857	78,906	5,413,733,537

Source: Texas Comptroller of Public Accounts, 1989. Calculated using Texas Comptroller Office Employment, Income, and Final Demand Multipliers.

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.

The economic and employment impact findings are based on public construction expenditures only, and do not include any private sector investments or private development or redevelopment expected to occur in the immediate area. The larger the infusion of public expenditures for tollway construction, the higher the payrolls and purchases, as well as economic and employment impact results. Private investments in new development or redevelopment induced by the proposed project are likely to significantly and materially change the outcome of the economic and employment findings for each alternative. The model accounts for all economic activity that occurred in Texas in 1986 (the latest year for which sufficient statistics are available) with tables describing sales and purchases among the state's many industries, businesses, and institutions.

1. Personal income includes wages, salaries, dividends, rents, and other forms of payments to persons by businesses.
2. Person-years of employment (rounded to whole numbers) over total construction period. Person-years of employment do not necessarily indicate additional total employment.
3. Statewide Final Demand consists of the consuming sectors, such as households and government consumption. The final demand multiplier indicates the total impacts of the change in sector output (new road/highway construction) on output from all Texas sectors.

Regional Economic Impacts

The U.S. BEA uses the RIMS II methodology for estimating the economic impacts of a project on regional employment, earnings, and total output. **Table 4-27** indicates that the Build Alternatives would generate differing results, varying from approximately $522.5 million to $1.01 billion in earnings, approximately $1.61 billion to $3.11 billion in economic output, and approximately 18,956 to 36,521 jobs during construction.

TABLE 4-27. ESTIMATES OF REGIONAL ECONOMIC IMPACTS

Category	Trinity Parkway Build Alternatives							
	2A	2B	3A	3B	3C	4A	4B	5
Est. Construction Cost	$2,079,000,000	$1,606,000,000	$1,079,000,000	$1,142,000,000	$1,290,000,000	$1,216,000,000	$1,384,000,000	$1,479,000,000
Less 35 percent Spent Outside Region	$727,466,250	$561,974,700	$377,590,850	$399,479,150	$451,433,150	$422,987,600	$484,251,950	$513,706,550
Amount Spent in Region	$1,351,008,750	$1,043,667,300	$701,240,150	$741,889,850	$838,375,850	$785,548,400	$899,325,050	$954,026,450
Est. Increase in Regional Economic Output	$3,110,427,000	$2,402,835,000	$1,614,465,000	$1,708,053,000	$1,930,193,000	$1,808,568,000	$2,070,516,000	$2,196,455,000
Est. Increase in Regional Economic Earnings	$1,006,596,000	$777,605,000	$522,473,000	$552,760,000	$624,649,000	$585,289,000	$670,060,000	$710,817,000
Est. Increase in Regional Employment	36,521	28,213	18,956	20,055	22,663	21,235	24,311	25,789

Source: Insight Research Corporation, 2007.
Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
Calculated using the U.S. Bureau of Economic Analysis, RIMS II input-output multipliers (specific to the Dallas Metropolitan Division [MD]). The study assumes that 35 percent of the construction costs would be spent outside of the region, thus, would not impact the regional economy. The defined economic region for this study is the Dallas MD, which includes the counties of Collin, Dallas, Delta, Denton, Ellis, Hunt, Kaufman, and Rockwall in north central Texas. The economic and employment impact findings are based on public construction expenditures only, and do not include any private sector investments or private development or redevelopment expected to occur in the immediate area. The larger the infusion of public expenditures for tollway construction, the higher the payrolls and purchases, as well as economic and employment impact results. Private investments in new development or redevelopment induced by the proposed project are likely to significantly and materially change the outcome of the economic and employment findings for each alternative.

4.6.2.2 Local Economic Impacts

The Trinity Parkway project has been developed with continuous direct input from local government officials, representatives from the business community, and local residents. Throughout the project development process, it has been recognized that the Trinity Parkway would improve the local economy by managing congestion and improving safety on the major routes near and within the study area, especially along IH-35E.

Overall, economic impacts would be positive for this project. For example initially local businesses could supply much of the construction-related purchases. The proportion of economic benefit retained locally depends on capturing the sale or acquisition of local materials and labor during the construction process.

Some negative aspects of the Trinity Parkway project can also be expected, for while the Trinity Parkway is likely to facilitate an increase in local and regional transportation along its route, diversion of traffic flow

from traditionally used routes (i.e., IH-35E) could diminish local business exposure and revenue in and around the CBD.

However, the Trinity Parkway Build Alternatives would stimulate some areas with improved access and visibility, creating new opportunities for development, jobs, and revenue to local tax bases. The City of Dallas is a regional economic and cultural center and the presence of governmental offices, schools, medical facilities, neighborhoods, shopping centers, tourist attractions, major transportation facilities, and places of worship would continue to draw the regional population to and through the downtown area.

Direct interstate connections and a major north-south reliever route, as proposed in this project would improve the movement of people and goods throughout the City of Dallas and the north central Texas region. The available routes connecting area residents with commercial and industrial development activity in both the northern and southern parts of the city currently result in considerable delays and inconvenience for motorists.

As previously discussed in **Section 4.1 Land Use Impacts**, changes in land use would affect the local economy. Direct impacts occur when land and improvements are removed from the tax rolls. Travelers on the proposed tollway would add revenue and sales taxes to the local economy. Right-of-way acquisition for the Trinity Parkway would result in a one-time increase in income for property owners, benefiting the local economy, but would also cause a permanent loss of taxable values from the local tax rolls. **Table 4-28** identifies the estimated total tax value lost and the annual tax revenue lost as a result of land conversion to government-owned property for each Build Alternative and by each taxing entity.

TABLE 4-28. ESTIMATED TAX VALUE LOST

Build Alt	Total Tax Value Lost ($)	Annual Tax Revenue Loss in 2006 Dollars			Percent Loss from Tax Base		
		Dallas County tax rate 0.553934 ($)	City of Dallas tax rate 0.7292 ($)	DISD tax rate 1.50264 ($)	Dallas County Base $146,317,744,795 (%)	City of Dallas Base $76,124,190,818(%)	DISD Base $68,640,586,165(%)
2A	125,792,762	696,809	917,281	1,890,212	0.086	0.165	0.183
2B	113,342,834	627,844	826,496	1,703,135	0.077	0.149	0.165
3A	27,585,836	152,807	201,156	414,516	0.019	0.036	0.040
3B	32,988,403	182,734	240,551	495,697	0.023	0.043	0.048
3C	32,988,403	182,734	240,551	495,697	0.023	0.043	0.048
4A	29,778,657	164,954	217,146	447,466	0.020	0.039	0.043
4B	29,778,657	164,954	217,146	447,466	0.020	0.039	0.043
5	33,507,543	185,610	244,337	503,498	0.023	0.044	0.049

Sources: Insight Research Corporation, 2007. 2006 tax rates and base property values, Dallas Central Appraisal District.
Note: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.

As shown in **Table 4-28**, the estimated tax value lost ranges from a low of $27.6 million (Alternative 3A) to a high of $125.8 million (Alternative 2A). While generated revenues may decrease in the short term, redevelopment attracted by the proposed tollway (determined within the Indirect Land Use Impacts

Assessment as potentially occurring at a "Moderate" level, see **Appendix L-5**), as well as from other reasonably foreseeable projects within the study area, may offset this initial decrease.

4.7 CULTURAL RESOURCES AND PARKLANDS

The following sections describe the potential impacts to cultural resources and parklands identified in **Chapter 3 Affected Environment**. Potential impacts to cultural resources (archeological and historic architectural) are described in **Sections 4.7.1** and **4.7.2**. Potential impacts to parks/recreational areas are described in **Section 4.7.3.** For cultural resources, Tribal coordination by the FHWA occurred in August and September of 2002 (**Appendix B**). This evaluation of impacts focuses on those cultural resources currently listed in, or eligible for, the National Register of Historic Places (NRHP). Archeological and historic architectural resources that are NRHP-listed, or determined to be eligible for the NRHP, are afforded special consideration and may require additional documentation under Section 4(f) (see **Chapter 5 Draft Section 4(f) Evaluation**).

4.7.1 Impacts to Archeological Resources

4.7.1.1 No-Build Alternative

The No-Build Alternative would have no impacts on known prehistoric and/or historic archeological resources.

4.7.1.2 Build Alternatives

Areas of High Potential within the Archeological APEs

As discussed in **Section 3.3.1.3**, within the study area the majority of the Trinity River in the Dallas Floodway has been diverted and channelized. The old natural river channel is located generally to the east of the Dallas Floodway east levee. Each Build Alternative is close to and in some places crosses the old channel of the river. The most likely locations to encounter buried prehistoric archeological deposits are along the meanders of the old Trinity River. **Plates 4-14** and **4-16** show the old Trinity River channel in relation to the alternative alignments. Additionally, each alternative cuts across the first terrace of the Trinity River and thus has potential for encountering prehistoric deposits in the terrace sediments. Terrace sediments are found in and above the old river channel and creek floodplains and are shown as the Quaternary Terrace (QT) on the Dallas Texas Geological Quadrangle Map prepared by the Bureau of Economic Geology (1972).

Alternatives 3A, 3B, 3C, 4A, 4B, and 5 are primarily located within or adjacent to the Dallas Floodway levees (see **Plates 4-15** through **4-16**). The Dallas Floodway was in the past designated as having a "high" potential for containing prehistoric archeological resources; however, in recent years it has been concluded that the designation was too broadly defined. The THC has provided the opinion that the area within the floodway levees has little potential for containing preserved prehistoric archeological deposits (Skinner, 2003). Therefore, Alternatives 3A, 3B, 3C, 4A, 4B, and 5 APEs have little potential for encountering preserved prehistoric archeological deposits within the levees (see area of low potential on **Plate 3-16**). Archeological deposits are more likely to be encountered where these alternatives or access roads cross old river channel segments and in first terrace deposits as described above.

In summary, prehistoric archeological resources within the Build Alternative APEs are most likely to be encountered in areas where:

- Each alternative crosses the old natural, meandering channel of the Trinity River;
- Where all Build Alternatives may cross a tributary intersecting with the old channel; or
- Where all Build Alternatives cut across the first terrace of the Trinity River at the north and south ends of the project.

Potential for Impacts to Known Archeological Sites

Archeological studies thus far have shown that none of the Build Alternatives (including potential borrow excavation areas) would have an impact on an archeological site that is either listed in the NRHP or which has been determined by TxDOT with SHPO concurrence to be eligible for NRHP listing. As described in **Section 3.3.1.3**, there are six known archeological sites located in the general proximity of the eight Build Alternatives, none of which is listed in the NRHP. Of these sites, five are within the APE of one or more of the Build Alternatives and/or in a proposed borrow excavation area (see **Plate 4-26**) One site that is located in a proposed borrow area west of the Houston Street Bridge (Site 41DL440) has been determined by TxDOT with SHPO concurrence to be ineligible for listing in the NRHP (see **Appendix B**, page 36). An additional two sites (41DL370 and 41DL371) are located in proposed borrow areas east of IH-35E; previous investigations have indicated that Site 41DL370 has been destroyed by previous construction activity and is likely ineligible for the NRHP, and that Site 41DL371 would require further investigation to determine eligibility. Site 41DL441 is a floodway site that is both within the APE of Alternative 5 near the proposed project's western end and in a borrow area; TxDOT has determined (with SHPO concurrence) that this site requires further investigation to determine NRHP eligibility (see **Appendix B**, page 36). Site 41DL320 may be affected by the river Build Alternatives (3A, 3B, 3C, 4A, 4B, and 5) near the east end of the project area; the eligibility of this site for NRHP listing has not been determined and further investigation would be required.

The possibility for impacts outlined above indicates that additional field studies would be required to further evaluate known archeological sites, in the event a river Build Alternative is identified as the preferred alternative. Section 106 review and consultation will proceed in accordance with the First Amended Programmatic Agreement among the FHWA, TxDOT, the Texas SHPO, and the Advisory Council on Historic Preservation Regarding the Implementation of Transportation Undertakings (PA-TU), as well as the Memorandum of Understanding (MOU) between the THC and TxDOT. The results of additional field surveys and coordination efforts would be documented in the FEIS.

4.7.2 Impacts to Historic Architectural Properties

This section identifies historic architectural resources (buildings, structures, objects, districts, etc.) that are listed in, or eligible for listing in, the NRHP. Impacts to historic architectural resources can be classified as either direct or indirect, depending on the proximity of the proposed action. A direct impact is defined as a direct taking in which the proposed right-of-way would include all of an existing building and/or site or any portion of its associated land. An indirect impact, such as noise or visual intrusion, may occur to buildings and/or sites situated beyond the right-of-way, but within the defined APEs for each Build Alternative. Efforts to avoid or minimize such impacts were undertaken during the planning stages for each Build Alternative.

4.7.2.1 No-Build Alternative

Impacts to historic architectural resources are not anticipated as a result of the No-Build Alternative.

4.7.2.2 Build Alternatives

Impacts to Historic Districts and Bridges

The historic districts and bridges in the project area have been evaluated in terms of their physical relationship to all proposed Build Alternatives. The locations of these resources are shown on **Plate 3-17 (Chapter 3)** and **Plates 4-14** through **4-16** at the end of this chapter. The expected physical relationships are summarized at the outset of this discussion in **Table 4-29**, which is followed by a brief description of the historic district or bridge and expected impacts. There are two rows of information for all of the bridges in **Table 4-29**; the upper row indicates whether the Build Alternative would pass over, under, or through the bridge, and the lower row indicates whether the Build Alternative would connect with the bridge or result in partial reconstruction of it. Although the table contains a column with an indication as

to whether there is an expected Section 4(f) "use" of any kind (i.e., direct, indirect, or constructive) by the Build Alternatives, further description and discussion of uses under Section 4(f) are in **Chapter 5**.

TABLE 4-29. IMPACTS TO HISTORIC DISTRICTS AND BRIDGES

Plate ID Nos.[1]	Resource	Potential Section 4(f) Use (Yes/No)[2]	Trinity Parkway Build Alternatives							
			2A	2B	3A	3B	3C	4A	4B	5
PROPERTIES LISTED IN THE NRHP										
1	Colonial Hill Historic District	Yes - Alts. 2A, 2B	Parkway adjacent	Parkway adjacent	Parkway near	Parkway near	Parkway near	Parkway near	Parkway near	Parkway near
2	Houston Street Viaduct	Yes - Alts. 2A, 3A, 3B, 3C, 4A, 4B, 5	Parkway over	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under
			Ramp connection	No connection	Ramp connection	Ramp connection	Ramp connection	Ramp connection	Ramp connection	Ramp connection
PROPERTIES ELIGIBLE FOR THE NRHP										
3	UP RR Bridge	Yes - Alt. 5	Parkway over	Parkway over	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under
			No connection	No connection	No connection	No connection	No connection	No connection	No connection	Reconstruct section
4	Corinth Street Viaduct	Yes - Alts. 3A, 3B, 3C, 4A, 4B, 5	Parkway over	Parkway over	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under
			No connection	No connection	Ramp connection	Ramp connection	Ramp connection	Ramp connection	Ramp connection	Ramp connection
5	AT&SF RR Bridge	Yes - All Alts.	Parkway through	Parkway through	Parkway through	Parkway through	Parkway through	Parkway through	Parkway through	Parkway through
			No connection	No connection	No connection	No connection	No connection	No connection	No connection	No connection
6	MKT RR Bridge	No	Parkway over	Parkway over	Parkway over	Parkway over	Parkway over	Parkway over	Parkway over	Parkway over
			No connection	No connection	No connection	No connection	No connection	No connection	No connection	No connection
7	Continental Avenue Viaduct	Yes - Alts. 3A, 3B, 3C, 4A, 5	Parkway over	Parkway over	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under
			No connection	No connection	Ramp connection	Ramp connection	Ramp connection	Ramp connection	No connection	Ramp connection
8	Commerce Street Viaduct	Yes - Alts. 3A, 4A, 5	Parkway over	Parkway over	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under	Parkway under
			No connection	No connection	Ramp connection	No connection	No connection	Ramp connection	No connection	Ramp connection

Notes:
The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in Section 2.3.9.
1. Plate ID Numbers correspond to the locations shown on Plates 4-14 through 4-16.
2. Potential Section 4(f) "uses" are described and discussed in Chapter 5, Draft Section 4(f) Evaluation.

The NRHP-listed Colonial Hill Historic District is located within the APE of all Build Alternatives. South Lamar Street forms the western boundary of the district. Alternatives 2A and 2B mainlanes track along the west side of South Lamar Street and, consequently, are adjacent to the district. Both of these alignments are elevated (bridge or embankment) through this area. There are no direct impacts (displacements) to the district; however, there would be indirect impacts such as increased noise, visual intrusion, and proximity effects. Alternatives 3A, 3B, 3C, 4A, 4B, and 5 mainlanes are elevated (bridge) and are located approximately 1,000 feet west of the district and South Lamar Street. There are no direct impacts (displacements) to the district; however, there would be indirect impacts such as increased noise, visual intrusion, and proximity effects. Due to their greater distance away from the district, these indirect impacts would likely be less than Alternatives 2A and 2B.

View looking northeast on Herald Street in the Colonial Hill Historic District. All build alternatives will follow a path along the southwestern border of the district.

The NRHP-listed Houston Street Viaduct is located within the APE of all Build Alternatives. Alternative 2A mainlanes are proposed to go over the viaduct at Industrial Boulevard with no physical impact. However, Alternative 2A includes elevated ramp connections to the viaduct outside the levee, which would involve physical impact. Alternative 2B mainlanes and service roads are proposed to go under the viaduct at Industrial Boulevard with no physical impact. Alternative 2B has no ramp connections to the viaduct. Alternatives 3A, 3B, and 3C mainlanes are proposed to go under the viaduct within the levee with no physical impact, but there would be impact from the ramp connections to the viaduct on the inside and on top of the levee. Alternatives 4A and 4B mainlanes are proposed to go under the viaduct within the levee. The east levee mainlanes go under the viaduct with no physical impact, but there would be impact from the ramp connections on top of the levee for Alternative 4A and inside the levee for Alternative 4B. The west levee mainlanes go under the viaduct in a section that is not arched. This section of the viaduct would be rebuilt. The west levee mainlanes have ramp connections on top of the levee, which would result in physical impact. Alternative 5 mainlanes are proposed to go under the viaduct outside the levee. The east levee mainlanes go under the viaduct with no physical impact, but there would be impact from the ramp connections on top of the levee. The west levee

View looking southwest toward the Houston Street Viaduct on the south side of the east levee of the Dallas Floodway.

mainlanes go under a newer rebuilt portion of the viaduct outside the levee. The west levee mainlanes have ramp connections to the viaduct outside the levee, which would result in physical impact.

The NRHP-eligible UP (Southern Pacific) Railroad Bridge is located within the APE of all Build Alternatives. In the area of Industrial Boulevard, the railroad is elevated on an embankment then bridges over Industrial Boulevard. The railroad continues west on an embankment to the Dallas Floodway east levee. The railroad crosses the floodway to the west levee via the UP Railroad Bridge. Alternatives 2A and 2B mainlanes are elevated above Industrial Boulevard and are proposed to go over the railroad with no physical impact. Alternatives 3A, 3B, 3C, 4A, and 4B mainlanes are proposed to go under the railroad within the levees with no physical impact. Alternative 5 mainlanes are proposed to go under bridge sections that would be constructed outside the east and west levees to replace the existing railroad embankment.

View looking southwest toward the UP RR Bridge on the south side of the east levee of the Dallas Floodway.

View looking southwest toward the Corinth Street Viaduct on the north side of the east levee of the Dallas Floodway.

The NRHP-eligible Corinth Street Viaduct is located within the APE of all Build Alternatives. The viaduct begins at the intersection of Industrial Boulevard and Corinth Street, and then crosses over the Trinity River levees and floodway. Alternatives 2A and 2B mainlanes are elevated along Industrial Boulevard and are proposed to go over the viaduct with no physical impact. However, Alternatives 2A and 2B have ramp connections to Corinth Street outside the levee, which would involve physical impact. Alternatives 3A, 3B, 3C, 4A, and 4B mainlanes are proposed to go under the viaduct within the levee with no physical impact, but there would be impact from the ramp connections to the viaduct within and on top of the levee. Alternative 5 mainlanes are proposed to go under the viaduct outside the levee with no physical impact, but there would be impact from the ramp connections to the viaduct outside the levee.

View looking west toward the AT&SF RR Bridge on the south side of the east levee of the Dallas Floodway.

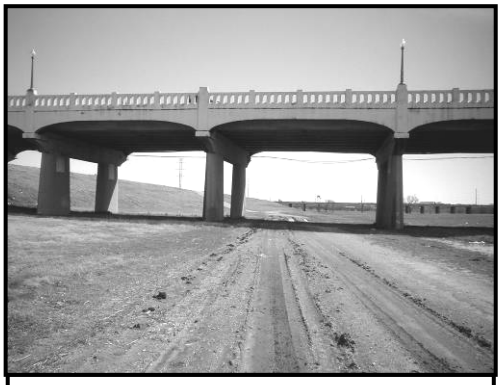
The NRHP-eligible AT&SF Railroad Trestle is located within the APE of all Build Alternatives. This abandoned steel truss

and wooden trestle bridge is a free span over the river, which features approaches supported by wood piers and earth embankments at each end. Stone piers support the central span across the Trinity River. The DART LRT Bridge spanning the floodway is located adjacent to the railroad trestle. Alternatives 2A, 2B, and 5 mainlanes are proposed to go under the existing DART Bridge and through the east embankment of the abandoned railroad. Alternatives 3A, 3B, 3C, 4A, and 4B mainlanes are proposed to go under the existing DART Bridge and through the abandoned railroad in the area of the wooden trestles west of the embankment.

The NRHP-eligible MKT RR Trinity River Bridge is located within the APE of all Build Alternatives. Each of the Build Alternative mainlanes is proposed to go over the railroad embankment east of the river bridge with no direct impact.

The NRHP-eligible Continental Avenue Viaduct is located within the APE of all Build Alternatives. As proposed by TxDOT, this viaduct may be closed for vehicular traffic use at the completion of the Woodall Rodgers Extension project. Alternatives 2A and 2B mainlanes are both elevated above Industrial Boulevard and are proposed to go over Continental Avenue with no physical impact to the bridge. Alternatives 2A and 2B have no ramp connections to Continental Avenue. Alternatives 3A and 4A mainlanes are proposed to go under the viaduct with ramp connections to the viaduct on top of the levee. Alternatives 3B and 3C mainlanes are proposed to go under the viaduct with ramp connections to the viaduct on top of the levee and outside of the levee. Alternative 4B mainlanes are proposed to go under the viaduct with no ramps. These ramp connections would require the replacement of a section of the existing viaduct. Alternative 5 mainlanes are proposed to go under the viaduct outside the levees. For the east and west levee mainlanes, bridge sections would be constructed outside the levee to replace the existing bridge or embankment.

View looking southwest toward the Continental Avenue Viaduct on the south side of the east levee of the Dallas Floodway.



View looking southwest toward the Commerce Street Viaduct on the south side of the east levee of the Dallas Floodway.

The NRHP-eligible Commerce Street Viaduct is located within the APE of all Build Alternatives. Alternatives 2A and 2B mainlanes are elevated above Industrial Boulevard and are proposed to go over Commerce Street with no physical

impact. Alternatives 2A and 2B have no connections to Commerce Street. Alternatives 3A, 3B, and 3C mainlanes are proposed to go under the viaduct within the levee with no physical impact. However, there would be impact from the ramp connections to the viaduct on the inside and on top of the levee for Alternative 3A. Alternatives 3B and 3C have no ramp connections. Alternatives 4A and 4B mainlanes are proposed to go under the viaduct within the levees with no physical impact. However, Alternative 4A has ramp connections to the viaduct on top of the levees, resulting in physical impact. Alternative 4B has no ramp connections. Alternative 5 mainlanes are proposed to go under the viaduct outside the levees with no physical impact. For the east levee lanes, ramps connect to the viaduct outside the levee, resulting in physical impact. For the west levee lanes, ramps connect to a new bridge section that would be constructed outside the levee, replacing the existing bridge section.

Impacts to Properties with Historic Buildings

As outlined in **Section 3.3.1.4**, archival research and field surveys conducted by architectural and historical specialists identified six buildings that have been determined by TxDOT with SHPO concurrence to be eligible for listing in the NRHP. Each of these structures has been evaluated in terms of potential building displacement (direct impact) by each of the Build Alternatives, and the results are summarized in **Table 4-30**. The location of each property containing historic buildings is shown on **Plates 4-14** through **4-16** at the end of this chapter. Note that Sportatorium (Plate ID 13) has been demolished by its owners since the determination of eligibility in July 2002.

TABLE 4-30. POTENTIALLY DISPLACED PROPERTIES WITH HISTORIC BUILDINGS

Plate ID No.	Location	Building Type	NRHP Status	Trinity Parkway Build Alternatives							
				2A (Yes/No)	2B (Yes/No)	3A (Yes/No)	3B (Yes/No)	3C (Yes/No)	4A (Yes/No)	4B (Yes/No)	5 (Yes/No)
9	2255 Irving Boulevard - City/County Levee Operations	Public Utility-Pump Station B	Eligible[2]	No	No	No	No	No	No	No	Yes
10	3701 South Lamar - DISD Storage and Maintenance Facility	Institutional	Eligible[3]	Yes (2 of 6 Bldgs.)	Yes (4 of 6 Bldgs.)	No	No	No	No	No	No
11	1715 Market Center - Pettigrew Associates	Commercial	Eligible[2]	Yes	No	No	No	No	No	No	No
12	1202 North Industrial - ACF Corp.	Commercial	Eligible[2]	Yes	No	No	No	No	No	No	No
13	1000 South Industrial - Sportatorium (demolished)	Commercial	Eligible[1,4]	---	---	---	---	---	---	---	---
14	1212 South Industrial - Oak Cliff Box Co.	Commercial	Eligible[2]	Yes	No	No	No	No	No	No	No
Totals				4	1	---	---	---	---	---	1

Notes:
The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in Section 2.3.9.

1. Eligible under Criterion A, Community Development, at the level of local significance.
2. Eligible under Criterion C, Architecture, at the level of local significance.
3. Eligible under Criterion A, Community Development, and Criterion C, Architecture, at the level of local significance.
4. Building has been demolished and removed by others since the determination of NRHP-eligibility.

-- = No displacement(s) for this alternative.

Plate ID 10 in the above table, address 3701 South Lamar, refers to the DISD storage and maintenance facility. The facility was formerly the Procter and Gamble manufacturing facility built in the 1920s. The facility is approximately 30 acres in size and contains one large building and several smaller ancillary buildings. The large building at the facility, shown in the photo on the following page, has been determined eligible for listing in the NRHP. The NRHP eligibility of the ancillary buildings at the 3701 South Lamar property, and on an associated parcel at 1301 McDonald, has not been established. Once a preferred alternative has been identified, a historic resources survey will evaluate the NRHP eligibility of these resources. TxDOT will consult with the SHPO on their eligibility. Alternative 2B requires the displacement of the large building and three ancillary buildings at the facility (see **Plate 4-14B**). Alternative 2A requires the displacement of two ancillary buildings at the facility (see **Plate 4-14B**). As shown in the table, Alternative 2A would also require the displacement of three other buildings determined to be eligible for listing in the NRHP, including a warehouse/shipping facility built circa 1954 at 1715 Market Center Boulevard, a warehouse/shipping facility built circa 1947 at 1202 N. Industrial

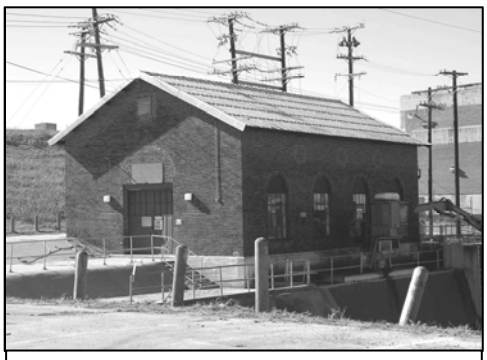
Boulevard, and a 1948 Art Moderne office building and attached 1950 warehouse/shipping facility at 1212 S. Industrial Boulevard. Plate ID 9 in the above table, refers to the water pumping facility built circa 1925 at 2255 Irving Boulevard. The pump station would be displaced by Alternative 5 (see **Plate 4-16A**). A photo of each NRHP-eligible building is presented below.

View looking toward the NRHP-eligible property located at 1715 Market Center Boulevard (Plate ID 11).

View looking toward the NRHP-eligible property located at 1202 North Industrial Boulevard (Plate ID 12).

View looking toward the NRHP-eligible property located at 1212 South Industrial Boulevard (Plate ID 14).

View looking toward the NRHP-eligible property located at 3701 South Lamar Street (Plate ID 10).



View looking toward the NRHP-eligible property located at 2255 Irving Boulevard (Plate ID 9).

Summary of Impacts to Cultural Resources

Table 4-31 summarizes the potential use of cultural resources by each of the Trinity Parkway alternatives.

TABLE 4-31. SUMMARY OF POTENTIAL CULTURAL RESOURCE USE BY ALTERNATIVE

Project Alternative	NRHP Districts	NRHP Bridges and Eligible Bridges (see Table 4-29)	NRHP Eligible Buildings (see Table 4-30)	Known Archeological Sites subject to Section 4(f)
1 (No Build)	None	None	None	None
2A	Colonial Hill Historic District - potential proximity impacts	• Houston Street Viaduct - parkway over with ramp connections • AT&SF Railroad Bridge - parkway through east embankment	4 displaced	None
2B	Colonial Hill Historic District - potential proximity impacts	• AT&SF Railroad Bridge - parkway through east embankment	1 displaced	None
3A	None	• Houston Street Viaduct - parkway under with ramp connections • Commerce Street Viaduct - parkway under with ramp connections • Continental Avenue Viaduct - parkway under with ramp connections • Corinth Street Viaduct - parkway under with ramp connections • AT&SF Railroad Bridge - parkway through	None	None
3B/3C	None	• Houston Street Viaduct - parkway under with ramp connections • Continental Avenue Viaduct - parkway under with ramp connections and reconstruction of a bridge segment • Corinth Street Viaduct - parkway under with ramp connections • AT&SF Railroad Bridge - parkway through	None	None
4A	None	• Houston Street Viaduct - parkway under with ramp connections • Commerce Street Viaduct - parkway under with ramp connections • Continental Avenue Viaduct - parkway under with ramp connections • Corinth Street Viaduct - parkway under with ramp connections • AT&SF Railroad Bridge - parkway through	None	None
4B	None	• Houston Street Viaduct - parkway under with ramp connections • Corinth Street Viaduct - parkway under with ramp connections • AT&SF Railroad Bridge - parkway under and through	None	None
5	None	• Houston Street Viaduct - parkway under with ramp connections • Commerce Street Viaduct - parkway under with ramp connections • Continental Avenue Viaduct - parkway under with no ramp connections (bridge section reconstruction) • Corinth Street Viaduct - parkway under with ramp connections • AT&SF Railroad Bridge - parkway through east embankment • UP Railroad Bridge - parkway under and reconstruction of section of bridge	1 displaced	None

Notes:

- Archeological sites are subject to Section 4(f) only if the SHPO determines that preservation in place is warranted. This determination has not yet been made for any known archeological site within the study area. A more detailed analysis would be completed during preparation of the FEIS for this project (see **Chapter 5**).
- The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.

Alternatives 2B and 4B each affect three cultural resources, and Alternatives 3B and 3C each affect four cultural resources. Alternatives 3A and 4A each affect five cultural resources, and Alternatives 2A and 5 each affect seven cultural resources. All potential impacts identified to date would affect historic architectural resources. The information developed thus far on cultural resources would be used for evaluation of alternatives leading to the recommendation of a preferred alternative. After a preferred alternative has been identified, additional investigations may be required. The type and amount of work required, if any, would be coordinated by the NTTA and the TxDOT Environmental Affairs Division with the SHPO, in compliance with Section 106 of the NHPA and Texas Antiquities Code (THC, 2002b).

Potential adverse impacts to cultural resources (archeological/historical) would be assessed, in consultation with the SHPO, for the preferred alternative during review of the FEIS. This may include refinement of the planning concept to further avoid and minimize impacts to these resources. In addition, Section 4(f) evaluations would be undertaken as needed in order to further assess the avoidance or minimization of adverse effects to historic properties (see **Chapter 5 Draft Section 4(f) Evaluation**). Where avoidance is determined to be neither prudent nor feasible, adverse effects can be mitigated through historical documentation, archeological excavation, or some other appropriate treatment of the affected cultural resource. More details concerning potential mitigation measures are described in **Chapter 7 Mitigation Measures and Commitments**.

4.7.3 Impacts to Parks and Recreational Areas

This section describes the potential impacts to parks and recreational areas (existing and/or planned) identified in **Chapter 3**. The properties included in this SDEIS were evaluated in the context of their surrounding neighborhoods and adjacent properties; access routes between the facilities and their users; ownership and/or jurisdiction; proximity of the alternative alignments; and associated impacts. A discussion concerning the applicability of Section 4(f) to these resources is also provided.

4.7.3.1 No-Build Alternative

Under the No-Build Alternative, the FHWA/TxDOT/NTTA would not continue to participate in cooperative planning for the Dallas Floodway and adjacent areas (i.e., Great Trinity Forest Park). The USACE/City of Dallas' plans for parks and recreational areas within the study area would not be affected by this alternative. The No-Build Alternative would not prohibit the USACE/City of Dallas' planned development of parkland within the Dallas Floodway or other areas; therefore, no impact would occur and no mitigation would be required.

Although the No-Build Alternative would avoid direct impacts to parks/recreational areas, potential coordinated development opportunities that would have been possible with one or more of the Build Alternatives would be lost. The No-Build Alternative would contribute to increased traffic congestion as well as both human and air quality impacts. Traffic volume and congestion would continue to increase on the existing roadway network, possibly contributing to traffic congestion to and from parks and recreational areas, as well as unsafe bicycle and pedestrian use of trail systems.

4.7.3.2 Build Alternatives

Section 3.3.2 and **Table 3-11** provide a description of the parks and recreational areas in the study area that may be affected by one or more of the Build Alternatives. These areas are shown on **Plate 3-18** at the end of **Chapter 3. Plates 4-14** through **4-16** at the end of this chapter show the park and recreational areas and the proposed alternative footprints.

Several different types of impacts to existing and proposed parks/recreational areas may occur as a result of the proposed action. These impacts may include right-of-way or proximity impacts such as noise impacts or visual effects. This analysis includes those resources where the technical studies prepared for other sections of this document (i.e., land use, noise, visual, etc.) indicate that one or more direct and/or potential proximity impacts are possible. Where the technical studies have documented that there are clearly no direct impacts or potential proximity impacts to certain park/recreational resources, then those resources have not been analyzed below.

The impacts discussed in this section are generalized and would not be uniform for all locations within the park/recreational area. Impacts may be more pronounced or less pronounced depending on the proximity to a proposed alternative. Only those areas where a proximity impact may occur have been identified in **Table 4-32**, below.

Notably, the City of Dallas Park and Recreation Department (PARD) has indicated that none of the Trinity Parkway Build Alternatives would have a negative impact to any of the existing/planned parks and recreational areas located in the study area. The PARD acknowledges one of the goals for the Trinity Parkway project as a whole is to improve access to existing and proposed recreational opportunities. In this regard, the Trinity Parkway would provide positive benefits for these resources (see **Appendix A-1, Pages 67-68**).

TABLE 4-32. POTENTIAL IMPACTS ON PARKS AND RECREATIONAL AREAS

Plate ID Number	Site Description	Trinity Parkway Build Alternatives							
		2A	2B	3A	3B	3C	4A	4B	5
1	Sleepy Hollow Park (Existing)	N, V	N, V	N, V	N, V	N, V	N, V	N, V	N, V
	Closest Distance to/from Build Alternative	720 feet (0.14 miles)	720 feet (0.14 miles)	720 feet (0.14 miles)	720 feet (0.14 miles)	720 feet (0.14 miles)	720 feet (0.14 miles)	720 feet (0.14 miles)	720 feet (0.14 miles)
3	Trinity River Greenbelt Park (Existing)	R (1.1)* V	R (5.1)* V	R (173.9)* V	R (153.7)* V	R (176.8)* V	R (213.5)* V	R (269.6)* V	R (84)* V
	Closest Distance to/from Alternative	Adjacent to park at AT&SF RR Bridge	Adjacent to park at AT&SF RR Bridge	Encroaches within park	Encroaches within park	Encroaches within park	Encroaches within park	Encroaches within park	Encroaches within park
10	Oak Cliff Founders Park (Existing)	---	---	---	---	---	N, V	N, V	N, V
	Closest Distance to/from Alternative	2,880 feet (0.55 miles)	2,400 feet (0.45 miles)	1,980 feet (0.38 miles)	1,980 feet (0.38 miles)	1,980 feet (0.38 miles)	500 feet (0.10 miles)	500 feet (0.10 miles)	400 feet (0.06 miles)
11	Eloise Lundy Park (Existing)	---	---	---	---	---	V	V	V
	Closest Distance to/from Alternative	2,980 feet (0.56 mile)	2,710 feet (0.51 mile)	1,980 feet (0.38 mile)	1,980 feet (0.38 mile)	1,910 feet (0.36 mile)	330 feet (0.06 mile)	420 feet (0.08 mile)	40 feet (0.01 mile)
17	Great Trinity Forest Park (Planned)	V	V	V	V	V	V	V	V
	Closest Distance to/from Alternative	Adjacent to park at AT&SF RR Bridge**	Adjacent to park at AT&SF RR Bridge**	Adjacent to park at AT&SF RR Bridge**	Adjacent to park at AT&SF RR Bridge**	Adjacent to park at AT&SF RR Bridge**	Adjacent to park at AT&SF RR Bridge**	Adjacent to park at AT&SF RR Bridge**	Adjacent to park at AT&SF RR Bridge**
18	Old Trinity River Meanders (Planned)	V	V	---	---	---	---	---	---
	Closest Distance to/from Alternative	Adjacent**	Adjacent**	470 feet** (0.09 mile)	470 feet** (0.09 mile)	470 feet** (0.09 mile)	470 feet** (0.09 mile)	470 feet** (0.09 mile)	470 feet** (0.09 mile)
20	Trinity Strand (Existing Park with Planned Trail)	V	V	---	---	---	---	---	---
	Closest Distance to/from Alternative	Adjacent to park	50 feet (0.01 mile)	1,100 feet (0.21 mile)	1,100 feet (0.21 mile)	1,140 feet (0.22 mile)	1,100 feet (0.21 mile)	1,140 feet (0.22 mile)	1,000 feet (0.19 mile)

Key to Terms: R = right-of-way would be required, and access rights for construction, operation, and maintenance are anticipated to be established by an operating agreement with the City of Dallas (estimated number of acres shown in parentheses -see Section 4.1.2; N = project noise analysis indicates site has noise levels above impact criteria - see Section 4.15; V = visual – indicates a project alternative can be seen from the park, the effect ranges from minimal visual change, moderate visual change, or strong visual change depending on location and other factors - see Section 4.16; --- = indicates no impact anticipated.

Notes:

The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in Section 2.3.9.

* - The deed records for the park land indicate that it can be used for transportation. Therefore, even though a change in use would occur, the estimated acreage needed for right-of-way would not constitute a direct use (take) of park land under Section 4(f).

** - Due to concurrent planning efforts with the City of Dallas, it is expected that the proposed project would be adjacent or further away from the final area designated as parkland. Note also that Build Alternatives 3A, 3B, 3C, 4A, 4B, and 5, although within 500 feet of the Old Trinity River Meanders, were not assessed noise or visual impacts because of intervening structures (i.e., levee and/or buildings).

Calculated distances/areas are estimates only.

Plate ID numbers correspond to the locations shown on Plate 3-18 (Chapter 3) and Plates 4-14 through 4-16 (Chapter 4).

As shown in **Table 4-32**, the project Build Alternatives would have some degree of proximity impact to seven parks and/or recreation areas (five are existing and two are planned). **Plates 4-14** through **4-16** located at the end of this chapter show the locations of these facilities by Map ID and also show the footprints of the project Build Alternatives. No other park/recreational areas identified within the study area would be adversely impacted by the Build Alternatives.

Section 4(f) and Existing Parks/Recreational Areas

As previously described in **Section 3.3.1.1**, FHWA may not approve the use of land from a publicly-owned public park, recreation area, wildlife or waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance unless it is determined that there is no feasible and prudent avoidance alternative to the use of land from the property and that the action includes all possible planning to minimize harm to the property resulting from such use (23 CFR 774.3). Section 4(f) is triggered by the "use: of land from a protected resource." A "use" occurs when land is permanently incorporated into a transportation facility, when there is a temporary occupancy of land that is adverse in terms of the statutes preservation purpose or when there is a constructive use of a Section 4(f) property (23 CFR 774.17). A constructive use occurs when the transportation project does not physically incorporate land from a Section 4(f) property, but the project's proximity impacts are so severe that the protected activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired (23 CFR 774.15).

The following discussion describes the potential project impacts to the existing park and recreation areas. Additional information regarding noise impacts described below may be found in **Section 3.7 Existing Noise Environment**, **Section 4.15 Noise Impacts**, and **Table 4-45**. The Great Trinity Forest Park (Plate ID 17) and the Old Trinity River Meanders park (Plate ID 18) are planned parks and are discussed in the next section.

Sleepy Hollow Park (Plate ID 1) is an urban neighborhood park located approximately 300 feet northeast of IH-35E. The park is rectangular in shape and approximately 0.6 acres in size. The park is surrounded on three sides by residential streets. On the remaining side (south) is a commuter rail line and further south is IH-35E, located approximately 300 feet away. Amenities at the park include picnic benches, a playground, and a multi-use court facility (primarily basketball). In this area, all project Build Alternatives are the same consisting of connecting ramps to the southwest side of the existing IH-35E facility (greater than 700 feet from the park).

The project's noise analysis determined that Sleepy Hollow Park has existing noise levels of 66 dBA which equals or exceeds FHWA Noise Abatement Criteria (NAC). The existing noise level at the park is due to the existing traffic on nearby IH-35E. The predicted future noise level at the park with the Build

Alternatives in place remains at 66 dBA. In sum, predicted noise levels at the park equal or exceed the NAC because of high existing noise, and there is no increase in predicted future noise levels at the park if the proposed project is constructed, when compared with the predicted noise levels if the project is not constructed. Because of their height, the proposed ramp structures of all Build Alternatives would likely be visible from the park, as is the IH-35E facility. The Build Alternatives would cause minimal visual impacts in that they would be somewhat visible, but consistent with the existing landscape.

In sum, the project's proximity impacts would not substantially impair the activities, features, or attributes that qualify this park for protection under Section 4(f).

Trinity River Greenbelt Park (Plate ID 3) is an urban open space park of approximately 3,652 acres extending from Northwest Highway (SH 348), located northwest and outside the study area, to the AT&SF Railroad bridge located in the southwest portion of the study area. The designated primary use of the Trinity River Greenbelt Park is floodplain and flood control, with secondary use as park and open space. The Dallas Floodway encompasses approximately 2,000 acres of this park. Research of the City of Dallas' acquisition and deed stipulations was performed for the floodway land between Westmoreland Road and the DART/AT&SF Railroad bridge, comprising approximately 1,900 acres. This segment of the Dallas Floodway is part of the 3,652 acre Trinity River Greenbelt Park. It is through this area the Trinity Parkway would be constructed if one of the river alternatives (Alternatives 3A, 3B, 3C, 4A, 4B or 5) is selected. The deed records of the City of Dallas' acquisition of the Trinity River Greenbelt Park include a conveyance for transportation purposes (see correspondence in **Appendix A-1, Pages 37-47 and 58-69**). As noted previously, the City of Dallas PARD (official with jurisdiction) has indicated that none of the Build Alternatives would have a negative impact to any of the existing or planned parks and recreational areas in the study area, including the Trinity River Greenbelt Park. The FHWA has determined that the provisions of Section 4(f) do not apply to the park land between Westmoreland Road and the DART/AT&SF Railroad bridge, based on deed records identifying a transportation use of the park land and the City of Dallas PARD opinion that the Trinity Parkway would not be detrimental to the Trinity River Greenbelt Park.

Future recreational facilities proposed to be constructed within the Trinity River Greenbelt Park are being planned by others concurrently with the Trinity Parkway project. If Alternative 3A, 3B, 3C, 4A, 4B or 5 is selected as the preferred alternative, additional noise studies would be performed for the preferred alternative to predict the future noise environment within the Trinity River Greenbelt Park adjacent to and near that alternative. Proposed park facilities adjacent to or near the preferred alternative that are planned, designed and programmed would be considered for reasonable and feasible noise abatement. These efforts would guide local officials responsible for land use control programs to ensure, to the maximum extent possible, that new recreational activity areas within the park are planned or constructed

with the predicted future noise environment in mind. Alternatives 3A, 3B, 3C, 4A, 4B or 5 would be constructed within or adjacent to the levees and would be visible from the park and planned recreational areas. Similarly, concurrent planning efforts would allow local officials responsible to ensure that new recreational activity areas within Trinity Park are planned or constructed with the locations of the proposed alternatives in mind.

Oak Cliff Founders Park (Plate ID 10) is located approximately 500 feet west of the west levee and is bounded by Zang Boulevard and Marsalis Avenue, which are major city arterials connecting to the Houston Street and Jefferson Boulevard Viaducts. This urban open space park is triangular in shape and is approximately 16.1 acres in size. The park is oriented such that the closest point of the park to the Build Alternatives is the northeastern point of the park triangle (approximately 500 feet from the levee). Amenities at the park include: a hike/bike trail extending around the perimeter and through the interior of the park, and several sitting benches throughout the park. The park has fairly heavy tree cover through most of its interior. Land use around the park includes single and multi family residential, retail, and commercial.

The project's noise analysis determined that Oak Cliff Founders Park has existing noise levels of 66 dBA Leq which equals or exceeds the FHWA NAC. The existing noise level is due to existing traffic on the adjacent city arterials (Zang and Marsalis). Alternatives 2A, 2B, 3A, 3B, and 3C have no noise effect on the park because of distance away. The predicted future noise level at the park without Alternatives 4A, 4B or 5 in place is 68 dBA. The predicted future noise level at the park with Alternatives 4A, 4B or 5 in place is 69 dBA Leq, a difference of 1 dBA. Zang and Marsalis are closer to the park than any proposed alternative and their traffic is the dominate noise generator at the park. The predicted noise levels at the park equal or exceed the NAC because of high existing noise, and the increase in predicted noise levels at the park if the proposed project is constructed, when compared with the predicted noise levels if the project is not constructed is 1 dBA. A barely perceptible change in noise is considered to be 3 dBA or less.

Alternatives 4A and 4B ramp connections to the Houston Street Viaduct would be located near the top of the levee and would be visible from the northeastern point of the park (approximately 500 feet away), but would not be visible from the interior sections of the park. The ramps would cause minimal visual change in that they would be somewhat visible, but consistent with the existing landscape. Alternative 5 southbound mainlanes and ramps would be located outside the west levee and would be visible only from the northeastern point of the park. Alternative 5 would cause moderate visual change in that it would be somewhat visible, but consistent with the existing landscape.

In sum, the project's potential proximity impacts would not substantially impair the activities, features, or attributes that qualify this park for protection under Section 4(f).

Eloise Lundy Park (Plate ID 11) is an urban community park located west of the west levee approximately one-quarter mile southeast of the IH-35E crossing of the Dallas Floodway. The park is roughly rectangular in shape and approximately 3.4 acres in size. Amenities include a picnic area, swimming pool, tennis court, softball field, playground, multi-use court facilities, and a community recreation center building. The park has residential streets on two sides, a major city arterial on the southwest side, and the floodway levee on the northeast side. Land use around the park is primarily residential. Alternatives 2A, 2B, 3A, 3B, and 3C would have no impact on the park. Alternatives 4A and 4B depart the west levee of the floodway between IH-35E and the park (approximately 330 and 420 feet from the park), and begin an eastward track across the floodway on bridge structure. Alternative 5 departs the west levee approximately 40 feet from the park.

The project noise analysis indicates the park would not be noise impacted by any of the project Build Alternatives. Because the park is located behind the levee, the proposed bridge structures crossing the floodway of Alternatives 4A, 4B, and 5 would likely be visible from some areas of the park and not visible from others. Build Alternatives 4A and 4B would cause minimal visual proximity impacts in that they would be somewhat visible in the distance. Alternative 5 would cause moderate visual impact because it would be considerably visible, but would not obscure the view of the landscape. In sum, the project's proximity impacts would not substantially impair the activities, features, or attributes that qualify this park for protection under Section 4(f).

Trinity Strand Trail Park (Plate ID 20) is an urban open space park located east of the east levee along a meander of the old Trinity River channel (see **Plate 3-23**). The park extends along the meander from IH-35E to near Irving Boulevard for a distance of approximately 2 miles and contains an area of approximately 57 acres. The park currently has no amenities, and functions as a sump of the Eastside Interior Drainage Sump System of the Dallas Floodway. A hike/bike trail and enhanced landscaping are proposed for this park. Land use in the area is primarily industrial and retail commercial. Irving Boulevard (a major city arterial) parallels the park on the southwest at a distance that varies from adjacent to 3,000 feet. IH-35E (a major freeway) parallels the park on the northeast at a distance that varies from adjacent to 2,000 feet.

The project noise analysis indicates the park would not be noise impacted by any of the project Build Alternatives. Alternatives 2A and 2B (alternatives along Irving Boulevard) would be on structure and adjacent or near the park in some areas. Alternatives 2A and 2B would be visible from the park area a small percentage of the time. Alternatives 2A and 2B would cause minimal visual proximity impacts

because they would not be visible through much of the park length, and in those areas where visible, would be consistent with the existing landscape.

In summary, all of the existing parks identified in **Table 4-32** exist or would exist in an urban environment where the influences of the local transportation system are part of their operational and functional characteristics. All are located adjacent to, near, or crossed by operating roadways, so the passage of vehicles nearby would not introduce an activity that has not previously existed. The visual proximity impacts caused by one or more of the Build Alternatives would not obscure the views from these parks and would be consistent with the landscape surrounding the parks. The existing parks provide an urban recreation opportunity, and serenity is not a component to achieve that purpose.

In conclusion, the Build Alternatives would not require the use of any publicly owned land from an existing public park or recreation area and the project's proximity impacts would not substantially impair the protected activities, features, or attributes that qualify a property for protection under Section 4(f). Also see **Chapter 5 - Draft Section 4(f) Evaluation**.

Section 4(f) and Planned Parks/Recreational Areas

Section 3.3.2.3 provided a description of planned parks/recreational areas in the study area that may be affected by one or more of the Build Alternatives. Under certain conditions, Section 4(f) may apply to publicly owned properties "planned" for parks and recreation purposes although they are not presently functioning as such. Section 4(f) applies if the agency that owns the property has formally designated and determined it to be significant for these purposes.

The NTTA continues to participate in a cooperative multi-project planning effort with the City of Dallas, Dallas County, TxDOT, FHWA, NCTCOG, and the USACE to implement various components of the City of Dallas' *Trinity River Corridor MIP/BVP*. The Trinity Parkway has been identified as a key component of this plan. As previously described in **Section 3.3.2.3**, the *Trinity River Corridor MIP/BVP* incorporates the proposals from these agencies into one cohesive concept plan. These projects include:

- Dallas County Trail Plan;
- Trinity Trails System;
- Regional Veloweb;
- Great Trinity Forest Master Plan; and
- The DFE Project.

No direct use of these planned resources is anticipatedas a result of any of the Build Alternatives. FHWA regulations stated in 23 CFR Section § 774.11(i) indicate that Section 4(f) does not apply when

"concurrent or joint planning or development of the transportation facility and the Section 4(f) resource occurs." The above-mentioned parks and recreational resources continue to be planned and may be developed concurrently with the proposed action (see **Sections 1.3, 1.11, 1.12, 2.4, 3.1.1.1, 3.1.1.4, 3.3.2.3,** and **4.2**).

Efforts to avoid potential impacts to planned park/recreational areas initially involved the development of alternative alignments that avoided or minimized impacts to these resources. Any park/recreational use that may be affected by potential noise or visual impacts associated with the Build Alternatives can be planned and designed to avoid or minimize those impacts. For additional details, see **Chapter 5 - Draft Section 4(f) Evaluation** and **Section 7.1.2 Measures to Minimize Impacts to Neighborhoods**.

As mentioned above, the NTTA is participating in a cooperative planning effort with all agencies involved with proposed recreational and non-recreational developments planned for the Dallas Floodway (i.e., Trinity Park) and DFE (i.e., Great Trinity Forest Park) portions of the study area. NTTA would work closely with these agencies in order to maximize these multi-project planning efforts and, thereby, work to minimize any potential adverse impacts that may result from the Trinity Parkway Build Alternatives. Due to the proximity of the Build Alternatives relative to the area planned as the Great Trinity Forest Park, a determination by FHWA to verify Section 4(f) applicability is currently being coordinated.

Section 4(f) and Planned Trails

Table L-1 in **Appendix L** of this SDEIS provided a list of proposed trails in the Trinity Parkway study area that may be affected by one or more of the Build Alternatives. As mentioned above, these proposed trail projects have been planned and may be developed (by others) concurrently with the proposed action. As a result, the provisions of Section 4(f) would not apply to these proposed trail projects. Many of the proposed trails are adopted elements of the Trinity Parkway Corridor MTIS and are considered integral components of the regional transportation system as described in *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area.*

Bike routes or bikeways are also considered under the provisions of Section 4(f). According to FHWA's *Section 4(f) Policy Paper* (March 2005), if a bikeway is primarily for transportation and is an integral part of the local transportation system, the requirements of Section 4(f) do not apply. Section 4(f) would apply to bikeways (or portions thereof) designated or functioning primarily for recreation unless the official having jurisdiction determines it not to be significant for such purpose. However, as with recreational trails, if the recreational bikeway is simply described as occupying the highway rights-of-way and is not limited to any specific location within that right-of-way, a "use" of land would not occur [Section 4(f) would not apply] provided adjustments or changes in the alignment of the highway or bikeway would not substantially impair the continuity of the bikeway. No official easements or rights-of-way have been

established for any of the proposed trails within the study area. These proposed trail projects are being planned and coordinated with the proposed action and would not be implemented until a preferred alternative has been identified.

Section 6(f) Considerations

Section 6(f) lands in the study area (see **Table 3-11**) include a portion of Rochester Park located between IH-45 and the Amtrak rail line. Alternatives 3A, 3B, 3C, 4A, 4B, and 5 mainlanes travel to the north of, but do not contact, this area of Rochester Park. However, as currently planned, a proposed northbound connection ramp from IH-45 to Alternatives 3A, 3B, 3C, 4A, 4B, or 5 may result in some degree of modification near, but outside of, Rochester Park. However, no direct impacts to Section 6(f) lands are anticipated because all work is assumed to take place within the existing TxDOT right-of-way for IH-45 and, therefore, would not result in a permanent loss of recreational land. No other Section 6(f) lands are located within the project study area; therefore, no Section 6(f) involvement is required (see **Appendix A-1, Page 25** and **Plates 4-14B**, **4-15B**, and **4-16B**).

Access to Trinity Park

Depending on which alternative is identified as the preferred alternative, access to the future planned Trinity Park may be affected by the proposed action. Generally, Alternatives 3A, 3B, 3C, 4A, 4B, and 5 would directly affect access to Trinity Park, while Alternatives 2A and 2B would have no effect. The proposed access to Trinity Park falls into two broad categories: vehicular/bicycle/pedestrian access from adjacent arterial streets and bicycle/pedestrian access from adjacent neighborhoods. The measures proposed to resolve the potential effects of the proposed action on access to Trinity Park are discussed in the following paragraphs.

Access from Arterial Streets

The City of Dallas proposes to access Trinity Park from several arterial streets, which currently cross the Dallas Floodway on bridges. Some of the proposed access points are funded in the initial implementation of the City's plan, while others are designated as future construction. For these access points, the City proposes to construct park access roads originating at the top of the east and west levees, which would travel down the riverside faces of the levees on an angled path to reach the floodplain. Alternatives 3A, 3B, 3C, 4A, and 4B may directly affect this type of access because the roadway may block the planned park access road if it were placed on the levee face. Alternative 5 may also have an effect in some locations.

The proposed resolution to this access issue is a structured ramp into the floodplain at each access location. The ramp would originate on the arterial street near the riverside edge of the proposed Trinity Parkway and would bring two-way traffic into the park areas without having to cross the facility. If provided by the NTTA, ramps of this kind would mitigate any cost impact to the City for park access. The

proposed schematic plans for Alternatives 3A, 3B, 3C, 4A, 4B, and 5 located at the end of **Chapter 2 Alternatives Considered** include these two-way ramp locations. **Plates 4-17** through **4-19** at the end of this chapter show conceptual park access points from arterial streets. The budgets for Alternatives 3A, 3B, 3C, 4A, 4B, and 5 also include the costs for these ramps to a touchdown point in the Dallas Floodway. **Table 4-33** provides a summary of the proposed park access ramps associated with the Trinity Parkway Build Alternatives.

TABLE 4-33. PROGRAMMED ACCESS RAMP IMPROVEMENTS FOR TRINITY PARK

Access Point No.	Proposed Access Location	Trinity Parkway Build Alternatives							
		2A	2B	3A	3B	3C	4A	4B	5
5	Hampton Road Bridge, East Levee	---	---	Ramp	Ramp	Ramp	Ramp	Ramp	---
6	Hampton Road Bridge, West Levee	---	---	---	---	---	Ramp	Ramp	---
11	Sylvan Avenue Bridge, East Levee	---	---	Ramp	Ramp	Ramp	Ramp	Ramp	---
12	Sylvan Avenue Bridge, West Levee	---	---	---	---	---	Ramp	Ramp	---
17*	Commerce Street Viaduct, East Levee	---	---	Ramp	Ramp	Ramp	Ramp	Ramp	---
18	Commerce Street Viaduct, West Levee	---	---	---	---	---	Ramp	Ramp	---
19*	Reunion Gateway, East Levee	---	---	Ramp	Ramp	Ramp	Ramp	Ramp	Ramp
20	Reunion Gateway, West Levee	---	---	---	---	---	Ramp	Ramp	Ramp
23	Houston/Jefferson Viaduct, East Levee	---	---	Ramp	Ramp	Ramp	Ramp	Ramp	---
24	Houston/Jefferson Viaduct, West Levee	---	---	---	---	---	Ramp	Ramp	---
29	MLK/Gateway, East Levee	---	---	Ramp	Ramp	Ramp	Ramp	Ramp	Ramp

Source: City of Dallas, 1999a and 2003a.
Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
Access point locations are shown on **Plates 4-17** through **4-19 (Chapter 4)** and **Plate 2-9 (Chapter 2)**.
***** = Access ramp funded as part of the City of Dallas' *Trinity River Corridor MIP/BVP*. **---** = No action

Access from Adjacent Neighborhoods

The *Trinity River Corridor MIP/BVP* includes proposed bicycle/pedestrian access points to Trinity Park from adjacent neighborhoods. These proposed access routes are bicycle/pedestrian trails, which would go up and over the Dallas Floodway levees, typically using a zigzag layout on the levee slopes in order to meet ADA grade requirements. Most of the proposed bicycle/pedestrian trails would be directly affected by Alternatives 3A, 3B, 3C, 4A, 4B, and 5, while Alternatives 2A and 2B would have no effect.

To resolve the neighborhood access issue, NTTA has proposed that both underpasses and overpasses of the Trinity Parkway mainlanes would provide bicycle/pedestrian access to Trinity Park from adjacent neighborhoods. The underpass version takes advantage of several existing drainage channels in the Dallas Floodway, which are located at outfalls of gravity sluices and pump stations. Since these channels would need to be bridged by the Trinity Parkway mainlanes, NTTA has proposed that these bridge locations be modified as needed in order to accommodate trails to be located under one or both abutments. The overpass version would be considered on a case-by-case basis in the future. The schematic plans for Alternatives 3A, 3B, 3C, 4A, 4B, and 5 located at the end of **Chapter 2 Alternatives Considered** show the proposed underpass/overpass locations. **Plates 4-17** through **4-22** at the end of

this chapter show conceptual park access from adjacent neighborhoods. **Table 4-34** provides a summary of the proposed neighborhood access locations associated with the Trinity Parkway Build Alternatives.

TABLE 4-34. PROGRAMMED NEIGHBORHOOD ACCESS IMPROVEMENTS FOR TRINITY PARK

Access Point No.	Proposed Access Location	Trinity Parkway Build Alternatives							
		2A	2B	3A	3B	3C	4A	4B	5
3	Old Meanders Stemmons/Quebec, East Levee	---	---	---	---	---	---	---	---
4	Bernal Trail, West Levee	---	---	---	---	---	---	---	---
7	Old Meander North No. 1, East Levee	---	---	Potential B/P overpass	---	---	Potential B/P overpass	Potential B/P overpass	Potential B/P overpass
8	West Dallas/Vilbig, West Levee	---	---	---	---	---	B/P underpass	B/P underpass	B/P underpass
9	Old Meander North No. 2, East Levee	---	---	B/P underpass	B/P underpass	B/P underpass	B/P underpass	B/P underpass	B/P underpass
10	West Dallas/Winnetka, West Levee	---	---	---	---	---	Possible future B/P overpass	Possible future B/P overpass	Possible future B/P overpass
13	Oak Lawn, East Levee	---	---	B/P underpass	B/P underpass	B/P underpass	B/P underpass	B/P underpass	B/P underpass
14	Sylvan South/Bataan, West Levee	---	---	---	---	---	B/P underpass	B/P underpass	---
15	Continental Avenue Viaduct, East Levee	---	---	Bridge left in place for B/P access	Bridge left in place for B/P access	Bridge left in place for B/P access	Bridge left in place for B/P access	Bridge left in place for B/P access	Bridge left in place for B/P access
16	Continental Avenue Viaduct, West Levee	---	---	---	---	---	Bridge left in place for B/P access	Bridge left in place for B/P access	Bridge left in place for B/P access
21	Oak Cliff/Coombs Creek, West Levee	---	---	---	---	---	---	---	B/P underpass
22	Oak Cliff Gateway, West Levee	---	---	---	---	---	B/P underpass	B/P underpass	B/P underpass
25	Cedars Crossing, East Levee	---	---	B/P underpass	B/P overpass	B/P overpass	B/P underpass	B/P underpass	B/P underpass
26	Tenth Street/Oak Cliff Park, West Levee	---	---	---	---	---	---	---	---
27	AT&SF RR Bridge, East Levee	---	---	B/P overpass	---	---	B/P overpass	B/P overpass	B/P overpass

Source: City of Dallas, 1999a and 2003a.
Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
Access point locations are shown on **Plates 4-17** through **4-22 (Chapter 4)** and on **Plate 2-9 (Chapter 2)**.
B/P = Bicycle/Pedestrian; **---** = No action

4.8 IMPACTS TO WATERS OF THE U.S., INCLUDING WETLANDS

EO 11990 (*Protection of Wetlands*, 1977) mandates that a project should avoid wetlands or, if no practicable alternative exists that avoids wetlands, impacts to wetland areas should be minimized as much as possible. Build Alternatives for the proposed Trinity Parkway may potentially impact a number of wetland areas. An overview of the wetlands and other jurisdictional waters (e.g., rivers, creeks, and sumps) within the study area was presented earlier in **Section 3.4.6 Waters of the U.S., Including Wetlands**.

4.8.1 No-Build Alternative

The No-Build Alternative would result in no impacts to waters of the U.S., including wetlands.

4.8.2 Build Alternatives

The proposed Trinity Parkway would cross water bodies within the study area using bridges or concrete box culverts. Although the use of bridges would likely minimize impacts to wetlands and aquatic areas, bridge construction may require placement of fill material, such as dirt, concrete, or bridge pillars within jurisdictional areas. Construction of the roadway and bridges may in itself alter the wetlands by removing vegetation, excavating and/or compacting soils, and changing the hydrology of the immediate area, even if only temporarily. Precautions would be taken to avoid unnecessary impacts during construction.

4.8.2.1 Build Alternatives and Potential Borrow Areas

As mentioned in **Section 3.4.6**, a jurisdictional determination of waters of the U.S., including wetlands within the Dallas Floodway was approved by the USACE on June 19, 2006. The Build Alternatives as well as the potential borrow areas would require the placement of fill material in, or the excavation of, waters of the U.S., including wetlands. **Plates 4-23** through **4-25** show the locations of waters of the U.S., including wetlands that would be potentially affected by construction activities associated with the alignments of the Build Alternatives. In addition, **Plate 4-26** shows the approximate locations of the potential borrow areas for soil that would be used to build the embankments for the Trinity Parkway Build Alternatives. Additional discussion concerning the location of the potential borrow areas within the Dallas Floodway is presented in **Section 2.4.6**. **Table 4-35** presents the potential impacts to waters of the U.S., including wetlands, for each of the Build Alternatives. A summary of expected impacts of the Build Alternatives to waters of the U.S., including wetlands, arranged by the type of aquatic feature, is in **Table 4-36**.

As shown in **Tables 4-35** and **4-36**, the interior levee alternatives (Alternatives 3A, 3B, 3C, 4A, and 4B) would result in the largest acreage loss to waters of the U.S., including wetlands. Losses are predominantly associated with a number of intermittent wetland depressions that are dry during portions of the year. Alternative 5 would have the greatest impacts to the old river meanders (historic Trinity River channel). Alternatives 2A and 2B would have the least amount of impacts, primarily on the old river meanders. Alternatives 3A, 3B, 3C, 4A, 4B, and 5 could also impact man-made linear drainage sumps in the study area. These man-made sumps are not waters of the U.S., including wetlands (see **Table 3-19B** in **Section 3.4.6**), and as such, impacts to these aquatic features are not quantified in **Tables 4-35** and **4-36**.

As noted in **Section 3.4.6**, Waters of the U.S., including wetlands in the study area provide a wide range of functions, with each level of function dependent on a range of variables. The most recognizable function that would be affected is that of long-term surface water storage. Simply put, this function is dependent on the ability of the waters of the U.S., including wetlands to receive and retain water for an extended period during the growing season, of which all waters of the U.S., including wetlands in the study area are highly capable.

The Dallas Floodway is regularly mowed which is necessary to maintain flood conveyance capabilities. In doing so, the required maintenance mowing of the Dallas Floodway prohibits the development of riverine emergent wetlands into forested riverine wetlands, limiting the ability of the wetlands to function in general. Whereas the loss of the long-term surface water storage function may be more recognized, losses of aquatic function associated with vegetation characteristics (e.g.; vegetative communities, interspersion, and connectivity) are comparatively low.

Loss of other familiar aquatic functions such as dynamic surface water storage, energy dissipation, and particulate retention would occur at an intermediate level. Unlike long-term water storage and habitat associated functions, these functions are affected by multiple variables. The effect is that where a particular wetland is lacking in a certain variable, other variables exist that compensate and increase the level of function for a particular wetland. Furthermore, depending on the function, some variables are weighted more than other variables, which tend to mask the effect of deficient variables.

In summation, an assortment of different wetland functions would be affected by the proposed Build Alternatives. The quality of affected waters of the U.S., including wetlands range from to low to high; however, collectively the impacts of the various alternatives would be weighted towards medium quality waters of the U.S., including wetlands.

TABLE 4-35. POTENTIAL ADVERSE IMPACTS TO WATERS OF THE U.S., INCLUDING WETLANDS

Plate ID Number[1]	Feature (Type/Class)	Function Index[2]	Quality Rating[2]	Trinity Parkway Build Alternative Impacts (acres)[3]															
				2A		2B		3A		3B		3C		4A		4B		5	
				Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.
4	Emergent Wetland	0.54	medium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5	Emergent Wetland	0.40	low	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6	Emergent Wetland	0.40	low	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9	Emergent Wetland	0.45	low	--	--	--	--	--	0.59	--	0.59	--	0.59	0.19	0.59	0.19	0.59	0.11	--
16	Emergent Wetland	0.39	low	--	--	--	--	--	0.55	--	0.55	--	0.55	--	0.55	--	0.55	--	--
18	Emergent Wetland	0.49	low	--	--	--	--	--	1.45	--	1.45	--	1.45	--	1.45	--	1.45	--	--
19	Emergent Wetland	0.50	medium	--	--	--	--	--	1.66	--	1.66	--	1.66	--	1.66	--	1.66	--	--
20	Emergent Wetland	0.51	medium	--	--	--	--	--	0.46	--	0.46	--	0.46	--	0.46	--	0.46	--	--
21	Emergent Wetland	0.37	low	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
24*	Trinity River (Perennial Stream)	0.53	medium	--	--	--	--	0.27	40.35	0.18	40.35	2.98	40.35	1.97	40.35	2.98	40.35	1.32	--
25	Emergent Wetland	0.48	low	--	--	--	--	--	0.52	--	0.52	--	0.52	--	0.52	--	0.52	--	--
26	Emergent Wetland	0.58	medium	--	--	--	--	--	0.58	--	0.58	--	0.58	--	0.58	--	0.58	--	--
27	Emergent Wetland	0.45	low	--	--	--	--	--	0.99	--	0.99	--	0.99	--	0.99	--	0.99	0.52	--
28*	Open Water - Intermittent	0.23	low	--	--	--	--	--	--	--	--	--	--	0.06	--	0.06	--	0.09	--
29	Emergent Wetland	0.48	low	--	--	--	--	--	--	--	--	--	--	0.46	--	2.10	--	--	--
30*	Open Water - Intermittent	0.23	low	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
31	Emergent Wetland	0.62	medium	--	--	--	--	0.25	2.94	0.24	2.94	1.41	2.94	--	2.94	0.13	2.94	--	--
32	Emergent Wetland	0.44	low	--	--	--	--	3.30	--	2.64	--	2.83	--	1.69	--	2.04	--	--	--
33	Emergent Wetland	0.54	medium	--	--	--	--	0.40	--	<0.01	--	0.40	--	--	--	--	--	--	--
34*	Open Water - Intermittent	0.23	low	--	--	--	--	0.73	--	0.73	--	0.83	--	0.56	--	0.71	--	--	--
35*	Open Water - Intermittent	0.23	low	--	--	--	--	1.15	--	1.15	--	1.42	--	0.80	--	1.15	--	--	--
36*	Emergent Wetland	0.70	medium	--	--	--	--	--	--	--	--	--	--	2.67	--	5.71	--	--	--
42	Emergent Wetland	0.40	low	--	--	--	--	--	--	--	--	--	--	0.51	--	0.53	--	--	--
43*	Open Water - Intermittent	0.23	low	--	--	--	--	--	--	--	--	--	--	0.43	--	0.52	--	--	--
44	Emergent Wetland	0.58	medium	--	--	--	--	--	--	--	--	--	--	4.30	--	10.01	--	0.24	--
46	Emergent Wetland	0.45	low	--	--	--	--	1.55	--	1.55	--	1.56	--	1.39	--	1.51	--	--	--
47*	Open Water - Intermittent	0.23	low	--	--	--	--	0.55	--	0.55	--	0.63	--	0.39	--	0.47	--	--	--
48	Emergent Wetland	0.43	low	--	--	--	--	0.21	<0.01	0.20	<0.01	0.68	<0.01	0.03	<0.01	0.27	<0.01	--	--
49*	Open Water - Intermittent	0.23	low	--	--	--	--	0.03	0.62	--	0.62	0.12	0.62	--	0.62	0.07	0.62	--	--
50	Emergent Wetland	0.40	low	--	--	--	--	--	0.15	--	0.15	--	0.15	--	0.15	--	0.15	--	--
51*	Open Water - Intermittent	0.23	low	--	--	--	--	0.44	1.02	0.10	1.02	0.29	1.02	0.03	1.02	0.43	1.02	--	--
52	Emergent Wetland	0.40	low	--	--	--	--	0.01	1.64	<0.01	1.64	<0.01	1.64	--	1.64	0.01	1.64	--	--
53	Emergent Wetland	0.40	low	--	--	--	--	--	--	--	--	--	--	--	--	0.51	--	--	--
54	Emergent Wetland	0.63	medium	--	--	--	--	1.28	3.57	0.45	3.57	1.82	3.57	0.39	3.57	2.02	3.57	--	--
55*	Historic Trinity River Channel	0.35	low	--	--	1.14	--	--	--	--	--	0.75	--	--	--	0.75	--	0.25	--
56	Emergent Wetland	0.39	low	--	--	--	--	--	--	--	--	--	--	--	--	0.17	--	--	--
57*	Open Water - Intermittent	0.23	low	--	--	--	--	--	--	--	--	--	--	0.16	--	0.37	--	--	--
58*	Open Water - Intermittent	0.23	low	--	--	--	--	--	--	--	--	--	--	0.19	--	0.39	--	--	--
59	Emergent Wetland	0.47	low	--	--	--	--	0.68	0.65	0.67	0.65	0.98	0.65	--	0.65	0.65	0.65	--	--
60	Emergent Wetland	0.52	medium	--	--	--	--	--	--	--	--	--	--	--	--	0.15	--	--	--
61*	Open Water - Intermittent	0.23	low	--	--	--	--	--	--	--	--	--	--	0.04	--	0.36	--	--	--
62*	Open Water - Intermittent	0.23	low	--	--	--	--	0.95	0.84	0.95	0.84	1.16	0.84	0.27	0.84	0.97	0.84	--	--
63*	Open Water - Intermittent	0.23	low	--	--	--	--	--	0.05	--	0.05	--	0.05	0.05	0.05	0.29	0.05	--	--

TABLE 4-35. POTENTIAL ADVERSE IMPACTS TO WATERS OF THE U.S., INCLUDING WETLANDS

Plate ID Number[1]	Feature (Type/Class)	Function Index[2]	Quality Rating[2]	Trinity Parkway Build Alternative Impacts (acres)[3]															
				2A		2B		3A		3B		3C		4A		4B		5	
				Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.
65	Emergent Wetland	0.63	medium	--	--	--	--	--	0.39	--	0.39	--	0.39	0.24	0.39	0.61	0.39	--	--
66	Emergent Wetland	0.51	medium	--	--	--	--	4.54	--	5.57	--	6.84	--	1.34	--	6.55	--	--	--
67	Emergent Wetland	0.65	medium	--	--	--	--	--	3.97	--	3.97	--	3.97	--	3.97	--	3.97	--	--
68	Emergent Wetland	0.63	medium	--	--	--	--	--	0.07	--	0.07	--	0.07	0.77	0.07	1.19	0.07	--	--
69	Emergent Wetland	0.68	medium	--	--	--	--	--	0.45	--	0.45	--	0.45	0.53	0.45	0.93	0.45	1.15	--
70*	Historic Trinity River Channel	0.35	low	1.74	--	2.90	--	--	--	0.40	--	0.40	--	--	--	--	--	7.57	--
71	Emergent Wetland	0.43	low	--	--	--	--	0.41	--	0.41	--	0.50	--	0.40	--	0.50	--	--	--
76	Forested Wetland	1.00	high	1.38	--	2.52	--	1.74		1.27		1.26		1.75		1.26		--	--
78	Intermittent Stream	0.56	medium	0.14	--	0.21	--	0.20	--	0.22	--	0.17	--	0.19	--	0.11	--	0.13	--
79*	Historic Trinity River Channel	0.35	low	0.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
80*	Historic Trinity River Channel	0.35	low	0.25	--	0.57	--	0.27	--	0.44	--	0.37	--	0.42	--	0.46	--	0.42	--
81*	Historic Trinity River Channel	0.35	low	0.12	--	1.33	--	--	--	--	--	--	--	--	--	--	--	--	--
82*	Historic Trinity River Channel	0.35	low	0.31	--	0.40	--	--	--	--	--	--	--	--	--	--	--	--	--
			TOTAL IMPACTS (acres)	**4.23**	--	**9.07**	--	**18.96**	**63.51**	**17.72**	**63.51**	**27.38**	**63.51**	**22.22**	**63.51**	**47.13**	**63.51**	**11.79**	--

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.

1. Plate ID numbers correspond to the locations shown on **Plates 4-23** through **4-25**.
2. For derivation of wetland function index and quality rating, see discussion in **SDEIS Section 3.4.6, or reference "A Guidebook for Application of Hydrogeomorphic Assessments to Riverine Wetlands, Wetlands Research Program Technical Report WRP-DE-11" USACE, 1995c.**
3. Calculated areas are estimates only and may change as final configuration is refined. "**Fill**" impacts are expected from roadway construction; excavation ("**Ex**.") impacts are expected from potential borrow areas. Expected impacts are based on the jurisdictional determination approved by USACE on June 19, 2006 (File # SWF-2000-00308).

* Potential impacts to waters of the United States, including wetlands, may occur from bridge column construction and would be addressed or eliminated during final design stages.

TABLE 4-36. SUMMARY OF POTENTIAL IMPACTS TO WATERS OF THE U.S., INCLUDING WETLANDS

Build Alternative	Emergent Wetlands		Forested Wetlands		Open Water - Intermittent*		Historic Trinity River Channel		Intermittent Stream		Trinity River*		Total	
	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.	Fill	Ex.
2A	--	--	1.38	--	--	--	2.72	--	0.13	--	--	--	4.23	--
2B	--	--	2.53	--	--	--	6.34	--	0.20	--	--	--	9.07	--
3A	12.64	20.63	1.74	--	3.84	2.53	0.27	--	0.20	--	0.27	40.35	18.96	63.51
3B	11.73	20.63	1.27	--	3.47	2.53	0.84	--	0.23	--	0.18	40.35	17.72	63.51
3C	17.01	20.63	1.28	--	4.45	2.53	1.51	--	0.15	--	2.98	40.35	27.38	63.51
4A	14.90	20.63	1.74	--	2.98	2.53	0.42	--	0.20	--	1.98	40.35	22.22	63.51
4B	35.77	20.63	1.28	--	5.79	2.53	1.21	--	0.10	--	2.98	40.35	47.13	63.51
5	2.02	--	--	--	0.09	--	8.23	--	0.13	--	1.32	--	11.79	--

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.

1. All quantities shown in acres. Calculated areas are estimates only. "**Fill**" impacts are expected from roadway construction; excavation ("**Ex**.") impacts are expected from potential borrow areas (see **Plate 4-26** for borrow area locations).
2. Expected impacts are based on the jurisdictional determination approved by USACE on June 19, 2006 (File # SWF-2000-00308).
3. **--** = No impact anticipated for this alternative.

* Potential impacts to waters of the U.S., including wetlands, may occur from bridge column construction and can be addressed or eliminated during final design.

Where possible, the project would avoid impacting waters of the U.S., including wetlands, outside the rights-of-way. Disturbed areas would be treated with native grass seeding, mulching, erosion blankets, or similar erosion preventative measures to provide temporary soil stabilization until natural vegetation becomes reestablished. Additional details concerning avoidance and minimization techniques are discussed in **Chapter 7 Mitigation Measures and Commitments** (see also materials relating to mitigation that would be required under CWA Section 404 in **Appendices H, I,** and **J**). The discharge of dredged and/or fill material into waters of the U.S., including wetlands, associated with construction of the any proposed alignments would require a standard individual permit from the USACE. Alternatives available to the USACE relative to the proposed project's Section 404 permit application would include:

- issue a permit;
- issue a permit with special conditions, or
- deny a permit.

4.8.2.2 Agency Coordination and Permit Requirements

A jurisdictional determination of waters of the U.S., including wetlands, subject to regulation under Section 404 of the CWA was approved by the USACE in June 2006. A copy of the USACE correspondence is presented in **Appendix G-6 Correspondence**. Based on the initial assessment of impacts, all of the Build Alternatives would exceed the impact threshold allowed by Nationwide Permit 14 - Linear Transportation Crossings - and would require a Section 404 Individual Permit.

The proposed action would also comply with the CWA Section 404(b)(1) *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* (40 CFR Part 230), administered by the EPA and the USACE. These guidelines mandate that dredged or fill material should not be discharged into aquatic ecosystems (including wetlands), unless it can be demonstrated that there are no practicable alternatives to such discharge, that such discharge will not have unacceptable adverse impacts, and that all practicable measures to minimize adverse effects are undertaken.

As previously discussed in **Section 3.5.7 Navigation**, the Trinity River is officially designated a navigable waterway within the study area. FHWA has determined that the proposed project meets the criteria for the Surface Transportation Authorization Act and qualifies for exemption from USCG bridge permit requirements. FHWA has coordinated the proposed undertaking with the USCG, and the USCG has granted exemption from the requirements pertaining to navigable waterways imposed under 33 USC 401 and 525(b), and the lighting and signal requirements imposed under 33 CFR 118.40(b) (see **Appendix G-6**).

4.9 WATER BODY MODIFICATION; VEGETATION AND WILDLIFE IMPACTS

The construction of a new roadway affects the environment at various levels of geographic scale. On a landscape level, the ecological communities currently existing along the proposed Build Alternatives would be fragmented to some degree. It is difficult to quantify this effect, primarily because there are numerous dynamic variables involved. Many generalizations regarding the concept of habitat fragmentation are well accepted, but specific processes and functional relationships are site specific, dynamic, and are interrelated.

The direct impacts of construction, operation, and maintenance of the new right-of-way add an element of disturbance to the ecosystem. The vegetation communities occurring along the proposed Build Alternatives would be directly impacted by construction-related activities. The inevitable fragmentation of contiguous habitat blocks, the impacts on mature woodlands and potential modifications of hydrologic and nutrient cycling and transfer processes are also likely to have some impacts on natural communities.

Wetland and aquatic systems are impacted in a similar fashion through direct disturbance by heavy machinery compaction and scarification, placement of fill and construction materials, and the disruption of hydrological and nutrient cycling. As with other elements of the ecosystem, wildlife communities are impacted by the permanent loss of habitat. In addition to direct construction-related mortality or injury, wildlife populations often suffer impacts associated with displacement into adjacent habitats, which often are already at carrying capacity (i.e., the maximum sustainable level) for that species.

4.9.1 No-Build Alternative

The No-Build Alternative would result in no water body modifications and no vegetation or wildlife impacts other than what would develop from existing urban-related activities.

4.9.2 Build Alternatives

4.9.2.1 Water Body Modification

The proposed project would require coordination and permitting with the USACE under Section 404 of the Clean Water Act and possibly under Section 10 of the Rivers and Harbors Act. As previously stated in **Section 4.8.2.2**, the proposed crossings of the Trinity River have been exempted from USCG permit requirements.

As discussed above, drainages and the adjacent bank-side vegetation often serve as travel corridors for various wildlife species. Construction of the facility across a drainage channel can impede the movement of wildlife and can serve to fragment and reproductively isolate vegetational communities. There is a potential for temporary impacts during construction of the Trinity Parkway Build Alternatives. Other impacts may include traffic noise, increase in dust and debris, non-natural lighting, and shading from bridge structures.

The proposed roadway would cross smaller channels through the use of various-sized concrete box culverts, while larger drainages would be bridged. Depending upon the drainage geometry at alignment crossings, some channel modification may be necessary along certain drainages, although this would be a relatively infrequent occurrence and avoided if at all practicable. Specific locations along each alignment where channel modification would be necessary for required drainage crossings have not yet been identified. However, potential large-scale water body modification would be required for the construction of Alternatives 3A, 3B, 3C, 4A, 4B, and 5. As currently proposed, Alternatives 3A, 3B, 3C, 4A, 4B, and 5 would require excavation and earthwork activities within the Dallas Floodway, which would also require modification of the existing Trinity River channel. Detailed information concerning the proposed design and construction of Alternatives 3A, 3B, 3C, 4A, 4B, and 5 within and adjacent to the Dallas Floodway is presented in **Chapter 2 Alternatives Considered**. Alternatives 2A and 2B do not include any construction that directly impacts the Dallas Floodway; however, these alternatives would involve crossing old meanders of the historic Trinity River channel.

The proposed project would require coordination and permitting with the USACE under Section 404 of the CWA. Affected water body crossings are expected to exceed threshold criteria established under the

USACE's Nationwide Permit Program; an Individual Permit is expected to be required for each of the Build Alternatives. Additional details are presented in **Chapter 7 Mitigation Measures and Commitments**.

4.9.2.2 Vegetation Impacts

The primary impact of the proposed action to various vegetation types would be the direct conversion to impervious roadbed and roadside vegetation cover, whereas indirect impacts relate more to the potential degradation of the quality of remaining vegetation communities. Indirect impacts may include the reduction in value of the wildlife habitat surrounding the direct impact zone, or increased potential for erosion and water quality degradation due to exposed soils. These impacts are often cumulative and associated with increased development surrounding the roadway. The indirect impacts from vegetation impacts as it pertains to wildlife habitat, soil stability, and water quality, including potential cumulative impacts, are addressed in **Section 4.24 Indirect and Cumulative Impacts**.

A description of the different vegetation types within the study area is discussed in **Section 3.4.3 Vegetation within the Study Area**. To determine the potential direct impacts, each vegetation type was identified within the proposed right-of-way boundaries of each Build Alternative. The total acreage amount of each vegetation type occurring within the right-of-way of each alternative was then calculated. **Table 4-37** summarizes the total acres of vegetation cover types directly impacted by the Trinity Parkway Build Alternatives.

TABLE 4-37. ACRES OF VEGETATION COVER TYPES DIRECTLY AFFECTED BY THE TRINITY PARKWAY BUILD ALTERNATIVES

Build Alternatives	Woodland (non-wetland)		Aquatic Habitats*		Maintained Grass Areas	Total Undeveloped Area Impacts
	Bottomland Hardwoods	Riparian Forest	Waters of the U.S., Incl. Wetlands	Other		
2A	4.6	---	4.2	---	11.9	20.7
2B	6.4	---	9.1	---	31.1	46.6
3A**	10.1	3.2	19.4	0.6	221.0	283.1
3B**	10.2	2.9	17.7	0.04	208.7	239.54
3C**	12.8	6.7	27.4	0.01	209.8	255.91
4A**	10.1	3.2	22.2	0.2	298.6	334.3
4B**	9.6	5.9	47.1	0.1	314.8	377.5
5	8.3	2.2	11.8	9.7	190.4	222.4
Potential Borrow Areas**	---	13.8	63.5	---	258.3	335.6

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.

1. All quantities are shown in acres. Calculated areas are estimates only.
2. Potential impacts to waters of the U.S., including wetlands, may occur from bridge column construction and can be addressed during final design.
3. **---** = No impact anticipated for this alternative.

*** =** Includes impacts associated with drainage sumps, open water, and river channel, most would be spanned by bridges.

**** =** Build Alternatives that would also require excavation from the potential borrow areas shown at the bottom of the column; the approximate locations of potential borrow areas are shown on **Plate 4-26**.

As shown in **Table 4-37**, the total amount of vegetative cover impacted by the Build Alternatives varies based on vegetative cover type. The largest impacted vegetation cover type in terms of area is the maintained grassland type. The largest of this impact type occurs in floodplain grassland communities associated with riverside alignments (Alternatives 3A, 3B, 3C, 4A, and 4B). The different Build Alternatives would impact riparian and bottomland hardwood forests, the majority of which occur in forested areas between the DART Bridge and MLK. The riparian forest identified in **Table 4-37** is considered an unusual vegetation feature, and the bottomland hardwoods and water bodies (i.e., aquatic habitats) are considered special habitat features according to the TxDOT-TPWD MOA.

The potential introduction of invasive plant species exists under the Build Alternatives. This potential exists because, as with almost any type of construction project, ground-disturbing activities occur that require seeding, landscaping, and long-term maintenance. Barring appropriate mitigation measures, invasive plant species can be introduced into a corridor during erosion control and revegetation operations. Weed seed can be inadvertently introduced into a corridor during construction on equipment or through the use of imported mulch, soil, gravel, or sod.

Compliance with EO 13112 means that Federal-aid and Federal Lands Highway Program funds cannot be used for construction, revegetation, or landscaping activities that purposely include the use of known invasive plant species. Until the National Vegetation Management Plan specified by EO 13112 (1999) is completed, the proposed action is relying on the Texas noxious weed list to define the invasive plants that must be addressed and the measures to be implemented to minimize their harm. No prohibited noxious weed seeds from the statewide list would be planted. Any seed mixes used to reestablish vegetation will be consistent with TxDOT standard specifications for construction and maintenance of highways, streets, and bridges, meeting the requirements for Texas Seed Law, including the testing and labeling for pure live seed. In addition, the type of vegetation within the Dallas Floodway is subject to approval by USACE to ensure there is not diminution of flood conveyance capacity.

4.9.2.3 Wildlife Habitat Impacts

Habitat used by wildlife species is a complex matter. Wildlife diversity and density correlate strongly with vegetation diversity and the type, degree, and frequency of disturbances to which an area's vegetation is subjected. Therefore, for the purposes of evaluating the potential impacts to wildlife resources of the proposed roadway project, vegetation impacts serve as a useful indicator of the magnitude of the various wildlife habitats. For this reason, **Table 4-37** provides useful data in this assessment.

Urban landscaped areas and floodplain grasslands account for the majority of the aerial coverage of the vegetation portions of the Build Alternatives. However, the greatest impact to wildlife would result from

the destruction of forest and wetland habitats. Forested areas require greater regenerative time after clearing as compared to grasslands or emergent wetlands. Furthermore, the vegetation type and associated transition areas to riverine wetlands provide the most valuable habitat for wildlife within the study area. These areas typically contain the greatest diversity of wildlife species. The impacts of forest fragmentation particularly threaten neo-tropical migratory birds and other area-sensitive, interior-woodland avian species. For these reasons, the evaluation of project-related impacts on wildlife is largely focused on the amount of woodlands, especially riparian, as well as the amount of aquatic habitat impacted by the various Build Alternatives. The appropriate vegetation community data provided in **Table 4-37** have been configured in several ways to assess acreage impacts to general "wildlife habitat" (e.g., urban landscaped plus aquatic habitat) and "highest quality wildlife habitat" (e.g., riparian woodlands plus aquatic habitat).

Impacts to contiguous stands of mature woodlands would be associated with riparian and bottomland forests between the DART Bridge and MLK. The riverside alignments (Alternatives 3A, 3B, 3C, 4A, and 4B) would potentially convert a large amount of emergent wetlands to un-vegetated open water, which would result in additional loss of wildlife habitat.

A search of the Natural Diversity Database (NDD), maintained by the TPWD to track known occurrences of rare biological resources, identified two rookeries within the search area (i.e. 10 mile search radius from the proposed project). Neither location (see **Section 3.4.5.3**) houses threatened or endangered species; however, both would be subject to protection by the Migratory Bird Treaty Act (MBTA). None of the Build Alternatives would directly impact either location. The rookery north of IH-35E (EOID 2952) is already isolated from other potential habitat by its urban surroundings, and it is not anticipated that the proposed project would isolate it further. The location near Hutchins (EOID 1439) is approximately four miles away from the proposed project area, and is no longer known by local wildlife rehabilitation professionals to serve as a rookery. Both EORs are far enough removed in space and/or time to indicate that the proposed project would not have an adverse effect on the individual species that are typically found within them.

As noted in **Table 3-16** of **Section 3.4.4**, a variety of migratory birds utilize the project area. The MBTA states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, or egg in part or in whole, without a federal permit issued in accordance with the Act's policies and regulations. Migration patterns would not likely be affected; however, a survey of these areas would be conducted prior to construction to verify if any migratory birds are found in the project area. In the event that migratory birds are encountered on-site during project construction, every effort will be made to avoid take of protected birds, active nests, eggs, and/or young. The contractor would remove all old migratory bird nests between September 1 and January 31 from any structure where work will be done. In addition,

the contractor would be prepared to prevent migratory birds from building nests between February 1 and August 31. Therefore, the requirements for the MBTA appear to be satisfied.

4.9.2.4 Threatened and Endangered Species

Sections 4.9.2.5 through **4.9.2.7** describe the potential impacts to threatened and endangered species from the proposed action and summarize the coordination process with the USFWS under Section 7 of the ESA and the Migratory Bird Treaty Act.

4.9.2.5 No-Build Alternative

No effect to any endangered, threatened, proposed, or candidate species is anticipated from the No-Build Alternative.

4.9.2.6 Build Alternatives

No recent occurrences of federally or state listed threatened or endangered species have been identified in the project study area during field surveys and correspondence with the USFWS, TPWD, and other organizations considered to have special expertise related to wildlife and their habitat. Other organizations contacted regarding sensitive species issues have included the Dallas Zoo, Audubon Dallas, and Rogers Wildlife Rehabilitation, Inc.

Table 3-17 in **Section 3.4.5.2** provides a list of all threatened and endangered species potentially present within the study area. A description of the habitat requirements for each of the sensitive species of potential occurrence in the study area was presented by species in this section of the SDEIS. Potential habitat is present within the project study area for the interior least tern, a federally listed endangered species, as well as the alligator snapping turtle and timber/canebrake rattlesnake, which are state listed threatened species. The least tern has been known to nest on man-made structures near water. This type of unnatural habitat exists in the study area, and as indicated in **Table 4-16** in **Section 4.5** and on **Plates 4-5** through **4-12**, each Build Alternative would require removal of several commercial buildings. As shown in **Table 4-37**, each Build Alternative would have impacts of varying degrees on aquatic and wooded areas that could serve as habitat for the alligator snapping turtle and timber/canebrake rattlesnake, respectively. Since the proposed project would include loss of potential habitat, the possibility for these three species to be affected is explored further in this section. For all other federally or state listed threatened and endangered species listed in **Table 3-17**, there would be no effect.

Within the Trinity River basin, interior least terns have adapted to using non-traditional nesting habitat, which includes sand and gravel pits, dirt roads, and gravel rooftops instead of expected natural habitat such as sandbars and salt flats (Lott 2006). In the greater Dallas area, this species has been known to nest at unnatural sites, and has been found nesting on top of warehouses along the Elm Fork of the Trinity River in northwestern Dallas County. Nesting terns have also been documented on spoil beds at the Southside Wastewater Treatment Plant, several miles south of the study area. The birds spend less than half the year in the Metroplex, arriving in May and nesting until early September. Typical nesting sites are usually associated with calm water bodies deep enough to support fish life on which the tern predates. In addition, they tend to return to the same sites year after year, and the species is not known to nest in the project area (see **Appendix G-6** Dallas Zoo correspondence). Field surveys were conducted in July 2008 to determine if the terns are currently using the study area for nesting or foraging. No evidence of the interior least tern was observed at any potential nesting sites or foraging grounds within the study area. Another consideration is the possibility of construction activities attracting interior least terns to the area by creating potential nesting habitat in the form of bare open areas near the Trinity River. Monitoring construction sites during late spring would ensure that if terns begin utilizing the area during construction, appropriate measures could be taken to locate and protect nests. Methods to avoid impacts to the interior least tern would be developed as necessary following identification of the preferred alternative and during continued coordination with the USFWS. For these reasons, the proposed project may affect, but is not likely to adversely affect this species.

The alligator snapping turtle requires perennial water bodies for habitat and, if the species occurs within the study area, the only aquatic features that could provide suitable habitat for the species are the Trinity River and Cedar Creek. The proposed project would not impact Cedar Creek. As shown in **Table 4-36** in **Section 4.8.2**, fill and excavation activities associated with Alternatives 3A, 3B, 3C, 4A, 4B, and 5 would affect the Trinity River, with impacts ranging from approximately 1.32 acres (Alternative 5) to 43.33 acres (Alternatives 3C and 4B). The effect these disturbances could have on any alligator snapping turtles inhabiting the river channel is difficult to predict; however, most of the impacts (approximately 40.35 acres) from the river alternatives (Alternatives 3A, 3B, 4A, and 4B) would be a result of excavation of potential borrow areas for roadway embankment, which would involve benching excavated areas into the overbanks of the Dallas Floodway pilot channel, causing only temporary disturbances to preferred habitat within deeper areas of the river. This species is completely aquatic, with females leaving the water only to nest, usually within twelve meters of the water's edge. In addition, potential habitat would remain available upstream and downstream of the project impacts. Access and use of these areas by the species would not be restricted by the proposed project. Consequently, the project may affect, but is not likely to adversely affect the species.

The DFW Metroplex, including the project study area, represents the far western edge of the range of the timber/canebrake rattlesnake, and is characterized by drier conditions than generally preferred for this snake. Forested areas near permanent water sources are the most likely to be suitable for this species. Within the project study area, possible habitat includes forested floodplain and riparian corridors. Impacts from the Build Alternatives to bottomland and riparian forests that could serve as habitat range from approximately 4.6 acres (Alternative 2A) to 33.3 acres (Alternative 3C). The timber/canebrake rattlesnake is a shy animal that prefers to live in areas with high amounts of cover and available refuge. Most of the acreage of possible habitat affected by the Build Alternatives occurs between the DART and MLK Boulevard bridges, and consists of isolated areas and fringe areas located at the outer margin of wooded floodplain that extends several miles southeast of the project study area. The home range of this species is large, at times encompassing in excess of 100 acres. It is unlikely that the proposed project would substantially affect the species, as the amount of affected potential habitat is a relatively small percentage of its range. In addition, if a localized population of the rattlesnake does occur within the region, it likely resides deeper within the forested floodplain, as this would be preferred for den locations. Consequently, the project may affect, but is not likely to adversely affect the species.

Species of Concern

The proposed project is not likely to adversely affect any species of concern (SOC) listed in **Table 3-17**. However, the proposed project would include loss of potential habitat for several SOC; therefore, the possibility for these species to be affected is discussed below.

The western burrowing owl nests in west Texas and winters into central Texas. The project area is outside the current range for this species. In addition, existing abandoned small mammal burrows (prairie dog, etc.) were not observed during field visits, and would be expected to be rare in the project area. Thus, it is expected the proposed project would not affect the western burrowing owl.

The cave myotis bat is known to be a permanent resident of Texas, roosting in abundant numbers in west and central Texas. Dallas County is on the outer eastern edge of this species' range, and the cave myotis bat was not observed during field visits to the project area. No caves or mines exist within the project area, and bats are not known to utilize the bridges that would potentially be affected by the proposed project. In addition, areas of potential bridge habitat would remain should this species begin to utilize the area for roosting. Consequently, it is expected the proposed project would not affect the cave myotis bat.

The plains spotted skunk is believed to be potentially vulnerable within Texas. Little is known about the ecology of this subspecies, but the closely related eastern spotted skunk (*Spilogale putorius*) prefers habitats with substantial cover such as forested and brushy areas. The skunks utilize abandoned

mammal burrows or similar crevices for den sites and raising young. The project area primarily consists of urban development and open areas within a maintained floodway, with cover and potential den sites being scarce throughout. The species was not observed during field visits, and is not expected to be affected by the proposed project.

The Trinity River contains potential habitat for all of the mollusk species listed in **Table 3-17**; however, it is unknown if any exist within the project area. As such, it is difficult to assess potential effects for these species. Potential impacts would be similar to those discussed above for the alligator snapping turtle (associated with Alternatives 3A, 3B, 3C, 4A, 4B, and 5), as the mollusks are fully aquatic, and would be temporary in nature. Thus, it is expected that the proposed project would not adversely affect the mollusks listed in **Table 3-17**.

The texas garter snake prefers marshy habitats associated with permanent water bodies, though it can be found in many habitats, including suburban areas, throughout Dallas County. The most likely impacts to this species would be expected to be similar to those of the timber/canebrake rattlesnake discussed above. As this species is cosmopolitan throughout the county, it is expected the project would disturb a small fraction of the snake's potential habitat, but would not adversely affect this species.

Additional discussion of measures that would be considered to minimize impacts to wildlife habitat and potential threatened or endangered species is presented in **Sections 7.3** and **7.10**.

4.9.2.7 Coordination with the U.S. Fish and Wildlife Service

Coordination with the USFWS was initiated on August 16, 1999 (see **Appendix A-1**). This coordination was conducted pursuant to NEPA and FHWA scoping requirements to assess the possibility of encountering threatened and endangered species and/or potential habitat protected under the ESA and the Migratory Bird Treaty Act in the proposed project area. Continued coordination with USFWS occurred through the review and opportunity for comment on the February 2005 DEIS (see **Appendices G-2** and **G-5**). Following the identification of the preferred alternative, coordination would occur with the USFWS to determine if a Biological Assessment would be required for any threatened or endangered species that may be affected by the proposed action. A Biological Assessment would identify any potential impacts of the preferred alternative and propose mitigation for any affected species. The FEIS would include information from coordination with the resource agencies and preparation of the Biological Assessment, if required.

4.10 MICROCLIMATE IMPACTS

The influence of urbanization, including roadway construction, on climate (local or global) is difficult to predict because the exchanges of energy, mass, and momentum are very complex. A city's compact mass of buildings and pavement exhibits a complex geometry of street canyons and a large spatial heterogeneity and constitutes a profound alteration of the natural landscape, which may result in a large number of microclimates. These microclimates may be revealed by the existence of so-called "urban heat islands," where temperature changes in the air may reach several degrees in comparison to rural areas.

In urban areas, buildings and paved surfaces have gradually replaced preexisting natural landscapes. As a result, solar energy is absorbed into roads and rooftops, which may cause the surface temperature of urban structures to become much higher than the ambient air temperature. **Table 4-38** shows "albedo" or reflectivity values for typical urban surfaces. The albedo is a measure of the amount of solar energy reflected by the surface. As such, low albedo values imply higher surface temperatures, since larger amounts of energy are absorbed.

TABLE 4-38. TYPICAL URBAN SURFACE ALBEDO

SURFACE	UNITS
Asphalt	0.05-0.20
Concrete	0.10-0.35
Brick/Stone	0.20-0.40
Tar and Gravel Roof	0.03-0.18
Highly Reflective Roof	0.60-0.70
Trees	0.15-0.18
Grass	0.25-0.30
Colored Paint	0.15-0.35
White Paint	0.50-0.90
Source: Global Hydrology and Climate Center, 2000.	

Table 4-38 shows that darker surfaces (e.g., asphalt, tar and gravel roof, and trees) have the lowest albedo values and absorb much more heat than lighter-colored surfaces. As a result, darker surfaces can become very hot (as much as 70°F above the air temperature). The main contributors are dark roofs and asphalt pavements.

4.10.1 No-Build Alternative

The No-Build Alternative would have no anticipated microclimate impacts.

4.10.2 Build Alternatives

The proposed action may have a direct microclimate impact by increasing surface temperatures on and immediately adjacent to the roadway itself (within the right-of-way), especially during summer months. However, all Build Alternatives would be constructed within a major pre-existing urban environment surrounded by typical urban structures, such as buildings, bridges, and asphalt/concrete-paved roadways. When combined with existing conditions, the proposed action would have no perceivable impact to the so-called “urban heat island” effect. No adverse microclimate impacts - either separately or collectively - are anticipated as a result of the proposed action.

4.11 TOPOGRAPHY, GEOLOGY, AND SOILS

4.11.1 No-Build Alternative

No impacts to topography, geology, and soils would occur in the study area under the No-Build Alternative.

4.11.2 Build Alternatives

Topography

As previously described in **Section 3.5.3.1**, the study area is located within the northernmost section of the Gulf Coastal Plain, which is characterized as “flat to gently dipping...” The Dallas Floodway is the dominant topographic feature within the study area. This large, man-made grassy open space is bounded by flood control levees (approximately 30 feet in height) and accounts for approximately 50 percent of the study area. The remaining portion of the study area is dominated by urban development (e.g., buildings, roads, bridges) and other floodplain areas (see **Section 3.1**).

All of the Build Alternatives would involve some degree of change to surface topography due to cut and fill slopes, embankment material, excavation, ditching, and/or trenching. Alternatives 2A and 2B would have the least impacts to surface topography. Alternatives 3A, 3B, 3C, 4A, 4B, and 5 would have greater impacts because construction of either of these alternatives may involve coordinated development with other projects (see **Section 4.2**) and, therefore, require substantial modifications to the Dallas Floodway (e.g., construction of roadway embankments, levee modification, lake excavation). Of these, Alternative 4B would have the most impacts to surface topography of all the alternatives. A summary of the estimated excavation and/or fill quantities required for each of the Build Alternatives is provided in **Section 4.20.8 Construction Excavation and Fill Requirements**.

Geology and Soils

The project study area is considered to be free of geologic conditions that would be expected to constitute potentially adverse impacts, hazards, or impediments to construction. The proposed action is located in a region of relatively low seismicity. Project features would be designed to incorporate provisions for mitigation of expansive soils and possible local presence of weak soils, flood control features (i.e., levees, embankments, sump areas, etc.), and high water table conditions.

During and immediately following construction, there would be exposed soils. Soils within the Build Alternative rights-of-way, in general, are classified as having slight to moderate potential for erosion (see **Section 3.5.3**). The relatively flat topography in the study area reduces the potential for erosion during project construction. Erosion is expected to be limited to the immediate vicinity of the proposed roadway, new embankment slopes, and at interchanges and overpasses. The potential for soil erosion would occur during the construction period; however, it is expected to be controlled because best management practices (BMPs) including erosion and sedimentation control measures, such as silt fences, rock berms, sedimentation basins, and/or soil retention blankets, would be implemented as necessary prior to construction.

Mineral resources within the study area are limited to near-surface deposits of sand and gravel. Extensive areas of sand and gravel extraction have occurred along the floodplain/terrace complexes of the Trinity River. Currently, there are no active quarries within the project study area. None of the alternatives would impact mineral production within the study area.

4.12 WATER QUALITY IMPACTS

This section describes potential surface water and groundwater quality impacts that may result from the proposed action. Included is a description of the regulatory requirements involved with impacts to water quality. Many of the potential impacts are common to all Build Alternatives. Construction-related water quality impacts are further described in **Section 4.20 Temporary Impacts during Construction**.

4.12.1 Agency Coordination and Regulatory Requirements

FHWA Requirements

The proposed action would comply with 23 CFR 650, Subpart B, *Erosion and Sediment Control on Highway Construction Projects*.

Texas Pollutant Discharge Elimination System Permit Requirements

The TPDES program implements the federal NPDES program in the State of Texas. On September 14, 1998, the EPA authorized the State of Texas to develop and implement the TPDES Program (63 FR

51164). As of March 2003, the TCEQ developed its own general permit for construction activities that exceed one acre.

Construction of the proposed action would disturb more than 1 acre of ground surface; therefore, this project must comply with the conditions of TCEQ's TPDES General Permit Number TXR150000. A Notice of Intent for storm water discharges associated with construction activity would be submitted to the TCEQ in compliance with the TPDES General Permit. The TPDES general permit also requires the development of a Storm Water Pollution Prevention Plan (SW3P).

The TCEQ requires that the SW3P plan:

- Be prepared in accordance with good engineering practices;
- Identify potential sources of pollution that may reasonably be expected to affect the quality of storm water discharges from the construction site;
- Describe and ensure the implementation of practices that would be used to reduce the pollutants in storm water discharges associated with construction activity at the site; and
- Assure compliance with the terms and conditions of the TPDES General Permit.

Section 404 and Section 10 Permit Requirements

The USACE regulates activities that would result in the discharge of dredged or fill material into waters of the United States under Section 404 of the Clean Water Act. Given the proposed extent of fill for the Build Alternatives and potential impacts to floodplains, the proposed action would require a Section 404 individual permit. The USACE regulates activities in, or affecting, navigable waters of the U.S. under Section 10 of the Rivers and Harbors Act. Given the potential impacts of Build Alternatives 3A, 3B, 3C, 4A, 4B, and 5 on the pilot channel of the Trinity River, the proposed action would possibly require a Section 10 permit. Additional details regarding permitting and compliance requirements that may be required for the proposed action are provided in **Chapter 7 Mitigation Measures and Commitments**.

TCEQ Water Quality Certification

In addition to the 404 permitting requirements, the project applicant must obtain a Water Quality Certification from the TCEQ pursuant to Section 401 of the CWA. This Water Quality Certification provides reasonable assurance that an activity that may result in discharge to waters of the U.S. would not violate water quality standards.

TCEQ Permit for Municipal Separate Storm Sewer System (MS4)

Municipalities and other designated entities have storm water permit requirements to monitor storm water during wet weather events. In north central Texas, this includes the cities of Dallas, Fort Worth, Arlington,

Garland, Irving, Plano, Mesquite, and the local districts of TxDOT. In addition, the NTTA applied for its own MS4 permit that was approved by the TCEQ on February 22, 2006. The NCTCOG has been assisting these entities through a cooperative regional monitoring program designed to meet permit requirements. The primary goal of the regional sampling program, which calls for quarterly sampling within each entity's designated watershed, is to establish a baseline and determine long-term trends to assess the impact of storm water discharge on receiving stream quality. The NTTA permit would remain in effect during the course of the project. The major elements of the storm water management program required as part of NTTA's permit include the following:

- Structural controls to reduce the discharge of pollutants;
- Operation and maintenance of roadways in a manner that minimizes the discharge of pollutants (including deicing or sanding activities);
- Development and implementation of controls to reduce the discharge of pollutants related to the storage and application of pesticides, herbicides, and fertilizers applied to public right-of-ways or other NTTA property;
- Programs and controls to prevent illicit discharges and improper disposal (i.e., sanitary sewer overflows into the MS4, motor vehicle fluids, household hazardous wastes, etc.);
- Spill prevention and response programs;
- Identification and evaluation of industrial and high risk runoff (i.e., landfills, TSD facilities, etc.) and implementation of control measures and a monitoring program, if necessary;
- A program to reduce the discharge of pollutants from construction sites;
- A public education program; and
- Monitoring and screening programs (i.e., dry and wet weather screening, etc.).

4.12.2 No-Build Alternative

The No-Build Alternative would not have a direct impact to water quality in the Trinity Parkway study area. Increased congestion on local roadways and the resulting stop-and-go traffic may add to the build-up of pollutants on road surfaces and rights-of-way in the study area. This has the potential to have long-term adverse impacts on the quality of surface and groundwater. In addition, decreased traffic safety due to congestion may increase the potential for an accidental spill of toxic or otherwise hazardous materials along existing roadways, such as IH-35E or IH-30.

4.12.3 Build Alternatives

Surface Water Impacts

The major short-term water quality issues associated with construction activities are erosion and sedimentation. Erosion and sedimentation are accelerated when vegetation is cleared in preparation for the construction of the roadway. These cleared areas and any other exposed ground are susceptible to erosion. Each of the Build Alternatives requires the crossing of several water bodies within the study area, including the Trinity River and its network of drainage sumps and tributaries. The potential erosion and sedimentation are dependent upon local conditions (i.e., soil type, slope, and vegetation) and construction practices. Bridge construction also has the potential to create soil erosion, which could affect sedimentation and turbidity of water. Eroded sediment may then redeposit downstream, resulting in the disruption of the aquatic ecosystem and water quality degradation. In addition, increased pavement area and vehicular traffic over the life of the project have the potential to discharge storm water pollutants to the water bodies and wetlands that could negatively impact the quality of surface water.

Beneficial Use of Water Resources in the Area

Generally, beneficial use is the use of a reasonable amount of water necessary to accomplish the purpose of an appropriation, without waste. In Texas, it refers to the amount of water that is economically necessary for purposes authorized by the Texas Water Code, when reasonable intelligence and reasonable diligence are used in applying the water to that purpose. Purposes of use may include, but are not limited to, domestic and municipal, industrial, agricultural, recreational, and in-stream uses such as aquatic and wildlife habitat. Conserved water is considered a beneficial use (Texas Water Code. § 11.002(4); Texas Administrative Code Chapter 30, Part I, Section 297.43). The “footprints” for the Build Alternatives would require fill and crossings of water resources in various locations, which would include portions of the Dallas Floodway (Alternatives 3A, 3B, 3C, 4A, and 4B) and associated flood control storage sumps and wetlands (all Build Alternatives) in the study area as described in **Section 4.8 - Impacts to Waters of the U.S., Including Wetlands** and **Section 4.9.2.1 Water Body Modification**. Although fill activities would remove some aquatic features from the landscape, it is not anticipated that these activities would substantially affect the capacity of the Trinity River and its waters to provide other beneficial uses to the public. Subsequent impacts to water quality from a storm water runoff perspective are discussed in the following narrative, and cumulative impacts to water quality are addressed in **Section 4.24 - Indirect and Cumulative Impacts**.

Evaluation of Potential Runoff Impacts on Aquatic Resources

Existing water quality data suggest that surface water quality has already been compromised by wastewater effluent, contaminated groundwater, and local urban runoff, including storm water runoff from existing roadways in the study area and beyond (see **Section 3.5.5 Water Quality**). Concentrations of

several pollutants in water and sediment within the Trinity River, including the study area, exceed water quality and aquatic wildlife objectives established by the TCEQ and Texas Department of State Health Services (TDSHS). Furthermore, existing concentrations of contaminants (i.e., nitrite plus nitrate, phosphorus, orthophosphorus, fecal coliform bacteria, zinc, chlordane, PCBs, etc.) may be adversely affecting the local aquatic environment.

The most common contaminants in highway runoff are heavy metals, inorganic salts, aromatic hydrocarbons, and suspended solids that accumulate on the road surface as a result of regular highway operation and maintenance activities. Salting and sanding practices may leave concentrations of chloride, sodium, and calcium on the roadway surface. Ordinary operations and the wear and tear of vehicles also result in the dropping of oil, grease, rust, hydrocarbons, rubber particles, and other solid materials on the highway surface. Although leaded gasoline is no longer in use, lead is still being deposited on highway surfaces through atmospheric deposition and sources such as paints used on roadways and railings.

The ability to predict highway runoff quality is limited by the many variables that combine to make each storm event unique. Differences in antecedent dry conditions, rainfall intensity, traffic volume, surrounding land use, highway surface type, and drainage method result in a wide range of concentrations for many of the pollutants observed in runoff.

During construction, receiving water quality may be affected as storm water runoff is transported from exposed construction areas to the receiving environment. During the operation phase of the proposed action, storm water would have elevated concentrations due to the increase in impervious surfaces. Potential impacts on receiving water quality from both the construction and operation phase may include:

1. **Sedimentation and solids suspension:** Direct impacts may include reduction in light penetration (limiting growth of aquatic plants), alteration of geomorphology and in-stream habitat, covering of benthic communities, and reduced visibility for aquatic wildlife. Suspended solids may also be a source of heavy metals and nutrients, which may magnify the effect to the aquatic environment.
2. **Gross litter accumulation:** Litter accumulation is typically unsightly and reduces the aesthetic quality of a waterway. Physically, litter accumulation may impede wildlife movement, or interfere with local drainage (i.e., clogging storm drainages) within the proposed project.
3. **Hydrocarbon and toxicant contamination:** The oxidation of hydrocarbons found in runoff may contribute to the biochemical oxygen demand within a particular water feature. Together with increased nutrient loads, which may facilitate excessive macrophyte/algal growth, the ultimate

effect will be the depletion of dissolved oxygen which could lead to the death of aquatic organisms.

4. **Heavy metal accumulation:** Chemical reduction of heavy metals may contribute to the biochemical oxygen demand in the water column. Absorption of metals by aquatic species may also lead to immediate lethal effects, or sub-lethal effects which may eventually lead to long-term impacts on community health.

Throughout the mid-1980s, the FHWA conducted extensive nationwide studies to determine highway runoff constituents, amount relative to roadway types and traffic conditions, and the potential impacts to surface water resources (Driscoll, Shelley and Strecker, 1990). FHWA's research concluded that pollutants in highway runoff are not present in amounts sufficient to threaten surface or groundwater where ADT volumes are below 30,000.

Table 4-39 lists the FHWA study results for pollution concentrations in highway runoff for highways with ADT volumes less than 30,000 and more than 30,000.

TABLE 4-39. POLLUTANT CONCENTRATIONS IN HIGHWAY RUNOFF

Pollutant	Event Mean Concentration (mg/L) ADT Less Than 30,000	Event Mean Concentration (mg/L) ADT More Than 30,000
Total Suspended Solids	41.0	142.0
Lead	0.080	0.400
Zinc	0.080	0.329
Copper	0.022	0.054

Source: Driscoll, Shelley and Strecker, 1990.
Notes: Event mean concentrations were derived by averaging from several storm events.
mg/L = milligrams per liter (by volume)
ADT = Average Daily Traffic

In order to put the above-noted pollutant concentrations in perspective, the EPA acute toxicity threshold levels for human health are 0.477 mg/L for lead, 0.800 mg/L for zinc, and 0.065 mg/L for copper. The values shown in **Table 4-39** for these constituents are below these levels. Concerning pollutant threshold levels that may cause adverse impacts to aquatic life, the FHWA concluded that:

- Pollutants in runoff for highways with less than 30,000 ADT, and without runoff abatement, would not cause adverse impacts to aquatic life; and
- Pollutants in runoff for highways with more than 30,000 ADT have the potential, without runoff abatement, for adversely affecting aquatic life.

As previously described in **Section 4.4 Transportation Impacts**, the projected traffic volumes for each of the Build Alternatives would exceed 30,000 ADT. Highway runoff abatement measures would be incorporated into all of the detailed study Build Alternatives in accordance with NPDES/TPDES permit

requirements, which require the use of storm water BMPs that would control negative impacts on water quality from this project.

In consideration of the Executive Memorandum on Beneficial Landscaping (FHWA, 1994b), landscaping activities for each Build Alternative may utilize techniques to minimize the adverse effect that landscaping may have on the local environment. In particular, this means employing landscaping practices and technologies that conserve water and prevent pollution. By using effective landscape management practices, appropriate application of pesticides and fertilizers, and runoff reduction practices, potential impacts to water quality would be minimized.

The proposed action would not affect any public water supply, water treatment facilities, or water distribution systems; however, rainfall runoff rates would increase slightly due to the increase in impervious cover. This increased runoff could have adverse impacts over the long term, which would be magnified if the possibility of overland flow is not available and proper control measures are not implemented. To manage the possibility of contamination of surface water due to pollutant runoff, proper control measures would be implemented during construction and operation of the proposed action.

Groundwater Impacts

During the short term, the primary impacts to groundwater are associated with erosion during construction. During this time, the exposed earth and stockpiled materials may be eroded and transported into nearby surface water features, which may have the potential to recharge underground water supplies. Temporary BMPs (see **Section 7.2**) would be used to minimize the potential for such adverse impacts during construction.

Groundwater quality would not be substantially affected by any of the Build Alternatives. Over the long term, the main potential impact to groundwater would come from the continuing runoff of debris and pollutants that accumulate on the road surface and along the right-of-way, or possibly an isolated spill event. An accidental release of hazardous materials could have an adverse impact on the quality of groundwater, especially if such an accident were to occur at a bridge crossing of the Trinity River. Each Build Alternative would involve a crossing of either the Trinity River main stem or one of its associated drainage sumps or tributaries at varying locations. Groundwater is present within alluvial strata primarily associated with the Trinity River terrace deposits throughout the study corridor. These shallow groundwater resources exist in sand and gravel soils that are highly permeable, and therefore, would experience some recharge during storm events. As such, shallow groundwater would be susceptible to constituents of concern from storm water runoff associated with the proposed project. However, aeration, biodegradation, and absorption of contaminants by clay minerals are supported by the soil types and the

expanse of the alluvium in the area. In addition, highway runoff abatement measures would be implemented in accordance with NTTA's MS4 permit and NPDES/TPDES permit requirements.

Deeper aquifers would not be expected to incur substantial impacts as a result of the proposed project. In addition, no public drinking water supply wells are located in the project study area, therefore public health concerns related to any potential groundwater impacts would be negligible.

Continued urban development, along with potential channel modifications within the Dallas Floodway, may slightly alter local groundwater inflows and outflows of the Trinity River. These flow changes should not cause any substantial groundwater quality problems. As previously described in **Section 2.4.6** and **Section 4.9.2.1**, lakes proposed by the City of Dallas in the Dallas Floodway as part of the BVP could provide a source of roadway embankment material for Trinity Parkway Alternatives 3A, 3B, 3C, 4A, 4B, and 5. In the event one of these Build Alternatives is selected, the borrow sites for roadway embankment are proposed as "dry" excavations produced by benching excavated areas into the overbanks of the Dallas Floodway pilot channel in the shapes of the BVP lakes. Areas of sandy material in the Dallas Floodway may be exposed by the borrow excavations, and groundwater may be encountered in these areas. Where such conditions exist, appropriate methods of cutting off under-seepage would be required to protect the integrity of the Dallas Floodway levees. Depending on the nature of the conditions encountered during excavation, these methods may include cutoff walls and impervious membranes or liners in the potential borrow areas. While changes to the existing hydrogeologic regime may occur as a result of these activities, they would not be expected to impact groundwater quality.

Mitigation of Long-Term Impacts

The overall mitigation structure for water quality impacts is a condition of the NPDES/TPDES requirements as well as other local, state, and federal storm water runoff control and management programs. Implementation details for these mitigation measures would be developed and incorporated into project design and operations prior to project start-up. With proper implementation and monitoring of appropriate mitigation measures, short-term (construction-related) and long-term (operation-related) water quality impacts would be avoided or minimized. Detailed information concerning measures to minimize water quality impacts is provided in **Chapter 7 Mitigation Measures and Commitments**.

4.13 FLOODPLAIN IMPACTS

The protection of floodplains and floodways is required by EO 11988 *Floodplain Management* and is implemented by FHWA through 23 CFR 650, Subpart A *Location and Hydraulic Design of Encroachments on Floodplains*. The intent of these regulations is to avoid or minimize highway encroachments within base floodplains where practicable, and to avoid supporting land use development

that is incompatible with floodplain values. To comply with EO 11988, the project must be designed to avoid floodplain impacts where practicable and to adequately mitigate unavoidable impacts (see **Section 4.13.1**).

This section summarizes the impacts of project alternatives on the base floodplain (see also **Section 3.5.6 Floodplains and Flood Control Features**). This includes a description of the encroachments in the base floodplain areas, the potential flood-related risks, impacts to natural and beneficial floodplain values, and the potential for incompatible floodplain development attributable to the proposed action. Since the project includes several route alternatives located within the Dallas Floodway, the section also includes hydraulic modeling results specific to the Dallas Floodway.

Floodplains in the Project Corridor generally comprise the Trinity River main stem located in the Dallas Floodway and Dallas Floodway Extension (DFE), and drainage courses in the surrounding developed areas, typically protected by the Dallas Floodway levees. The hydraulic conditions within the Dallas Floodway are controlled by the USACE, with the City of Dallas having local operations and maintenance authority. The hydraulic conditions within the surrounding developed areas are generally controlled by FEMA through its Flood Insurance program, and the City of Dallas through its municipal authority. For convenience, floodplain impacts in this section are divided into a discussion of impacts on the Trinity River Main Stem and a discussion of the surrounding Developed Areas. This division is made for clarity in comparing impacts to the applicable agency criteria.

In the discussion of flood probabilities, this section refers to the "100-Year Flood" and the "Standard Project Flood" (SPF). A 100-Year Flood is calculated to be the level of flood water expected to be equaled or exceeded at least once in a 100-year period. The 100-year flood is more accurately referred to as the 1% flood, since it is the event which has a 1% chance of being equaled or exceeded in any one year time period. The Standard Project Flood (SPF) is an extreme event, typically used by USACE in the analysis of levee systems. In the area of the Dallas Floodway, the SPF approximates an 800-year event.

This section also refers to the term "Valley Storage." This is the volume of water contained in a reach of a river during a storm event, typically measured in acre-feet. Valley storage is important to flood conditions, since a flood crest moving down a river is attenuated and lowered if the river has room to store floodwater in its "valley" or overbank areas. Conversely, if the valley storage is reduced by encroachments, such as levees or embankments, the flood depths can increase. The effect of valley storage loss is particularly critical in urban areas, since unchecked development and floodplain encroachment in an upstream community can increase flood heights in a downstream community, increasing the flood threat over time.

4.13.1 Corridor Development Certificate (CDC) Process - Trinity River Main Stem

The USACE Fort Worth District prepared the Final Regional Environmental Impact Statement, Trinity River & Tributaries in 1987. This was a study of the Upper Trinity River Basin, with particular emphasis on the Dallas-Fort Worth Metroplex. Among other things, the EIS focused on urban development impacts and valley storage losses in the Trinity River basin upstream of the Dallas Floodway. The study concluded that SPF levels had increased over the years and now threatened to overtop the Dallas Floodway levees. The 1988 USACE Record of Decision (ROD) from the study (see **Appendix E**) developed specific criteria to apply to future projects along the Trinity River main stem and major tributaries (the "ROD Criteria"):

- There should be no rise in the 100-year or SPF elevation for the proposed condition.
- The maximum allowable loss in valley storage capacity for the 100-year discharge is 0%, and for the SPF discharge is 5%.
- Alterations of the floodplain may not create or increase an erosive velocity on or off-site.
- The floodplain may be altered only to the extent permitted by equal conveyance reduction on both sides of the channel.

The Trinity River Corridor Development Certificate (CDC) process was developed by local agencies in the DFW area in response to the ROD criteria (NCTCOG, 2002). This formalizes the review/permitting process for new projects in the affected floodplains to comply with the intent of the 1988 ROD. The CDC process was developed with the coordination of the NCTCOG, and the joint efforts of nine participating cities and three counties along the Trinity River corridor. Under the CDC, each city retains development permit authority within its jurisdiction, but bases its permit decisions on a set of common permit criteria. Local government agencies with development permitting authority within the river corridor are implementing the CDC process. Technical aspects of the CDC process are managed by the USACE - Fort Worth District.

The CDC process ensures that a development's effect, including cumulative impacts, on future flooding is considered in floodplain permitting decisions. Floodplain development can continue, but specific standards ensure that development does not exacerbate flooding. For properties located within the 100-year floodplains of the Trinity River, the Elm Fork, and portions of Lower White Rock Creek and Lower Fivemile Creek (the "*Regulatory Zone"* under the CDC process), the applicant is required to apply for a CDC permit in addition to typical local agency fill permits. The process involves technical review by the USACE, and a CDC permit must be obtained from the local agency prior to approval of a fill permit. For property located within the "*Review Zone,"* which is the area between the 100-year and the SPF flood boundaries (including FEMA Zone X), no CDC permit is required. However, the applicant must apply to

the CDC/Floodplain Administrator(s) (Part I of the CDC application) to inform them of the plans and activities.

The CDC process incorporates common permit criteria developed to ensure a consistent design level of protection and minimal adverse impacts on flooding, upstream or downstream of the project, unless granted a variance. In order to receive a CDC permit, the applicant is required to evaluate and comply with the criteria established for hydraulic impacts (water surface elevations, valley storage capacity, velocities, and conveyance); cumulative impacts (upstream, adjacent, and downstream impacts); and preservation of adjacent project storage (i.e., respect the valley storage provided by adjacent projects by ensuring that their hydraulic connection to the river is maintained). In addition, other permitting and design criteria must also satisfy the requirements of the USACE, FEMA, TCEQ, and any other local criteria for pertinent flood events. (See also **Sections 1.12.4** and **1.12.6** regarding USACE permitting roles under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, and **Section 2.4.6** regarding USACE right to review and approve all construction within the limits of the Dallas Floodway, an existing federal flood protection project.) CDC criteria are very similar to, and often linked with, ROD criteria. The CDC criteria include a requirement that no "significant" rise is allowed in SPF elevations (compared to zero rise in the ROD criteria).

4.13.2 No-Build Alternative

The No-Build Alternative would not encroach on any existing floodplains or regulatory floodways, nor would it have any effect on base flood elevations in the study area.

4.13.3 Build Alternatives - Developed Area Impacts

Potential floodplain impacts on affected streams and other water bodies in the developed areas were evaluated by use of the Flood Insurance Rate Maps (FIRMs) published by FEMA, as well as available engineering studies for city drainage facilities. The developed areas include water courses and drainage facilities typical of an urban development, as well as the pumps, sumps and related facilities particular to the flood protection systems on the landside of the Dallas Floodway levees (see also **Section 3.5.6.2**).

The FEMA designated floodplains in the Project Area are shown on **Plate 3-22**. The FEMA designations within the Project Area are Zone AE (100 Year), Zone AE (Floodway) and Zone X. Zone AE (Floodway) is a defined area of 100-year inundation for the Trinity River main stem, primarily including the Dallas Floodway, but also including sump areas landside of the levees. Zone AE (100-year) is shown in the levee-protected areas and is defined as "Special Flood Hazard Areas Inundated by 100-year Flood - Base Flood Elevations Determined." Zone X, within the Project Area designates "Other Flood Areas,"

including areas of 500-year flood, areas of 100-year flood with average depths of less than 1-foot with drainage areas less than 1 square mile, and areas protected by levees from 100-year flood. Since the Dallas Floodway levees provide in excess of 100-year protection, Zone X represents the area protected by the levees during a 100-year flood.

The potential floodplain impacts for each Build Alternative were calculated based on preliminary plans for the roadways shown in the Plates at the end of **Chapter 2**. Outlines for the various alternatives were transposed onto the FEMA flood zone designation map as shown on **Plates 4-23** through **4-25** at the end of this Chapter. Using this mapping, the areas impacted were calculated for designated Zone X, Zone AE (100-Year), or Zone AE (Floodway.) **Table 4-40** provides the resulting areas of floodplain impact.

TABLE 4-40. POTENTIAL FLOODPLAIN IMPACTS FROM FEMA FLOOD MAPPING

FEMA Flood Zone	**Trinity Parkway Build Alternatives**							
	2A	**2B**	**3A**	**3B**	**3C**	**4A**	**4B**	**5**
Zone X (Levee Protected)	196	264	67	81	82	78	72	104
Zone AE (Floodway) Trinity River Main Stem	27	37	273	256	262	353	386	223
Zone AE (Floodway) Developed Areas	9	23	3	6	7	4	5	17
Zone AE (100-Year) Developed Areas	19	16	27	28	28	27	27	27
Developed Area Floodplain Total	**28**	**39**	**30**	**34**	**35**	**31**	**32**	**44**

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
All quantities shown in acres. Calculated areas are estimates only.

Summarizing the results from **Table 4-40**:

- Zone X (Levee Protected) - This is the total footprint of the roadway alternatives on developed land protected from flooding by the Trinity River levee system. Because the levee already provides in excess of 100-year flood protection in Zone X, there are no additional floodplain impacts in this zone due to the roadway alternative.
- Zone AE (Floodway) Trinity River Main Stem - This is the calculated total footprint of the roadway within the Dallas Floodway. This includes embankments and bridges, plus the areas of re-grading of the adjacent levees. This Zone is described further in **Section 4.13.4**.
- Zone AE (Floodway) Developed Areas - This is the FEMA floodway designation applied to the sumps landside of the Dallas Floodway levees. The impact areas are calculated a full width of the road right of way, resulting in the areas being overstated because sump areas are proposed to be crossed with bridges. All sump crossings will be designed for no loss of water storage volumes in the sumps.
- Zone AE (100-Year) Developed Areas - These are areas landside of the Dallas Floodway levees and generally affected by 100-year inundation from local drainage. If portions of Zone AE (100-Year) actually contribute to sump system storage, they will be subject to no loss of storage volume. Otherwise, the final design will be coordinated with the City of Dallas and FEMA, and

might involve bridges or embankments, plus other drainage improvements needed to maintain a 100-year system.

4.13.4 Build Alternatives - Trinity River Main Stem Impacts

Build Alternatives 3A, 3B, 3C, 4A, and 4B are located within the Dallas Floodway and potentially impact hydraulic conditions on the Trinity River Main Stem. Hydraulic impacts for each of these alternatives were assessed based on criteria in the USACE 1988 Trinity River Regional EIS ROD. The alternatives were evaluated for hydraulic and hydrologic impacts within, upstream of, and downstream of the Dallas Floodway. The analysis was performed using the USACE's Hydrologic Engineering Center - River Analysis System (HEC-RAS) program, a computer program in wide use in hydraulic modeling applications.

Existing Conditions

The ROD criteria basically require a comparison of existing flood event conditions along a stretch of the river to the proposed conditions if a particular project is built. The existing conditions hydraulic model used for this analysis has been developed from an available model used by the USACE Fort Worth District in its ongoing Trinity River studies. The model originated from the stream hydraulics model developed by USACE for implementation of the Trinity River Corridor Development Certificate (CDC) process as a part of the Upper Trinity River Feasibility Study. This particular model utilizes flood discharges that reflect future (year 2040) land uses in the 6,100 square mile Upper Trinity River Basin, and is therefore believed to be conservative with respect to flows and computed flood depths.

The USACE model has been adjusted to reflect current conditions within the Dallas Floodway, including pilot channel improvements near the IH-35E bridge performed by the City of Dallas around 2004. In the reach downstream of the existing Dallas Floodway, the model has been adjusted to include the proposed USACE DFE project (see **Section 3.5.6.4**) in its entirety. The DFE is a federally approved project, and is therefore assumed to be in place as a starting point to hydraulic modeling of the proposed Trinity Parkway. This inclusion also follows the general project assumptions outlined in **Section 1.11.3**.

The above combination of assumptions was used to create the "Existing Conditions" model for this analysis. Summary tables and other output from the existing conditions model are provided in **Appendix F**.

Proposed Conditions

The Existing Conditions model described above has been used to build five proposed conditions models reflecting the addition of proposed roadways, bridges and embankments from Trinity Parkway

Alternatives 3A, 3B, 3C, 4A, and 4B, all of which are proposed to occupy land within the Dallas Floodway levees. The assumed geometry of these features is based on the conceptual alignments provided in the Plates at the end of **Chapter 2**. In addition, excavation (or "borrow") areas are incorporated into the model to provide a source for the required embankment fill material for the roadways. These borrow sites also offset the hydraulic encroachments and valley storage losses introduced by the embankments.

The assumed borrow sites in the proposed conditions models are shown on **Plate 4-26**. These sites are consistent with the conceptual layout of lakes in the City of Dallas (2003a) Balanced Vision Plan (BVP). For the Trinity Parkway models, these sites are assumed to be "dry" excavations, produced by benching excavated areas into the overbanks of the Dallas Floodway pilot channel in the shapes of the BVP lakes, but without additional construction needed to fill the lakes with water (see also **Section 2.4.8**).

The models are intended to produce a sustainable end-point condition, which meets the USACE ROD criteria and can exist in the floodplain indefinitely in the event the cities' BVP is cancelled or delayed. Nevertheless, the city does not anticipate delay in implementation of the BVP, and the layout of borrow sites is compatible with separate environmental clearance permitting and construction of the BVP improvements, including lake impoundments, pilot channel meanders and other features.

Results

Results for the 100-year flood are summarized below in **Table 4-40A**, and for the SPF in **Table 4-40B**. Both tables compare existing conditions to proposed conditions, and include an assessment of whether the results meet the ROD criteria (see **Section 4.13.1**). The tables provide a maximum water surface elevation increase in the Dallas Floodway (wherever it occurs for each alternative) as well as the water surface elevation at the Elm Fork/West Fork confluence at the upper end of the Dallas Floodway. The "Within Project Area" valley storage calculations are based on the total Trinity River flood volume in the reach starting approximately 900 ft. downstream of Martin Luther King, Jr. Blvd. and ending at the Elm Fork/West Fork confluence. The "Total Including Upstream Reaches" valley storage includes additional volumes along the Elm Fork and West Fork reaches, calculated up to a point where differences in water surface elevations between existing conditions and the Build Alternatives returned to zero for more than one cross-section on each of the reaches.

TABLE 4-40A. SUMMARY OF 100-YEAR HYDRAULIC CHARACTERISTICS

Hydraulic Characteristic	Existing Conditions	Trinity Parkway Build Alternatives (located in Floodway)				
		Alt 3A	Alt 3B	Alt 3C	Alt 4A	Alt 4B
Flood Elevations						
Maximum Increase	n/a	0.18 feet	0.14 ft	0.41 ft	0.31 ft	1.2 ft
Meets ROD Criteria? (No Rise)		No	No	No	No	No
Change at Elm/West Fork Confluence	423.41 feet	-0.31 ft	-0.18 ft	-0.14 ft	-0.05 ft	0.5 ft
Meets ROD Criteria? (No Rise)		Yes	Yes	Yes	Yes	No
Valley Storage						
Within Project Study Area	41,758 ac-ft	0.7% loss	0.7% gain	2.0% gain	0.7% gain	2.4% gain
Meets ROD Criteria?		No	Yes	Yes	Yes	Yes
Total Including Upstream Reaches	Varies*	2.2% loss	0.1% loss	2.1% gain	0.5% gain	5.7% Gain
Meets ROD Criteria? (0% Loss)		No	No	Yes	Yes	Yes
Maximum Velocity						
Channel	8.22 ft/sec	8.22 ft/sec	8.33 ft/sec	8.07 ft/sec	8.22 ft/sec	8.21 ft/sec
Meets ROD Criteria?		Yes	Yes	Yes	Yes	Yes
Overbank	3.24 ft/sec	3.77 ft/sec	3.38 ft/sec	3.53 ft/sec	3.39 ft/sec	3.38 ft/sec
Meets ROD Criteria?		Yes	Yes	Yes	Yes	Yes

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
ft/sec = river flow velocity in feet per second; n/a = not applicable; ac-ft = acre feet (a volume measurement).
* the "Valley Storage - Total Including Upstream Reaches" varies for existing conditions because the distance upstream to the point of zero rise is different for each alternative.
See **Section 4.13.1** for ROD criteria.

TABLE 4-40B. SUMMARY OF SPF HYDRAULIC CHARACTERISTICS

1988 ROD Criteria	Existing Conditions	Trinity Parkway Build Alternatives (located in Floodway)				
		Alt 3A	Alt 3B	Alt 3C	Alt 4A	Alt 4B
Flood Elevations						
Maximum Increase	n/a	0.05 ft	0.09 ft	0.03 ft	0.19 ft	0.71 ft
Meets ROD Criteria?		Negligible Rise	Negligible Rise	Negligible Rise	No	No
Change at Elm/West Fork Confluence	435.56 ft	-0.51 ft	-0.25 ft	-0.16 ft	-0.08 ft	0.45 ft
Meets ROD Criteria?		Yes	Yes	Yes	Yes	No
Valley Storage						
Within Project Study Area	71,547.5 ac-ft	2.1% loss	0.5% loss	0.0%	0.1% gain	0.7% loss
Meets ROD Criteria?		Yes	Yes	Yes	Yes	Yes
Total Including Upstream Reaches	Varies*	5.8% loss	2.1% loss	0.3% gain	0.4% loss	3.8% Gain
Meets ROD Criteria? (<5% Loss)		No	Yes	Yes	Yes	Yes
Maximum Velocity						
Channel	10.78 ft/sec	10.6 ft/sec	10.6 ft/sec	11.23 ft/sec	11.12 ft/sec	11.26 ft/sec
Meets ROD Criteria?		Yes	Yes	Yes	Yes	Yes
Overbank	4.56 ft/sec	5.37 ft/sec	4.89 ft/sec	5.11 ft/sec	4.63 ft/sec	4.8 ft/sec
Meets ROD Criteria?		Yes	Yes	Yes	Yes	Yes

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
ft/sec = river flow velocity in feet per second; n/a = not applicable; ac-ft = acre feet (a volume measurement).
* the "Valley Storage - Total Including Upstream Reaches" varies for existing conditions because the distance upstream to the point of zero rise is different for each alternative.
See **Section 4.13.1** for ROD criteria.

Summary tables from the hydraulic model output are provided in **Appendix F**. Model output for each Dallas Floodway Build Alternative is shown graphically on **Plates 4-27** through **4-31**. For each Build Alternative, the surface water elevations for the 100-year and SPF floods are plotted and compared to hydraulic modeling results for existing conditions.

Note the majority of SPF valley storage losses presented in the tables above is not due to encroachment, since the Trinity Parkway embankments are offset by the borrow sites in the Dallas Floodway. Rather, the reported loss of valley storage is largely due to the computed drop in water surface between existing and proposed conditions. In concept, if the Dallas Floodway stores 71,547.5 acre-feet at the existing conditions SPF levels (see **Table 4-40B**), the computed storage for the proposed conditions SPF is reduced if the computed water surfaces are lower on average than existing. (The Dallas Floodway is

holding less water.) The USACE HEC-RAS computer program has been utilized for comparing existing conditions storages to the Build Alternative storages, and calculating the percentage changes in the table. The methodology used for determining impacts to valley storage and supporting calculations is in **Appendix F**.

Discussion of Results

The ROD criteria for the 100-Year and SPF water surface elevations and valley storage preservation effectively requires four primary targets for the hydraulic modeling to be met in addition to considerations for erosive flow velocity. It is challenging to design a project that impacts such a large project reach to meet all four of these primary hydraulic criteria with each design alternative at every point along the project reach as well as offsite. The results presented above reflect concerted efforts to design each Trinity Parkway alternative located in the Dallas Floodway to meet the ROD hydraulic criteria. As shown in the tables, none of the alternatives meet the ROD criteria on every point. However, Alternative 3C meets each point of the criteria except for a maximum rise of 0.03 feet for the SPF event and 0.41 feet for the 100-year event. The maximum water surface rise for the SPF event of 0.03 feet has been regarded as insignificant with consideration for the magnitude and location of the rise. The maximum water surface rise for the 100-year event is higher at 0.41 feet, but because of the location of this rise within the Dallas Floodway levees, there would be no increased risk of flood damage to existing structures. The 100-year water surface rise of 0.41 feet for Alternative 3C is located within the Dallas Floodway levees and no rise occurs beyond the limits of the Dallas Floodway levees both upstream and downstream of the project. All modeled alternatives except for Alternative 4B produce a lowering of the SPF water surface elevation at the Elm Fork/West Fork Confluence and no rise occurs upstream of that point, which results in a valley storage loss offsite. This loss is calculated and combined with the onsite valley storage change to produce the total valley storage change and is expressed as a percent change (% loss or gain) compared with the pre-project onsite valley storage.

In the event one of these alternatives is selected for further development, any increased 100-year flood levels would be accounted for during the Trinity Parkway's design phase by adjusting the design crest of the floodwall protecting the roadway by a few inches to account for the rise. Additionally, the design team would to the extent possible, modify the hydraulic characteristics of the selected alternative in future design phases, with a goal of reducing or eliminating 100-year flood rises. This effort would be expected to include consideration of several possible measures designed to improve 100-year flood conveyance, such as reshaping of cut and fill areas, modifications to remove/reduce specific flow obstructions, modifications to vegetated areas to reduce hydraulic roughness, or other similar measures. Such possible changes would be analyzed both for 100-year and SPF ROD criteria compliance.

The tables show that Alternative 3A and 3B do not meet the ROD criteria due to a total valley storage loss. The other alternatives result in a total valley storage gain. Generally valley storage losses due to the project produce negative downstream flooding impacts by slightly increasing the computed peak flow and the downstream flooding risk. Valley storage gains will generally produce the opposite effect. It is for this reason that the ROD criteria limits the valley storage to no loss for the 100-year and minimal losses for the SPF flood events.

Tables 4-40A and **4-40B** show small changes in velocity at some locations for floodwaters traveling through the Dallas Floodway. The results indicate that erosion protection needs are minor, and would most likely be limited to transitions at bridges and excavation areas. A detailed comparison of channel velocities for the applicable Build Alternatives is provided in **Appendix F**. The maximum channel flow velocities shown in the tables for both the 100-year and SPF events would generally be considered erosive flow velocities for average soils. However, these flow velocities are typical of channel flow velocities for high flow events for both existing and proposed conditions. The alternatives have been regarded as meeting the ROD criteria based on very small increases in the channel flow velocity. Some localized erosion within the channel would be expected for such rare events and would not represent an increased risk to the safety of the levee system or significant maintenance concern over the life of the project.

The results of the hydraulic modeling for Alternatives 3A, 3B, 3C, 4A and 4B are presented for comparison. Alternatives 3B and 3C are the only alternatives that effectively meet the ROD criteria for the SPF event. Each of these two alternatives result in a negligible rise within the Dallas Floodway for the SPF event. These SPF water surface rises have been regarded as negligible with consideration for the location and the localized nature of the rises, as well as the potential for reducing or eliminating the rises if one of these alternatives is selected for more detailed design.

4.13.5 Flooding Risk

Developed Areas

As stated in the introduction to this Section, the term “developed areas” is used to describe the levee protected areas surrounding the Dallas Floodway in the Project Area. Based on the FEMA mapping, this is predominantly Zone X (levee protected) with scattered areas of Zone AE (Floodway) in drainage sumps, and Zone AE (100-year) in areas subject to local flooding. Based on NTTA usual design standards, the proposed roadway would be designed to be protected from the 100-year storm event. The Zone X levee protected area exceeds 100-year event protection. Therefore the roadway would not require additional elevation or other special treatment to protect it in Zone X. Zones AE (Floodway) and AE (100-Year) would require specific measures to protect the roadway from base flooding.

Zone AE (Floodway) comprises the drainage sumps in the developed areas. Avoidance of flooding impacts is proposed by bridging over these sumps. Any potential impacts to storage (such as displacements by columns or abutments) would be offset by providing additional excavated areas to ensure no net loss of flood water storage capacity. Zone AE (100-year) in the developed areas comprises minor areas of local ponding from rainfall events. These areas would either be bridged over or filled by embankments to assure 100-year flood protection.

In accordance with 23 CFR 650 Subpart A, bridge structures would be designed to avoid the base floodplain, where practicable. As currently proposed, in developed areas, bridge structures would be supported with concrete piers and the decks elevated above 100-year flood levels to avoid interference with flood flows. Using this design approach, the proposed structures would have no substantial effect on the base floodwater surface elevation, and there would be a low risk of water overtopping the roadway or causing additional damage to adjacent property. Since the proposed structures would displace only a small portion of Zone AE, the encroachment into the floodplain is considered minimal. In the event, the final design requires any substantial encroachment of base flood zones, detailed analysis and design would be required in compliance with FEMA guidelines, local regulations, and directives from 23 CFR 650 Subpart A. Analysis of the preliminary project designs for each of the Build Alternatives and recommended mitigation measures indicates this project would not constitute a significant encroachment into the base floodplain in developed areas (outside of the Floodway) and does not create a significant risk as defined by 23 CFR 650 Subpart A.

Trinity River Main Stem Areas

Along the Trinity River Main Stem within the Dallas Floodway, Zone AE (Floodway) has a base floodplain elevation ranging from approximately 414 feet near MLK Blvd. to approximately 423 feet at the Elm Fork/West Fork Confluence. The profile grade of each alignment and the proposed floodwalls associated with Alternatives 3A, 3B, 3C, 4A and 4B (see **Section 2.4.7**) would be constructed at or above base (100-year) floodwater elevations. There would be a low risk of floodwaters overtopping the roadway/floodwalls or causing damage to adjacent property at these locations, and no substantial effect on the base flood water surface elevation. In accordance with 23 CFR 650 Subpart A, the design of encroachments would be consistent with standards established by FEMA, state, and local governmental agencies for the administration of the National Flood Insurance Program (NFIP).

Bridge structures within the Dallas Floodway would typically be placed with their top deck elevations about 2-feet above the 100-year water surface. This is required to reduce longitudinal blockage of river flow under SPF conditions, where the road would be inundated. It is preferred to keep the bridges around the same elevation as the usual roadway surface to not present additional obstruction to SPF flows. This positioning of the bridges requires the superstructures to be partially submerged by the 100-year flood.

However, there are two crossings of the Dallas Floodway (levee to levee) required in Alternatives 4A, 4B and 5. These long bridges would be elevated above the SPF to prevent blockage of flows. USACE Pamphlet SWFP 1150-2-1 (see **Appendix E**) would apply to all construction within the Dallas Floodway, including bridge structures.

None of the Trinity Parkway's Dallas Floodway Build Alternatives constitute a substantial risk of increased flooding since any adverse impacts associated with the probability of flooding are mitigated through compensating hydraulic design. However, as shown in **Table 4-40**, the Floodway Build Alternatives (3A, 3B, 3C, 4A, 4B and 5) include encroachments into "Zone AE (Floodway) Trinity River Main Stem" in the 200 to 400 acre range.

4.13.6 Incompatible Floodplain Encroachment

Highway projects can impact floodplains indirectly by facilitating or inducing development in floodplains. FHWA guidance on floodplain encroachment includes a requirement to determine whether a proposed action is compatible with "a community's floodplain development plan" (see FHWA, 1987, paragraph 14). In the project corridor, the applicable community development plans for the City of Dallas are the *Trinity River Corridor MIP/BVP* and the ongoing *Trinity River Corridor Comprehensive Land Use Plan* (see **Section 3.1.1.1**), which are both subject to the CDC process (City of Dallas, 1999a, 2002a, and 2003).

The Project has no potential to attract development into the Dallas Floodway (other than the BVP proposed parks) because of municipal ownership and strict federal oversight and prohibition. In the developed areas, there is limited potential to attract development into floodplains because of the city control over sump areas. The Project Area sump and pump station systems are considered undersized, and are to be improved as part of the $1.35 billion City of Dallas bond program passed by Dallas citizens on Nov 7, 2006. Bond Proposition No. 2 is for the issuance of $334,315,000 general obligation bonds for flood protection and storm drainage facilities. This amount includes funding for "various areas experiencing flooding in March 2006 and March 2004" including Stemmons Corridor (Dallas East Bank Watershed), West Dallas (Dallas West Bank Watershed), and Mill Creek (Dallas Warren Watershed.) In regard to the East and West Bank watersheds, the funding is understood to be focused on increases in pumping capacity, since it is unlikely that sump storage capacity could be substantially improved due to the level of development of the land in the area. In this light, it is unlikely that development would be permitted by the city to encroach onto the sump areas because such encroachments would endanger the flood protection for the City, possibly resulting in loss of levee certification such that structures within the 100-year inundation limits would be required to purchase flood insurance.

4.13.7 Impacts on Floodplain Values

For any of the Build Alternatives, within the Dallas Floodway (Alternatives 3A, 3B, 3C, 4A, 4B, and 5) there would be some impacts to natural and beneficial floodplain values. Natural and beneficial floodplain values include, but are not limited to fish, wildlife, plants, open space, natural beauty, scientific study, outdoor recreation, agriculture, aquaculture, forestry, natural moderation of floods, water quality maintenance, and groundwater recharge. Many of the natural values of the floodplain have been altered by the creation of the Dallas Floodway levee system and the regular operation and maintenance of the system. There would be temporary adverse impact to the taking of wetlands, but this would be mitigated by the establishment of new wetlands (see **Section 4.8**).

The wetland areas proposed to be taken by this project are not considered candidate wetlands for scientific study. The greatest potential is in the study of wetland creation techniques, which could be developed as part of the mitigation plan for this project. There would be some impacts on floodplain values related to wildlife movement, open space loss, and outdoor recreation potential (see **Section 4.9**).

The project would have a temporary adverse impact on water quality since erosion and sedimentation always accompany construction projects of this magnitude. However, erosion and sedimentation should be effectively minimized through the use of both temporary and permanent BMPs (see **Section 4.12**).

4.13.8 Significant Floodplain Encroachment

Federal regulations require that a finding of no “practicable alternative” be prepared for projects that result in a significant floodplain encroachment (23 CFR Subpart 650A). This finding is applicable if one of the Trinity Parkway Alternatives 3A, 3B, 3C, 4A, and 4B is selected, since these alternatives occupy floodplain land within the Dallas Floodway.

EO 11988 states “if an agency has determined to, or proposes to, conduct, support, or allow an action to be located in a floodplain, the agency shall consider alternatives to avoid adverse impacts and incompatible development in the floodplains. If the head of the agency finds that the only practicable alternative consistent with the law and with the policy set forth in this Order requires siting in a floodplain, the agency shall, prior to taking action, (i) design or modify its action in order to minimize potential harm to or within the floodplain, consistent with regulations issued in accord with Section 2(d) of this Order, and (ii) prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain.”

FHWA's regulations at 23 CFR Subpart 650A implement EO 11988 by establishing policies and procedures that govern the location and hydraulic design of roads within floodplains. These regulations require that if a Build Alternative is recommended that substantially affects the base floodplain (including Alternatives 3A, 3B, 3C, 4A, or 4B), an "Only Practicable Alternative Finding", and supporting rationale, would be required in the FEIS (see 23 CFR § 650.113).

4.13.9 FEMA Coordination Related to Floodplain Modification(s)

If a Build Alternative is selected which involves modification of floodplains, the project would need to be coordinated through FEMA prior to construction. The FEMA process would be expected to be started with preparation and submittal of a Conditional Letter of Map Revision (CLOMR) to the City of Dallas and FEMA. For the proposed Trinity Parkway project, the CLOMR preparation could begin once a preferred alternative has been identified (assuming this is a Build Alternative), which would occur in the FEIS after comments of government agencies and the public on the SDEIS have been considered by the project sponsors. The CLOMR submittal process would consist of the following steps:

- Contact FEMA to obtain or confirm the current effective floodplain and floodway model for the Trinity River in the area of the project.
- Create revised existing condition model(s) from the above models (as appropriate) by adding additional cross-sections and updating existing cross-sections based on new topography, and updated bridge information.
- Create proposed condition model(s) based on the preferred alternative.
- Prepare a report with exhibits, tables, required FEMA forms, and supporting model(s).
- Notify affected property owners, if necessary.
- Submit a CLOMR application report to City of Dallas for review and approval.
- Submit the CLOMR application to FEMA after City of Dallas approval.
- Coordinate with FEMA during the review process.

It should be noted that current effective models from FEMA are based on existing (1991) land use conditions, while the models which support the hydraulic results in the SDEIS are based on future (2050) land use conditions. Furthermore, the future conditions model may have a greater level of detail (especially at bridges) than that of the current effective FEMA models, and may include modeling enhancements by the USACE that have not been submitted to FEMA for review and approval. Therefore, these details may have to be incorporated into the FEMA existing condition models at the time the CLOMR submittal is prepared. Other projects in the area that are underway or recently completed at the time of CLOMR submittal, and have been submitted independently to FEMA for CLOMR or LOMR approval, would also need to be included.

Successful permitting of the project through approval of the CLOMR by FEMA would be required before project construction could begin. After construction, a final Letter of Map Revision (LOMR) would be submitted to the City of Dallas and FEMA, including details of as-built conditions of the completed work. An approved LOMR would evidence FEMA's acceptance of the project and would result in FEMA Flood Hazard Mapping reflecting the floodplain modifications made by the project.

4.14 AIR QUALITY IMPACTS

Section 3.6 in **Chapter 3 Affected Environment** provided details concerning air quality regulatory requirements (see **Section 3.6.1**); the 1990 CAAA conformity requirements (see **Section 3.6.2**); local meteorology and topography (see **Section 3.6.3**); and existing project area air quality, including transportation-related pollutants and attainment status (see **Section 3.6.4**).

As previously described in **Section 3.6.1**, six pollutants are of primary concern with regards to air quality in urban areas, including CO, NO_2, O_3, particulate matter ($PM_{2.5}$ and PM_{10}), SO_2, and Pb. The EPA establishes National Ambient Air Quality Standards (NAAQS) (see **Table 3-30**) for these identified air pollutants that represent exposure levels where potential threats to human health occur. Currently, the DFW area (Collin, Dallas, Denton, Tarrant, Ellis, Johnson, Kaufman, Parker, and Rockwall counties) is in non-attainment only for O_3 (ozone).

4.14.1 Air Quality Conformity Statement

The proposed North Central Texas project is located in Dallas County, which is part of the EPA-designated nine-county non-attainment area for the 8-hour standard for the pollutant ozone; therefore, the transportation conformity rule applies. The proposed project design concept and scope and project cost are not yet consistent with the conforming Metropolitan Transportation Plan (*Mobility 2030: The Metropolitan Transportation Plan (MTP) for the Dallas-Fort Worth Area*) (NCTCOG, 2007a) and the *2008-2011 TIP*, as revised (NCTCOG, 2007g), as proposed by the NCTCOG. Measures are being taken to address the issue. Prior to FHWA taking final action on this proposed project, it will be consistent with a conforming MTP and TIP/STIP. The U.S. Department of Transportation (FHWA/FTA) found the current MTP to conform to the State Implementation Plan (SIP) on June 12, 2007 (TCEQ, 2007d) and the *2008-2011 TIP* was found to conform on October 31, 2007 (TxDOT, 2007a). All projects in the NCTCOG's TIP that are proposed for federal or state funds were initiated in a manner consistent with federal guidelines in Section 450, of Title 23 CFR and Section 613.200, Subpart B, of Title 49 CFR. Energy, environment, air quality, cost and mobility considerations are addressed in the programming of the TIP. The appropriate MTP and Statewide TIP pages are located in **Appendix L-7**.

The Congestion Management Process (CMP) is a systematic process for managing congestion that provides information on transportation system performance and on alternative strategies for alleviating congestion and enhancing the mobility of persons and goods to levels that meet state and local needs. The project was developed from NCTCOG's operational CMP which meets all requirements of amended 23 U.S.C. 134(k)(3) and 49 U.S.C. 5303(k)(3), amendments incorporating the transportation planning requirements of SAFETEA-LU (see **Section 1.10.3** and **Table 1-9** for a description of CMP operational improvement projects within the study area). Additionally, the project comes from an operational CMP that meets all requirements of 23 C.F.R. Highways, Parts 450 and 500.

4.14.2 No-Build Alternative

The No-Build Alternative would not manage congestion on IH-35E, IH-30, or other study area roadways. In fact, it would lead to increased congestion and decreased mobility (see **Tables 4-14** and **4-15**). As a result, the No-Build Alternative would not be consistent with the conforming TIP/MTP (*Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*) for the region. Implementation of the No Build Alternative would require a revision of the TIP and MTP and a new conformity determination.

4.14.3 Build Alternatives

The analysis presented here for the proposed Build Alternatives is subject to change pending the 2009 update to the MTP. The design year traffic (2030) for each of the proposed Build Alternatives does not exceed 140,000 vehicles per day. Therefore, in accordance with *TxDOT Air Quality Guidelines* (TxDOT, 2006a), a Traffic Air Quality Analysis (TAQA) to assess the impacts of the proposed action on air quality is not required because previous analyses of similar projects did not result in a violation of NAAQS. The traffic volumes developed for the proposed Build Alternatives are presented in **Section 4.4.1** and **Table 4-14**. Although not required according to TxDOT guidelines, the public and resource agencies have expressed concern regarding potential air quality impacts resulting from the project; therefore, a TAQA was conducted to demonstrate that CO concentrations would not exceed the NAAQS under any of the Build Alternatives in 2025 or 2030. The following sections document the methodology followed and the results of the TAQA for each of the Build Alternatives.

4.14.3.1 Analysis Methodology

The TAQA for the proposed project was prepared in accordance with TxDOT's *2006 Air Quality Guidelines*. The TAQA was conducted for CO concentrations using the EPA-approved MOBILE6/CAL3QHC computer programs for the Estimated Time of Completion year 2025, when the ultimate six main lane

configuration is proposed to be in-place (see **Section 2.5.4 Staged Construction**), and the design year 2030. CAL3QHC is a line-source dispersion model specifically designed for the prediction of pollutant concentrations in the vicinity of highways. Additional details concerning the MOBILE6 and CAL3QHC models are described in this section of the SDEIS.

Appropriate vehicle emission values from MOBILE6 for the years 2025 and 2030 were input into CAL3QHC. MOBILE6 input factors (to simulate the driving fleet characteristics for the region) include parameters for tampering rates, vehicle speeds, vehicle registration by vehicle type and age, percentage of vehicles in cold start mode, atmospheric temperature, humidity, and type of vehicle inspection/maintenance program. Projected CO concentrations were then calculated using a *worst-case analysis* for each alternative for receivers located at the proposed right-of-way boundaries. The variables used in the analysis involved generally worst-case assumptions regarding meteorological conditions, vehicle fleet operating characteristics, traffic, and local terrain.

MOBILE6 Model

The EPA's highway vehicle emission factor model, MOBILE, is a FORTRAN program that provides average in-use fleet emission factors for three criteria pollutants (VOC, CO, and NOx) for each of eight categories of vehicles. These emission factors can be provided for any calendar year between 1952 and 2050 and under various conditions affecting in-use emission levels (e.g., ambient temperatures, humidity, average traffic speeds, and gasoline volatility).

The output from the model is in the form of emission factors expressed as grams of pollutant per vehicle mile traveled (g/mi). Because newer cars with better pollution-control devices are replacing older cars, the vehicle mean exhaust emission factors usually decrease faster than the traffic volumes increase each year. The Air Quality Analysis Section of the TxDOT Environmental Affairs Division (TxDOT-ENV) in Austin, Texas, provided the MOBILE6 city-specific emission factors for the Dallas area used in this study.

MOBILE6 Inputs and Outputs

MOBILE6 default values for the DFW area operating mode (percent cold and hot starts) and percent of diesel vehicles were used. Since vehicle exhaust emissions are higher during colder months, average ambient temperatures of 34.0° F (low) and 54.1° F (high) were assumed. The Estimated Time of Completion year 2025 and year 2030 were input into the model to calculate the exhaust emission factors.

Emission Factors. Emission factors for vehicular traffic are derived using the MOBILE6 output and projected peak-hour traffic and vehicle categories. While heavy-duty vehicles 8,501 pounds and higher gross vehicle weight (GVW) may be prohibited from using the Trinity Parkway, this study included all eight vehicular categories to calculate the average in-use emission factors. With respect to CO, the use of toll

booths can result in the formation of localized pockets or "hot spots" of increased CO levels. Although, the NTTA plans to eliminate the use of toll plazas and implement an electronic toll collection method along all future NTTA facilities (see **Section 2.5.2**), including the Trinity Parkway, the TAQA considered the use of toll plazas to provide a "worst-case" analysis. The composite emission factors used for the roadway segments analyzed are:

Roadway Segment	Emissions (g/mi)	
	Year 2025	**Year 2030**
Mainlane Toll Plaza (All Build Alternatives)		
-Lanes 1-4 (Change Made, Exact Change)	17.283	17.106
-Lanes 5-6 (Toll Tag)	5.539	5.488
Mainlane Segments	5.539	5.488
Other Roadway Segments		
-Irving/Industrial Boulevard (Alternative 2A)	4.124	4.082
-Frontage/Access Roads (Alternative 2B)	4.124	4.082

CAL3QHC Model (Version 3.1.1)

The CAL3QHC model is listed in 40 CFR Part 51 Appendix W, *Guidelines on Air Quality Models (guidance)* as an appropriate model. CAL3QHC can predict CO or other inert pollutant concentrations from both moving and idling vehicles. The model is based on the Gaussian diffusion equation and employs a mixing zone concept to characterize the pollutant dispersion over the roadway.

CAL3QHC Inputs

Meteorology. The regulatory default values for the following parameters were used:

Wind Speed: 1 meter/second

Wind Angle: "Worst-Case" wind direction angle (variable at 10-degree increments)

Stability Class: D for an urban area

Mixing Height: 1,000 meters

Emission Factors. The composite emission factors derived from the MOBILE6 program were input.

Roadway and Receptor Parameters. The geometrics of the proposed roadways were derived from preliminary design schematics developed by the project study team. Based on the projected traffic volumes and peak-hour congestion levels, receptor points were placed near the proposed mainlane toll locations for each Build Alternative. Receptor points were also placed along the proposed right-of-way boundaries in increments of approximately 50 meters (164 feet).

Receptor heights were input at 6.0 to 38.0 feet above ground surface. Receptor heights at 38.0 feet represent points along the proposed right-of-way 6.0 feet above the top of the existing Dallas Floodway levees for Alternatives 3A, 3B, 3C, 4A, 4B, and 5. All other receptor heights were input at 6.0 feet (i.e., Alternatives 2A and 2B). For each alternative, the receptor with the highest CO concentration is reported.

Source heights were input depending on roadway type (e.g., at-grade, bridge, or elevated on fill) for each alternative. Source heights for Alternative 2A were input at 30.0 feet above ground. Source heights for Irving/Industrial Boulevard (located beneath Alternative 2A) were input at 0.0 feet above ground. Source heights for Alternative 2B, including adjacent frontage/access roads, ranged from 0.0 feet to 20.0 feet above ground. Source heights for Alternatives 3A, 4A, 4B, and 5 were input at 22.0 feet above ground. Source heights for Alternatives 3B and 3C ranged from 26.9 to 32.8 feet above ground.

Other Site Variables. A surface roughness factor (Z_0) of 1.0 meter was input. The settling velocity (V_s) and deposition velocity (V_d) were each set at zero because CO is a gaseous emission. All projected CO concentrations are based upon an averaging time of 60 minutes.

Background Concentrations. Background concentration (or ambient level) is a summation of all CO concentrations that are from other than project mobile sources. Included are natural sources, point sources, non-project mobile sources, residential and industrial heating, and other industrial emissions. The background concentration is intended to represent a conservative constant that is used homogeneously throughout the project area. It is then added to the predicted values to be compared to the NAAQS for a more accurate picture of the project's effect on the area. Model calculations included TxDOT's recommended background CO concentrations of 3.7 ppm for the 1-hour average and 2.3 ppm for the 8-hour average for the years 2025 and 2030.

Traffic Parameters. Morning and evening traffic volumes for the years 2025 and 2030 were obtained from the traffic study conducted by the NCTCOG (see **Section 4.4**). Peak-hour traffic volumes were projected for roadways within the study area, including the proposed action. The worst-case traffic volumes (p.m. peak-hour) input for each Build Alternative are:

	Year 2025		**Year 2030**	
Location	**Northbound**	**Southbound**	**Northbound**	**Southbound**
Alternative 2A	4,625	5,724	5,048	6,463
Irving Blvd	1,800	1,800	1,947	1,947
Alternative 2B	4,625	5,724	5,048	6,463
Frontage Roads	1,800	1,800	1,947	1,947
Alternative 3A	5,172	6,408	5,652	7,344
Alternatives 3B, 3C	6,042	5,356	6,986	6,352
Alternatives 4A, 4B, and 5	4,967	6,143	5,362	6,968

Conversion from the 1-Hour Standard to the 8-Hour Standard. The NAAQS 1-hour CO standard is 35 ppm and the 8-hour standard is 9 ppm. The conversion from the 1-hour to 8-hour standard is accomplished using the following mathematical formula:

$$CO_8 = (CO_1 - BG_1)\ PF + BG_8$$

where

CO_8 = 8-hour CO concentration

CO_1 = 1-hour CO concentration

BG_1 = 1-hour background CO concentration

PF = 0.60 (meteorological persistence) x 0.67 (8-hour traffic factor) = 0.4

BG_8 = 8-hour background CO concentration

Once the 1-hour and 8-hour CO concentrations are calculated, the results are converted to a percentage of the 1-hour and 8-hour CO NAAQS, respectively (TxDOT, 2006a).

4.14.3.2 Micro-Scale Carbon Monoxide Analysis

The projected 2025 concentrations for 1-hour and 8-hour CO and percentage of the NAAQS for each Build Alternative are presented in **Table 4-41A**.

TABLE 4-41A. PROJECTED CO CONCENTRATIONS - YEAR 2025

Build Alternative	1-Hour CO (ppm)	Percent of NAAQS (1-Hour)	8-Hour CO (ppm)	Percent of NAAQS (8-Hour)
2A	10.2	29.1	4.9	54.4
2B	8.8	25.1	4.3	48.2
3A	9.6	27.4	4.7	51.8
3B	9.4	26.9	4.6	50.9
3C	9.4	26.9	4.6	50.9
4A	9.2	26.3	4.5	50.0
4B	9.2	26.3	4.5	50.0
5	9.2	26.3	4.5	50.0

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
The receptor with the highest CO concentration is reported for each Build Alternative.
CO 1-hour concentrations include an ambient background level of 3.7 ppm.
CO 8-hour concentrations include an ambient background level of 2.3 ppm.
ppm = parts per million

The CO concentrations ranged from 8.8 ppm (Alternative 2B) to 10.2 ppm (Alternative 2A) for the 1-hour and 4.3 ppm (Alternative 2B) to 4.9 ppm (Alternative 2A) for the 8-hour time period. The analysis results indicated the 2025 CO concentrations for each alternative are below the NAAQS of 35 ppm for 1-hour and 9 ppm for 8-hour time period as set by the EPA. As a result, no substantial air quality impacts are anticipated for any area along the proposed Build Alternatives in the Estimated Time of Completion year 2025.

The projected 2030 concentrations for 1-hour and 8-hour CO and percentage of the NAAQS for each Build Alternative are presented in **Table 4-41B**.

TABLE 4-41B. PROJECTED CO CONCENTRATIONS - YEAR 2030

Build Alternative	1-Hour CO (ppm)	Percent of NAAQS (1-Hour)	8-Hour CO (ppm)	Percent of NAAQS (8-Hour)
2A	10.9	31.1%	5.2	57.6%
2B	9.0	25.7%	4.4	49.1%
3A	10.1	28.9%	4.9	54.0%
3B	9.8	28.0%	4.7	52.7%
3C	9.8	28.0%	4.7	52.7%
4A	9.4	26.9%	4.6	50.9%
4B	9.4	26.9%	4.6	50.9%
5	9.4	26.9%	4.6	50.9%

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
The receptor with the highest CO concentration is reported for each Build Alternative.
CO 1-hour concentrations include an ambient background level of 3.7 ppm.
CO 8-hour concentrations include an ambient background level of 2.3 ppm.
ppm = parts per million

The CO concentrations projected for year 2030 ranged from 9.0 ppm (Alternative 2B) to 10.9 ppm (Alternative 2A) for the 1-hour and 4.4 ppm (Alternative 2B) to 5.2 ppm (Alternative 2A) for the 8-hour time period. The results indicated the 2030 CO concentrations would not exceed the NAAQS for any of the Build Alternatives.

As shown in **Tables 4-41A** and **4-41B**, local concentrations of CO are not expected to exceed national standards at any time. The projected concentrations represent the absolute peak for the entire length of the proposed project under worst-case meteorological conditions. As a result, no substantial air quality impacts are anticipated for any area along the proposed Build Alternatives. Beyond the right-of-way, CO concentrations would be diminished and, under average conditions, impacts to sensitive receptors are not anticipated. The presence of natural and/or man-made barriers (e.g., buildings, bridges, and flood control levees) in the study area would have a minimal effect on the atmosphere's ability to disperse concentrated build-ups of pollutants. As indicated above and in **Section 4.14.3.1**, the NTTA has recently directed that future facilities, including the proposed Trinity Parkway, implement the electronic toll collection method to promote operational safety and efficiency. An ETC implementation would be expected to reduce air quality impacts.

4.14.4 Other Air Quality Considerations

Particulate Matter

There are two types of particulate matter for which the EPA has set national standards: $PM_{2.5}$ and PM_{10}, which are respectively defined as particles with an aerodynamic diameter less than or equal to a nominal 2.5 and 10 micrometers. The particulate matter NAAQS reflect values the EPA deems protective of public health, including the health of sensitive populations such as asthmatics, children, and the elderly.

The health risk from potential air pollutants, including particulate matter, is generally determined on a regional basis with the EPA designating areas where the potential for threat to human health exists as non-attainment areas for specific air pollutants. Many areas of the country, including Texas, are in the process of monitoring levels of $PM_{2.5}$. This ongoing monitoring serves as the basis for whether this pollutant needs to be addressed at the regional scale, local scale, or both. The EPA has not designated the DFW area as a non-attainment area for either $PM_{2.5}$ or PM_{10}.

Additional discussion of mobile source emissions, including particulate matter, is included in the MSAT analysis presented in **Section 4.14.5**, below.

Consideration of Federal Emission Standards

In December 1999, the EPA announced new engine and gasoline standards commonly known as Tier II. The standards were designed to reduce the emissions from new passenger cars and light trucks, including pick-up trucks, minivans, and sport utility vehicles. As of 2004, the nation's refiners and importers of gasoline have to manufacture gasoline with sulfur levels capped at 300 ppm. As of 2006, refiners are required to meet a 30 ppm average sulfur level with a maximum cap of 80 ppm.

In December 2000, the EPA issued new heavy-duty diesel emission standards to reduce diesel emissions from heavy-duty trucks and buses. Beginning in 2006, refiners are required to produce diesel fuel for use in highway vehicles with a sulfur content of no more than 15 ppm. This is down from the previous level of 500 ppm, a 97 percent reduction.

Increased roadway usage would occur either under the No-Build or Trinity Parkway Build scenarios; however, this would not necessarily lead to increases in emissions (e.g., NOx, VOCs, particulate matter, and air toxics). Such emissions from vehicles are expected to continue the current dramatic pattern of decrease, even with the continuing increases in VMT, for several reasons:

- Automotive design technology continues to improve. Older, more polluting vehicles continue to be retired and replaced with newer, cleaner vehicles;

- Newer technology vehicles are getting cleaner with each subsequent model year;
- Fuels are improving and continue to improve. For instance, reformulated gasoline, in use in the DFW area since the mid-1990s, has produced reductions in air toxics;
- Emissions from heavy-duty on-highway vehicles are expected to decrease. Between 2007 and 2030, the EPA's heavy-duty diesel emission standards are predicted to reduce NOx and particulate matter emissions from heavy-duty diesel engines by 88 percent and 64 percent, respectively; and
- Emissions from light-duty on-highway vehicles are expected to decrease. The Tier II regulations are predicted to decrease NOx emissions by 61 percent and VOC emissions by 24 percent between 2004 and 2030 (FHWA, 2006).

4.14.5 Mobile Source Air Toxics (MSATs)

The quantitative MSAT analysis presented in this section is based on existing or base year (2007) and future volumes of traffic (2030) that have been projected by the NCTCOG travel model, and is subject to change pending the 2009 update to the MTP.

4.14.5.1 MSATs Regulatory Background

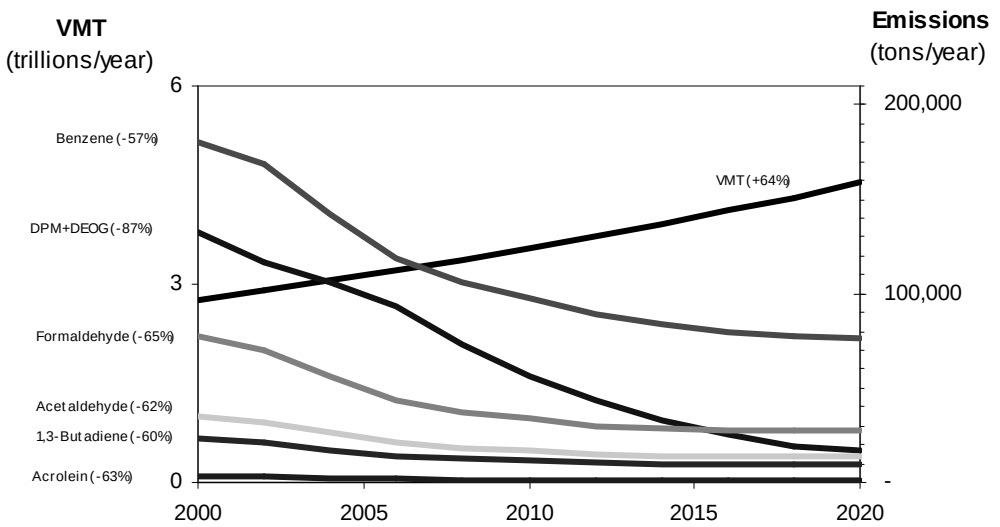
In addition to the criteria air pollutants for which there are NAAQS, the EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

MSATs are a subset of the 188 air toxics defined by the Clean Air Act (CAA). The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA is the lead federal agency for administering the CAA and has certain responsibilities regarding the health effects of MSATs. The EPA issued a *Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources* (66 Federal Register 17229, March 29, 2001). This rule was issued under the authority in Section 202 of the CAA. In its rule, EPA examined the impacts of existing and newly promulgated mobile source control programs, including its reformulated gasoline (RFG) program, its national low emission vehicle (NLEV) standards, its Tier II motor vehicle emissions standards and gasoline sulfur control requirements, and its proposed heavy duty engine and vehicle standards for on-

highway diesel fuel sulfur control requirements. Between 2000 and 2020, FHWA projects that even with a 64 percent increase in VMT, these programs would reduce on-highway emissions of acrolein, benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57 to 65 percent, and would reduce on-highway diesel particulate matter (PM) emissions by 87 percent, as shown in the following graph:

FIGURE 4-2A. U.S. ANNUAL VEHICLE MILES TRAVELED (VMT) VS. MOBILE SOURCES AIR TOXICS EMISSIONS, 2000 - 2020



Notes: For on-road mobile sources. Emissions factors were generated using MOBILE6.2. Methyl tertiary-butyl ether (MTBE) proportion of market for oxygenates is held constant, at 50% Gasoline Reid Vapor Pressure (RVP) and oxygenate content are held constant. VMT: *Highway Statistics 2000*, Table VM-2 for 2000, analysis assumes annual growth rate of 2.5% "DPM + DEOG" is based on MOBILE6.2-generated factors for elemental carbon, organic carbon and sulphate from diesel-powered vehicles, with the particle size cutoff set at 10.0 microns.

Source: FHWA Interim Guidance on Air Toxic Analysis in NEPA Documents, February 3, 2006.
*National trend information is provided as background. For specific locations, the trend lines may be different, depending on local parameters defining vehicle mix, fuels, meteorology, and other factors.

In an ongoing review of MSATs, the EPA finalized additional rules under authority of CAA Section 202(l) to further reduce MSAT emissions that are not reflected in the above graph. The EPA issued Final Rules on Control of Hazardous Air Pollutants from Mobile Sources (72 F.R. 8427, February 26, 2007) under Title 40 Code of Federal Regulations Parts 59, 80, 85 and 86. The rule changes were effective April 27, 2007. As a result of this review, EPA adopted the following new requirements to significantly lower emissions of benzene and the other MSATs by: (1) lowering the benzene content in gasoline; (2) reducing non-methane hydrocarbon (NMHC) exhaust emissions from passenger vehicles operated at cold temperatures (under 75 degrees Fahrenheit); and (3) reducing evaporative emissions that permeate through portable fuel containers. A summary of the benefits of this rule are provided below, based on information provided by EPA in the preamble to the rule.

Beginning in 2011, petroleum refiners must meet an annual average gasoline benzene content standard of 0.62 percent by volume, for both reformulated and conventional gasoline, nationwide. The national benzene content of gasoline in 2007 is about 1.0 percent by volume. EPA standards to reduce NMHC exhaust emissions from new gasoline-fueled vehicles will become effective in phases. Standards for light-duty vehicles and trucks (equal to or less than 6000 pounds [lbs]) become effective during the period of 2010 to 2013, and standards for heavy light-duty trucks (6,000 to 8,000 lbs) and medium-duty passenger vehicles (up to 10,000 lbs) become effective during the period of 2012 to 2015. Evaporative requirements for portable gas containers become effective with containers manufactured in 2009. Evaporative emissions must be limited to 0.3 grams of hydrocarbons per gallon per day.

EPA has also adopted more stringent evaporative emission standards (equivalent to current California standards) for new passenger vehicles. The new standards become effective in 2009 for light vehicles and in 2010 for heavy vehicles. In addition to the reductions from the 2001 rule, the new rules will significantly reduce annual national MSAT emissions. For example, EPA estimates that emissions in the year 2030, when compared to emissions in the base year prior to the rule, will show a reduction of 330,000 tons of MSATs (including 61,000 tons of benzene), reductions of more than 1,000,000 tons of volatile organic compounds, and reductions of more than 19,000 tons of $PM_{2.5}$.[1] Please note that EPA has not updated MOBILE6.2 emission factors to capture the February 2007 Rule emission reductions; therefore, it is not possible to reflect these emission reductions in the quantitative MSAT analysis provided below.

4.14.5.2 Project Specific MSAT Information

For the Build and No-Build alternatives in the Trinity Parkway project, the amount of MSATs emitted would be proportional to the VMT, assuming that other variables such as fleet mix are the same for each alternative. Because the estimated VMT for the Build and No-Build alternatives are similar, varying approximately 8.5 percent, it is expected there would only be a small difference in overall MSAT emissions comparing the various Build Alternatives to the No-Build alternative (also see **Table 4-42C**, **Figure 4-2B** and **Figure 4-2C** in the MSAT Analysis subsection of **Section 4.14.5.3** below. Note that the VMTs were derived from the MSAT affected transportation network described in the MSAT Analysis subsection). Regardless of the alternative chosen, emissions would likely be lower than present levels in the design year (2030) as a result of EPA's national control programs that are projected to reduce MSATs emissions by 57 to 87 percent between 2000 and 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSATs emissions area are likely to be lower in the future in nearly all cases.

[1] EPA Fact Sheet/Regulatory Announcement: *Control of Hazardous Air Pollutants from Mobile Sources: Final Rule to Reduce Mobile Source Air Toxics, EPA, Office of Transportation and Air Quality*, EPA420-F-07-017, February 2007, page 4.

The additional travel lanes that are part of the Trinity Parkway's Build alternatives would have the effect of moving some traffic closer to nearby homes, schools, and businesses; therefore, under each Build alternative there may be localized areas where ambient concentrations of MSATs could be higher under a Build alternative than the No-Build alternative. These localized increases in MSATs concentrations would likely be most pronounced near any Build alternative alignment constructed on new location where there are no existing travel lanes (e.g., Alternatives 3A, 3B, 3C, 4A, 4B and 5 are on new location). Proposed Alternatives 2A and 2B would be constructed along existing Irving/Industrial Boulevard, and the increase in localized increase in MSAT concentration would not be as pronounced. However, as discussed above, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot be accurately quantified due to the inherent deficiencies of current models. In sum, when a new roadway is built and, as a result, moves closer to receptors, the localized level of MSAT emissions for the Build Alternatives could be higher relative to the No-Build Alternative. However, on a regional basis, EPA's vehicle and fuel regulations coupled with fleet turnover will cause region-wide MSAT levels to be significantly lower than today in almost all cases.

Sensitive Receptors within the Study Area

FHWA has completed a review of several studies that have attempted to address how MSAT concentration levels may behave based on the distance from a roadway. FHWA notes that air quality in areas immediately adjacent to roadways can vary as opposed to community-wide air quality. The tendency for pollutant levels to drop off substantially as the distance from the roadway increases is well documented. Dispersion studies have shown that the distance where the highest decrease in concentration starts to occur is approximately 100 meters (328 feet). By 500 meters (1,640 feet), most studies have found difficulty distinguishing between background levels of a given pollutant and any concentration that may be found directly adjacent to the roadway. Finally, wind direction and speed, vehicle traffic levels, and roadway design can further increase or decrease the distance at which elevated levels of any given pollutant can be distinguished as directly associated with a roadway.

Sensitive receptors are defined as schools both public and private, licensed day care facilities, hospitals, and senior citizen care facilities. An assessment of sensitive receptors within 100 meters and 500 meters of the Build alternatives was conducted. The assessment identified and mapped a total of 18 sensitive receptors within 500 meters (1,640 feet) of the proposed project alternatives (measured from the proposed right-of-way line). From these, three of the sensitive receptors were located within 100 meters (328 feet). The number of sensitive receptors within 100 meters and between 100 and 500 meters varies per Build Alternative and can be found in **Table 4-42B**. No hospitals were located within 500 meters of any proposed roadway alignment. **Plate 4-32** illustrates the location of the sensitive receptors in relation

to the eight Build Alternatives. **Table 4-42A** identifies the sensitive air quality receptors along and near the proposed project and **Table 4-42B** lists the sensitive receptors by alternative.

TABLE 4-42A. AIR QUALITY SENSITIVE RECEPTORS

Facility Type and Plate ID	Name	Address	City and Zip Code	<100 Meters (328 ft.) from a Build Alt.
DAY CARE CENTERS[1]				
1	Early Head Start Lakewest Program	3737 Goldman Street	Dallas, TX 75212	
2	Jessica Gray Lovings	1520 Briar Cliff Road	Dallas, TX 75235	
3	Te'Shay Playhouse	2043 Canada Drive	Dallas, TX 75212	✓
4	Delores Turner	1830 Homeland Street	Dallas, TX 75212	
5	A Time and A Season	835 North Marsalis	Dallas, TX 75203	
6	Children's World Stars & Tykes	207 South Houston Street	Dallas, TX 75202	
7	Kirby's Kreative Learning Center	330 South R L Thornton	Dallas, TX 75203	
8	St. Philip's School & Community Ctr.	1600 Pennsylvania Avenue	Dallas, TX 75215	
9	Tanisha Reshay Yates	1606 Garden Drive	Dallas, TX 75215	✓
10	Rosie M. Harris Headstart	5700 Jarvis Circle	Dallas, TX 75215	
SCHOOLS				
1	Priscilla L Tyler Elementary	2333 Calypso Street	Dallas, TX 75212	
2	C F Carr Elementary	1952 Bayside Street	Dallas, TX 75212	
3	Trinity Basin Preparatory	808 North Ewing Avenue	Dallas, TX 75203	
4	St. Phillips School	1600 Pennsylvania Avenue	Dallas, TX 75215	
5	Martin Luther King Elementary	1817 Warren Avenue	Dallas, TX 75215	
6	HS Thompson Elementary	5700 Bexar Street	Dallas, TX 75215	✓
ELDER CARE				
1	Sunshine Home of Dallas	1234 Sleepy Hollow Drive	Dallas, TX 75235	
2	South Dallas Nursing Home	3808 South Central Expressway	Dallas, TX 75215	
HOSPITALS				
No hospital facilities within 500 meters (1,640 feet) of any alternative.				

Notes: [1]Includes places of worship with day care facilities.
See **Plate 4-32** for facility locations.

Table 4-42B, below, shows the number of sensitive receptors located within 100 meters and 500 meters of each Build Alternative.

TABLE 4-42B. AIR QUALITY SENSITIVE RECEPTORS BY ALTERNATIVE

Alternative Alignment	<100 Meters (328 ft.)	Facility Type	ID	Total Receptors <100 Meters (328 ft.)	Between 100 Meters (328 ft.) and 500 Meters (1,640 ft.)	Facility Type	ID	Total Receptors Between 100 Meters (328 ft.) and 500 Meters (1,640 ft.)	Total Receptors <500 Meters (1,640 ft.)
2A	1	Day Care	9	2	4	Day Care	2, 6, 8, 10	6	8
	1	Schools	6		1	Schools	4		
	---	Elder Care	---		1	Elder Care	1		
2B	1	Day Care	9	2	4	Day Care	2, 6, 8, 10	6	8
	1	Schools	6		1	Schools	4		
	---	Elder Care	---		1	Elder Care	1		
3A	1	Day Care	9	2	2	Day Care	8, 10	7	9
	1	Schools	6		3	Schools	3, 4, 5		
	---	Elder Care	---		2	Elder Care	1, 2		
3B	1	Day Care	9	2	2	Day Care	8, 10	7	9
	1	Schools	6		3	Schools	3, 4, 5		
	---	Elder Care	---		2	Elder Care	1, 2		
3C	1	Day Care	9	2	2	Day Care	8, 10	7	9
	1	Schools	6		3	Schools	3, 4, 5		
	---	Elder Care	---		2	Elder Care	1, 2		
4A	1	Day Care	9	2	5	Day Care	3, 4, 5, 8, 10	11	13
	1	Schools	6		4	Schools	1, 3, 4, 5		
	---	Elder Care	---		2	Elder Care	1 , 2		
4B	1	Day Care	9	2	4	Day Care	3, 4, 8, 10	10	12
	1	Schools	6		4	Schools	1, 3, 4, 5		
	---	Elder Care	---		2	Elder Care	1, 2		
5	2	Day Care	3, 9	3	6	Day Care	1, 4, 5, 7, 8, 10	13	16
	1	Schools	6		5	Schools	1, 2, 3, 4, 5		
	---	Elder Care	---		2	Elder Care	1, 2		

Notes:
The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
--- = No sensitive receptors within the distance of 100 meters or 500 meters
ID numbers correlate with **Table 4-42A** and **Plate 4-32**

4.14.5.3 Unavailable Information for Project-Specific MSATs Impact Analysis

This SDEIS includes a basic analysis of the likely MSATs emission impacts of this project. However, available technical tools do not enable the prediction of project-specific health impacts resulting from the emission changes associated with the alternatives in this SDEIS. Due to these limitations, the following

discussion is included in accordance with CEQ regulations [see 40 CFR Section 1502.22(b)] regarding incomplete or unavailable information:

Information that is Unavailable or Incomplete

Evaluating the environmental and health impacts from MSATs on a proposed roadway project would involve several key elements, including emissions modeling, dispersion modeling in order to estimate ambient concentrations resulting from the estimated emissions, exposure modeling in order to estimate human exposure to the estimated concentrations, and then final determination of health impacts based on the estimated exposure. Each of these steps is encumbered by technical shortcomings or uncertain science that prevents a more complete determination of the MSATs health impacts of this project.

Emissions: The EPA tools to estimate MSATs emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE6.2 is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE6.2 is a trip-based model - emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means MOBILE6.2 does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects and cannot adequately capture emissions effects of smaller projects. For particulate matter (PM), the model results are not sensitive to average trip speed, while other MSATs emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE6.2 for both PM and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis.

These deficiencies compromise the capability of MOBILE6.2 to estimate MSATs emissions. MOBILE6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations. However, MOBILE6.2 is currently the only available computer model for use by FHWA/TxDOT and so it was used for the comparison of alternatives.

Dispersion: The tools to predict how MSATs disperse are also limited. The EPA's current regulatory models, CALINE3 and CAL3QHC, were developed and validated more than a decade ago for the purpose of predicting episodic concentrations of carbon monoxide (CO) to determine compliance with the NAAQS. The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at some time at some location within a geographic area. This limitation makes it difficult to

predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess potential health risk. Along with these general limitations of dispersion models, FHWA is also faced with a lack of monitoring data in most areas for use in establishing project-specific MSATs background concentrations.

Exposure Levels and Health Effects: Finally, even if emission levels and concentrations of MSATs could be accurately predicted, shortcomings in current techniques for exposure assessment and risk analysis preclude us from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are problematic because of the difficulty to accurately calculate annual concentrations of MSATs near roadways, and to determine the time frame in which people are actually exposed to those concentrations at a specific location. These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of MSATs is ongoing. For different emission types, there are a variety of studies that show some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to toxics has been a focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable to the county level (EPA, 1996a). While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or state level.

The EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The IRIS database is located at http://www.epa.gov/iris. The following toxicity information for the six prioritized MSATs was taken from the IRIS database Weight of Evidence Characterization summaries.[2] This information is taken from

[2] EPA Office of Research and Development, National Center for Environmental Assessment: IRIS database of human health effects that may result from exposure to various substances found in the environment. http://www.epa.gov/iris/

EPA's IRIS database and represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- **Acetaldehyde:** Acetaldehyde is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure;

- **Acrolein:** Under the Draft Guidelines for Carcinogen Risk Assessment (EPA, 1999e), the potential carcinogenicity of acrolein cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure. There are no adequate human studies of the carcinogenic potential of acrolein. Collectively, experimental studies provide inadequate evidence that acrolein causes cancer in laboratory animals;

- **Benzene:** Under the Proposed Guidelines for Carcinogen Risk Assessment (EPA, 1996b), benzene is characterized as a known human carcinogen for all routes of exposure based upon convincing human evidence as well as supporting evidence from animal studies (EPA, 1979, 1985, 1998b; Agency for Toxic Substances and Disease Registry [ATSDR], 1997);

- **1,3 Butadiene:** Under the EPA's Draft Guidelines for Carcinogen Risk Assessment (EPA, 1999e), 1,3-butadiene is characterized as carcinogenic to humans by inhalation. This characterization is supported by the total weight of evidence provided by the following: 1) sufficient evidence from epidemiologic studies of the majority of U.S. workers occupationally exposed to 1,3-butadiene, either to the monomer or to the polymer by inhalation, showing increased lymphohematopoietic cancers and a dose-response relationship for leukemia in polymer workers, 2) sufficient evidence in laboratory animal studies showing that 1,3-butadiene causes tumors at multiple sites in mice and rats by inhalation, and 3) numerous studies consistently demonstrating that 1,3-butadiene is metabolized into genotoxic metabolites by experimental animals and humans. The specific mechanisms of 1,3-butadiene-induced carcinogenesis are unknown. However, the scientific evidence strongly suggests that the carcinogenic effects are mediated by genotoxic metabolites of 1,3-butadiene (i.e., the monoepoxide, the diepoxide, and the epoxydiol);

- **Diesel Exhaust:** Using the EPA's Draft Guidelines for Carcinogen Risk Assessment (EPA, 1999e), diesel exhaust is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is the combination of diesel particulate matter and diesel exhaust organic gases; and

- **Formaldehyde (B1 Probable Human Carcinogen):** The chronic health hazard assessment for formaldehyde is based on limited evidence in humans, and sufficient evidence in animals. Human data include nine studies that show statistically substantial associations between site-specific respiratory neoplasms and exposure to formaldehyde or formaldehyde-containing products. An increased incidence of nasal squamous cell carcinomas was observed in long-term inhalation studies in rats and in mice. The classification is supported by in vitro genotoxicity data and formaldehyde's structural relationships to other carcinogenic aldehydes such as acetaldehyde.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute (HEI), a non-profit organization funded by EPA, FHWA, and industry has undertaken a series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. A recently released report reviews available scientific literature on the health effects of MSATs, identifies data gaps, and makes suggestions for future research (HEI, 2007). The final summary of the series is not expected for several years.

Some recent studies have reported that proximity to roadways is related to adverse health outcomes - particularly respiratory problems.[3] Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria pollutants and other pollutants. In addition, as mentioned previously, EPA has not developed a health based standard for MSATs. The FHWA cannot evaluate the validity of these studies, but more importantly, these studies do not provide information that would be useful to alleviate the uncertainties listed above and enable the FHWA to perform a more comprehensive evaluation of the health impacts specific to this project. In addition, as mentioned previously, EPA has not developed health based standards for MSATs, but rather has focused on regulation to significantly reduce on-road and non-road MSAT emissions nationwide.

Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of Impacts Based upon Theoretical Approaches or Research Methods Generally Accepted in the Scientific Community
Because of the uncertainties outlined above, an assessment of the effects of MSAT emissions impacts on human health cannot be made at the project level. While available tools do allow us to predict relative MSAT emission changes between alternatives for a proposed project of this magnitude, the amount of

[3] South Coast Air Quality Management District, Multiple Air Toxic Exposure Study-II (2000); Highway Health Hazards, The Sierra Club (2004) summarizing 24 Studies on the relationship between health and air quality); NEPA's Uncertainty in the Federal Legal Scheme Controlling Air Pollution from Motor Vehicles, Environmental Law Institute, 35 ELR 10273 (2005) with health studies cited therein.

MSAT emissions from the project alternatives are presented here for consideration of alternatives and for disclosure purposes, and are not intended for estimating potential human exposure or health impacts.

In this document, a quantitative analysis of MSAT emissions relative to the various alternatives has been conducted. The analysis indicates that project alternatives may result in increased exposure to MSAT emissions in certain locations, although the concentrations and duration of exposures are uncertain, and because of this uncertainty, the health effects from these emissions cannot be estimated. As mentioned previously, Congress directed EPA to reduce MSAT emissions under authority of CAA Section 202(l). EPA has focused efforts on developing a number of regulations specific not only to reducing MSAT emissions, but also to reduce all vehicle emissions. EPA has not developed ambient air standards for MSATs or health effects thresholds for MSATs.

MSAT Analysis

The approach used in the analysis of MSATs within the Trinity Parkway study area considers the on-road sources for the six priority MSATs (i.e., acetaldehyde, acrolein, benzene, 1,3 butadiene, DPM, and formaldehyde). This analysis is based on existing or base year (2007) and future volumes of traffic (2030) that have been projected by the NCTCOG travel model, and is subject to change pending the 2009 update to the MTP. An affected transportation network was derived from the 2030 No-Build Scenario compared to the 2030 Build Scenario to determine which roadway links in the model have a ±5% volume change. The affected transportation network was then compared to the 2007 model in order to extrapolate a baseline traffic network. The MSAT emissions shown in **Table 4-42C** were calculated using daily emission factors provided by NCTCOG for each roadway link in the affected transportation network. These inputs are appropriate to the Dallas-Fort Worth Urban Area, and are consistent with those used for other modeling activities in the area (e.g., State Implementation Plan [SIP] inventories, conformity analyses).

Model Results

The resulting daily emission inventory for the six priority MSATs and the daily VMT in the affected transportation network was compiled as summarized in **Table 4-42C** and **Figure 4-2A**, below. Please note that EPA has not updated MOBILE6.2 emission factors to capture the February 2007 Rule emission reductions; therefore, the quantitative MSAT analysis provided below does not reflect the 2007 Base Case emission reductions.

TABLE 4-42C. MSAT EMISSIONS OF TRINITY PARKWAY BY SCENARIO (TONS/DAY)

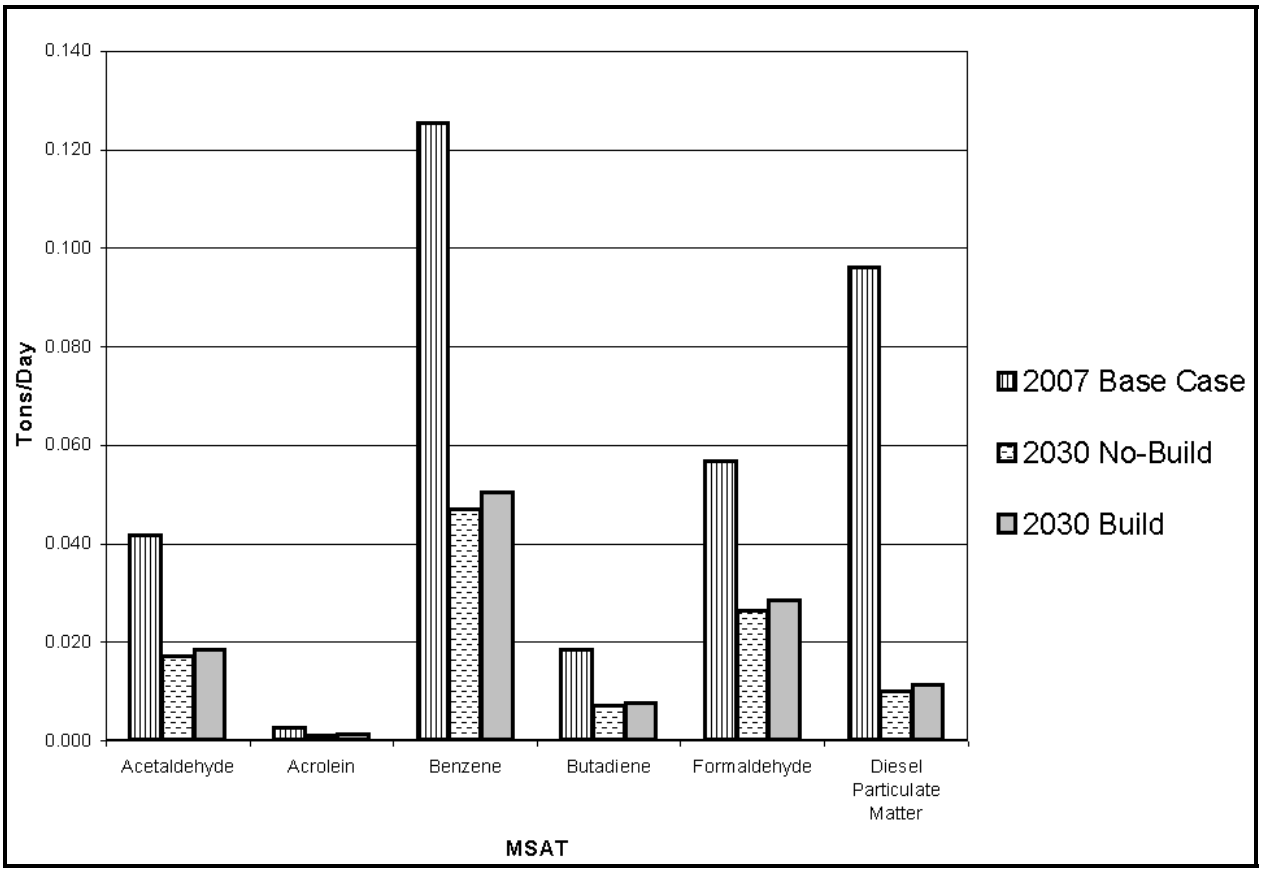
Compound	Year / Scenario			Difference Base/No-Build	Difference Base/Build
	2007 Base Case	2030 No-Build	2030 Build		
Acetaldehyde	0.042	0.017	0.018	-59%	-56%
Acrolein	0.003	0.001	0.001	-55%	-52%
Benzene	0.125	0.047	0.051	-63%	-60%
Butadiene	0.018	0.007	0.008	-62%	-59%
Formaldehyde	0.057	0.027	0.029	-53%	-50%
Diesel Particulate Matter (DPM)	0.096	0.010	0.011	-89%	-88%
Total MSAT	**0.341**	**0.109**	**0.118**	**-68%**	**-65%**
VMT (vehicle miles traveled/day)	8,431,599	10,952,834	11,882,206	+30%	+41%

Source: Study Team 2007

The analysis indicates a substantial decrease in daily MSAT emissions can be expected for both the Build and No-Build scenarios (2030) compared to the base year (2007) (**Figure 4-2B**). Daily emissions of total MSATs are predicted to decrease by approximately 65-68 percent in 2030 compared with 2007 levels. If emissions are plotted over time, a substantially decreasing level of MSAT emissions can be seen (**Figure 4-2C**), even though overall VMT in the effected transportation network continues to rise. The 2030 Build scenario is expected to generate an increase of approximately 8 percent in MSAT emissions as compared to the 2030 No Build.

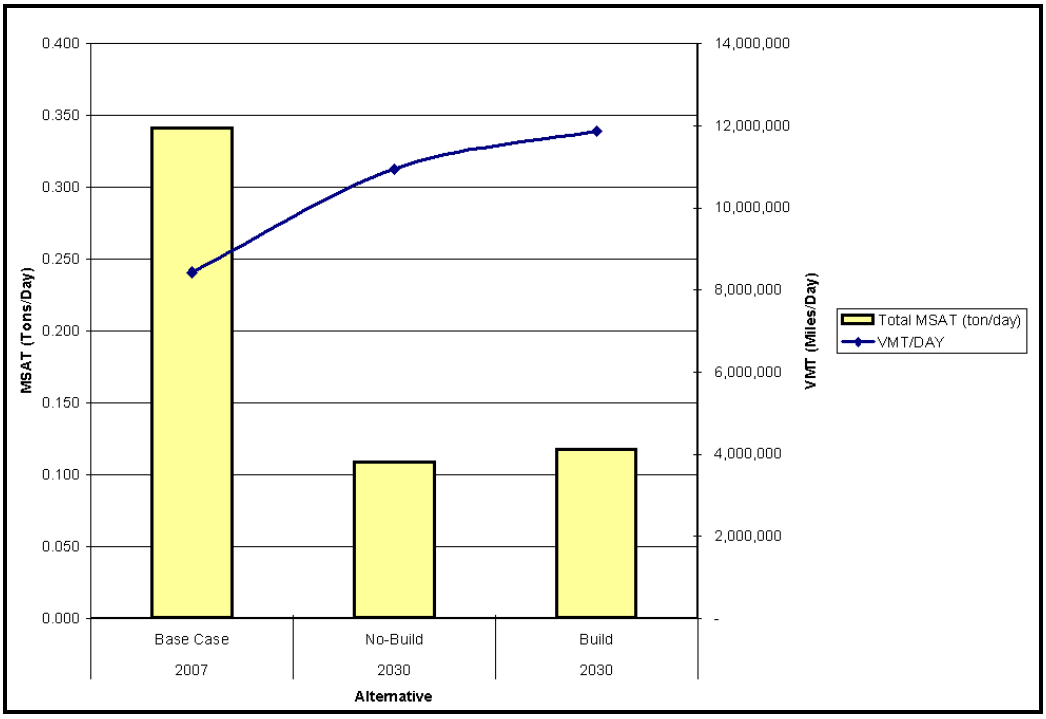
Of the six priority MSAT compounds, benzene and DPM contribute the most to the daily emissions total for the 2007 base year. In future years, a substantial decline in benzene is anticipated (a 63 percent reduction in benzene from 2007 to 2030, Build scenario), and an even larger reduction in DPM emissions is predicted (a 90 percent decrease from 2007 to 2030, Build scenario).

FIGURE 4-2B. PROJECTED CHANGES IN TRINITY PARKWAY MSAT EMISSIONS OVER TIME BY SCENARIO



Source: Study Team 2007

FIGURE 4-2C. COMPARISON OF TRINITY PARKWAY MSAT EMISSIONS VS VMT



Source: Study Team 2007

The reasons for these dramatic improvements are two fold, a change in vehicle fuels, both gasoline and diesel fuel, and a change in emission standards that both light-duty and heavy-duty on-road motor vehicles must meet. The EPA predicts substantial future air emission reductions as the agency's new light-duty and heavy-duty on-road fuel and vehicle rules come into effect (Tier II, light-duty vehicle standard, Heavy-Duty Diesel Vehicle (HDDV) standards and low sulfur diesel fuel, and the EPA's proposed Off-Road Diesel Engine and Fuel Standard). These projected air emission reductions will be realized even with the predicted continued growth in VMT. See EPA's Tier II Regulatory Impact Analysis (RIA) and EPA's HDDV RIA; Regulatory Impact Analysis (EPA, 2001a; EPA, 1999f).

Growth in the Dallas/Fort Worth area is expected to remain robust through 2030. Population is expected to increase 80 percent and employment growth is expected to increase by 72 percent from 2000 through 2030 (NCTCOG, 2003b). There are several ways to address this anticipated growth and consequential increase in traffic within the Dallas/Fort Worth metropolitan area.

Increased roadway usage, which will occur either under the No-Build or Build scenario, will not necessarily lead to increases in emissions (NOx, VOCs, PM, or MSATs). Such emissions from vehicles are expected to continue the current pattern of decrease, even with continuing increases in VMT. Technology is improving at a pace that exceeds the effect of increased VMT.

MSAT Conclusions

The ability to discern differences in MSAT emissions among transportation alternatives is difficult given the uncertainties associated with forecasting travel activity and air emissions 23 years or more into the future. The main analytical tool for predicting emissions from on-road motor vehicles is the EPA's MOBILE6.2 model. The MOBILE6.2 model is regional in scope and has limited applicability to a project-level analysis. However, the impacts of a major transportation project extend beyond its corridor and an evaluation within the context of an affected transportation network can be accomplished.

When evaluating the future options for upgrading a transportation corridor, the major mitigating factor in reducing MSAT emissions is the implementation of the EPA's new motor vehicle emission control standards. Substantial decreases in MSAT emissions will be realized from a current base year (2007) through an estimated time of completion for a planned project and its design year some 23 years in the future.

MSATs from mobile sources, especially benzene, have dropped dramatically since 1995, and are expected to continue dropping. The introduction of reformulated gasoline has lead to a substantial part of this improvement. In addition, Tier II automobiles introduced in model year 2004 will continue to help reduce MSATs. Diesel exhaust emissions have been falling since the early 1990s with the passage of the Clean Air Act Amendments (CAAA). The CAAA provided for improvement in diesel fuel through reductions in sulfur and other diesel fuel improvements. In addition, the EPA has further reduced the sulfur level in diesel fuel, which took effect in 2006. The EPA also has called for dramatic reductions in NOx emissions, and PM from on-road and off-road diesel engines.

4.15 NOISE IMPACTS

This analysis was accomplished in accordance with TxDOT's (FHWA approved) *Guidelines for Analysis and Abatement of Highway Traffic Noise* (1996). This analysis is subject to change pending the 2009 update to the MTP.

4.15.1 Introduction

The FHWA Traffic Noise Model (TNM) was used to calculate existing and predicted traffic noise levels at sensitive receiver areas within a noise study area of approximately 1,000 feet from each alternative. TNM is a noise prediction computer program that estimates the acoustic intensity at various receiver locations. TNM primarily considers the number, type, and speed of vehicles; highway alignment and grade; cuts, fills and natural berms; surrounding terrain features; and the locations of receivers likely to be impacted

by the associated traffic noise. Traffic noise levels reported in this section and subsequent subsections of 4.15 are reported in dBA Leq(h). The traffic noise analysis typically includes the following elements:

- Identification of land use activity areas that might be impacted by traffic noise;
- Determination of existing noise levels;
- Prediction of future noise levels;
- Identification of possible noise impacts; and
- Consideration and evaluation of measures to reduce noise impacts.

4.15.2 Description of FHWA Noise Abatement Criteria

The FHWA has established the following Noise Abatement Criteria (NAC) for various land use activity areas. The NAC is used as one of two means to determine when a traffic noise impact would occur (see absolute and relative criterion in **Section 4.15.3**). The NAC criteria are shown in **Table 4-43**.

TABLE 4-43. FHWA NOISE ABATEMENT CRITERIA (NAC)

Activity Category	dBA Leq	Description of Land Use Activity Areas
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary value and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: TxDOT, 1996: *Guidelines for Analysis and Abatement of Highway Traffic Noise*.
Note: Primary consideration is given to exterior areas (Category A, B, or C) where frequent human activity occurs. However, interior areas (Category E) are used if exterior areas are physically shielded from the roadway, or if there is little or no human activity in exterior areas adjacent to the roadway.

4.15.3 Impacts to Noise Receivers

A noise impact occurs when either the absolute or relative criterion, described below, is met:

- Absolute criterion: the predicted noise level at a receiver approaches, equals, or exceeds the NAC. "Approach" is defined as 1 dBA below the NAC. For example, a noise impact would occur at a Category B residence if the noise level is predicted to be 66 dBA or above.
- Relative criterion: the predicted noise level substantially exceeds the existing noise level at a receiver even though the predicted noise level does not approach, equal, or exceed the NAC. "Substantially exceeds" is defined as more than 10 dBA. For example, a noise impact would occur at a Category B residence if the existing level is 54 dBA and the predicted level is 65 dBA (11 dBA increase).

4.15.4 No-Build Alternative

Traffic noise is a primary component of the existing ambient noise level in the study area. **Section 3.7.3** describes the existing ambient noise levels at many areas throughout the project noise study area. As described, areas near high-volume arterial roads and highways typically have existing noise levels ranging from 64 to 77 dBA. Along Irving/Industrial Boulevard and Lamar Street, existing noise levels ranged from 60 to 69 dBA and along Canada Drive existing noise levels ranged from 60 to 66 dBA. Areas within the Dallas Floodway near existing high-volume crossing highways such as the IH-30 bridge have existing noise levels at or near 69 dBA, while some areas within the floodway that are secluded and far away from crossing roads have noise levels typically ranging from 42 to 50 dBA.

With the No-Build Alternative, traffic volumes and congestion on area roadways would likely increase and this would have an effect on the future noise levels in the study area. In the future No-Build scenario, noise levels near roadways such as Canada Drive, Irving/Industrial Boulevard, Lamar Street, and major highways would be expected to increase 0 to 5 dBA, depending on the increase in traffic volumes and the decrease in speed related to congestion. Areas within the study area that are not near high volume roadways would likely have generally the same noise levels as today.

4.15.5 Build Alternatives

Existing and predicted traffic noise levels were modeled at receiver locations that represent the land use activity areas adjacent to the proposed alternatives that may be impacted by traffic noise and may potentially benefit from feasible and reasonable noise abatement. These areas include Category B land use activity areas. No Category A land use activity areas currently exist within the noise study area. Category C areas (retail, commercial, and industrial areas) typically have no outside area of frequent human activity, and therefore these areas were modeled to predict interior noise levels (Category E). No noise impacts were predicted to occur in the retail, commercial, and industrial areas. **Plates 4-33** through **4-36** show the general areas near each Build Alternative where noise impacts are predicted to occur and where mitigation would be considered. **Table 4-44** provides the number of predicted future build impacted Category B receivers for each of the Trinity Parkway Build Alternatives.

TABLE 4-44. SUMMARY OF NOISE IMPACTS

Build Alt.	Single-Family	Multi-Family	School	Park	Community Center	Church	Total
2A	208	0	0	1	0	0	**209**
2B	201	0	0	1	0	0	**202**
3A	127	0	0	1	0	0	**128**
3B	127	0	0	1	0	0	**128**
3C	127	0	0	1	0	0	**128**
4A	164	0	0	2	0	0	**166**
4B	164	0	0	2	0	0	**166**
5	224	0	0	2	0	0	**226**

Note: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.

As shown in **Table 4-44**, the Build Alternatives with the fewest Category B noise impacts are Alternatives 3A, 3B, and 3C followed by Alternatives 4A and 4B, 2B, 2A and 5.

All of the Build Alternatives merge together at both the north and south termini of the study area. As a result, 126 of the above listed noise impacts are common to each Build Alternative. These common noise impacts include 125 residences and one park (Sleepy Hollow Park). The following paragraphs describe the common areas and impacts:

Common area at south terminus of the study area - an existing heavy traffic area with south US-75 connecting with US-175. Land use is single-family residential with a few retail/commercial facilities. In this area, the proposed build alignments merge near the Lamar Street and Starks Avenue intersection. At this location the Build Alternatives are on elevated structure, they continue eastward dropping in elevation to go under the US-75 Bridge, merging with US-175 to the end of the project. A total of 106 residences have noise levels that exceed NAC criteria in the future build year.

Common area at north terminus of study area - an existing heavy traffic area at the IH-35E and SH-183 split. Land use is retail/commercial with a residential neighborhood known as Sleepy Hollow located approximately 300 feet east of the existing freeways. In this area, the proposed Build Alternative alignments are the same, consisting of connecting ramps to the existing IH-35E freeways system. Nineteen residences and one small playground/park (Sleepy Hollow Park) have noise levels that exceed NAC criteria in the future build year.

The following paragraphs describe impacts for each alternative, which are in addition to the above common area impacts:

Alternatives 2A and 2B - from the south common area, the alternatives track Lamar Street, Industrial Boulevard, and Irving Boulevard to the north common area. Land use is primarily retail/commercial/industrial along the corridor with the exception of a residential neighborhood located adjacent to Lamar Street between MLK and Starks Avenue. There were no predicted noise impacts to the retail/commercial/industrial areas adjacent to Alternatives 2A and 2B. A portion of the residential neighborhood (between IH-45 and Hatcher Street) is designated as the Colonial Hill Historic District. In addition to the common area impacts, 83 residences (Alternative 2A) and 76 residences (Alternative 2B) have noise levels that exceed NAC criteria in the future build year. These impacts primarily occur along Lamar Street between MLK and Starks Avenue.

Alternative 3A, 3B, and 3C - from the south common area, these alternatives track through an industrial area, then enter the Trinity River floodplain and levee system near the AT&SF/DART railroad bridges. The alternatives track along the interior side of the east levee and exit the levee system near Hampton Road. The alternatives then track through a commercial area to the north common area. In addition to the common area impacts, two residences have noise levels that exceed NAC criteria in the future build year.

Alternative 4A and 4B - from the south common area, the alternative tracks through an industrial area, then enters the Trinity River floodplain and levee system near the AT&SF/DART railroad bridges. The alternative splits with travel lanes tracking along each interior side of the levees and exits the levee system near Hampton Road. The alternative then tracks through a commercial area to the north common area. In addition to the common area impacts, 39 residences and one park (Oak Cliff Founders Park) have noise levels that exceed NAC criteria in the future build year. These noise impacts occur at ramp connections to existing roads along the exterior side of the west levee.

Alternative 5 - from the south common area, the alternative tracks through an industrial area, then enters the Trinity River floodplain and levee system AT&SF/DART railroad bridges. The alternative splits with travel lanes tracking along each exterior side of the levees and exits the levee system near Hampton Road. The alternative then tracks through a commercial area to the north common area. In addition to the common area impacts, 99 residences and one park (Oak Cliff Founders Park) have noise levels that exceed NAC criteria in the future build year. These noise impacts occur at ramp connections to existing roads along the exterior side of the west levee.

4.15.6 Description of Noise Levels at Nearby Parks and Amenities

Table 4-45 describes the noise levels at nearby parks and amenities and shows the potential noise impacts by each alternative. Parks in the study area are shown on **Plate 3-18** at the end of **Chapter 3**.

TABLE 4-45. DESCRIPTION OF NOISE LEVELS AT NEARBY PARKS AND AMENITIES

Park	Noise Impact (Yes/No)								Description
	2A	2B	3A	3B	3C	4A	4B	5	
Sleepy Hollow Park	Y	Y	Y	Y	Y	Y	Y	Y	Located at the north end of the study area, approximately 300 feet east of IH-35E. This is an urban neighborhood park with picnic, swimming pool, playground, and multi-use court facilities. In this area, all proposed Build Alternative alignments are the same (common), consisting of connecting ramps to the existing IH-35E freeway system. The park has existing noise levels of 66 dBA. This noise level is due to existing traffic on IH-35E. The predicted future noise level at the park with the Build Alternatives in place remains at 66 dBA, indicating that the IH-35E traffic is the dominant noise generator and the connecting ramps of the proposed project alternatives do not increase predicted noise levels at the park. However, because the park is within the noise study area and all project alternative alignments tie into IH-35E in the vicinity of the park, it has been identified as a noise impacted park in this study.
Trinity River Greenbelt Park (Trinity Park)	N	N	N	N	N	N	N	N	Portions of Alternatives 3A, 3B, 3C, 4A, 4B, and 5 are located within the Trinity River levees from just north of Hampton/Inwood Road to the AT&SF/DART Bridge. This land is commonly known as the Trinity River Greenbelt Park (Trinity Park within the limits of the Dallas Floodway). The designated primary use of the Trinity River Greenbelt Park is floodplain and flood control, with secondary use as park and open space. The land within the levees is currently undeveloped and there are no existing facilities near any alternative with the exception of Crow Lake (discussed below). Human recreational activity within the levees is sporadic and generally consists of the occasional hiker, bird watcher, or canoeist. According to TxDOT *Guidelines for Abatement of Highway Traffic Noise*, a project's noise analysis should evaluate noise levels where frequent human activity occurs. Because of infrequent human use, there are no existing areas within the Trinity Park where noise impacts would occur. Future recreational facilities are proposed to be constructed within the Trinity Park. These future facilities are being planned by others concurrently with the roadway project. If Alternative 3A, 3B, 3C, 4A, 4B or 5 is selected as the preferred alternative, additional noise studies would be performed for the preferred alternative to predict the future noise environment within the Trinity Park adjacent to and near that alternative. Proposed park facilities adjacent to or near the preferred alternative that are planned, designed, and programmed would be considered for reasonable and feasible noise abatement. These efforts would guide local officials responsible for land use control programs to ensure, to the maximum extent possible, that new recreational activity areas within Trinity Park are planned or constructed with the predicted future noise environment in mind. As indicated in Section 4.15.4, areas within the Dallas Floodway near existing high-volume crossing highways such as the IH-30 bridge have existing noise levels typically around 69 dBA while other areas within the floodway that are secluded and far away from crossing roads have noise levels typically ranging from a low of 42 to around 50 dBA. Alternatives 3A, 3B, 3C (Combined Parkway-Riverside) and 4A, 4B (Split Parkway-Riverside) are benched (elevated) on the riverside of the levee. If one of these alternatives is selected as the preferred alternative, the predicted noise levels near the toe of the road embankment within the levee are predicted to increase by 7 to 15 dBA in those areas that are currently very quiet (i.e., away from existing roadways) and near a build alternative. These areas within the levee are located north of Hampton Road, between Hampton Road and Sylvan Avenue, between Sylvan Avenue and Continental Avenue, and south of IH-35. Noise levels within the levees near existing high-volume crossing highways such as IH-30 and IH-35E are predicted to have noise level increases ranging from 2 to 5 dBA with a substantial portion of the predicted noise level coming from the traffic on IH 30 and IH-35E.

TABLE 4-45. DESCRIPTION OF NOISE LEVELS AT NEARBY PARKS AND AMENITIES

Park	Noise Impact (Yes/No)								Description
	2A	2B	3A	3B	3C	4A	4B	5	
Oak Cliff Founders Park	N	N	N	N	N	Y	Y	Y	Located west of the west levee and bounded by Zang Boulevard and Marsalis Avenue. This park is an urban open space park with a 0.25 mile hike/bike trail and several sitting benches in its eastern part nearest the levee (approximately 500 feet from the levee). The eastern portion of the park has existing noise level of 66 dBA. This noise level is due to existing traffic on Zang Boulevard and Marsalis Avenue, which are major city arterials. Alternatives 2A, 2B, 3A, 3B, and 3C have no effect on the park due to distance away. The predicted future noise level at the park without the proposed Alternatives 4A, 4B and 5 in place is 68 dBA, an increase of 1 dBA. The predicted future noise level at the park with proposed Alternatives 4A, 4B and 5 in place is 69 dBA. Based on the impact criteria, Alternatives 4A, 4B and 5 have absolute criteria noise impacts at the park (see Section 4.7.3.2). The predicted noise level increase (3 dBA) includes traffic noise from adjacent city arterials (Zang and Marsalis) as well as from the Trinity Parkway alternatives.
Moore Park	N	N	N	N	N	N	N	N	Extends into the Dallas Floodway in the southwest portion of the study area near the AT&SF and DART Railroad. None of the Build Alternatives is adjacent to or in close proximity to this park. The existing noise levels at the park nearest any Build Alternative ranges from 43 to 48 dBA. The predicted future noise level at the park for all Build Alternatives ranges from 46 to 50 dBA. Based on the impact criteria, this park is not noise impacted by any of the Build Alternatives.
Rochester Park	N	N	N	N	N	N	N	N	Extends into the Dallas Floodway in the southwestern portion of the study area near IH-45. None of the Build Alternatives are adjacent to or in close proximity to this park. The existing noise levels at the park nearest any Build Alternative ranges from 59 to 61 dBA. The predicted future noise level at the park for all Build Alternatives ranges from 59 to 62 dBA. Based on the impact criteria, this park is not noise impacted by any of the Build Alternatives.
Eloise Lundy Park	N	N	N	N	N	N	N	N	Located adjacent to the west levee, southeast of the IH-35 crossing of the Dallas Floodway. At the corner nearest the levee, the park has existing noise levels of 57 dBA. Alternatives 2A, 2B, 3A, 3B, and 3C have no effect on the park due to distance away. Alternatives 4A, 4B and 5 depart the west levee area between IH-35 and the park. The predicted noise level at the park for Alternative 4A and 4B is 60 dBA, an increase of 3 dBA over existing levels. The predicted future noise level at the park for Alternative 5 is 62 dBA, an increase of 5 dBA over existing levels. Based on the impact criteria, this park is not noise impacted by any of the Build Alternatives.
Bickers Park	N	N	N	N	N	N	N	N	Located about 2 blocks west of the west levee between Hampton/Inwood Road and Sylvan Ave. The park has existing noise levels of 54 dBA. Alternatives 2A, 2B, 3A, 3B, and 3C have no effect on the park due to distance away. The predicted future noise level at the park for Alternative 4A and 4B is 57 dBA, an increase of 3 dBA over existing levels. The predicted future noise level at the park for Alternative 5 is 59 dBA, an increase of 5 dBA over existing levels. Based on the impact criteria, this park is not noise impacted by any of the Build Alternatives.
Planned Great Trinity Forest	N	N	N	N	N	N	N	N	This planned "umbrella" park is located downstream of the Dallas Floodway and would extend from the DART/AT&SF RR bridge (south of Corinth Street) southward to IH-20. All proposed alternatives are located adjacent to this area generally from the DART/AT&SF RR to Martin Luther King Boulevard before disappearing behind the levee. The area nearest the proposed alignments is currently undeveloped and forested land with no existing park facilities or existing activity areas of frequent human use. For this reason, this area was not specifically analyzed, however existing noise levels and predicted future build noise would be expected to be near the same as those discussed for similar type areas in the Trinity Parkway Greenbelt Park entry of this table. Currently, future proposed recreation amenities between DART/AT&SF RR to Martin Luther King Boulevard include a walking trail and a trail head. Based on the impact criteria, this area is not noise impacted by any of the Build Alternatives.
Crow Lake	N	N	N	N	N	N	N	N	This amenity of Trinity Greenbelt Park is located within the levees adjacent to Sylvan Avenue. Crow Lake is not a designated City of Dallas Park. Amenities at Crow Lake include a small lake, sculptures, a volleyball court, a jogging trail, and access to a canoe launch at the river. The existing noise level at Crow Lake ranges from 57 to 63 dBA. Alternatives 2A and 2B have no effect due to distance away. The predicted future noise level at Crow Lake associated with Alternatives 3A, 3B, 3C, 4A, 4B and 5 ranges from 58 to 63 dBA. Based on the impact criteria, Crow Lake is not noise impacted by any of the Build Alternatives.

TABLE 4-45. DESCRIPTION OF NOISE LEVELS AT NEARBY PARKS AND AMENITIES

Park	Noise Impact (Yes/No)								Description
	2A	2B	3A	3B	3C	4A	4B	5	
All Other Parks in Study Area	N	N	N	N	N	N	N	N	All other parks in the study area have no predicted noise impacts from project traffic noise due to distance away. These include: Pegasus Park, Nash/Davis Park, Shaw Park, Benito Juarez Park, Pueblo Park, Hattie Moore Park, and Forest Park. Additionally, there are no predicted noise impacts to Trinity Strand (near Industrial) because there are no amenities or areas of frequent human activity.
Total	1	1	1	1	1	2	2	2	

Note: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.

4.15.7 Summary of Potential Mitigation Measures

As indicated in **Table 4-44**, the proposed project would result in a traffic noise impact and the following noise abatement measures were considered:

- Traffic management;
- Alteration of horizontal and/or vertical alignments;
- Acquisition of undeveloped property to act as a buffer zone; and
- The construction of noise walls.

In accordance with TxDOT's guidelines, before any abatement measures can be incorporated into the project, it must be both feasible and reasonable. To be feasible, the measure should reduce noise levels by at least 5 dBA at impacted receivers; and reasonable cost should not exceed $25,000 for each benefited receiver.

(a) Traffic Management: traffic management measures typically considered for noise abatement are reduced speed and time/use restrictions for certain vehicles. Reduced speeds are not an effective noise mitigation measure since a substantial decrease in speed is necessary to provide a perceptible noise reduction. The minor benefit of 1 dBA per 5 mph reduction in speed does not outweigh the associated increase in congestion and air pollution. Additionally, traffic control is not appropriate for the access-controlled facility that by design encourages free flow of traffic. Vehicle time/use restrictions may be considered since heavy trucks may be prohibited from using the facility (see **Section 1.12.7**).

(b) Alteration of horizontal and/or vertical alignments: the alteration of the horizontal alignment is limited by the available right-of-way along the alternative corridors. This could displace existing businesses and residences, require additional right-of-way, and would not be cost effective or reasonable.

(c) Buffer Zone: the acquisition of sufficient undeveloped land adjacent to the Build Alternative would not be cost effective or reasonable, and in most locations would not be possible because of developed properties abutting the right-of-way line.

(d) Noise walls: this is the most commonly used noise abatement measure. Noise walls are normally solid wall-like structures constructed between the noise source (roadway) and the impacted receivers. Noise walls are constructed only if they are both feasible and reasonable and with the approval of adjacent landowners. Factors used to evaluate noise walls include the following:

- Noise walls should have a continuous length with no breaks or gaps for crossing roads, driveways, or walkways;
- Effective noise mitigation should create an insertion loss (the difference in noise levels after mitigation and before mitigation) of 5 dBA or greater; and
- Noise wall costs should not exceed $25,000 for each benefited receiver (noise walls are normally not cost effective for an individual receiver).

A noise wall analysis was performed for the impacted areas of each alternative. Based on the analysis, noise walls were determined to be both feasible and reasonable only at the residential neighborhoods located in the common area at the south terminus of the project. **Plates 4-33** through **4-36** show the proposed noise walls. In this area, from Lamar Street to the south project termini, all project alternatives are the same, and consequently, the proposed noise walls are reasonable and feasible for all alternatives (also see **Section 7.1.2**).

The two parks identified as noise impacted in **Table 4-45** (Sleepy Hollow Park and Oak Cliff Founders Park) are located adjacent to major roadways that are nearer to the park(s) than any project alternative. Sleepy Hollow Park is located east of IH-35E at the north project terminus and Oak Cliff Founders Park is located between Zang Boulevard and Marsalis Avenue (these roads connect to the Houston Street and Jefferson Boulevard Viaducts). These adjacent major roadways are the major source of traffic noise at the two parks. Traffic noise from a Trinity Parkway alternative would be a minor component of total traffic noise at the parks. Based on the noise wall analysis, noise walls along the Trinity Parkway alternatives in the area of the two parks would not provide a 5 dBA reduction and therefore would not be feasible.

Industrial Alternatives 2A and 2B had predicted noise impacts to residential properties along Lamar Boulevard between MLK and Starks Avenue (**Plate 4-33**). This is an area of mixed residential, commercial, and industrial use with several side-streets and numerous entrances to the adjacent properties. Both Industrial Alternatives are on elevated structure through this area and a noise wall on the elevated structure would not provide a 5 dBA reduction at ground level receivers (not feasible). A

noise wall along Lamar Boulevard (constructed at-grade below the Industrial Alternatives) would severely restrict access to a majority of the adjacent activity areas. Numerous gaps in the noise wall would satisfy access requirements but would render the wall ineffective (unfeasible). Also, a noise wall could have a detrimental impact on adjacent businesses by restricting views and access to potential customers. Finally, a noise wall would not be cost effective for an individual receiver. For these reasons, a noise wall would not be feasible and reasonable for this area.

When a preferred alternative is identified, the noise wall analysis would be reviewed for each traffic noise-impacted area of the preferred alternative. Any additional areas where a noise wall is determined to be both reasonable and feasible would be reported in the FEIS. The final decision to construct any proposed noise wall would be made upon completion of the final design for the proposed action and the public involvement process.

A copy of the traffic noise analysis would be provided to local officials to ensure, to the maximum extent possible, future developments are planned, designed, and programmed in a manner that would avoid traffic noise impacts. In accordance with TxDOT's guidelines, on the date of approval of this document (Date of Public Knowledge), FHWA, TxDOT, and NTTA are no longer responsible for providing noise abatement for new developments adjacent to the proposed project.

4.16 VISUAL IMPACT ANALYSIS

The visual impact assessment conducted for the Trinity Parkway was completed in accordance with the FHWA's guiding document: *Visual Impact Assessment for Highway Projects* (1988). According to the FHWA, visual impacts result from the modification of existing visual resources (but not necessarily changes in visual quality) as seen in views to and from the proposed roadway. These impacts are particularly important for projects in visually sensitive urban settings where design and planning considerations include methods for avoiding, minimizing, or reducing impacts. In this section, the impacts to the visual resources of the study area as a result of each alternative are discussed. Each of the Trinity Parkway alternatives is described in **Chapter 2 Alternatives Considered**. The existing visual and aesthetic qualities of the study area are described in **Section 3.8**. A discussion of potential measures to minimize adverse visual impacts is provided in **Chapter 7 Mitigation Measures and Commitments**.

Visual Assessment Methodology

Assessing the visual impacts of a large-scale project like the Trinity Parkway is the result of two primary assessments: the evaluation of changes in visual resources and the consideration of projected viewer group responses to those changes. Assessing changes in visual resources can be described as recording the probable visual impacts of differing alternatives - not predicting the actual changes in the

quality of what viewers see. However, from combining the probable visual impacts with the response to visual changes by the four viewer groups (motorists, residents, recreational users, and business employees/patrons - described in **Section 3.8.1 Viewer Groups**), changes in visual quality can be inferred.

In order to evaluate changes in visual resources, photographs were taken at multiple key observation points (KOPs) to depict the current visual character of the study area. KOPs were derived from a list of 26 points identified with the assistance of the Community Advisory Work Group (CAWG). The location and viewshed of each KOP is shown on **Plate 4-37** at the end of this chapter.

Photos of select observation points throughout the study area were then digitally altered to show the appearance of the proposed project (if visible from the KOP). The altered photos were compared to the originals to predict the change in visual resources, which are graphically represented herein and are quantitatively assessed based on the prominence that each alternative would have in the view. For example, if the resulting photograph appears to focus on the proposed roadway or the roadway obscures the original view, the roadway is considered prominent in the view; if the roadway is visible, but does not constitute a significant portion of the photo, it is considered minimally prominent. Prominence was measured during the quantitative assessment as the overall change in the form, line, color, and texture of the visible landscape in each view as well as the roadway's dominance and scale in the view and the resulting diversity and continuity of the landscape. While this approach presents a more analytical rating system for impacts, it is important to keep in mind that this is a very limited approach to measuring visual changes.

The visual impact for each KOP was assessed and rated according to the level of the roadway's visual impact (i.e., none, weak, moderate, and strong impacts). The summary of the impacts derived from the assessment is depicted below in **Table 4-46**. Several KOPs were not assessed and rated for every viewer group; rather, KOPs were rated only for applicable viewer groups - those which would view the project from the KOPs specific location.

TABLE 4-46. VISUAL IMPACT ASSESSMENT

Trinity Parkway Build Alternatives	KEY OBSERVATION POINTS																								
	1	4	5	9	17	19	20	23	24	26	29	30	31	34	41	42	49	51	55	57	58	59	61	62	63
2A Irving/Industrial Boulevard (Elevated)																									
Recreational Users	NA	NA	NA	NA	NA	NA	NA	NA	NA	W	W	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	W	NA	NA
Residents	NA	NA	NA	NA	NA	NA	NA	NA	S	NA	NA	NA	NA	NA	NA	NA	M	S	NA	NA	NA	NA	NA	NA	NA
Business Employees/Patrons			W		NA	NA	NA	NA	S	NA	NA	NA	S	NA	NA	NA	M	S	NA	NA	M	NA	NA	NA	NA
Motorists			NA		NA	NA	NA	NA	S	NA	NA	NA	S	NA	NA	NA	M	S	NA	NA	M	NA	NA	NA	NA
2B Irving/Industrial Boulevard (At Grade)																									
Recreational Users	NA	NA	NA	NA	NA	W	NA	NA	NA	W	W	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	W	NA	NA
Residents	NA	NA	NA	NA	NA	NA	NA	NA	S	NA	NA	NA	NA	NA	NA	NA	M	S	NA	NA	NA	NA	NA	NA	NA
Business Employees/Patrons			W	NA	NA	NA	NA	NA	S	NA	NA	NA	S	NA	NA	NA	M	S	NA	NA	M	NA	NA	NA	NA
Motorists			NA	NA	NA	NA	NA	NA	S	NA	NA	NA	S	NA	NA	NA	M	S	NA	NA	M	NA	NA	NA	NA
3A Combined Parkway (Original)																									
Recreational Users	NA	NA	NA		NA	M	M	M	NA	S	S	NA	NA	W	S	W	NA	NA	NA	NA	NA	NA	S	NA	NA
Residents	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	S	W	NA	NA	NA	NA	NA	NA
Business Employees/Patrons	S	S	S		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	S	NA	NA	S	W	NA	NA	NA	NA	NA	NA
Motorists	S	S	NA		NA	NA	NA	NA	NA	NA	S	NA	NA	W	NA	NA	NA	S	W	NA	NA	NA	NA	NA	NA
3B Combined Parkway (Modified)																									
Recreational Users	NA	NA	NA		NA	M	M	M	NA	S	S	NA	NA	W		W	NA	NA	NA	NA	NA	NA	S	NA	NA
Residents	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	S	W	NA	NA	NA	NA	NA	NA
Business Employees/Patrons	S	S	S		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	S	NA	NA	S	W	NA	NA	NA	NA	NA	NA
Motorists	S	S	NA		NA	NA	NA	NA	NA	NA	S	NA	NA	W	NA	NA	NA	S	W	NA	NA	NA	NA	NA	NA
3C Combined Parkway (Further Modified)																									
Recreational Users	NA	NA	NA	NA		M	M	M	NA	S	S	NA	NA	W	S	W	NA	NA	NA	NA	NA	NA	S	NA	NA
Residents	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	S	W	NA	NA	NA	NA	NA	NA
Business Employees/Patrons	S	S	S	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	S	NA	NA	S	W	NA	NA	NA	NA	NA	NA
Motorists	S	S	NA	NA		NA	NA	NA	NA	NA	S	NA	NA	W	NA	NA	NA	S	W	NA	NA	NA	NA	NA	NA
4A Split Parkway Riverside (Original)																									
Recreational Users	NA	NA	NA	NA	M	S	W	M	NA	M	M	NA	NA	M	S	W	NA	NA	NA	NA	NA	NA	M	NA	S
Residents	NA	NA	NA	NA	M	NA	NA	M	NA	NA	NA	NA	NA	NA	NA	NA	NA	S	M	NA	NA	NA	NA	NA	NA
Business Employees/Patrons	S	S	S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	S	NA	NA	S	M	NA	NA	NA	NA	NA	NA
Motorists	S	S	NA	NA	NA	NA	NA	NA	NA	NA	M	NA	NA	M	NA	NA	NA	S	M	NA	NA	NA	NA	NA	NA
4B Split Parkway Riverside (Modified)																									
Recreational Users	NA	NA	NA	NA	M	S	W	M	NA	M	M	NA	NA	M	S	W	NA	NA	NA	NA	NA	NA	M	NA	S
Residents	NA	NA	NA	NA	M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	S	M	NA	NA	NA	NA	NA	NA
Business Employees/Patrons	S	S	S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	S	NA	NA	S	M	NA	NA	NA	NA	NA	NA
Motorists	S	S	NA	NA	NA	NA	NA	NA	NA	NA	M	NA	NA	M	NA	NA	NA	S	M	NA	NA	NA	NA	NA	NA
5 Split Parkway Landside																									
Recreational Users	NA	NA	NA	NA	M	S	NA	NA	NA	W	M	W	NA	S	S	W	NA	NA	NA	NA	NA	NA	W	NA	S
Residents	NA	NA	NA	S	M	NA	NA	NA	NA	NA	NA	W	NA	NA	NA	NA	NA	S	M	NA	NA	S	NA	NA	NA
Business Employees/Patrons	S	S	S	M	NA	NA	NA	NA	NA	NA	S	W	NA	NA	S	NA	NA	S	M	NA	W	NA	NA	NA	NA
Motorists	S	S	NA	M	NA	NA	NA	NA	NA	NA	S	S	NA	S	NA	NA	NA	S	M	NA	W	S	NA	M	NA

Visual Impact	Visual Items
None	No Visual Change
W Weak	Minimal Visual Change - Somewhat visible, but consistent with existing landscape
M Moderate	Moderate Visual Change - Considerably visible, but does not obscure the view of the landscape
S Strong	Strong Visual Change - Highly visible, obscures view, greatly alters character of the landscape

NA Not Applicable Not Applicable to this Viewer Group - This view applies only to specific viewer groups because of its location

The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.

4.16.1 No-Build Alternative

There would be no visual change and therefore no visual impacts to the views or other aesthetic conditions within the study area as a result of the No-Build Alternative.

4.16.2 Build Alternatives

Northern and Southern Termini

The project's northern terminus is located at the IH-35E/SH-183 interchange. Construction of the Build Alternatives in this area would be primarily on elevated structure. Though not relevant to visual impacts as experienced by existing viewer groups, views from the northern terminus of the proposed by motorists would include short-range vistas of the immediate landscape. Long-range vistas would be evident from the elevated sections of the proposed alternatives. Views toward any of the Build Alternatives in this location would be largely from motorists traveling area roadways, existing nearby businesses and residents would also be visually impacted by all of the alternatives.

The southern terminus of any of the Build Alternatives intersects US-175 at SH-310. An at-grade section proposed for the southern terminus would link any of the Build Alternatives to the US-175/SH-310 interchange. Views from any of the Build Alternatives by future motorists would provide limited long-range vistas of the adjacent residential and commercial developments. The southern terminus of any of the Build Alternatives would be a dominant visual feature for adjacent residential and commercial viewers. For many of the adjacent residents, each of the Build Alternatives would serve as a visual and physical barrier running through their neighborhood.

Alternative 2A

Views from Alternative 2A to Adjacent Areas

The most common view for future motorist from Alternative 2A would be the sides and tops of commercial businesses and residential neighborhoods. The east levee would obstruct some of the views from the

View looking northwest along Industrial Boulevard toward the Industrial/Irving/Market Center Boulevard Intersection from under Alternative 2A (KOP No. 24).

elevated Trinity Parkway towards the Dallas Floodway and beyond. The buildings in and around the Dallas CBD would be quite visible throughout Trinity Parkway (Alternative 2A), except from segments along Irving/Industrial Boulevard. However, existing motorists using Irving Boulevard, Industrial Boulevard, and South Lamar Street would be driving underneath the elevated facility, which would block skyward views and limit the views toward adjacent businesses and neighborhoods.

Views to Alternative 2A from Adjacent Areas

Alternative 2A would present a visual barrier between the Irving/Industrial Boulevard properties. Adjacent storefronts, depending on the proximity to the proposed facility, would have restricted skyward views, views toward the horizon, and across Industrial/Irving Boulevard. The topographic relief and numerous large buildings would restrict visibility of the roadway to the immediate vicinity, other than elevated roadways and buildings near the Dallas CBD. Most commercial businesses and residential structures beyond the immediate Irving/Industrial Boulevard corridor would not have their views restricted or

impeded by Alternative 2A. This alternative would not be visible to most of the views from the Dallas Floodway area and beyond due to the east levee, which would be a visual barrier.

Alternative 2B

Views from Alternative 2B to Adjacent Areas

Motorists using Alternative 2B would predominately see the sides of commercial businesses and a few residential neighborhoods and would have intermittent views of the downtown skyline. Unlike Alternative

View looking northwest along Industrial Boulevard toward the Industrial/Irving/Market Center Boulevard Intersection adjacent to Alternative 2B (KOP No. 24).

2A, this "at-grade" facility would not block skyward views from motorists using Irving/Industrial Boulevard or restrict the views predominately towards these facilities, except for locations where bridges would be placed. This would limit skyward views and expose the top of the previously mentioned buildings in some locations. The east levee and the buildings in the Dallas CBD would be more visible to existing motorists because of the widened corridor and more set-back building frontages.

Views to Alternative 2B from Adjacent Areas

Alternative 2B would experience visibility impacts similar to Alternative 2A in places where this alternative would utilize elevated facilities to by-pass existing local thoroughfares. Since this alternative is predominantly an "at-grade" facility, it would be visible to fewer viewer groups than Alternative 2A. Building removal associated with this alternative would result in the expansion of views across the landscape, including more views of the CBD, where the roadway maintains an "at-grade" profile, especially along Irving/Industrial Boulevard.

Alternative 3A

Views from Alternative 3A to Adjacent Areas

The most common view for future motorists from Alternative 3A would be of the east levee and the floodwall along the southern edge of the roadway. The east levee would limit the views from this alternative towards many of the commercial businesses and residential neighborhoods on the other side of the levee and of the Dallas CBD.

Views to Alternative 3A from Adjacent Areas

Outside of the Dallas Floodway levees, Alternative 3A would be visible at both termini and where access ramps provide connections with other roadways. Topographic relief (namely the east levee) would restrict most views of this alternative from the north. Inside the Dallas Floodway levees, Alternative 3A would be

View looking northwest on top of the east levee toward the Commerce Street Viaduct alongside Alternative 3A (KOP No. 29).

visible to recreational users between the levees; in some cases, the roadway itself and access ramps would be visible while in other cases, the roadway would be hidden from view behind the Trinity Parkway's floodwall. While the floodwall itself would be visible in some locations, an earthen embankment will be built against the floodwall; in these locations, the combined floodwall/embankment would visually resemble the levees and it would appear as if the east levee were simply closer to the

center of the Dallas Floodway than it actually is. The topographic relief, east levee, and numerous large buildings would restrict the Trinity Parkway's visibility to the immediate vicinity, other elevated roadways, and buildings in the Dallas CBD. This alternative would not substantially limit the views of most commercial businesses and residential neighborhoods beyond the immediate corridor. The west levee would restrict most of the views toward this alternative from the west and southwest the Dallas Floodway.

Alternative 3B

Views from Alternative 3B to Adjacent Areas

Views from Alternative 3B would be similar to Alternative 3A, except that Alternative 3B has fewer interchange connections and elevated sections and would therefore afford fewer views of downtown Dallas and adjacent land uses.

Views to Alternative 3B from Adjacent Areas

Views to Alternative 3B would be similar to Alternative 3A, except this alternative has fewer interchange connections and elevated sections, which would lower its visibility from adjacent park and commercial areas.

Alternative 3C

Views from Alternative 3C to Adjacent Areas

Views from Alternative 3C would be similar to Alternative 3B.

Views to Alternative 3C from Adjacent Areas

Views to Alternative 3C would be similar to Alternative 3B.

Alternative 4A

Views from Alternative 4A to Adjacent Areas

Outside of the Dallas Floodway levees (at either termini), Alternative 4A would provide motorists a view of commercial businesses, a few residential neighborhoods, and buildings in the Dallas CBD, while the levees would limit motorists' views toward the Dallas Floodway and areas south. Inside the levees, this alternative would provide motorists vantage points from both sides of the Dallas Floodway, though these views would be highly limited by the floodwalls. The levees would partially restrict or obscure views of the surrounding buildings and neighborhoods outside of the levees with the exception of the tall buildings in the Dallas CBD.

Views to Alternative 4A from Adjacent Areas

At either end, Alternative 4A would run outside of the Dallas Floodway levees, through the industrial, commercial, and residential districts. The at-grade portions of this alternative would be visible from businesses in the immediate vicinity and from taller buildings in the Dallas CBD. Overpasses, ramps, and other elevated structures of this alternative would be visible to more viewers, including recreational users and residents.

View looking northwest on top of the east levee toward the Commerce Street Viaduct alongside Alternative 4A (KOP No. 29).

Inside the Dallas Floodway levees, Alternative 4A would be highly visible to recreational users standing atop the levees, buildings in the Dallas CBD, and, in some areas, recreational users standing in the Dallas Floodway. This alternative would not limit visibility outside of the Dallas Floodway for recreational users any more than the existing levees themselves do. Most commercial businesses and residential neighborhoods beyond the immediate levees would not have their views affected by Alternative 4A.

Alternative 4B

Views from Alternative 4B to Adjacent Areas

Views from Alternative 4B would be similar to Alternative 4A, except that Alternative 4B has fewer interchange connections and would therefore afford fewer views of downtown Dallas and adjacent land uses.

Views to Alternative 4B from Adjacent Areas

Views to Alternative 4B would be similar to Alternative 4A, except this alternative has fewer interchange connections, which would lower its visibility from adjacent park and commercial areas.

Alternative 5

Views from Alternative 5 to Adjacent Areas

Similar to Alternatives 4A and 4B, Alternative 5 is a split alignment that would provide motorists a view of adjacent commercial businesses, residential neighborhoods, and the Dallas CBD near each terminus. Unlike Alternatives 4A and 4B, the split roadways for this alternative are located along the “landside” of the levees. Alternative 5 would provide northbound motorists a view of the east levee and adjacent commercial and industrial districts while southbound motorists would see the west levee and adjacent neighborhoods. Motorists traveling in both directions would have views of the buildings in the Dallas CBD. The levees would mostly block the view of the Dallas Floodway for motorists.

View looking northwest on top of the east levee toward the Commerce Street Viaduct alongside Alternative 5 (KOP No. 29).

Views to Alternative 5 from Adjacent Areas

Near both termini, Alternative 5 would pass through the adjacent urbanized areas on its way to and from of the Dallas Floodway similar to Alternatives 3A, 3B, 3C, 4A, and 4B. Views to Alternative 5 would be similar to these alternatives in these areas

Along the "landside" of the levees, this alternative would be highly visible to commercial buildings and residential neighborhoods in the immediate corridor along the east levee and the buildings in the Dallas CBD, as well as commercial buildings and residential neighborhoods in the immediate corridor along the west levee. The southbound roadway would present a visual and physical barrier between the West Dallas, La Bajada, Oak Cliff, The Bottoms, Skyline Heights, and Cadillac Heights neighborhoods and the Trinity River Greenbelt Park. Most of this alternative, except for the upper portions of elevated structures and Dallas Floodway crossings would not be visible from the Dallas Floodway because of the levees.

Summary

At the northern and southern termini, all of the Build Alternatives would have similar visual impacts. From within the Dallas Floodway, Alternatives 4A and 4B would have the most substantial visual impact. Alternatives 3A, 3B, 3C, and 5 would have lesser degrees of visual impact to this area, while Alternatives 2A and 2B would not visually impact the Dallas Floodway viewers. Along the Irving/Industrial Boulevard corridor, Alternatives 3A, 3B, 3C, 4A, and 4B would have no visual impact. Alternative 2A would have the greatest visual impact, followed by 2B and 5 respectively. From southwest of the west levee, Alternatives 2A, 2B, 3A, 3B, 3C, 4A, and 4B would have no visual impact; therefore, Alternative 5 would have the largest impact from this area. Southeast of MLK Boulevard (IH-45) all of the alternatives would have a similar degree of visual impact.

Trinity Parkway Design Enhancements

On any of the Build Alternatives, design guidelines would be applied to the design and construction of the roadway which would result in a more attractive piece of infrastructure than a typical urban highway. These design enhancements would be consistent with FHWA's context-sensitive approach and NTTA's *System-Wide Design Guidelines* (NTTA 2003, as amended). Design enhancements would consist of context-sensitive landscaping, foreground elements (i.e., toll gantries, toll gantry landscaping, and foreground colors unique to the corridor), and background elements (i.e., background color, roadway and pedestrian lighting, sign structures, wall texture, logo wall panels, bridge railing, right-of-way fencing, and cross street identification). Design enhancements and quality landscaping would help soften, and partially shield, the Trinity Parkway and may help maintain or improve the property values of businesses and residential areas adjacent to the facility. For additional details, see **Section 7.1.2 Measures to Minimize Impacts to Neighborhoods**.

Toll Road Impacts

The designation of the Trinity Parkway as a toll road might not add to the visual impacts created by the highway itself. If conventional toll facilities are used, the construction materials, structural design, and size of the facilities would exhibit appropriate color, scale, and texture and would exude a visually pleasing character in keeping with NTTA's System-Wide Design Guidelines, which would minimize any perceived denigration of the visual landscape.

4.17 HAZARDOUS/REGULATED MATERIALS

This section summarizes the potential impacts of the No-Build and Build Alternatives with regard to hazardous and regulated materials. Hazardous and regulated materials impacts are anticipated primarily during construction activities. Thus, additional detail regarding these potential impacts is presented in **Section 4.20 Temporary Impacts During Construction**.

The construction of the proposed action poses little risk of hazardous waste contamination of the environment. Hazardous waste impacts associated with the proposed action are more likely to be associated with present and past sites and facilities that have already impacted the environment or have the potential to impact the existing environment. Such facilities that are located within the preferred alternative right-of-way would be acquired by NTTA and secured in accordance with FHWA policies and applicable state and federal laws to minimize the risk of a contaminant release to the environment.

Environmental liabilities may be associated with the acquisition of contaminated properties. However, CERCLA can hold past and present owners and/or operators of real property liable for the costs of site investigations and remediation. CERCLA as amended by the Small Business Liability Relief and Brownfields Revitalization Act (the "Brownfields Amendments") of 2002 provides liability protection if the owner or operator complies with specific provisions outlined in the statute, which include conducting all appropriate inquiries (40 CFR Part 312) into the condition of the property prior to acquisition.

Table 3-37 in **Section 3.9** and **Plate 3-25** lists 63 sites within 500 feet of the Build Alternative right-of-ways that were identified as hazardous waste/material sites of potential environmental concern. The table also identifies the regulatory ID number, status, and other information about each site. Examples of hazardous waste/material sites with potential environmental concerns are landfills, active Superfund sites, RCRA sites with reported violations, and reported LUST sites that have not attained closure status.

4.17.1 No-Build Alternative

The No-Build Alternative would have no impact on existing hazardous waste/materials sites.

4.17.2 Build Alternatives

The 63 sites within 500 feet of the Build Alternative right-of-ways were further segregated to identify only those sites that are located within or adjacent to the alternative right-of-ways.

Table 4-47 provides a summary of the identified hazardous waste/material sites within or adjacent to the proposed right-of-way boundaries for each of the Trinity Parkway Build Alternatives. **Plates 4-14** through **4-16** show the location of these sites.

TABLE 4-47. SUMMARY OF HAZARDOUS WASTE/MATERIAL SITES POTENTIALLY AFFECTED BY THE TRINITY PARKWAY BUILD ALTERNATIVES

ID Number	Regulatory Database*	Facility Name/Address	Trinity Parkway Build Alternatives							
			2A	2B	3A	3B	3C	4A	4B	5
2	RCRIS-SQG LUST RST	Hylift, Inc. 2928 Irving Boulevard	Yes	Yes	---	---	---	---	---	---
4	LUST RST	Bright Truck Leasing 3020 Irving Boulevard	Yes	Yes	---	---	---	---	---	---
5	LUST RST	Aladdin Car Wash 1449 Inwood Road	Yes	Yes	---	---	---	---	---	---
6	RCRIS-SQG CERCLIS	Motor Works/Dallas Battery, Inc. 2743-45 Irving Boulevard	Yes	Yes	---	---	---	---	---	---
7	IOP LUST RST	Pioneer Concrete of Texas/Hanson Aggregate Central 2151 Irving Boulevard	Yes	Yes	---	---	---	---	---	Yes
8	LUST RST	Hargrove Electric Co. 1522 Market Center Boulevard	---	Yes	---	---	---	---	---	---
12	LUST RST	Auto Detail and Service 1101 N. Industrial Boulevard	Yes	Yes	---	---	---	---	---	---
13	LUST RST	Payless Convenience Store 1000 N. Industrial Boulevard	Yes	Yes	---	---	---	---	---	---
15	RCRIS-SQG	TU Electric Payne Street Service Center (Dallas Power and Light Materials Reclaim) 100 Payne Street	---	---	---	Yes	Yes	---	---	Yes
19	RCRIS-SQG	Oak Cliff Plating Co. 2330 N. Beckley Avenue	---	---	---	---	---	---	---	Yes
21	LUST RST	Kwik Stop (Diamond Shamrock) 418 Corinth Street	Yes	---	---	---	---	---	---	---
22	LUST RST	Texaco Service Station (Gulf/Chevron/Metro Cost Plus) 201 Corinth Street	Yes	Yes	---	---	---	---	---	---
24	VCP	Atlas Scrap Iron and Metal Company 2209 S. Industrial Boulevard	Yes	Yes	---	Yes	Yes	---	---	Yes
25	RCRIS-SQG RST ENF	Faubion Associates, Inc. (Dresser Industries Guiberson Div.) 1000 Forest Avenue	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
26	RCRIS-SQG RCRIS-TSD RAATS RST LUST ICIS	Praxair, Inc. (Union Carbide Corp./Linde Gases of the South/Airgas Southwest) 1001 Forest Avenue	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 4-47. SUMMARY OF HAZARDOUS WASTE/MATERIAL SITES POTENTIALLY AFFECTED BY THE TRINITY PARKWAY BUILD ALTERNATIVES

ID Number	Regulatory Database*	Facility Name/Address	Trinity Parkway Build Alternatives							
			2A	2B	3A	3B	3C	4A	4B	5
27	RCRIS-LQG LUST RST	Brockway Standard Southwestern Steel Plant 3301 S. Lamar Street	Yes	Yes	---	---	---	---	---	---
28	RCRIS-SQG LUST RST	Procter and Gamble Manufacturing (Dallas Public Schools Transportation Dept. facility) 1301 McDonald/3701 S. Lamar	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
29	LUST RST RCRIS-SQG VCP ICIS	Beall Concrete (Tri Gas, Inc. /Chemetron Corp.) 3301 S. National Street	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
30	RCRIS-LQG	Occidental Chemical Corp. Dallas Plant (Diamond Shamrock Corp. Dallas Silicate/Oxychem) 1100 Lenway Street	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
31	RCRIS-LQG RST	Okons Iron and Metal Co. (Trinity Recycling) 4801 S. Lamar Street	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
32	CLI - Closed Landfill	Herman Gibbons 5003 S. Lamar Street	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
33	LUST RST	Vacant Station 5006 S. Lamar	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
36	SWF/LF - Closed Landfill	City of Highland Park Landfill 1261 Conveyor Lane	---	---	Yes	Yes	Yes	Yes	Yes	Yes
37	Not Registered (PSTs)	Artistic Furniture Craftsmen 1820 Irving Boulevard	Yes	Yes	---	---	---	---	---	---
38	Not Registered (PSTs)	Abandoned Gas Station 1129 N. Industrial Boulevard.	Yes	Yes	---	---	---	---	---	---
40	CLI - Landfill closed in 1930s	Unnamed Landfill E. Side of Trinity River, S. of MLK	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
41	Not Registered (PSTs)	Former Wrecking Company 4901 S. Lamar Street	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
42	Not Registered - Abandoned Landfill	Forest Avenue Landfill North of MLK on east side of Trinity River	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
43	NPL CERCLIS RCRIS-SQG/TSD CORRACTS	Murmur Corporation Site (Murph Metals/RSR Corporation) 2727 Westmoreland Road	---	---	---	---	---	Yes	Yes	Yes
44	VCP IOP	Dover Elevator 7017-7021 Carpenter Freeway	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
49	RCRIS-SQG VCP LUST	North Texas Tollway Authority (NTTA Maintenance Facility/Texas Turnpike Authority) 405 S. Industrial Boulevard	Yes	Yes	---	---	---	---	---	---
51	LUST	Jim Lake Co. Property 166 Howell Street	---	Yes	---	---	---	---	---	---
52	RCRIS-SQG ENF LUST	Volvo & GMC Trucks of Dallas (Summit Wite GMC Trucks/Paint and Body Shop) 2959 Irving Boulevard	Yes	Yes	---	---	---	---	---	---
53	RCRIS-SQG	Creative Type and Graphics 1201 Oak Lawn Avenue	Yes	Yes	---	---	---	---	---	---
54	RCRIS-SQG LUST	Moody Day (Crescent Machinery Co.) 2323 Irving Boulevard	Yes	Yes	---	---	---	---	---	---
55	RCRIS-SQG	The Drive Shaft Shop 530 S. Industrial Boulevard	Yes	Yes	---	---	---	---	---	---

TABLE 4-47. SUMMARY OF HAZARDOUS WASTE/MATERIAL SITES POTENTIALLY AFFECTED BY THE TRINITY PARKWAY BUILD ALTERNATIVES

ID Number	Regulatory Database*	Facility Name/Address	Trinity Parkway Build Alternatives							
			2A	2B	3A	3B	3C	4A	4B	5
56	ICIS RST	Ram Automotive (First Choice, Greenleaf) 5311 S. Lamar Street	---	---	Yes	Yes	Yes	Yes	Yes	Yes
57	ICIS RCRIS-SQG LUST RST	Oak Farms Dairy (Southern Foods Group) 1114 N. Lancaster Avenue	---	---	---	---	---	---	---	Yes
58	ENF ICIS	Big City Crushed Concrete (Recycle Concrete Plant, Downtown Dallas Ready Mix) 1005 Forest Avenue	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
59	RCRIS-SQG ICIS	Southwest Industrial Gases 538 S. Industrial Boulevard	Yes	---	---	---	---	---	---	---
60	ICIS RST	Knox Oil of Texas, Inc. (Knox Super Stop) 2221 Irving Boulevard	Yes	Yes	---	---	---	---	---	---
61	ICIS	Ace Brass and Aluminum Co. 1203 S. Industrial Boulevard	---	Yes	---	---	---	---	---	---
62	ICIS	Okon Metals, Inc. 2110 S. Industrial Boulevard	Yes	Yes	---	---	---	---	---	---
		Totals	**34**	**35**	**15**	**17**	**17**	**16**	**16**	**21**

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
Plate ID numbers correspond to the locations on **Plates 4-14** through **4-16**.
Yes = Site is potentially affected by the Build Alternative indicated.
--- = Right-of-way would not encounter the site.
* **Table 3-37** (**Chapter 3**) gives additional details about each site and the EPA and TCEQ regulatory reference numbers.

As shown in **Table 4-47**, a total of 43 hazardous/regulated material sites were identified along or within the right-of-way of the Build Alternatives. Each of the eight Build Alternatives would impact hazardous/regulated material sites ranging from 15 (Alternatives 3A) to 35 (Alternative 2B).

During the preliminary design stage for each of the Build Alternatives, the project engineers attempted to minimize the total amount of right-of-way crossing the various landfills and other hazardous/regulated materials sites, thereby reducing the degree of impacts from these areas. Based on preliminary design schematics of the Build Alternatives, these areas could not be avoided during the planning and construction of the transportation facility; geotechnical considerations, vehicle speed, ramp and structure locations, and design geometry limit the opportunities to avoid the various landfills and other hazardous/regulated materials sites.

All of the sites listed in **Table 4-47** were identified as environmental concerns located adjacent to or within an alternative alignment. The majority are RCRA sites with reported violations or LUST sites that have not yet attained closure status. Two Superfund (CERCLA) sites (ID Numbers 6 and 43) were identified in the study area. Five sites (ID Numbers 7, 24, 29, 44, and 49) are sites where contamination of soils and/or groundwater has been documented, and as a result, have voluntarily been entered into a state

regulatory program. Four sites (ID Numbers 32, 36, 40, and 42) are landfills. **Table 3-37** provides additional details. Two sites (ID Numbers 28 and 30) are industrial sites with known on-site disposal areas. All of the alternatives are on structure (elevated bridge) where they would encounter the above-mentioned landfills and industrial disposal areas.

In addition to the sites listed in **Table 4-47**, previous environmental investigations performed by others have identified the presence of potential constituents of concern in a limited number of samples of soils and sediment at locations within the Dallas Floodway. Additional details are presented in **Section 3.9.1**. The potential for encountering constituents of concern in soils within the Dallas Floodway would be a consideration for Alternatives 3A, 3B, 3C, 4A, 4B, and 5. Further investigation may be necessary to characterize soils within the proposed construction limits in the Dallas Floodway, including potential borrow areas for roadway embankment (see **Plate 4-26**).

When the preferred alternative is identified and prior to right-of-way acquisition, it is anticipated that a Phase I Environmental Site Assessment (in accordance with 40 CFR Part 312 and the most current American Society for Testing and Materials [ASTM] Standard) would be performed for right-of-way acquisitions that have known or potential occurrences of hazardous materials. Based on the results of the Phase I Environmental Site Assessment, sampling and analysis activities and potential remedial activities can be evaluated for the preferred alternative. Additional information is provided in **Chapter 7 Mitigation Measures and Commitments**.

4.18 UTILITIES

This section describes the potential impacts to various utility systems located throughout the study area. As previously described in **Section 3.1.5**, several major utilities are located within the study area, which are shown on **Plates 3-11** through **3-13** and **Plate 3-23** at the end of **Chapter 3**. Should any utility relocation be necessary, NTTA would comply with 23 CFR Part 645 (*Utilities*); Subpart A (*Utility Relocations, Adjustments, and Reimbursement*); and Subpart B (*Accommodation of Utilities*). NTTA would also follow the procedures involved in Public Utilities Commission (PUC) *General Order 131-D*, dated August 11, 1995.

4.18.1 No-Build Alternative

Impacts to utilities would not occur under the No-Build Alternative.

4.18.2 Build Alternatives

Each of the Trinity Parkway Build Alternatives would impact major utilities differently. Overhead electrical, telephone, and television cables would be relocated. The exact locations of underground cables or fiber-optic lines would be identified once the preferred alternative has been identified. The potential impacts to known major utilities associated with each Build Alternative are presented in **Table 4-48**.

TABLE 4-48. POTENTIAL IMPACTS TO MAJOR UTILITIES

Plate ID	Description of Major Utilities	Trinity Parkway Build Alternatives							
		2A	2B	3A	3B	3C	4A	4B	5
Plate 3-11 **Water Lines -** *Key to Symbols:* **R** = Relocation (number of linear feet); **N** = No Impact									
1	48-inch concrete water line	R (1,600)	R (1,600)	R (1,600)	R (1,600)	R (1,600)	R (1,600)	R (1,600)	R (1,600)
2	36-inch water line	R (500)	R (700)	N	N	N	N	N	N
3	24-inch water line	N	N	N	N	N	R (500)	R (500)	R (1,300)
6	24-inch concrete water line	R (14,000)	R (14,000)	N	N	N	N	N	N
7	20-inch cast-iron water line	R (9,100)	R (9,100)	N	N	N	N	N	N
8	24-inch concrete water line	R (9,100)	R (9,100)	N	N	N	N	N	N
9	66-inch concrete water line	R (6,000)	R (6,000)	N	N	N	N	N	N
Plate 3-12 **Sanitary Sewer Lines -** *Key to Symbols:* **R** = Relocation (number of linear feet); **N** = No Impact									
3	60-inch sludge force main	R (6,000)	R (6,000)	N	R (2,000)	R (2,000)	N	N	N
4	12-inch concrete sanitary sewer	R (2,500)	R (2,500)	N	N	N	N	N	N
5	10-inch concrete sanitary sewer	R (2,000)	R (2,000)	N	N	N	N	N	N
6	12-inch sanitary sewer	R (1,200)	R (1,200)	N	N	N	N	N	N
Plate 3-13 **Natural Gas Lines -** *Key to Symbols:* **R** = Relocation (number of linear feet); **N** = No Impact; **Atmos** = Atmos Gas Co.									
1	24-inch Atmos gas line	N	N	N	N	N	N	N	R (16,600)
4	16-inch Atmos gas line	N	N	N	N	N	N	N	R (4,300)
Plate 3-13 **Electrical - Overhead Transmission Lines -** *Key to Symbols:* **R** = Relocation (number of towers); **A** = Adjustment (number of towers); **N** = No Impact; **kV** = kilovolts (of electricity)									
1	Oncor 138 kV trans. line (1)	N	N	A (2)	R (2); A (2)	R (2); A (2)	A (4)	A (4)	R (23); A (15)
2	Oncor 138 kV trans. Lines (2)	N	N	R (2); A (4)	R (2); A (2)	R (2); A (2)	A (6)	A (6)	R (2)
3	Oncor 138 kV trans. line (1)	A (2)	R (1); A (1)	R (4); A (7)	R (6); A (3)	R (6); A (3)	R (4); A (7)	R (4); A (7)	R (26); A (1)
4	Oncor 345 kV and 138 kV trans. line (1)	N	N	N	N	N	R (1); A (10)	R (1); A (10)	R (1); A (2)
5	Oncor 138 kV trans. Line (1)	R (1)	R (1)	N	A (3)	A (3)	A(2)	A(2)	R (1); A(2)
6	Oncor 138 kV trans. Line (1)	N	N	A (1)	R (1); A (2)	R (1); A (2)	A (1)	A (1)	R (1)
7	Oncor trans. line (1)	R (1)	R (1)	R (1)	R (1)	R (1)	R (1)	R (1)	R (1)
8	Oncor 138 kV trans. Line (1)	A (2)	R (1); A (1)	N	N	N	N	N	N
9	Oncor trans. lines (4)	R (2); A (6)	R (2); A (6)	N	N	N	N	N	N
Plate 3-13 **Electrical - Substations -** *Key to Symbols:* **R** = Relocation; **N** = No Impact									
1	West Network Substation (Oncor)	N	R	N	N	N	N	N	N

TABLE 4-48. POTENTIAL IMPACTS TO MAJOR UTILITIES

Plate ID	Description of Major Utilities	Trinity Parkway Build Alternatives							
		2A	2B	3A	3B	3C	4A	4B	5
Plate 3-23 **Storm Drainage - Pump Stations** *Key to Symbols:* **R** = Reconstruction; **N** = No Impact									
As Labeled	Pump Station 'A'	N	N	N	N	N	N	N	R
As Labeled	Pump Station 'B'	N	N	N	N	N	N	N	R
As Labeled	Pump Station 'C'	N	N	N	N	N	N	N	R
As Labeled	Pump Station 'D'	N	N	N	N	N	N	N	N
Plate 3-23 **Storm Drainage - Storm Water Outfalls -** *Key to Symbols:* **E** = Extension; **B** = Bridge (over outfall); **N** = No Impact									
As Labeled	Hampton Pump Station Outfall	N	N	B	B	B	B	B	N
As Labeled	Pavaho Pump Station Outfall	N	N	N	N	N	B	B	N
As Labeled	Pump Station 'A' Outfall	N	N	E	E	E	E	E	N
As Labeled	Pump Station 'B' Outfall	N	N	B	B	B	B	B	N
As Labeled	Pump Station 'C' Outfall	N	N	N	N	N	E	E	N
As Labeled	Pump Station 'D' Outfall	N	N	N	N	N	B	B	N
As Labeled	Turtle Creek Pressure Sewer	N	N	B	B	B	B	B	N
As Labeled	Woodall Rodgers Pressure Sewer	N	N	E	E	E	E	E	N
As Labeled	Dallas Branch Pressure Sewer	N	N	E	E	E	E	E	N
As Labeled	Bellevue Pressure Sewer	N	N	B	E	B	B	B	N
As Labeled	Lake Cliff Pressure Sewer	N	N	N	N	N	E	E	N
As Labeled	Old Coombs Creek Pressure Sewer	N	N	N	N	N	B	B	N
As Labeled	Coombs Creek Pressure Sewer	N	N	N	N	N	B	B	N
Plate 3-23 **Storm Drainage - Storage Sumps -** *Key to Symbols:* **I** = Impact; **N** = No Impact									
As Labeled	Sump 1E	N	N	N	N	N	N	N	I
As Labeled	Sump 2E	N	N	N	N	N	N	N	I
As Labeled	Sump 3E	N	N	N	N	N	N	N	I
As Labeled	Sump 1W	N	N	N	N	N	N	N	I
As Labeled	Sump 2W	N	N	N	N	N	N	N	I
As Labeled	Sump 3W	N	N	N	N	N	N	N	I
Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.									

Table 4-48 shows that each of the Build Alternatives, to a certain degree, would have impacts to major/minor utilities located in the study area. Based on this information, Alternative 5 would have the most impacts to major storm drainage pump stations, storm drainage storage sumps, natural gas lines, and overhead electrical transmission lines. Alternatives 2A and 2B would have the most impacts to major sanitary sewer lines and water lines. Alternatives 3A, 3B, 3C, 4A, and 4B would have the least impact to major utilities in the study area. A summary of the information shown in **Table 4-48** is provided in the following paragraphs.

Water Lines

Alternatives 2A and 2B have the most impacts to major water lines by requiring the relocation of an estimated 40,300 and 40,500 feet of water lines, respectively. Alternatives 4A, 4B, and 5 each require the relocation of an estimated 2,900 feet of water lines. Alternatives 3A, 3B, and 3C have the least impact to water lines (approximately 1,600 feet).

Sanitary Sewer Lines

Alternatives 2A and 2B have the most impacts to major sanitary sewer lines, with each alternative requiring the relocation of an estimated 11,700 feet of sewer lines. Alternatives 3B and 3C would require the relocation of an estimated 2,000 feet of sewer lines. None of the remaining Build Alternatives impact major sanitary sewer lines.

Natural Gas Lines

Alternative 5 has the most impacts to major natural gas lines by requiring the relocation of an estimated 20,900 feet of gas lines. None of the remaining Build Alternatives impact major natural gas lines.

Electrical Facilities

Alternatives 4A, 4B, and 5 have the most impacts to major electrical transmission lines by requiring the relocation/adjustment of seven major lines and associated support towers. Alternatives 3B and 3C require the relocation/adjustment of six major lines and associated support towers. Alternatives 2A, 2B, and 3A have the least amount of impacts, requiring the relocation/adjustment of five major lines and associated support towers. In addition, Alternative 2B requires the relocation of the Oncor West Network Substation. None of the remaining Build Alternatives impact electrical substations.

The Public Utility Commission has approved a new 345 kV line to be constructed from the West Levee switching station to the Norwood switching station in Irving, Texas. The preferred route would construct the new line within the median of Irving Boulevard beginning at Sylvan Avenue and continuing westward past Commonwealth. This new electric line could be built prior to the proposed Trinity Parkway project and could add new cost impacts to Alternatives 2A and 2B.

Storm Drainage

Alternative 5 has the most impacts to major storm drainage facilities by requiring the displacement and relocation of Pump Stations A, B, and C, and by direct impacts (primarily fill) to six drainage storage sumps (Sumps 1E, 2E, 3E, 1W, 2W, and 3W). None of the remaining Build Alternatives would impact pump station facilities; however, all of the Build Alternatives would require bridges over storage sumps at several locations. Additionally, Alternatives 3A, 3B, 3C, 4A, and 4B would require bridges and/or

extensions to several pump station outfall channels and pressure sewers, to varying degrees. Alternatives 4A and 4B have the most impacts to storm water outfalls and would require eight bridges and the extension of two outfall channels and three pressure sewers. The least amount of impacts to storm drainage facilities occurs with Alternatives 2A and 2B.

4.19 ENERGY REQUIREMENTS

4.19.1 No-Build Alternative vs. Build Alternatives

A detailed energy analysis has not been conducted for this study. However, certain generalizations can be applied to the study area to estimate the effect of the proposed action with respect to energy expenditures. Transportation-related energy use is usually separated into two main categories: fuel consumed by traveling vehicles on the roadway and the energy associated with the construction, operation, and maintenance of the roadway itself.

The amount of fuel consumed by traveling vehicles on a transportation facility is a major source of energy use and is a function of several variables including vehicle miles of travel, average speed, vehicle mix, and the amount of congestion and delay. Excessive idling and stop-and-go traffic conditions associated with traffic congestion reduces fuel efficiency and substantially reduces fuel economy. **Section 1.7.9** provides a discussion of future traffic conditions in the project study area and includes **Table 1.6**, which provides a summary of the modeled daily travel demand performance for the project study area. The table displays various performance measures and compares the predicted conditions within the project study area without the proposed action (2030 No Build Alternative) and with the proposed action (2030 Build Alternatives). The table indicates that the 2030 Build Alternatives would have more total lane-miles available in the study area and have higher study area vehicle miles of travel. At the same time, congestion indicators such as vehicle hours of travel is less, congestion delay is less, the percent of lane-miles in the study area operating at LOS D, E, or F is less, and the average speed of vehicles traveling in the study area is higher. Higher vehicle miles of travel for the 2030 Build Alternatives would be offset in some measure by the indicated improvement of congestion in the study area. This suggests that fuel consumption in the study area would be similar when comparing the 2030 No Build Alternative and the 2030 Build Alternatives.

All proposed Build Alternatives would require energy consumption during construction activity. Energy would be consumed during the mining and production of construction materials such as steel, cement, and aggregate and when transporting materials and equipment to the construction site. Operating construction equipment and providing construction lighting would also consume energy resources. The amount of energy used during construction of a project would be roughly proportional to the size of the

project. If a Build Alternative is not constructed, these one-time construction impacts to energy resources would not occur.

Operation and maintenance of any Build Alternative would require additional energy resource consumption. These typically include electrical use associated with lighting along the facility and toll collection activities (gantries and electronic equipment), in addition to fuel associated with everyday use of operation and maintenance vehicles. If a Build Alternative is selected that is located within the floodway (3A, 3B, 3C, 4A, or 4B), additional energy use would be required in the event of a flooding event. The road may be shut down, in part or whole, for a period of time to allow unhindered access for flood fighting activities. Closure and evacuation of the roadway may be required in the event of expected inundation of the roadway itself. Additional maintenance, repair, and clean-up actions would be required. Operations and maintenance costs associated with each Build Alternative are included in **Chapter 6**.

4.19.2 Mineral and Energy Resource Impacts

There are no mineral or energy resource impacts anticipated by any of the proposed alternatives. A discussion by alternative follows.

4.19.2.1 No-Build Alternative

No impacts to mineral or energy resources are expected with the No-Build Alternative. No gravel or other type of mineral mining operations would be interrupted, nor would any oil or gas wells be displaced.

4.19.2.2 Build Alternatives

No impacts to mineral or energy resources are expected as a result of the proposed action. No gravel or other type of mineral mining operations would be interrupted, nor would any oil or gas wells be displaced.

Toll Road Impacts

The designation of the Trinity Parkway as a toll road is not expected to result in an adverse impact to energy resources. The Trinity Parkway is expected to be an electronic toll collection facility. An ETC system provides operational efficiencies and would reduce the stop-and-go conditions that are associated with conventional cash booths at toll plazas, resulting in lower consumption of energy resources. The toll designation would allow the roadway to be built sooner than with traditional funding; therefore, network congestion reduction would occur sooner. This would result in energy consumption reductions.

4.20 TEMPORARY IMPACTS DURING CONSTRUCTION

This section describes potential temporary impacts of the Build Alternatives that may occur during project construction. Because the No-Build Alternative would not involve any project-related construction, discussions are focused on the Build Alternatives. In general, the potential for disruptive construction impacts would correspond to the type and location of activities proposed in each construction stage and the duration of the overall construction process associated with each alternative. Measures to minimize construction-related impacts are described in **Chapter 7 Mitigation Measures and Commitments**.

Roadway construction activities would result in several inconvenience-causing impacts. These impacts can be categorized as follows:

- Airborne dust due to clearing, grubbing, hauling, and construction activities;
- The use of local and regional streets and arterials to haul materials and equipment to and from the site;
- Temporary materials and equipment storage;
- Increase in noise levels due to construction activities and equipment;
- Temporary utility rerouting;
- Temporary traffic detours; and
- Soil and water runoff due to rain and dust control.

4.20.1 Community Impacts

Potential construction period impacts to residents and businesses within the study area are addressed in the following paragraphs.

Neighborhoods and Businesses

During construction, motorists and pedestrians would experience some delays and detouring. Some streets may be temporarily closed during construction and others would be subject to periodic lane closures. Further delays may occur as construction vehicles and equipment use local streets.

Traffic Disruptions

Construction activities under all Build Alternatives would result in some traffic disruption on major freeways and arterials in the project area. Construction could also temporarily affect local streets providing access to businesses and residents in the project area. In addition to temporary traffic disruptions (closures and detours), construction traffic would be noticeable on area roadways and could contribute to periods of localized congestion. It is likely that the disruptions described above would be

greater for Alternatives 2A and 2B, which would also result in disruption to transit operations, as Irving and Industrial Boulevards are highly utilized roadways compared to Alternatives 3A, 3B, 3C, 4A, 4B, and 5, which are located in or around the undeveloped Dallas Floodway.

Safety and Security

Safety and security issues associated with construction activities include potential disruption of traffic movements and potential access constraints for emergency and law enforcement vehicles. Heavy vehicle movements, possible hazardous waste excavation and transport, and construction site activity would also create potential safety concerns.

Construction Employment

Economic activity generated by the Trinity Parkway is anticipated to benefit the DFW region and would also follow the labor and material markets for roadway and bridge construction. Refer to **Section 4.6 Economic Impacts** for a description of construction-related employment associated with the proposed action.

4.20.2 Construction Period Visual Changes

Impacts to the visual landscape would occur during construction. The excavation and movement of fill material from the potential borrow pit excavations in the Dallas Floodway, and the placement and grading of the material for roadway embankment on the levees, would cause a visual change due to the operation of construction and hauling equipment in these areas where they are not typically present. This activity would only occur if one of the river alternatives (Alternative 3A, 3B, 3C, 4A, 4B or 5) is identified as the preferred alternative (see **Sections 1.11.4** and **2.4.6**). Construction materials and equipment would also be stored temporarily in designated staging areas, which may change the visual character in some areas. The location of these areas would be determined during final design. Demolition activities due to the potential “taking” of structures for right-of-way would also be a visual change experienced during construction of any of the alternatives, but would be more substantial for the Irving/Industrial Boulevard alternatives (Alternatives 2A and 2B).

4.20.3 Construction Period Air Quality

Impacts to ambient air quality would occur as a result of construction activities. Fugitive dust and particulate matter emissions, including those less than 10 microns in size (PM_{10}), would be generated during project construction activities. Construction equipment and off-site vehicles used for hauling debris and supplies would also produce emissions during the construction. The pollutants of primary concern include fugitive dust, PM_{10}, reactive organic gases, NOx, CO, and, to a lesser extent, SO_2.

The impact of construction emissions on air quality is difficult to predict and depends on many variables such as the type of construction vehicles and the timing and phasing of construction activities. However, project construction would be conducted in accordance with all federal, state, and local regulations that govern construction activities and emissions from these vehicles.

4.20.4 Construction Period Noise

Noise associated with the construction of the project is difficult to predict. Heavy machinery, the major source of noise in construction, is constantly moving in unpredictable patterns. However, construction normally occurs during daylight hours, although some construction may also occur at night. None of the receivers is expected to be exposed to construction noise for a long duration; therefore, any extended disruption of normal activities is not expected. Provisions would be included in the plans and specifications that require the contractor to make every reasonable effort to minimize construction noise through abatement measures such as work-hour controls and proper maintenance of muffler systems (see **Section 7.8.3**).

4.20.5 Hazardous/Regulated Materials

The impacts from hazardous/regulated material use and handling during construction activities associated with the proposed action pose a minimal risk of impacts to the environment. Temporary aboveground storage tanks (ASTs) and equipment, vehicles, and machinery that contain oil and use diesel fuel are typically utilized during major construction projects. Typical impacts would include leaking valves, hoses, or small spills that may occur during refueling activities associated with ASTs or small leaks that may occur from equipment, vehicles, and/or machinery. Should a leak or spill of hazardous materials/substances occur during construction activities, steps would be taken to protect personnel and the environment in accordance with applicable federal, state, and local regulations.

4.20.6 Water Quality

The project engineer would ensure that appropriate steps are taken to control water pollution during construction. The amount of disturbed earth would be limited so that potential for excessive erosion is minimized and sedimentation outside of the right-of-way is avoided. Existing vegetation would be preserved wherever possible. As described in the SW3P, which would be developed prior to construction, temporary erosion and sedimentation control measures such as silt fences, rock berms, sedimentation basins, and/or soil retention blankets would be implemented as needed prior to the initiation of construction. Permanent soil erosion control features would be constructed as soon as

feasible during the early stage of the contract through proper sod placement and/or seeding techniques. Disturbed areas would be restored and stabilized as soon as the construction schedule permits, and temporary sod would be considered where large areas of disturbed ground would be left bare for a considerable length of time.

With respect to potential surface water contamination due to erosion and sedimentation, the critical time period occurs between the removal of existing vegetation to begin site work and the completion of construction and revegetation. There are numerous activities associated with construction that accelerate the rate of erosion. Virtually all of these activities involve the removal of vegetation and/or the movement of soil to provide a construction site.

Waterways adjacent to and downstream from construction sites can be adversely impacted by erosion and sedimentation. The most obvious damage is physical, where the effect can be seen as gullies or rills that form across the affected area. Sediment loss resulting from erosion can provide a medium for unwanted vegetative growth in the waterway, resulting in slowing of the natural flow of water and deposition of more sediment. Ultimately, the ecological relationships in the water and the substrate may be disrupted or destroyed.

Protection of the water quality, ecological functions, and other functions of the natural and man-made drainages adjacent to the Trinity Parkway will be a high priority in the detailed engineering design, construction, and operation and maintenance phases for the proposed action.

4.20.7 Natural Resources

Each of the Build Alternatives may potentially impact wetlands and other aquatic resources by temporarily increasing sedimentation from land clearing activities and altering wetland hydrology by changing drainage patterns. Some sediment movement is inherent in any large construction project. The actual amount of sedimentation and impacts to natural resources that may occur would be difficult to predict because the change in drainage patterns, hydraulics of flow during the construction phase, and identification of specific settling areas for any sediment loss can not be determined at this stage of the proposed project. In addition, the efficiency of many BMPs varies. Another consideration is that isolated events of accidental damage to structural controls from construction equipment may occur during earthworks activities, which could result in some loss of sediment from the construction area and potential impacts to natural resources. The frequency and duration of these events is unpredictable. Generally, direct impacts may include reduction in light penetration (limiting growth of aquatic plants), alteration of geomorphology and in-stream habitat, covering of benthic communities, and reduced visibility for aquatic wildlife. Suspended solids may increase concentrations of contaminants and nutrients in downstream

water bodies, which could magnify the effect to the aquatic environment. Construction activities may also result in displacement of wildlife due to noise and human activity or cause barriers to wildlife movement. Impacts to these resources would be avoided and/or minimized during the design phase. Additional details are provided in **Chapter 7**.

4.20.8 Construction Excavation and Fill Requirements

Each of the Build Alternatives would require excavation and fill on land, in water and/or floodplain areas, to allow construction equipment access to construction sites. A summary of the estimated excavation and/or fill quantities required for each of the Build Alternatives is provided in **Table 4-49**. The approximate locations of the potential borrow areas are shown on **Plate 4-26** at the end of this chapter.

TABLE 4-49. ESTIMATES OF EXCAVATION AND FILL QUANTITIES

Build Alternative	Location	Roadway Excavation (cubic yards)	Roadway Embankment (cubic yards)	Net Borrow (Excludes Shrinkages)
2A	Floodway or other	---	0.3 million	-0.3 million
2B	Floodway or other	0.2 million	1.1 million	-0.9 million
3A	Floodway Borrow	0.1 million	4.1 million	-4.0 million
3B	Floodway Borrow	0.1 million	4.1 million	-4.0 million
3C	Floodway Borrow	---	4.3 million	-4.3 million
4A	Floodway Borrow	0.2 million	4.2 million	-4.0 million
4B	Floodway Borrow	---	6.7 million	-6.7 million
5	Floodway or other	0.5 million	2.7 million	-2.2 million

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
Roadway embankment only. All quantities shown in cubic yards (see **Sections 1.11.4** and **2.4.6**).

As previously described in **Section 2.4.6**, excavation of lakes proposed by the City of Dallas in the Dallas Floodway could provide sufficient suitable material to build the roadway embankments for any of the Build Alternatives.

A detailed erosion and sedimentation control plan would be required as part of the construction contract specifications. The plan would follow appropriate BMPs. Additionally, construction activities would require a permit under the rules of the TCEQ (see **Section 7.2**).

4.20.9 Potential Construction Impacts on Flooding

For roadway alternatives within the Dallas Floodway, construction activities would be suitably staged and implemented to avoid impacts (including temporary impacts) on the integrity of the levees, the safe and efficient operation of the floodway, or on the overall capability of the Dallas Floodway to convey its design floods. Such measures would be part of ensuring compliance with USACE flood control regulations (33 CFR Part 208), which include the requirement that construction activities within a flood control project “will not adversely affect the functioning of the protective facilities” at any time (33 CFR § 208.10(a)(5)).

Indeed, to ensure the detailed regulatory safeguards in these flood control regulations would be maintained during construction periods, USACE approval is required before construction may begin. The USACE Fort Worth District has issued guidance (USACE Pamphlet SWFP 1150-2-1, see **Appendix E**) that further implements the USACE flood control regulations at the local level by prescribing criteria for construction within floodways. In essence, this guidance (or any superseding guidance) describes specific project design criteria and construction management measures that are preconditions to receiving USACE approval for construction. Additionally, construction activity within the Dallas Floodway subject to USACE construction phase oversight to ensure that flood conveyance attributes are maintained (see also **Section 2.4.6**).

In areas outside the Dallas Floodway, the construction activity would be arranged to avoid temporary impacts to local drainage and waterways. Existing drainage facilities would be maintained in proper working order during construction, until such time those facilities are replaced by permanent facilities. Site drainage would be maintained through proper organization of the construction sequence and storage areas, maintenance of cross slopes and ditches, and installation of temporary drainage facilities where necessary.

4.21 LIST OF ANTICIPATED FEDERAL, STATE, AND LOCAL PERMITS AND ACTIONS

Table 4-50 provides a summary of the required federal, state, and local actions and approvals anticipated for the proposed action.

TABLE 4-50. ANTICIPATED MAJOR PERMITS AND APPROVALS

Required Permit or Approval	Regulated Activity	Issuing Agency
Record of Decision	Compliance with NEPA process.	FHWA and TxDOT - joint lead agencies
		EPA and USACE - cooperating agencies
Clean Water Act Section 404 permit / Clean Water Act Section 401 certification / Rivers and Harbors Act Section 10 permit (collectively, “404 permit”)	Discharge of dredged or fill material into waters of the United States, including wetlands, and obstructions to navigable waterways.	USACE - issues 404 permit
		EPA - concurrence required
		TCEQ - issues 401 certification
Section 4(f) approval	Approval of transportation project requiring the use of publicly-owned land.	FHWA - issues approval of evaluation
		Advisory Council on Historic Preservation (ACHP) - commenting authority
		State Historic Preservation Officer (SHPO) - commenting authority
		U.S. Dept. of Interior - commenting authority
		HUD - commenting authority

TABLE 4-50. ANTICIPATED MAJOR PERMITS AND APPROVALS

Required Permit or Approval	Regulated Activity	Issuing Agency
NHPA Section 106 approval	Impacts to structures listed or eligible for inclusion in the NRHP.	TxDOT - lead agency
		FHWA - makes final determination of adverse impacts
		SHPO - consulting agency
		ACHP - consulting agency
Clean Air Act conformity determination	No federal financial assistance is to be made available unless the project conforms to the State Implementation Plan.	FHWA - makes determination
		RTC - conducts analysis
		TxDOT - consulting agency
Surface Transportation Act and Rivers and Harbors Act Section 9 (bridge permit or exemption from permitting)	Bridge crossing navigable waterway.	FHWA and U. S. Coast Guard
General Permit for storm water discharges associated with construction activities	Required for projects that will disturb more than 1 acre.	TCEQ
Municipal Separate Storm Sewer System (“MS4”) Permit	Required for operating a MS4.	TCEQ
Implementation of BMPs to minimize impacts to impaired waters.	For projects which encroach upon threatened or impaired stream segments designated under Section 303(d) of the Clean Water Act.	TCEQ
Navigational Airspace and Obstruction Marking and Lighting approval	Acknowledgment required that structures associated with the toll road are not a hazard to navigation.	FAA
Corridor Development Certificate (“CDC”)	Required for development in the Trinity River Corridor.	City of Dallas - approves issuance of CDC
		USACE - conducts technical review
Fill Permit	Required for development activities in floodplain.	City of Dallas
Conditional Letter of Map Revision (“CLOMR”) and Letter of Map Revision (“LOMR”)	Required for development activities in a floodplain.	FEMA
Toll Agreement	Agreement to operate a federal-aid highway as a toll road.	FHWA
		TxDOT
		NTTA
Interstate Access Agreement	Access to interstate highway system.	FHWA
		TxDOT
		NTTA
Compliance with 33 U.S.C. Section 408 and USACE Pamphlet No. 1150-2-1.	Authorization needed to cross over the levees into the Dallas Floodway.	USACE
		City of Dallas

4.22 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

4.22.1 No-Build Alternative

The No-Build Alternative would not require the commitment of any resources associated with the construction of the proposed action.

4.22.2 Build Alternatives

Constructing any of the Build Alternatives involves the commitment of a range of natural, human, physical, and fiscal resources. Land used in the construction of the proposed facility is considered an irreversible commitment during the period the land is used for transportation purposes. However, if a greater need arises for use of the land, or if the highway facility is no longer needed, the land can be converted to another use. At present, there is no reason to believe such a conversion would be necessary or desirable. In the event of selection of one of the Build Alternatives within the Dallas Floodway (Alternatives 3A, 3B, 3C, 4A, 4B, and 5), a Memorandum of Understanding (MOU) is proposed to be drafted to establish the rights and responsibilities for use of City of Dallas floodway land. The MOU would acknowledge the primacy of the flood control function and would provide the City of Dallas Flood Control District unhindered access for operations and maintenance (see **Section 2.4.8**).

Considerable amounts of fossil fuels, labor, and highway construction materials such as steel, cement, aggregate, and bituminous material would be expended for any of the Build Alternatives. In addition, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are not generally retrievable. However, the types of resources that would be used are not in short supply and their use would not have an adverse effect upon continued availability of similar resources. Any construction would also require a substantial one-time expenditure of state, federal, and private funds, which are not retrievable. The commitment of these resources is based on the concept that residents in the immediate area, region, state, and nation would benefit by the improved quality of the transportation system. These benefits would consist of improved accessibility and safety, savings in time, fuel savings, and greater availability of quality services, which are anticipated to outweigh the commitment of these resources.

4.23 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

4.23.1 No-Build Alternative

The short-term impacts associated with the No-Build Alternative are inconsistent with the maintenance and enhancement of long-term local, state, and national productivity. Short-term impacts include increasing levels of traffic congestion on IH-35, IH-30, and other major transportation facilities; a continuation of poor mobility; and a continuation of limited accessibility for important public facilities within and adjacent to the study area. These impacts are not consistent with national trade policy (NAFTA) objectives. They hinder the growth patterns and policies of local jurisdictions, and they limit the functionality of major public facilities such as Dallas Love Field, DFW International Airport, and other important intermodal transportation facilities.

4.23.2 Build Alternatives

The construction phase of the project would cause short-term adverse impacts on the environment. Adverse impacts have been evaluated and mitigation (i.e., avoidance or minimization) measures have been identified (see **Chapter 7**). Careful attention would be given to these identified adverse impacts during the design phase. Proposed mitigation measures would minimize adverse short-term impacts and avoid any substantial long-term damage.

This project, with its desirable design characteristics, would provide for safe and efficient vehicle operation for future traffic volumes. The benefits, such as anticipated reduction in operating costs, reduced travel time, reduced traffic accidents, and general economic enhancement of the area offered by the long-term operation of this project, are expected to offset the short-term inconvenience and adverse impacts on the human environment.

4.24 INDIRECT AND CUMULATIVE IMPACTS

4.24.1 Indirect Impacts

Sections 4.24.1.1 through **4.24.1.8** presents a project level analysis of the potential indirect impacts (or "effects") related to the proposed Build Alternatives for the Trinity Parkway. A discussion of the potential indirect impacts of the regional toll and managed/HOV system is presented in **Section 4.24.1.9**.

The Council on Environmental Quality (CEQ) defines indirect "effects" (synonymous with "impacts") as:

> *"… effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. (40 CFR 1508.8)*

Indirect impacts differ from the direct impacts associated with the construction and operation of the proposed project, and are caused by other actions that have an established relationship or connection to the proposed project. These induced actions are those that would not or could not occur except for the implementation of the proposed project.

The National Cooperative Highway Research Program (NCHRP) in Report 466 *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (TRB, 2002) suggests indirect impacts can occur in three broad categories:

1. Encroachment-Alteration Impacts - Alteration of the behavior and functioning of the affected environment caused by project encroachment (e.g., physical, chemical, biological);
2. Induced Growth Impacts - Project-influenced development impacts (i.e., the land use effect); and,
3. Impacts Related to Induced Growth - Impacts related to project-influenced development impacts, (i.e., impacts of the change of land use on the human and natural environment).

For transportation projects, Category 1 impacts include project impacts such as fragmentation of habitat by a roadway or dispersal of pollutants onto adjacent lands. Indirect impacts from Categories 2 and 3 are typically encountered outside of the project right-of-way, and may result from actions taken by other parties, such as private land developers not directly associated with the project. Indirect impacts are therefore subject to some level of conjecture as to the extent of changes which might be expected in the project corridor, with and without the project in place. There are various guidance documents published by FHWA and others on this subject, including the *Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process* (FHWA, 2003). The CEQ regulation cited above states that the EIS must identify all the indirect impacts that are known, and make a good faith effort to explain the impacts that are not known but which are "reasonably foreseeable." CEQ has issued guidance that further explains "reasonably foreseeable" as events that must be "probable," even though there is some uncertainty about them (*Forty Most Asked Questions Concerning CEQ's NEPA Regulations*, 46 FR 18031, 1981).

Applying the foregoing principles, the Indirect Impacts Analysis at the project level (**Sections 4.24.1.1** through **4.24.1.8**) has focused initially on identifying areas where project-related development or redevelopment are improbable, and eliminating such areas from further consideration. The discussion then turns to whether the proposed project would be likely to induce land development or redevelopment in those areas available for such changes. The stepwise process suggested in NCHRP Report 466 for assessing indirect impacts has been used as the structure for the analysis, and considers the following aspects:

1. Scoping, including identification of the location and extent of the Study Area.
2. Identify the Study Area's Direction and Goals.
3. Inventory the Study Area's Notable Features.
4. Identify Impact-Causing Activities of Proposed Action and Alternatives.
5. Identify Potential Indirect Impacts for Analysis.
6. Analyze Indirect Impacts.
7. Evaluate Analysis Results.
8. Assess Consequences and Develop Mitigation.

4.24.1.1 Step 1 - Scoping and Determination of a Study Area

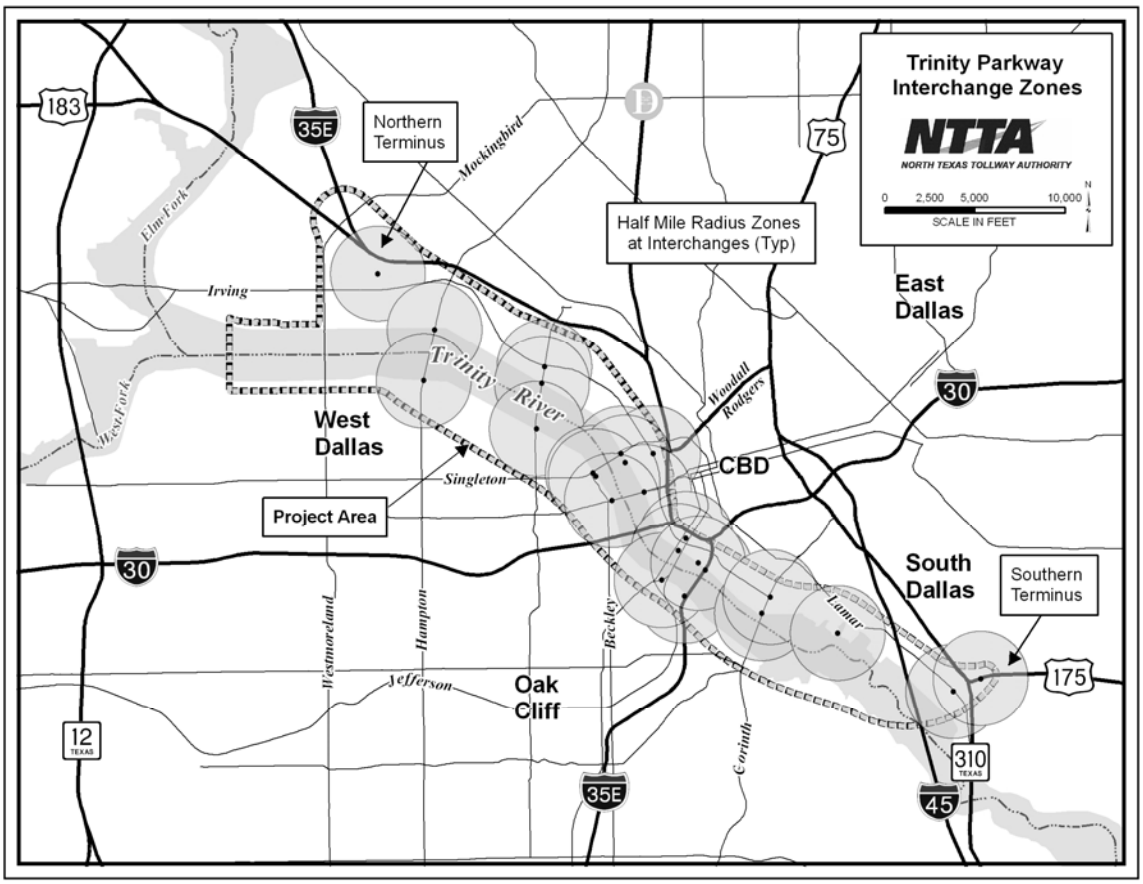
The initial step in this analysis examines the attributes of the Project and the surrounding area to focus the analytical approach and identify an appropriate area for analysis of indirect impacts. The Trinity Parkway corridor is already substantially developed except for the Trinity River floodplain, currently. As stated in **Section 1.2**, the purpose of Trinity Parkway is to manage congestion on IH-35E and IH-30, as well as on other major transportation facilities within the Project Area, to improve mobility, safety, and increase accessibility to businesses and public facilities (see also **Section 1.8**).

As stated above, the Project has been planned and designed to respond to existing and future traffic demands, and the need to improve mobility, access, and safety. The Trinity Parkway is also only one of several land development and redevelopment projects already planned for the study corridor (see **Section 4.24.2.7**). An in-depth discussion on potential induced land use impacts that may occur under the Trinity Parkway Build Alternatives is provided in **Appendix L-5**. The analysis used guidance provided in the NCHRP 25-25 (Task 22), *Forecasting Indirect Land Use Effects of Transportation Projects*. In light of the existing network of major roads in and near downtown Dallas, the roadway is not primarily intended to be a catalyst for new development, though it could be expected to provide congestion relief to the existing network of major roadways adjacent to major developments, and by providing some additional access to park and recreational amenities and economic opportunities proposed for the Trinity River Corridor (see **Plate 3-7**).

Access-controlled roadways, such as the proposed Trinity Parkway, would be unlikely to affect land redevelopment other than near access points (see, NCHRP Report 466, Page 27). Consequently, the most probable type of indirect impacts would be transportation-related development/redevelopment at or near interchanges. NCHRP Report 466 (Page 62) indicates that development impacts are most often found up to one mile around a freeway interchange. Although this may be the case in an undeveloped corridor, the one mile radius appears overly large for a dense urban corridor such as the Trinity Parkway corridor, where there are other freeways and interchanges in close proximity. For example, IH-35E parallels the proposed Trinity Parkway over much of its length. A one-mile influence radius would substantially overlap IH-35E, implying the Trinity Parkway would have a development effect on property that already has interstate access. A half mile radius is therefore considered more reasonable for the Trinity Parkway setting.

Half-mile radius circles were drawn around the interchange locations generated by Trinity Parkway Alternatives 2A, 2B, 3A, 3B, 3C, 4A, 4B and 5 as illustrated in **Figure 4-3**. Using the half-mile radius as a guide, the anticipated zone of potential indirect impacts for all of the Build Alternatives generally does not overlap other controlled-access highways. Based on **Figure 4-3** and an evaluation of the likely zone of indirect impacts influence, the Trinity Parkway Project Area (as shown in the figure) is considered a representative area to aggregate indirect impacts for the Project. This Project Area is therefore referred to in this section as the “Indirect Impacts Study Area.”

FIGURE 4-3. TRINITY PARKWAY INTERCHANGE HALF-MILE RADIUS CIRCLES



4.24.1.2 Step 2 - Study Area Direction and Goals - Development Trends

For the Trinity Parkway, the Indirect Impacts Analysis has been developed in part based on the *Trinity River Corridor Comprehensive Land Use Plan* (CLUP), a study commissioned by the City of Dallas (2002a). The CLUP was initiated in June 2000, and concluded with adoption of study recommendations by the Dallas City Council on March 9, 2005. The plan is intended by the city to "guide future development of the neighborhoods and business areas along the Trinity River corridor, and to ensure the greatest benefit from the significant investment in public facilities." The plan has also been used by the city to identify appropriate zoning changes in the corridor incorporated in the *Forward Dallas* citywide comprehensive plan, adopted by Council on June 14, 2006 (City of Dallas, 2006b). The maps associated with the CLUP were used in this Indirect Impacts Analysis as a key tool in evaluating the likelihood that an existing land use would be subject to redevelopment in the future, and the type of future land use to anticipate. Based on these city plans for the corridor, and other plans outlined earlier in this report (e.g., City Balanced Vision Plan, and USACE DFE project) much of the future development in the project area would be influenced by City of Dallas urban plans and policies, as well as city and USACE plans for

development of park and recreation resources, in addition to Dallas Floodway bridge and levee structures. The existence and attributes of these City of Dallas plans and policies, as well as an understanding of plans for major private and municipal land development/redevelopment, served to guide the process of identifying areas likely to be developed or redeveloped as a result of any of the eight Trinity Parkway Build Alternatives.

4.24.1.3 Step 3 - Inventory the Study Area's Notable Features

The third step in the indirect impacts assessment framework focuses on review of existing data to adequately identify the study area's notable features or resources. The features of the Indirect Impacts Study Area are detailed in **Chapter 3**, and are summarized as follows:

- The Trinity River, associated floodplain, flood control system, and open areas;
- Existing transportation interchange nodes, corridors, and bridge crossings of the Dallas Floodway;
- The urban development immediately outside the Dallas Floodway.

4.24.1.4 Step 4 - Identify Impact-Causing Activities of Proposed Action and Alternatives

The objective of this step is to consider the "cause and effect" relationships between the direct impacts of the proposed action and the notable features or resources in the Indirect Impacts Study Area. As noted in NCHRP Report 466 (Page 54), documented direct impacts "can be viewed as potential catalysts for indirect effects." These cause and effect relationships were discussed earlier in this chapter for a wide array of potential environmental resources and socio-economic issues and that discussion is incorporated into this analysis by reference. The cause and effect relationships observed for direct impacts were extended to the identification and evaluation of potential indirect impacts in the next step.

4.24.1.5 Step 5 - Identify Potential Indirect Impacts for Analysis

The objective of this step is to estimate the extent to which Trinity Parkway Build Alternatives may induce urban growth or change. The approach for this step is to first identify areas where it would be reasonable to expect shifts in development decision making, and then determine whether a proposed Build Alternative would be likely to induce development or redevelopment. This approach emphasizes the types of indirect impacts related to induce growth or property redevelopment (Categories 2 and 3 outlined above). NCHRP Report 466 provides multiple techniques to identify potential cause-effect relationships, one of which features using cartographic techniques (see, NCHRP Report 466, Page 66). As detailed GIS information was developed as part of this SDEIS, GIS mapping and analytical techniques were used

to identify the specific areas within the Indirect Impacts Study Area where potential future impacts could occur.

The initial step is to identify and map those areas where natural, governmental, or other constraints would make future change in land use unlikely. This step develops a “constraints map” depicting areas within the Indirect Impacts Study Area that would be unsuitable or unlikely for future development or redevelopment activities, and includes the following areas:

- Areas within the 100-year floodplain (including the Dallas Floodway);
- Public parks;
- Parcels owned and/or used for major utilities (e.g., electric substations or pump stations);
- Existing public facilities (e.g., road right-of-way, schools, Lew Sterrett Justice Center);
- Historic districts (e.g., Colonial Hill Historic District);
- Areas where other reasonably foreseeable development or redevelopment is already planned to occur or underway; and
- Areas currently developed and zoned for single-family residential use, and which are reflected as remaining residential in the CLUP.

Particular attention was given to the degree of local governmental interest and control over the types of areas listed above. For example, City of Dallas ordinances and programs restrict the construction of habitable buildings within floodplains. Also, municipal governing bodies such as the Landmark Commission ensure compliance with ordinances and programs designed to preserve historic districts, which would be expected to decrease the potential for redevelopment because of increased costs and time requirements. The constraints map, **Plate 4-38**, shows shaded areas where indirect impacts would be unlikely. The remaining unshaded areas are judged potentially suitable for development or redevelopment and total approximately 1,483 acres. Given the soil and slope characteristics in the Indirect Impacts Study Area and the generally comprehensive urban development of areas near the Dallas Floodway, it was assumed that all unshaded areas on the map could support urban development or redevelopment. These unshaded areas were examined more closely, as described below, to identify specific parcels where land use change was most likely to occur as a result of each of the Trinity Parkway Build Alternatives.

The methodology for identifying specific properties where land use changes would be most likely to occur involved applying a “qualitative inference” technique relying on professional planning judgement in concert with a case study analysis of specific areas of concern to identify possible changes that the proposed project might bring about. Using “planning judgement” is an acceptable methodological tool discussed in both NCHRP Report 466, which discusses the analysis of indirect land use impacts of

transportation projects more broadly, and the adjunct NCHRP Report 25-25, which supplements the approaches discussed in NCHRP 466 and provides additional guidance on selected methodologies for the assessment of indirect land use impacts. As mentioned, detailed GIS data was analyzed at the parcel level for each alternative, and general circumstances influencing the likelihood of induced development shifts (which accounts for many of the factors that motivate investors to develop or redevelop a particular parcel of real estate) were evaluated as suggested by NCHRP Report 466 (Page 62). These circumstances include such items as: the extent and maturity of existing transportation infrastructure to include access improvements proposed by the Trinity Parkway; land availability and price; land use controls, local political/regulatory conditions; location attractiveness; state of the regional economy; and area vacancy rates. **Appendix L-5** contains the written findings, with supporting logic and facts, which support the planning judgement analysis used in forecasting potential indirect land use impacts associated with the Trinity Parkway project.

In effect, the analysis considers whether construction of a particular Build Alternative would be likely to cause a shift in the way investors and land owners view the economic attractiveness of developing or redeveloping land that would be near the proposed roadway. Given that the Trinity Parkway is proposed as a limited access, tolled-facility, the most likely areas where future land use and/or development changes could occur are at proposed interchanges with major cross streets. The interchanges associated with each of the Trinity Parkway Build Alternatives are depicted in **Figure 4-3**. In addition to impacts near Trinity Parkway access points, land redevelopment would be a natural consequence for displaced properties. That is, the right-of-way acquisition process may, on certain tracts, convert ownership for only a portion of the property within the highway right-of-way footprint, leaving the remainder for potential redevelopment. The evaluation of indirect impacts examined interchange areas and displaced properties for parcels that would likely be redeveloped as a consequence of each of the eight Build Alternatives. The results of assessing site-specific indirect impacts using this approach are discussed as part of Step 6 in the Indirect Impacts Analysis.

The analysis of potential alteration of the behavior and functioning of the affected environment (Category 1 impacts) caused by project encroachment focused on a wide variety of environmental resources or issues relevant to the urban context, including land use, economic impacts, environmental justice, natural resources, cultural resources, and hazardous materials. The method for evaluating these resources and issues utilized the qualitative inference technique discussed in NCHRP Report 466 (Page 66) which applies “professional judgment of the possible changes that the proposed project would entail.” This approach seeks to identify possible cause-effect changes from a case-study review of resource/issue characteristics in the project area. It also draws heavily on the available ecological, economic, demographic, and social information developed during the analysis of direct impacts of the Build Alternatives. In essence, this methodology is a means to evaluate potential indirect impacts to

environmental resources and socio-economic issues that do not lend themselves to site-specific delineation of an impacts footprint. The observations based on a review of the list of environmental concerns noted above are discussed in the next step (Step 6).

4.24.1.6 Step 6 - Analyze Indirect Impacts

As noted in the previous step, areas of probable induced land development or redevelopment were identified and consolidated for each of the Build Alternatives. An evaluation of environmental impacts expected from those areas of development or redevelopment was completed for each of the environmental resources and issues described and discussed in the analysis of direct impacts. This evaluation of impacts was accomplished by overlaying the footprint of indirect impacts for each Build Alternative with maps of spatial data representing each environmental resource or issue examined.

Many of the environmental resources and issues for which direct impacts were assessed would not be expected to result in indirect impacts. That is, the assumptions implicit in the constraints map (**Plate 4-38**) would preclude induced development or redevelopment in development-constrained areas, thus obviating the possibility of impacts to resources or issues in those areas. For example, induced development would not be expected within the 100-year floodplain, thereby eliminating the possibility of impacts to floodplains and Dallas Floodway hydraulics. Similarly, the constraints assumptions would preclude any induced urban development of existing parks or government-owned property (including road right-of-way) and would not result in residential or commercial displacements.

The remainder of this step discusses the probable indirect impacts expected for ecological and socio-economic issues caused by project encroachment, as well as induced growth impacts. The approach taken focuses on the ecological, economic, demographic, and social characteristics of the Indirect Impacts Study Area as described in this report (see **Chapter 3**, and earlier subsections of this chapter). In the course of this analysis the study team determined that it would be unduly speculative to attempt to quantify site-specific indirect impacts for most of the resources and issues considered. In some instances, however, it was possible to assess impacts for several comparison factors which provide a basis for further differentiating between the Build Alternatives, and the results of the analysis for these factors are shown in **Table 4-51**. All other factors considered, and discussed below, either had no expected indirect impacts or would be expected to produce generalized indirect impacts that would be similar for any of the Build Alternatives.

TABLE 4-51 SUMMARY OF INDIRECT IMPACTS FOR SDEIS ALTERNATIVES

Comparison Factors	Unit of Measure	Trinity Parkway Alternatives								
		1 (No-Build)	2A	2B	3A	3B	3C	4A	4B	5
Socioeconomic										
Areas of Induced Redevelopment [1]	Acres	---	127	115	49	57	54	70	72	70
Natural Environment										
Maintained Grass Areas	Acres	---	4	5	3	3	2	15	14	14
Section 4(f) Involvement										
Potential Sec. 4(f) Historic Property [2]	Number	---	---	1	---	---	---	---	---	---

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9**.
--- = no impacts anticipated for this alternative.
1. Impacts to vegetation from project-induced changes are included in the total for this row of data.
2. Based on an evaluation of the locations of induced change as compared to a survey of historic structures.

Land Use: The evaluation of whether the proposed project is likely to have indirect land use impacts follows the NCHRP Report 25-25, Task 22 *Forecasting Indirect Land Use Effects of Transportation Projects*. Of the six land use forecasting tools introduced in the report, the "Planning Judgment" forecasting tool was used as the framework for the analysis. The Planning Judgment method requires the use of an eight step process. **Appendix L-5** contains the NCHRP 25-25 eight step analysis of indirect land use impacts. The following summarizes key aspects of the analysis.

As described in the NCHRP Report 25-25, the key variables that might contribute to measurable changes in local development patterns in response to a transportation improvement include:

- Change in accessibility - measured in travel time or delay, if available; or ratio of volume/capacity or change in access.
- Change in property value - Likelihood of changes in land price that would influence development.
- Forecasted growth - measured as population, employment, and land development; for a region, city, or sub-area. Forecasted population and employment trend may indicate the demand for land development where access and other public services may be available.
- Relationship between supply and demand - measured as population, employment, and land development. Determine how much vacant, buildable land is available within a reasonable sub-area.
- Availability of Non-Transportation Services and other market factors - determine factors that exist that would promote or limit development or possible barriers to service.
- Public Policy - determine whether land use plans are closely followed and enforced such that development pressures can be resisted.

The assessment of key variables for indirect impacts should take into consideration two questions: (1) How likely is it that a transportation project will be followed by some noticeable change in the land use

that would not have occurred in the absence of the project or sooner than anticipated?; (2) If such changes did occur, would they be consistent with the comprehensive plan?

The conclusions of the NCHRP 25-25 eight step analysis of potential indirect land use impacts (**Appendix L-5**) can be summarized as follows:

The indirect land use assessment (*Forecasting Indirect Land Use Effects of Transportation Projects*) located in **Appendix L-5** found that the proposed Trinity Parkway would have a "Moderate" potential for inducing changes in land use (rate, type, pattern, amount). Such development changes are anticipated to occur at a reasonably even pace with the region and include the conversion from older to more modern land use types (i.e. aged industrial parks to mixed-use facilities), development of vacant land, and revitalization of existing areas. The proposed access improvements resulting from the Trinity Parkway could have indirect land use impacts, especially around the proposed project's southern terminus (South Dallas and Rochester Park neighborhoods) and could have the potential to spur development in non-constrained areas throughout the corridor. However, the proposed project is consistent with local and regional planning documents (comprehensive plans, future land use plans, thoroughfare plans) and their cited land use expectations. The Trinity River Corridor Comprehensive Land Use Plan (commissioned by the City of Dallas) and conversations with City of Dallas public officials both acknowledge the development potential within the Trinity Corridor, driven primarily by the proposed park and recreational amenities proposed in the Trinity River Corridor Balanced Vision Plan. As such, and via a detailed analysis of variables associated with growth and development, a "Moderate" rating was determined for all of the change indicators evaluated (changes in accessibility, changes in property value, expected growth, the relationship between land supply and demand, availability of public services, market factors, and public policy).

Key findings included that the construction of the Trinity Parkway, in various different forms, has been in consideration by the City of Dallas for decades. Furthermore, regional and city land use planning tools account for the construction of the proposed project and concede possible indirect impacts resulting from the proposed project and other corridor initiatives (park, trails, lakes, etc). Under the Build Scenario, it is unlikely that the comprehensive plans and associated zoning would change because the proposed Trinity Parkway facility is a planned transportation corridor that would benefit from coordinated design, infrastructure, and compatibility of land uses set forth by the City Dallas and NCTCOG. As the proposed project would be a new-location limited-access toll facility, changes in accessibility and mobility within the study area would allow for congestion relief on nearby highways. However, changes in overall accessibility, measured in travel time savings and level of service, were found to be moderate; the reduction in lane miles functioning at LOS F decreased from 22% to 16% among the various Build Alternatives. In addition, beneficial economic impacts are expected to occur due to project construction,

as determined by a comparative economic impact and cost/benefit analysis of the No-Build and various Build Alternatives prepared by the City of Dallas in 2002.

The proposed Trinity Parkway could potentially open up specific neighborhoods surrounding the Trinity Corridor (South Dallas, Rochester Park) for future development/redevelopment, as well as inducing the development/redevelopment of non-constrained areas within the indirect impacts study region. However, as most development/redevelopment has been accounted for within local planning documents, the overall assessment of potential land use change generated from the construction of the proposed Trinity Parkway was found to be "Moderate."

Other positive benefits may include changes in land use that promote livable, sustainable communities by placing priority on enhancing community character, neighborhood cohesion, social interaction, safety, economic prosperity, and general quality of life. While it is inherently difficult to predict with any precision how large a role the Trinity Parkway would play in influencing socio-economic change in Dallas, it is clear that it would be but one of many forces of change. Moreover, in light of the municipal plans for encouraging substantial redevelopment of urban areas as well as the Dallas Floodway, it is expected that the proposed reliever-route would represent a relatively modest component of the overall socio-economic change anticipated in future years. Efforts to enhance beneficial aspects and minimize adverse impacts of development are subject to municipal land use plans/policies and development controls. This includes adherence to various rules and regulations associated with comprehensive land use planning, zoning, subdivision regulations, site plan permitting, and building permitting.

City of Dallas plans for future land use in and around the Indirect Impacts Study Area (see summary of key plans in **Section 4.24.1.2**, above and **Appendix L-5**) propose zoning changes on the east side of the Dallas Floodway and affect land that is typically in non-residential uses. These changes could be generally characterized as an attempt on the part of the city to convert land from current industrial uses to desired, higher value uses, such as office, commercial, and high density residential. The proposed zoning leaves unchanged the single family residential tracts in the west and south portions of the Indirect Impacts Study Area, reflecting a city desire to preserve older, low income neighborhoods from development pressures.

Social Impacts: There are potential areas of concern for environmental justice issues in the Indirect Impacts Study Area because there are nearby minority and low income populations. Based on the CLUP, land use changes in portions of these areas are likely in the future even without construction of the Trinity Parkway. However, based on the results of the land use analysis using the NCHRP 25-25 (Task 22) process (see **Appendix L-5**), the Trinity Parkway could have a "moderate" potential to influence the rate and amount of land use change within the indirect impacts study area. Construction of the Trinity

Parkway could result in additional impacts as a result of induced development and redevelopment (as discussed above) and possible economic and land use impacts.

Cartographically overlaying the areas of likely induced development and redevelopment with 2000 U.S. Census data (U.S. Census Bureau) indicated the census tracts and block groups shown in **Table 4-52** have predominately minority populations. This suggests a potential for indirect environmental justice impacts as a result of the Trinity Parkway Build Alternatives.

TABLE 4-52. MINORITY POPULATIONS POTENTIALLY AFFECTED INDIRECTLY BY THE TRINITY PARKWAY BUILD ALTERNATIVES

Build Alternative	U.S. Census Tracts and (Block Groups) [2]
2A	40(1), 40(2), 100(1)
2B	40(2), 100(1)
3A	40(2), 100(1)
3B	40(2), 100(1)
3C	40(2), 100(1)
4A	20(2), 40(2), 43(1), 100(1), 101.02(1)
4B	20(2), 40(2), 43(1), 100(1), 101.02(1)
5	20(2), 40(2), 43(1), 100(1), 101.02(1)

Source: U.S. Census Bureau, 2000.
Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9.**
1. Minority population exceeds 50 percent or is meaningfully greater than the minority population percentage in the general population.
2. Detailed demographic data for each of the included U.S. Census Tracts and Block Groups has been presented earlier in **Section 4.3.3.2**, **Tables 4-5** through **4-7**.

As discussed in Step 5, potential beneficial and adverse indirect impacts were analyzed according to a qualitative inference technique (NCHRP 466, page 66) which applies "professional judgment of the possible changes that the proposed project would entail." Insight into the significance of these impacts was garnered from a multitude of outlets including city planning documents (Comprehensive Plans, FLUPs, Area Plans, etc.), redevelopment programs (Tax Increment Financing Districts, Public Involvement Districts, Neighborhood Investment Programs), neighborhood/community development plans, conversations with planning officials, and available demographic and social information developed during the analysis of direct impacts of the Build Alternatives; all of which aided in the identification of potential beneficial or adverse indirect impacts generated from the proposed project.

Potential adverse indirect impacts in these census tracts and block groups would be those typically associated with development activities in an urban environment, and may affect noise levels, visual changes to the community, and replacement of existing retail stores with commercial facilities that may not be used by minority or low income populations. Noise impacts would be expected from traffic entering and exiting the commercial facilities that are anticipated in response to an influx of motorists that would otherwise bypass these areas of minority and low income populations. Such impacts are not expected to be substantial as they would be associated with already busy streets, and vehicles would be

traveling at low speeds as they enter and exit facilities. Visual impacts would largely amount to replacing existing older commercial buildings and vacant lots with new buildings. Whether the visual impacts of such redevelopment should be characterized as negative or positive would depend on individual observers. Similarly, whether the anticipated construction of new commercial facilities would represent an adverse impact would depend on individual preferences. For example, existing retail stores have probably remained in business because they are responsive to the needs of adjacent neighborhoods. The increase in motorist traffic to these areas would likely generate interest in redeveloping existing facilities to primarily address the needs of motorists as opposed to neighborhood residents. This could then require neighborhood residents to travel outside their neighborhood for the goods and services either no longer available locally, or only available at a higher price. Conversely, new commercial facilities may be viewed by neighborhood residents as a desirable replacement of some existing stores or business establishments. Potential adverse impacts would be expected to be somewhat offset by benefits associated with development/redevelopment triggered by the Trinity Parkway. Potential beneficial impacts may include the following: stimulation of the local economy from the circulation of construction spending (NCHRP 466, page 79); improved access to employment opportunities; improved access to markets, goods and services such as health and education; increased property values leading to increased city and county tax revenues; replacement of undesirable establishments; improvements/additions to public transportation; and increased work opportunities.

There are numerous neighborhoods/communities/districts within the City of Dallas that are actively involved in revitalization efforts, a multifaceted process involving surrounding influences that produce varying degrees of beneficial and adverse impacts. One such initiative, the *South Dallas/Fair Park Economic Development Corridor Plan* (page 66), identifies an area surrounding the proposed Trinity Parkway southern terminus as a “project opportunity area” primed for redevelopment due to linkage to the proposed Trinity Parkway. This “project opportunity area”, characterized by marginal land uses, is predicted to experience long-term opportunity created by the proposed Trinity Parkway, as well as the creation of a neighborhood retail center for community-based business development in advance of the proposed project implementation. Also cited is the conversion of S.M. Wright Freeway to an at-grade facility that would be facilitated by the reduction in traffic volume caused by the Trinity Parkway, decreasing noise levels and strengthening the viability of neighborhoods located between S.M. Wright and Lamar Street.

As outlined in the discussion above, a mixture of both beneficial and adverse indirect impacts are expected for the populations noted in **Table 4-52** from the development and redevelopment of areas near the planned Trinity Parkway. All induced commercial development outlined in **Table 4-51** would be subject to municipal oversight and is expected to be consistent with city plans for improving and revitalizing any of these neighborhoods. Mitigation for redevelopment projects, if necessary, would be

addressed both by municipal regulation and by the market interests of developers in creating and maintaining commercially viable enterprises for each site that would be redeveloped. As such, substantial adverse environmental justice impacts would not be anticipated from the induced development associated with the Trinity Parkway Build Alternatives and therefore the Trinity Parkway Project can be considered consistent with the policy established in EO 12898 (1994) and FHWA Order 6640.23 (1998).

Transportation Impacts: Indirect impacts of the Trinity Parkway Project on land converted to transportation right-of-way would be expected to be minor. Some new roadway and private driveway construction may take place in order to accommodate the induced development/redevelopment expected to occur in the project area. Such streets would likely be small local streets which, as defined in the TxDOT Roadway Design Manual, would function primarily in providing access to abutting properties. Any new development induced by the proposed project would likely remove and/or introduce new ingress and egress points to existing local streets, which could be expected to cause a slight change in traffic patterns. Some higher density development that would likely be introduced to the area would be expected to increase traffic volumes; however, it is expected that the City of Dallas, by implementing its development code and overseeing development permits, would ensure that new developments would be designed to optimize traffic circulation and access in the area. No significant indirect impacts would be expected to the larger street and transit system already in place within the project corridor.

Relocation and Displacement Impacts: No indirect relocation or displacement impacts would be expected to residential structures as part of the proposed Trinity Parkway project. Areas currently zoned as residential are generally carried over in *Forward! Dallas* and other municipal planning documents, indicating that what is residential now would remain residential for the foreseeable future. For commercial, retail, and industrial areas that could be redeveloped, relocation and displacement impacts would not occur as each property would be bought or sold by private developers or real estate investors and not the result of eminent domain action. Consequently, each change in ownership would be done so as a result of individual choices made by local land/business owners, and the subsequent relocation of any associated businesses would occur at the discretion of the new property owner. Thus, no indirect relocation or displacement impacts would be expected as part of the proposed action.

Economic Impacts: The Trinity Parkway Project is anticipated to have a beneficial effect on local and regional economies. An October 2002 report, *Fiscal and Economic Impacts of Proposed Recreation and Transportation Initiatives in the Trinity River Corridor, Dallas, TX* (Phase 3 Study), done in support of the CLUP, presents an economic analysis of the Trinity River Corridor Project and also discusses the possible economic contributions of the Trinity Parkway (City of Dallas, 2002c). The Phase 3 Study considered a mix of desired development types that stakeholders wanted throughout the corridor, and the

expected effect of the public investments. The general findings of the Phase 3 Study suggested that the Trinity Parkway could account for 6,000 to over 11,000 "construction person years" (i.e., one year of work by one person) within the corridor, and substantial increases in fiscal impacts to taxing jurisdictions (i.e., City of Dallas, DISD, and Dallas County) beyond the initial public investments. While it is difficult to partition the economic contribution of the Trinity Parkway to the economic impacts of other planned developments associated with the Trinity River Corridor Project, the general conclusion in the Phase 3 Study was that the Trinity Parkway would represent a substantial economic benefit to the community.

Cultural Resources and Parklands: Known archeological sites are located within the Dallas Floodway and DFE areas, and would not be affected by any development or redevelopment induced by the proposed project. Similarly, no impacts would be expected to public parks by any induced private development.

Indirect impacts to historic structures or districts were evaluated by overlaying the areas of induced development or redevelopment for the Build Alternatives with the database of historic properties which are either currently listed in the National Register of Historic Places (NRHP) or which have been determined to be eligible for listing in the NRHP. As noted in **Table 4-51**, only Alternative 2B would produce potential indirect impacts to this resource category (i.e., it may affect the Oak Cliff Box Company building at 1212 Industrial Boulevard).

Development and redevelopment of areas induced by the Build Alternatives are not expected to adversely alter the physical appearance of historic sites or districts in their vicinity (i.e., encroachment impacts, or Category I). This is because project-induced development would most likely be occurring on vacant lots and existing commercial sites which typically would not contribute to the historic nature of nearby sites or districts. In addition, the possibility that the Trinity Parkway could induce land developers to purchase historic properties for redevelopment was considered. The likelihood of this occurring is expected to be very low because of municipal controls in place to preserve historic districts and sites. The City of Dallas has a historic landmark ordinance in place that restricts development of properties that are individually designated as historic landmarks or are located within designated historic districts. The nearest historic district (Colonial Hill) would be unlikely to be redeveloped as a result of the Trinity Parkway because of its unique importance to the City of Dallas and the south Dallas community as a classic example of a streetcar suburban development (see **Section 3.3.1.4**). Historic properties that are not designated as historic landmarks could be vulnerable to unrestricted private development, however.

Surface Water Features: There are several major surface water bodies in the Indirect Impacts Study Area, including the following: Trinity River Mainstem (Dallas Floodway); Elm Fork of the Trinity River (Old River Channel); West Fork of the Trinity River (Old West Fork River Channel); Cedar Creek; Coombs

Creek; Crow Lake. None of the induced property development or redevelopment associated with the Build Alternatives would result in filling or otherwise altering these water bodies. However, these water features may be slightly affected by increased sedimentation from future developments or redevelopment induced by the proposed project. The NPDES storm water pollution prevention program supervised by the City of Dallas should serve to control and minimize sedimentation impacts. The regulatory programs supervised by USACE are also designed to protect and preserve these features.

Vegetation and Wildlife Impacts: As noted above in **Table 4-51**, indirect impacts from induced development and redevelopment would affect very little property that is not already urbanized. Moreover, the small areas of undeveloped land that would be developed as a result of the Trinity Parkway would generally be islands of maintained grass-dominated areas with little value for wildlife habitat. It is expected that city landscaping requirements for site development would mitigate the loss of the limited habitat represented by vacant lots and existing commercial sites, and may benefit wildlife with the addition of landscaping trees. There would be no change in habitat and vegetation in the Dallas Floodway and DFE due to indirect impacts, as urban development in these areas is generally constrained. Also, as induced indirect impacts would occur in a highly-urbanized area, there are no expected effects on threatened and endangered species in the Indirect Impacts Study Area. Field surveys conducted in July 2008 indicated that the interior least tern is not utilizing the project area for foraging grounds, and was not observed nesting in nearby vacant gravel lots or within the Floodway. As such, it is not believed the birds are nesting in the Indirect Impacts Study Area, and thus would not be affected.

Construction of Dallas Floodway Build Alternatives would result in a minor degree of habitat fragmentation and loss of habitat continuity (see **Section 4.9**). That is, habitat associated with Dallas Floodway levees would become separated from habitat in the floodplain. These types of impacts could also affect the processes and functions of communities including seed dispersal, reproductive activities, and the cycling and transfer of nutrients. In light of the limited size and maintained nature of the habitat associated with levees, habitat fragmentation impacts are not considered to be substantial. Road kills may also affect biological resources, although no endangered species would conceivably be affected.

Topography, Geology, and Soils: No indirect impacts would be expected to mineral resources. Soils would be exposed during construction activities associated with induced development or redevelopment, and there would be potential for soil erosion to occur. Soils within the Indirect Impacts Study Area, in general, are classified as having slight to moderate potential for erosion. The relatively flat topography reduces the potential for erosion during construction activities. Erosion and sedimentation control measures implemented in accordance with the TPDES program should serve to control soil erosion. No farmland is present in the Indirect Impacts Study Area.

Water Quality: Some minor positive water quality impacts may be experienced in the Indirect Impacts Study Area. These impacts would be expected from the redevelopment of industrial sites such as metal recycling facilities and engine shops, which are existing sources of water pollution from storm water runoff. Temporary negative impacts to water quality may be expected during redevelopment construction.

Floodplain Impacts: While much of the Indirect Impacts Study Area lies within the 100-year floodplain, urban development within the floodplain would be constrained by local government ordinances and USACE regulatory authority (i.e., in the Dallas Floodway). Consequently, the Trinity Parkway is not expected to result in any indirect impacts to floodplains, which include drainage sumps associated with the east and west levee internal drainage systems.

Air Quality Impacts: The Indirect Impacts Study Area is part of the EPA designated nine-county non-attainment area for the 8-hour standard for the pollutant ozone. The study area is currently in attainment for all other NAAQS pollutants, including CO (see **Section 3.6.4**). No change in attainment status is anticipated within the Indirect Impacts Study Area as the result of expected project-induced development/redevelopment of property. As determined in the Indirect Land Use Impacts Assessment (see **Appendix L-5**), induced changes in land use are expected to primarily include the redevelopment of existing urban land use areas (i.e., old industrial parks converted to mixed-use facilities). The amount of development/redevelopment induced by the proposed project is not expected to provide enough of a change, if any, on its own such that a change in the non-attainment status of ozone would occur. In order for the region to achieve ozone attainment, a variety of point, non-point, and mobile source emission reduction strategies must be implemented for the entire DFW area as outlined in the SIP. In addition, the amount of development/redevelopment induced by the project would not be expected to cause other criteria pollutants, including CO, to exceed the NAAQS. Indirect health effects of MSATs in the Indirect Impacts Study Area are unquantifiable due to existing limitations to determine pollutant emissions, dispersion, and impacts to human health. Emissions would likely be lower than present levels in future years as a result of the EPA's national control regulations (i.e., new light-duty and heavy duty on road fuel and vehicle rules; and the use of low sulfur diesel fuel). Even with an increase in VMT and possible temporary emission increases related to construction activities, the EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions of on road emissions, including CO, MSATs, and the ozone precursors VOC and NOx.

Noise Impacts: There is a possibility of some negative impacts due to increased human activity and traffic in the Indirect Impacts Study Area. Conversely, removal of heavy industry such as the existing scrap metal yards in the corridor may cause a beneficial effect on localized noise levels. In light of the

highly urbanized area in which indirect impacts would be realized, no long-term impacts on noise are anticipated above current levels.

Visual Impacts: Any anticipated induced land development or redevelopment would occur in areas that are already urbanized. Such changes would be expected to be beneficial to urban visual resources as aged structures are replaced with new improvements.

Hazardous Materials: The areas of expected induced land development and redevelopment were compared with the database of hazardous waste/material sites identified in **Chapter 3** of this report. No new high risk hazardous waste/material sites would be adjacent to any of the areas of induced development/redevelopment for any of the Build Alternative alignments.

Utilities and City Services: Indirect impacts in general and from induced development/redevelopment may include increased demand on existing utilities and city services, increased demand on schools due to population influx, and increased use of parks and recreational areas due to more convenient access.

4.24.1.7 Step 7 - Evaluate Analysis Results

The purpose of this step is to reconsider key assumptions used in the Indirect Impacts Analysis and evaluate the extent to which uncertainty associated with them may affect the results of the analysis. As indicated in NCHRP Report 466 (Page 92), "[t]here is inherent uncertainty in estimating indirect effects," and this is particularly difficult in the absence of a preferred alternative. With this challenge in mind, this step explores how sensitive the process of identifying indirect impacts is to the assumptions that served as a guide to defining the cause-effect relationships associated with project-induced land use changes. As noted above in Step 2, basic assumptions guiding this analysis included the following: future land use development would occur in accordance with the CLUP; the City of Dallas would continue to develop natural resources within the Dallas Floodway according to the Balanced Vision Plan; and that USACE would carry out its plans for the Dallas Floodway Extension.

Taken together these assumptions essentially indicate that the City of Dallas and USACE would be making improvements to enhance natural resources within the Dallas Floodway. As described in **Section 3.1.1.4**, the proximity of these city and USACE projects in the Floodway the possibility of a Floodway Build Alternative necessitate continuing coordinated planning and design of several independent but geographically overlapping projects. It is expected that the recreation and flood control activities planned by the city and USACE within the Dallas Floodway would be expected to serve as the principal catalyst for much of the economic redevelopment in areas adjacent to the Floodway. In light of this, the influence of the Build Alternatives as an economic engine for urban redevelopment would appear to be reduced.

Assuming for the moment that the Trinity Parkway could be built in an absence of such collateral projects and plans, it would nevertheless be unlikely to serve as a major economic catalyst for induced land use changes beyond those identified in this analysis. This conclusion is based on a review of the extensive existing transportation infrastructure in Downtown Dallas, and the overarching purpose of the Trinity Parkway as a reliever highway to allow many travelers to navigate past the downtown area. The Trinity Parkway will not provide access to any private property currently undeveloped, so the roadway would not serve as a major inducement for land use change; as noted in Step 5 (**Section 4.24.1.5**), the regulatory constraints and government ownership of land within the Dallas Floodway would prevent the Trinity Parkway from inducing private development of land within the Floodway. While it is also anticipated that many travelers would use the Trinity Parkway to drive into and out of Downtown Dallas, facilitating this is in response to an existing demand and is not expected to add substantial economic activity generally throughout the Trinity River transportation corridor.

4.24.1.8 Step 8 - Assess the Consequences and Develop Appropriate Mitigation

As nearly all of the readily identifiable indirect impacts primarily involve the redevelopment of a modest amount of existing urban land use, the requirement for mitigation of environmental impacts would be limited. Land development and redevelopment activities would generally be private ventures that would be regulated by City of Dallas land development ordinances. The local government regulation of land development necessarily addresses environmental and social impacts by requiring mitigation as part of site design and construction. Other city plans and policies ensure that redevelopment is in accordance with overall city objectives. In addition, much of the discussion of agencies and programs that would guide development/redevelopment induced by the proposed project would be the same or similar to the mitigation measures in **Chapter 7** of this report.

4.24.1.9 Indirect Impacts of the Regional Toll and Managed/HOV System

The analysis in the preceding sections (**Sections 4.24.1.1** through **4.24.1.8**) examined the potential project level indirect impacts for the proposed project. The following discussion focuses on the potential indirect impacts of the regional toll and managed/HOV system.

The current regional network of roadways, including priced facilities (i.e., toll, HOV/managed), and passenger rail is expected to increase by 2030. **Plates 4-40** through **4-42**, obtained from *Mobility 2030: The Metropolitan Transportation Plan (MTP) for the Dallas-Fort Worth Area*, show the proposed roadways, including priced facilities, and passenger rail for the region in 2030. The 2007 roadway network for DFW (calculated in mainlane lane-miles) consists of 4,397 lane-miles. Of the total system, 434 of the lane-miles are tolled (approximately 11 percent). The anticipated 2030 transportation network

for DFW would consist of approximately 8,569 mainlane lane-miles, which 30 percent (approximately 2,542 lane-miles) are tolled. **Table 4-52A** lists the priced facilities included in the 2030 MTP and when they are expected to be open to traffic. These projects include the construction of new location toll roads, the addition of managed HOV lanes, and the expansion of existing toll facilities. **Plates 4-43** through **4-45** show the priced facility system listed in **Table 4-52A** for the projected years of 2015, 2025, and 2030.

TABLE 4-52A. FUTURE TOLL ROAD AND MANAGED HOV LANE PROJECTS

Roadway	Location	Responsible Agency	Work Planned
Open to Traffic by 2015			
Dallas North Tollway	Parker Road to Royal Lane	NTTA	Expand existing toll road
IH 30 - Dallas County	SH 161 to IH 35E	TxDOT-Dallas	Add managed HOV lanes
IH 30 - Tarrant County	Cooper Street to Ballpark Way	TxDOT-Fort Worth	Add managed HOV lanes
IH 35E	IH 635 to Loop 12	TxDOT-Dallas	Add managed HOV lanes
IH 35E - “Northern Link”	FM 407 to PGBT	TxDOT-Dallas	Add managed HOV lanes
IH 35W	SH 170 to IH 30	TxDOT-Fort Worth	Add managed HOV lanes
IH 635	Luna Road to US 75	TxDOT-Dallas	Add managed HOV lanes
IH 820	SH 121/SH 183 to SH 121/SH 10	TxDOT-Fort Worth	Add managed HOV lanes
Loop 9	US 287/Outer Loop to IH 20/SH 190	TxDOT-Dallas	New toll road
Loop 12	IH 35E to SH 183	TxDOT-Dallas	Add managed HOV lanes
President George Bush Turnpike	IH 35E to SH 78	NTTA	Expand existing toll road
President George Bush Turnpike (Eastern Extension)	SH 78 to IH 30	NTTA	New toll road
SH 114	SH 121 (West) to International Parkway	TxDOT-Fort Worth	Add managed HOV lanes
SH 121	IH 820 to Minnis Road	TxDOT-Fort Worth	Add managed HOV lanes
SH 121	SH 183 to IH 820	TxDOT-Fort Worth	Add managed HOV lanes
SH 121	IH 30 to US 67	NTTA	New toll road
SH 121 - Collin County	US 75 to Hillcrest Road	TxDOT-Dallas	New toll road
SH 161	SH 183 to IH 20	TxDOT-Dallas	New toll road
SH 161/SH 360 Toll Connector	SH 161 to Sublett Road (SH 360)	TxDOT-Dallas & Fort Worth	New toll road
SH 170	SH 114 to US 81/US 287	NTTA	New toll road
SH 183	SH 121 to SH 161	TxDOT-Fort Worth	Add managed HOV lanes
SH 360 (toll road)	Sublett Road to US 287	NTTA	New toll road
Trinity Parkway	IH 35E to IH 45/US 175	NTTA	New toll road
US 75 - Collin/Dallas County	SH 121 (South) to Exchange Parkway	TxDOT-Dallas	Add managed HOV lanes
US 75 - North Collin County	SH 121 (North) to SH 121 (South)	TxDOT-Dallas	Add managed HOV lanes
Open to Traffic by 2025			
Dallas North Tollway	FM 121 to US 380	NTTA	New toll road
IH 20/US 287	IH 820 to Sublett Road (US 287)	TxDOT-Fort Worth	Add managed HOV lanes
IH 30	IH 35E to Bobtown Road	TxDOT-Dallas	Add managed HOV lanes
IH 30 - Tarrant County	IH 820 to Cooper Street	TxDOT-Fort Worth	Add managed HOV lanes
IH 30 - Tarrant County	Ballpark Way to SH 161	TxDOT-Fort Worth	Add managed HOV lanes
IH 35	Outer Loop (FM 156) to IH 35E/IH 35W	TxDOT-Dallas	Add managed HOV lanes
IH 35E	SH 183 to IH 20	TxDOT-Dallas	Add managed HOV lanes
IH 35E “Northern Link”	FM 2181 to FM 407	TxDOT-Dallas	Add managed HOV lanes
IH 35E “Northern Link”	PGBT to IH 635	TxDOT-Dallas	Add managed HOV lanes
IH 35W	IH 35/IH 35E to SH 170	TxDOT-Dallas	Add managed HOV lanes

TABLE 4-52A. FUTURE TOLL ROAD AND MANAGED HOV LANE PROJECTS

Roadway	Location	Responsible Agency	Work Planned
IH 635	US 75 to IH 30	TxDOT-Dallas	Add managed HOV lanes
IH 820/US 287	US 287 to IH 820 (US 287)	TxDOT-Fort Worth	Add managed HOV lanes
Loop 12	SH 183 to Spur 408	TxDOT-Dallas	Add managed HOV lanes
Outer Loop (Eastern Subregion)	IH 20/Loop 9 to IH 30	TxDOT-Dallas	New toll road
Outer Loop (Eastern Subregion)	US 75 to IH 35	TxDOT-Dallas	New toll road
President George Bush Turnpike	Belt Line Road to IH 635	NTTA	Expand existing toll road
SH 114 - Dallas County	SH 121 to SH 183	TxDOT-Dallas	Add managed HOV lanes
SH 170	SH 199/Outer Loop to US 67	NTTA	New toll road
SH 183	SH 161 to IH 35E	TxDOT-Dallas	Add managed HOV lanes
SH 190	IH 30/PGBT to IH 20/Loop 9	NTTA	New toll road
SH 360	Outer Loop to FM 2258	TxDOT-Dallas	New toll road
SH 360 (toll road)	US 287 to Outer Loop/Loop 9	NTTA	New toll road
US 67	IH 35E to FM 1382	TxDOT-Dallas	Add managed HOV lanes
US 67 - Dallas/Ellis County	FM 1382 to Loop 9	TxDOT-Dallas	Add managed HOV lanes
US 80	IH 30 to Belt Line Road	TxDOT-Dallas	Add managed HOV lanes
Open to Traffic by 2030			
IH 635	US 80 to IH 20	TxDOT-Dallas	Add managed HOV lanes
Outer Loop (Eastern Subregion)	IH 30 to US 75	TxDOT-Dallas	New toll road
Outer Loop (Western Subregion)	SH 199 to US 287/Loop 9	TxDOT-Fort Worth	New toll road

The expanding roadway network, including priced facilities, would cause indirect and/or cumulative impacts to the region. Because of the regional nature of these impacts, the proposed impacts would be better discussed at the regional level. The discussion of the expansion of the priced facility component of the system is presented in **Section 4.24.2.11**.

4.24.2 Cumulative Impacts

Sections 4.24.2.1 through **4.24.2.10** present a project level analysis of the potential cumulative impacts (or "effects") related to the proposed Build Alternatives for the Trinity Parkway. A system level analysis of the potential cumulative impacts of the regional toll and managed/HOV system is presented in **Section 4.24.2.11**.

4.24.2.1 Introduction

A CEQ regulation (40 CFR Section 1508.7) defines cumulative impacts as "the impact on the environment which results from the incremental impact of the proposed action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." As this regulation suggests, the purpose of cumulative impacts analysis is to view the direct and indirect impacts of the proposed project within larger contexts of time and space. First, resources affected by the Project's direct and/or indirect impacts are examined along with the impacts of future projects that are independent of the proposed Project but which are likely to affect the same resources (see **Tables 4-57 and 4-58; Figures 4-4 and 4-5**). Second, these same

resources are evaluated from the standpoint of their relative abundance, current condition, and trend of both abundance and condition among similar resources within a larger geographic area. Broadening the view of resource impacts in this way allows the decision maker to evaluate the incremental impacts of the proposed Build Alternatives in light of the overall health and abundance of selected resources. The focus of the analysis is on the sustainability of each resource of interest; the analysis, therefore, is not limited to the project study area but takes into consideration larger areas that can represent the base for sustaining the resource in that area.

In effect, a cumulative impacts evaluation first asks two questions: (1) What is the current condition and trend for a particular resource?; and, (2) What are the expected impacts to the resource from independent foreseeable future actions? The answers to these questions become the reference point for assessing the impacts of each of the proposed Project's Build Alternatives; that is, this process creates a model of the predicted condition of each resource that is independent of the proposed project (i.e., in essence, this reflects what would happen to a resource if the No-Build Alternative were ultimately selected). The net result of the evaluation may be that a seemingly minor incremental impact of a particular proposed action, when viewed in light of other planned projects, may in fact contribute to a major cumulative effect on a resource that is rare or in poor health. Thus, whether an effect is "significant" under the CEQ regulation quoted above would depend on the abundance and health of a given resource, as viewed in light of the current condition and trend of the resource. In sum, a "significant" cumulative effect on the environment means a potentially substantial adverse or beneficial change in any of the physical conditions within the area affected by the project that results from the collective environmental impacts of the proposed project and other reasonably foreseeable projects. The evaluation process for each resource considered may be expressed in shorthand form as follows:

BASELINE CONDITION + PROJECT IMPACTS + FUTURE IMPACTS = CUMULATIVE IMPACTS
(historical and current) (direct and indirect) (other expected projects)

4.24.2.2 Methodology

The evaluation of cumulative impacts presented in this document follows the eight steps in TxDOT's *Guidance on Preparing Indirect and Cumulative Impact Analyses* (2006b), which is modeled after the California Department of Transportation's (Caltrans) *Guidance for Preparers of Cumulative Impact Assessments* (June 30, 2005). These steps are outlined in **Table 4-53**. The methodology in this report also follows judicial requirements set out in controlling case law (see *Fritiofson v. Alexander*, 772 F.2d 1225, 5th Circuit, 1985), and applies many principles and methods suggested in guidance from the CEQ, *Considering Cumulative Effects under the National Environmental Policy Act* (1997b).

TABLE 4-53. STEPS IN THE ANALYSIS OF CUMULATIVE IMPACTS

Step	Description
1	Identify the resources to consider in the analysis.
2	Define the study area for each affected resource.
3	Describe the current health and historical context for each resource.
4	Identify the direct and indirect impacts that may contribute to a cumulative impact.
5	Identify other reasonably foreseeable actions that may affect resources.
6	Assess the potential cumulative impacts to each resource.
7	Report the results.
8	Assess and discuss mitigation issues for all adverse impacts.

The following sections provide the detailed methodology and results associated with each of the steps described above.

4.24.2.3 Step 1 - Identify the Resources to Consider in the Analysis

The cumulative impacts analysis must be limited through scoping to the resources that can be evaluated meaningfully, and should be limited to those resources substantially affected by the proposed Project. Guidance from TxDOT (Page 7) stresses that, “If a project would not cause direct or indirect impacts on a resource, it would not contribute to a cumulative impact on the resource. The cumulative impact analysis should focus on: (1) those resources substantially impacted by the project; and (2) resources currently in poor or declining health or at risk even if project impacts are relatively small." Similarly, the CEQ guidelines (Page 12) recommend narrowing the focus of the cumulative impacts analysis to important “resources, ecosystems, and human communities” of national, regional, or local significance so as to “count what counts, not produce superficial analysis of a long laundry list of issues that have little relevance to the effects of the proposed action or the eventual decisions.”

It is clear from TxDOT and CEQ guidance as well as case law that cumulative impacts should be assessed for a carefully selected group of natural resources, ecosystems, and human communities (hereinafter collectively referred to as “resources”), as opposed to every issue examined for direct and indirect impacts. The importance of limiting the analysis in this way becomes even more apparent in other steps of the analysis where understanding the nature and extent of each impact-receiving resource is critical (e.g., Step 2 - defining the “resource study area” for examining the resource within the larger context of like resources, and Step 3 - describing the abundance and health of resources). In contrast, the difficulty of exploring cumulative impacts for “non-resources” such as traffic noise levels or proximity to hazardous materials becomes apparent in light of the resource-oriented focus of cumulative impacts analyses. In summary, TxDOT and CEQ guidance emphasize the following two selection criteria as the basis for inclusion or exclusion from a cumulative impacts analysis:

1. Are there adverse impacts to a resource (i.e., resource, ecosystem, or human community)?
2. If so, then does either of the following apply?
    a. Are there substantial direct and/or indirect adverse impacts to the resource?
    b. If the direct and/or indirect adverse impacts expected to the resource are minor, is the resource affected either scarce or in poor or declining health?

The foregoing TxDOT and CEQ criteria were applied to the various environmental issues and resources evaluated for direct and indirect impacts in this SDEIS. In addition, the selection of resources for this analysis considered CEQ guidance (Page 13) suggesting additional criteria that focus on the importance of a particular resource to an area, and whether a resource is protected by legislation or planning documents. The selection of resources for analysis also considered input from the involved agencies and comments provided by the general public during the scoping process. The results of this approach is shown in the following table (**Table 4-54**), which indicates whether a particular issue or resource was considered appropriate and practicable for evaluating cumulative impacts and provides a brief discussion on how or why the determination was made. As noted in the introduction to **Chapter 4**, a review of some topics indicated that further evaluation for project impacts would not be warranted because a particular resource was not to be found in the project area. Such subjects, including Prime and Unique Farmland and Wild and Scenic Rivers, that were not found to have potential impacts were also excluded from **Table 4-54**.

TABLE 4-54. ISSUES/RESOURCES EVALUATED FOR DIRECT AND INDIRECT IMPACTS AND THOSE INCLUDED AS PART OF THE CUMULATIVE IMPACTS ANALYSIS

Subject Considered for Direct and Indirect Impacts	TxDOT/CEQ Criteria [1]		Included for Cumulative Impacts Analysis	Explanation for Including or Excluding the Subject from Cumulative Impacts Analysis
	Would Proposed Project Result in Substantial Adverse Impacts? [2]	Is Subject a Scarce Resource or in Poor or Declining Health? [2]		
4.1 Land Use Impacts				
Change in Land Use	No	Yes	Yes	Included because land used for additional right-of-way makes the land unavailable for other uses, and substantial acreage would be required for right-of-way in a highly urbanized corridor where land not already developed is scarce. Also, project-induced changes in land use were identified as potential indirect impacts.
4.2 Coordinated Planning and Design				
Coordination with Other Plans / Projects	---	---	No	Excluded because subject simply discusses the coordination of the Trinity Parkway with other key plans and projects. Also, the item does not involve a resource.
4.3 Social Impacts				
Neighborhoods / Districts	No	No	No	Excluded because the proposed project would result in minor adverse impacts.
Community Cohesion	No	No	No	Excluded because the proposed project would not result in substantial community cohesion issues. That is, design features include multiple forms and points of access that overcome the physical barrier that would be created.

TABLE 4-54. ISSUES/RESOURCES EVALUATED FOR DIRECT AND INDIRECT IMPACTS AND THOSE INCLUDED AS PART OF THE CUMULATIVE IMPACTS ANALYSIS

Subject Considered for Direct and Indirect Impacts	TxDOT/CEQ Criteria [1]		Included for Cumulative Impacts Analysis	Explanation for Including or Excluding the Subject from Cumulative Impacts Analysis
	Would Proposed Project Result in Substantial Adverse Impacts? [2]	Is Subject a Scarce Resource or in Poor or Declining Health? [2]		
Environmental Justice	No	Yes	Yes	Although the proposed project would be implemented consistent with EO 12898 and FHWA Order 6640.23, it was carried forward for cumulative impacts analysis in light of displacement impacts and the implications of this on the availability of affordable housing in and near affected areas, as well as an emerging regional tolling network and the potential accompanying financial impacts to potential users.
Community or Public Resources	No	No	No	Excluded because although the proposed project could result in adverse impacts, they would be minimal.
4.4 Transportation Impacts				
Congestion, Traffic Patterns, and Safety	---	---	No	Excluded because proposed project is expected to manage traffic congestion, and be beneficial for vehicle utilization, roadway effectiveness, and safety. Also, subject is not a resource.
4.5 Relocation and Displacement Impacts				
Relocations and Displacements	---	---	No	Excluded because relocations and displacements are impacts and do not represent a resource. Note that the potential loss of affordable housing as it relates to minority and/or low income populations resulting from residential displacements is considered under **Section 4.3** above.
4.6 Economic Impacts				
Local Economy	No	---	No	Excluded because the proposed project is expected to generate overall benefits for the local economy through construction spending and construction-related jobs.
4.7 Cultural Resources and Parklands				
Archeological Sites	No	No	Yes	Resource included because the proposed project has the potential to impact buried archeological sites, and Section 106 coordination is ongoing. No NRHP-listed archeological sites are located in the general proximity of the proposed project.
Historic Bridges, Buildings and Districts	No	Yes	Yes	Resource included because a historical trend of adverse impacts is evident in the study area regarding NHRP-listed or -eligible historic structures and districts.
Parks and Recreation Areas	No	Yes	Yes	Resource included because parks and recreation areas are a limited resource, and the subject of careful planning to conserve and enhance in a highly urbanized area.
4.8 Waters of the U.S., Including Wetlands				
Waters of the U.S., Including Wetlands	Yes	Yes	Yes	Resource included because the proposed project's Dallas Floodway alternatives would result in additional impacts to wetlands in the area which have been historically impacted or have been in decline.
Navigable Waters	No	No	No	Excluded because, although designated by the USCG as a navigable waterway, there are no plans to develop a navigation channel in this portion of the Trinity River.
4.9 Water Body Modification; Vegetation and Wildlife				
Water Body / Aquatic Habitat Modification	Yes	Yes	Yes	Resource has been included as part of the consideration of cumulative impacts to waters of the U.S., including wetlands, associated with Dallas Floodway alternatives.
Vegetation and Wildlife Habitat (woodlands)	No	Yes	Yes	Resource included because the proposed project's Floodway alternatives could result in the loss of habitat in an area that has historically seen encroachment and loss of available habitat.
Vegetation and Wildlife Habitat (grasslands)	Yes	No	Yes	Resource included because the proposed project's Floodway alternatives are expected to result in conversion of a substantial amount of maintained grassland area to transportation right-of-way.

TABLE 4-54. ISSUES/RESOURCES EVALUATED FOR DIRECT AND INDIRECT IMPACTS AND THOSE INCLUDED AS PART OF THE CUMULATIVE IMPACTS ANALYSIS

Subject Considered for Direct and Indirect Impacts	TxDOT/CEQ Criteria [1]		Included for Cumulative Impacts Analysis	Explanation for Including or Excluding the Subject from Cumulative Impacts Analysis
	Would Proposed Project Result in Substantial Adverse Impacts? [2]	Is Subject a Scarce Resource or in Poor or Declining Health? [2]		
Wildlife Populations	No	No	No	Excluded because wildlife populations are largely limited to the Dallas Floodway, and have become adapted to the disturbances common to an urbanized environment (e.g., noise, traffic, human presence, street lighting). While impacts to wildlife from Floodway alternatives are anticipated, assessing the impacts of a roadway on wildlife populations would be a complex process, requiring information about individual species that is not available and not obtainable with reasonable efforts. Inferences about impacts to wildlife have therefore been focused on changes to aquatic and terrestrial habitat (e.g., woodlands and jurisdictional waters).
Habitat for Threatened/ Endangered Species	No	Yes	No	Excluded because effect calls for federally listed species as a result of any of the Build Alternatives are all either "no effect" or "may affect, not likely to adversely affect." Also, high value habitat for wildlife species is part of the analysis of other resources (e.g., waters of the U.S., including wetlands, and woodland habitat).
4.10 Microclimate Impacts				
Impacts of Urbanization on Microclimate	---	---	No	Excluded because the proposed project is not expected to have microclimate impacts substantially different than other urban developments. Also, subject is not a resource.
4.11 Topography and Geology				
Topography, Geology, and Mineral Resources	No	No	No	Excluded because, although topographic changes would occur, they would not substantially affect the geologic setting or soil stability in the area. Also, the proposed project would not require the use of available mineral resources in the area.
4.12 Water Quality Impacts				
Water Quality	No	Yes	Yes	Included because the proposed project, particularly Dallas Floodway alternatives, could result in additional degradation to local water quality in a stream segment with a history of water quality issues.
4.13 Floodplain Impacts				
Floodplain and Valley Storage	No	Yes	Yes	Resource included because it is closely regulated to maintain the flood conveying capabilities of the Dallas Floodway, and could be affected by Floodway Build Alternatives. Maximum percent increase in 100-year flood and SPF water surface elevations and changes to 100-year flood and SPF valley storage were selected as representative indicators of impacts to this resource.
4.14 Air Quality Impacts				
Change in Air Quality	No	Yes	Yes	Resource included because of prevailing ozone non-attainment conditions, even though the proposed project is not expected to adversely affect the region's ability to comply with prevailing regulations/standards; the region is in attainment for all other NAAQS criteria, including CO. Also included in light of unknown impacts of mobile source air toxics (MSATs).
4.15 Noise Impacts				
Traffic Noise	---	---	No	Excluded because traffic noise is a potential direct impact that is not a resource.

TABLE 4-54. ISSUES/RESOURCES EVALUATED FOR DIRECT AND INDIRECT IMPACTS AND THOSE INCLUDED AS PART OF THE CUMULATIVE IMPACTS ANALYSIS

Subject Considered for Direct and Indirect Impacts	TxDOT/CEQ Criteria [1]		Included for Cumulative Impacts Analysis	Explanation for Including or Excluding the Subject from Cumulative Impacts Analysis
	Would Proposed Project Result in Substantial Adverse Impacts? [2]	Is Subject a Scarce Resource or in Poor or Declining Health? [2]		
4.16 Visual and Aesthetics				
Characteristics and Trinity River Views	No	Yes	Yes	Resource included because the addition of a transportation facility in the area would change the visual characteristics of the Dallas Floodway.
4.17 Hazardous Materials				
Hazardous Waste or Materials Sites	---	---	No	While the proposed project would likely encounter sites in or near the proposed right-of-way, subject was excluded because it does not represent a resource.
4.18 Utilities				
Easements / Corridors and Relocations	---	---	No	Although relocations/service disruptions could occur, subject excluded because impacts would be temporary in nature. Also, while the proposed project would likely result in the increased need for utility supply, the needs are anticipated to be within existing service distribution/collection capabilities.
4.19 Energy				
Availability and Expenditure	No	---	No	Excluded because most energy demands would be temporary during the construction phase. Although energy would be consumed with operation of the proposed project, the amounts would be minimal when compared to overall consumption in the region.

Notes:
1. In accordance with TxDOT (2006b) and CEQ (1997b) selection criteria for limiting the scope of cumulative impacts analyses.
2. "---" Represents an environmental "issue" but not a resource (i.e., natural resource, ecosystem, or human community), and does not lend itself to an evaluation of resource condition and context (i.e., amount of similar resources within a defined resource study area).

As recommended in CEQ guidance (1997b, Page 26), specific indicators representative of each resource's condition have also been identified for each of the resources evaluated for cumulative impacts. The use of indicators of a resource's health, abundance, and/or integrity is a helpful approach to formulating quantitative or qualitative metrics for characterizing overall impacts to resources and making comparisons between Build Alternatives. Resource indicators are also key aspects of each resource that have already been evaluated in terms of the project's direct and indirect impacts, and facilitate greater consistency and objectivity in the analysis of cumulative impacts. The resource categories and indicators used in this cumulative impacts analysis are shown in **Table 4-55**. Each indicator was selected from data developed as part of the evaluation of direct and indirect impacts in **Chapter 4**, and representative of resource impacts that would be of greatest import to planners. For example, indicators reflecting potential impacts to the SPF flood were selected as these reflect important data reflecting how the Floodway would respond during an extreme flood event. The objective in this process was to select indicators that would provide the basis for comparing alternatives on key aspects of each resource's current and predicted condition, without overburdening the analysis with excessive detail.

TABLE 4-55. INDICATORS ESTABLISHED FOR CUMULATIVE IMPACTS ISSUES/RESOURCES

Issues/Resources	Indicator [1]
4.1 Land Use Impacts	
Land Converted to Transportation Right-of-Way	• Amount of land converted to transportation right-of-way (acres) • Induced land development or redevelopment (acres)
4.3 Social Impacts	
Environmental Justice	• Impacts to minority and/or low-income populations resulting from residential displacements and the loss of affordable housing (qualitative evaluation) • The effect of tolling on minority or low-income populations (qualitative evaluation)
4.7 Cultural Resources and Parklands	
Archeological Resources	• Archeological sites and areas with high potential for archeological resources affected (qualitative evaluation)
NRHP-Listed or -Eligible Buildings, Bridges, and Districts	• NRHP-eligible or -listed buildings, bridges, or districts affected (number)
Parks and Recreation Areas	• Change in amount of parks and recreation areas (acres)
4.8 Waters of the U.S., Including Wetlands	
Waters of the U.S., Including Wetlands	• Waters of the U.S., including wetlands affected (acres)
4.9 Water Body Modification; Vegetation and Wildlife Impacts	
Water Body Modification / Aquatic Habitat	• Same indicator as for waters of the U.S., including wetlands (see above); discussion of both subjects are combined
Vegetation and Wildlife Habitat (woodlands)	• Amount of high quality habitat (woodlands) affected (acres)
Vegetation and Wildlife Habitat (grasslands)	• Amount of maintained grassland habitat affected (acres)
4.12 Water Quality Impacts	
Water Quality	• Results in further degradation of surface water quality in the area or hinders compliance with water quality regulations (qualitative evaluation)
4.13 Floodplain Impacts	
Floodplain and Valley Storage	• Change in 100-year flood and SPF water surface elevations (feet) • Percentage change (as compared to CDC criteria) in the 100-year and SPF valley storage capacities
4.14 Air Quality Impacts	
Regional Attainment Status	• Contributes to region's ability to comply with air quality regulations/standards (qualitative evaluation)
MSATs	• Trend of emissions over time (qualitative evaluation)
4.16 Visual Impacts	
Characteristics and View Sheds	• Results in a visual element that is not consistent or in conflict with the general visual characteristics of the Dallas Floodway area (qualitative evaluation)
Notes: [1]Indicators are representative of and consistent with those discussed earlier in **Chapter 4**.	

4.24.2.4 Step 2 - Define the Study Area for Each Affected Resource

Cumulative impacts analysis requires an evaluation of the sustainability of each resource or issue of interest as viewed from the perspective of a geographic area that is larger than the project area. The spatial limits for evaluating the cumulative impacts of the Trinity Parkway project were established using the criteria in CEQ/TxDOT guidance cited above. These spatial limits were selectively expanded beyond the established Trinity Parkway Study Area to consider possible direct and indirect impacts on larger areas, taking into consideration the physical characteristics, affected institutional jurisdictions, and relevant political boundaries where appropriate. The objective of this step is to identify reference area for each resource or issue as far away from the Project Area as the direct and indirect impacts of the Project

are expected to be felt. The size of the geographic area necessary to sustain the long-term vitality of a given resource can be a function of the nature of each resource as defined on a case-by-case basis after considering the unique aspects of a particular proposed project (CEQ, 1997b, Page 15). As suggested in the discussion above, some of the topics considered for cumulative impacts should be considered "issues" rather than resources. That is, some issues of interest do not lend themselves to a more traditional assessment of an amount and condition of a particular resource, as compared to the amount and condition of the same resource within a larger frame of reference. Nevertheless, for all resources and issues considered, the cumulative impacts analysis considered a larger frame of reference so as to allow the expected impacts of the Trinity Parkway to be viewed within a larger context for each resource or issue. The description of these frames of reference or "resource study areas" (RSA) and the rationale for choosing them are discussed below.

Land Use and Natural, Cultural, and Other Resources

The RSA for all cumulative impacts issues identified in **Table 4-54**, with the exception of air quality and social impacts, was designated as the Trinity River Corridor, as it has been defined by the City of Dallas for a variety of resource and land use planning purposes throughout recent years (see **Plate 4-39**). This selection of a RSA boundary emphasizes the "human communities" and "affected institutional jurisdictions" aspects of the CEQ guidance (1997b, Pages 12 and 15). In this case, widespread urbanization in the area has intensified the community's interest in the mixture of natural resources within it, a situation that has led the local community to study intensively the appropriate balance between preservation and development.

Using the Trinity River Corridor as a RSA represents a key management unit used by the City of Dallas in developing land use plans that focus on preserving and enhancing the socio-economic conditions and natural resources that characterize a geographic area of approximately 43,500 acres; in contrast, the Trinity Parkway Study Area, contained entirely within this corridor, is comprised of approximately 7,036 acres. Selecting this RSA is particularly well suited for evaluating impacts to land use as it offers the advantage of viewing cumulative impacts issues within a context that dovetails with the current and future planning efforts of the community.

The Trinity River Corridor is also centered on natural features (i.e., the hydrology and biology of the Trinity River) and adjacent urban areas, thus forming a hybrid management unit suitable for a variety of resources of interest to the community. In this highly urbanized landscape, the Trinity River Corridor encompasses most of the natural habitat, water resources, floodplains, open space and recreation areas, and visual resources to be found both upstream and downstream of the project area within the Trinity River drainage. This RSA also provides a broader context for considering impacts to cultural resources,

both historical structures and archeological sites, which have been identified or may be present in this urban area whose history is inextricably linked to the Trinity River.

Environmental Justice RSAs

This analysis has considered two diverse aspects of potential impacts to minority and/or low-income populations, and the RSAs for evaluating cumulative impacts have been tailored accordingly. The first aspect focuses on the loss of affordable housing represented by the potential displacement of residential buildings located within predominately minority and low-income populations. As the principal means of mitigating the effects of residential displacements would be relocation to affordable housing within or near the same neighborhood, the RSA should maintain the focus on the area of potential direct impacts. This approach allows an evaluation of the combined effects of direct, indirect, and other foreseeable projects on displacements and affordable housing within or near affected neighborhoods. This was accomplished by defining the RSA as the four census tracts (i.e., 34, 40, 41, and 101.02) for which potential residential displacements were identified.

In contrast, the evaluation of tolling effects on environmental justice populations has projected the influence of the proposed toll road as far away from it as the impacts are likely to be felt. The system level RSA for environmental justice populations is bounded by the nine counties that are predominantly served by the regional toll system (of which the proposed Trinity Parkway would be an element). Quantitative data provided by the U.S. Census Bureau was evaluated to determine the presence of minority and low-income populations. The project level resource study area consisted of adjacent census tracts, comparison reference areas, and traffic survey zone (TSZ) populations predicted to utilize the Trinity Parkway in 2030 per the NCTCOG origin/destination select link analysis. This aspect of the EJ analysis is subject to change pending the 2009 update to the MTP.

Air Quality

The resource study area for evaluating air quality associated with the NAAQS and transportation conformity was designated as the DFW 8-hour ozone non-attainment area, which includes Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant counties. This large area represents the management unit for mobile source pollutants as regulated by federal, state, and local government agencies. The NAAQS criteria pollutants include ozone, carbon monoxide, particulate matter, nitrogen dioxide, sulfur dioxide, and lead. Unlike the other cumulative impacts issues identified, air quality impacts from mobile sources are evaluated and managed on a regional basis primarily through the NCTCOG, in coordination with the EPA, TCEQ, TxDOT, and FHWA.

The MSAT RSA is an affected transportation network that includes the project network links and other transportation model links. The affected transportation network was derived from the 2030 No-Build

Scenario compared to the 2030 Build Scenario to determine which roadway links in the model achieved a ±5 percent volume change. These links were then compared to the 2007 model in order to extrapolate a baseline traffic network. The application was adopted as the basis to determine the affected transportation network RSA located within the NCTCOG MPA. This large area represents the management unit for mobile source pollutants that are regulated by federal, state, and local government agencies. It should be noted this analysis is also subject to change pending the 2009 update to the MTP.

Temporal Boundaries for Cumulative Impacts Analysis

In addition to defining RSAs, cumulative impacts analysis guidelines also require the setting of general temporal boundaries to better define the time period considered. Information for understanding the current health, condition, or status of a particular resource and how it got to its current state (i.e., historical context) is available as far back as the 1800s for some resources (e.g., biological resources), even further back for other resources (e.g., cultural resources). However, for all resources, reliable information/data regarding generalized trends is readily available within the 1970 to 1980 time frame. As a result, this time frame was established as the beginning point for discussing the current health, condition, or status of the resources of particular interest to the cumulative impacts analysis. The ending time frame was established as 2030 because, by this time, the proposed project (should it be approved) would be complete and operational and because this time frame is consistent with other regional planning efforts/projections including land use plans and traffic forecasts (i.e., *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*).

4.24.2.5 Step 3 - Describe the Current Health and Historical Context for Each Resource

In order to adequately assess the potential cumulative impacts of the proposed action, a description of the current health, condition, or status of each selected resource within the study area must be provided, as well as a historical context for understanding how each resource got to its current state. This essentially establishes the baseline condition and "tells the story of the issue or resource." It is this baseline condition that will be combined with later steps to assess the cumulative impacts on each of the resources of interest. For each resource examined for cumulative impacts, each resource's abundance and quality at the present time was evaluated considering the impacts of historical activities, the resource's response to change, and the continuing stresses imposed on the resource and its capacity to withstand these stresses. Collectively, these factors capture the influences that have shaped and are shaping the amount and quality of each resource and which would continue to shape each given resource into the future. The current condition and abundance of each selected resource within the study area was determined through review of current and historical reports, studies, and mapping (including aerial photography). Key indicators were input into geographic information systems (GIS) in an effort to quantify the resource when appropriate. A major factor influencing each resource is the framework of federal,

state, and local regulatory controls or measures. As these regulatory controls play an important role in the health, condition, or status of select resources, a discussion of regulatory controls is included as part of the discussion of historical context and existing condition for each resource considered in this analysis. A summary of existing conditions for each of these resources is included in **Table 4-59**, discussed under Step 5, below.

Land Use Impacts: Change in Land Use

Land use has been identified as a cumulative impacts subject because the proposed transportation project would have an impact on the land base available for alternative land uses. In other words, central in the decision of whether to select a Build Alternative is the tradeoff of committing land to transportation uses that could otherwise be used for industrial, commercial, residential, or open space uses (or any combination thereof). Historically, there has been a direct correlation between the use of land (development) and population growth. As a population grows, additional infrastructure and facilities are needed to adequately support the population, thus creating a constant need to balance the amount of land needed for transportation versus other land uses. The population in the DFW region (defined as the NCTCOG 16-county north central Texas region) has been steadily increasing since 1960. The DFW region was one of the fastest growing areas in the U.S. during the 1980s and 1990s. According to the U.S. Census Bureau, the DFW region grew by 29.1 percent between 1990 and 2000 - more than twice the national growth rate (U.S. Census Bureau, 2000). The DFW region is a major economic, social, and political center of Texas with rapid growth in population and employment expected to continue. By the year 2030, the DFW region is expected to attract over four million new residents. The four core counties within the DFW region (Collin, Dallas, Denton, and Tarrant) captured 85 percent of all regional growth throughout the 1990s. According to the NCTCOG, the City of Dallas demonstrated an 18 percent growth rate over the same 10-year time period. The Trinity Parkway Corridor area, however, showed a much lower growth rate over the same time period. There has, however, been a resurgence of interest in recent years in redevelopment of the central core areas of Dallas County, as evidenced by residential redevelopment in and around the Dallas CBD. This kind of redevelopment is encouraged by NCTCOG and the City of Dallas through sustainable growth initiatives. Potential redevelopment of lands within and surrounding the corridor can be expected to generally support this regional initiative.

Currently, development in the Trinity River Corridor is dominated by Commercial and/or Industrial uses. These uses total just over 11,000 acres located throughout the corridor, along major transportation systems, and along the majority of the levees. Residential development constitutes just over 5,000 acres and can be found primarily scattered throughout the corridor, but several residential areas can be found immediately adjacent to several portions of the levees. There are an additional 95 undeveloped parcels outside the Dallas Floodway that account for an approximately 1,740 acres. The remaining acreage

within the corridor comprises parks and recreation areas (primarily associated with the Dallas Floodway), surface water features, and utilities.

As stated previously, land use and development considerations in the City of Dallas have been primarily dictated by population and employment growth, accompanied by transportation, residential, commercial, industrial, and service-oriented development. The intensity, timing, and character of development have been directed by local or regional comprehensive plans, general plans, or long-range plans. The goals identified in planning documents have been implemented through a variety of tools including zoning, capital improvements, and tax incentives. Land use is regulated through the Dallas City Council according to the City's Comprehensive Land Use Plan, zoning maps, and zoning ordinances designed to minimize the adverse impacts of growth. Long-range infrastructure planning for the area is provided by NCTCOG, NTTA, TxDOT, DART, city, county, and others to improve transportation service, along with ambitious growth and revitalization plans for Trinity River Corridor. There are numerous developed and on-going studies and plans that attest to the intense pace of development and redevelopment that currently exists in the corridor and would exist in the foreseeable future, all controlled and managed by local government land use plans and policies.

Social Impacts: Environmental Justice and Affordable Housing

The historical background for affordable housing generally within the City of Dallas applies to the RSA for evaluating residential displacements in environmental justice communities. Predominately minority neighborhoods in Dallas often started out that way or developed because of past segregation practices. Whether these communities continue to retain racial or ethnic character as a result of choice or necessity is difficult to determine. However, federal, state, and local policies and programs have evolved in recent decades into a complex network that seeks to ensure that minority and low-income families have an affordable place to live, and that members of existing communities with a high proportion of a particular race or ethnicity are not forced into different areas for want of affordable housing.

As outlined in **Section 4.5.3**, the City of Dallas administers a variety of programs and funding directed toward the creation of and maintenance of affordable housing. The centerpiece of these programs involves the fostering of partnerships with local nonprofit groups through the Community Housing Development Organization Program, the Land Transfer Program, the City of Dallas Land Bank, and the Residential Development Acquisition Loan Program. Other agencies or programs focused on providing housing and financial assistance to low-income households include the Dallas Housing Authority, the Dallas Mortgage Assistance Program, and the Neighborhood Investment Program. An example of private developers who concentrate on affordable housing is the nonprofit organization Habitat for Humanity International, which has constructed over 20 affordable new homes in the South Dallas neighborhood

alone. Other private developers are also actively involved in the creating or improving of affordable housing within the RSA.

Inquiries with City of Dallas Housing Department staff indicate affordable housing continues to be available within the RSA. In addition, the city's future land use plan leaves unchanged the single familiy residential tracts in the west and south portions of the project area to preserve existing neighborhoods. There remains, however, the possibility that private developers could acquire affordable housing properties with the intent to create residential areas that would be too costly for existing residents. In such situations, the City of Dallas would continue to effectuate its affordable housing policies by negotiating the terms of development permits.

Social Impacts: Environmental Justice and Tolling

The 2007 transportation network for North Central Texas (calculated in mainlane lane-miles) consists of 4,397 lane-miles. Of the total system, 434 of the lane-miles are tolled and 3,963 are non-tolled. Tolled mileage accounts for approximately 11% of the 2007 North Central Texas network. The anticipated 2030 transportation network for North Central Texas (also calculated in mainlane lane-miles) would consist of approximately 8,569 mainlane lane-miles, of which 30% (approximately 2,542 lane-miles), are proposed to be tolled. The anticipated increase of tolled mainlanes from 11% to 30% is indicative of an emerging regional tolling network.

Existing tolling systems within the region include the Dallas North Tollway (DNT), President George Bush Turnpike (PGBT), and SH 121 in Denton County. Reasonably foreseeable tolling projects near the proposed project include HOV/Managed Lane facilities on SH 183, SH 114, and IH 635. Additional foreseeable tolling projects in the resource study area include the Regional Outer Loop, Loop 9, SH 170, SH 190 East, SH 161, SH 360 southern extension, and Southwest Parkway in Fort Worth.

The total population of the nine-county resource study area is 5,030,828 (U.S. Census Bureau, 2000). Of the nine counties, Dallas County contains the largest concentration of minority and low-income populations. Dallas County exhibits a minority population of 49.1% and a low-income population of 13%. The other eight counties exhibit minority populations ranging from approximately 10 to 40%, and low-income populations ranging from approximately 5 to 18%.

Presidential EO 12898 requires federal agencies to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental impacts of its programs, policies, and activities on minority populations and low-income populations." EO 13166 requires federal agencies to examine the services they provide and identify any need for those with limited English proficiency (LEP). The thresholds used to identify areas with high

concentrations of low-income and/or minority populations were based on the definitions of low-income and minority established in the FHWA Order and by the CEQ Environmental Justice Guidance under the National Environmental Policy Act documentation.

Historically, highway projects have been financed on a “pay-as-you-go” basis, using motor fuel taxes and other revenue deposited in the State highway fund. However, population increases and traffic demand have outpaced the efficiency of this traditional finance mechanism. Transportation agencies have worked cooperatively to plan a proposed integrated system of managed lanes and toll roads for the DFW region. The combination of traditional and toll funding would allow projects to be completed earlier than previously programmed using traditional highway funds, thus adding freeway/highway and frontage road capacity to the system earlier than originally programmed than by using traditional funding alone. As funding mechanisms evolve, the trend towards utilization of tolling facilities in this region may through time create “user impacts” as access to highway systems becomes an issue to the economically disadvantaged.

EO 12898 was intended to ensure that federal departments and agencies identify and address disproportionately high and adverse human health and environmental impacts of their policies, programs, and activities on minority populations and low-income populations. It reinforced Title VI and reminded all government agencies receiving federal funding that they are required to address discrimination as well as the consequences of their decisions or actions that might result in disproportionately high and adverse environmental and health impacts on minority and low-income communities. Subsequent to EO 12898, US DOT Order 5610.2 was published in the Federal Register in 1997. It describes the process for incorporating environmental justice principles into all Department of Transportation programs, policies, and activities. The following year, FHWA Order 6640.23 was issued, establishing policies and procedures for the FHWA to use in complying with EO 12898 and US DOT Order 5610.2. In addition, EO 13166 was signed in 2000 and requires that federal agencies examine the services they provide and identify any need for those with limited English proficiency (LEP). Environmental justice is not merely meeting legal and regulatory requirements. Environmental justice, if properly implemented, can result in decisions that result in better communities. It can mean that by working with minority and low-income communities and communicating with those groups who have a limited grasp of the English language, TxDOT can develop a transportation system in the DFW metropolitan area that better meets the needs of these populations.

Three fundamental principles summarize the essence of effective environmental justice practice:

- Avoid, minimize, or mitigate disproportionately high and adverse human health and environmental impacts, including social and economic impacts, on minority and low-income populations;

- Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process, including persons with LEP; and
- Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

Cultural Resources: Archeological Resources and Historic Architectural Properties

The City of Dallas has a long and interesting history that has developed from the Native American occupation of the area and later European settlement due to the vast expanses of lands that were available to farmers, real estate speculators, and developers, as well as its location at the "Three Forks" of the Trinity River. During early Native American periods, a nomadic hunting and gathering economy prevailed in the area, which has been demonstrated by prehistoric archeological sites primarily found buried in floodplain deposits and on terraces above the floodplain. A shift to more agricultural societies appears to have occurred during late prehistoric periods (i.e., 750-250 years before present) as evidenced through artifact collections dating to this time period that included pottery and possible horticultural tools (Skinner, 2006).

From its first visitors as early as 1542 (the Spanish) to settlers shortly after independence from Mexico in 1836, the area has consistently seen increases in population, growth, and development. Even the years of the Great Depression were not as devastating to the Dallas economy as perhaps the rest of the country with population growth and development continuing. Urban sprawl resulting from the post-war housing boom resulted in large housing developments and a tremendous growth in businesses throughout the City of Dallas. To meet this growth, a freeway system was designed and built during the mid-1950s. With economic prosperity, population growth, and development throughout the years, many of the City's older neighborhoods were divided and many of the historic homes and buildings that remained from the late 19th and early 20th centuries were destroyed. The 1960s through the 1980s also saw many of the City's historic commercial buildings destroyed in favor of the construction of skyscrapers and new commercial developments. It is probable that many archeological sites in the area have also been destroyed as a result of urban development and infrastructure improvements.

Although growth and development throughout the years in Dallas has resulted in the unfortunate loss of important cultural resources, a plethora of cultural resources still remain to this day. In the past 30 years, surveys of the historic and cultural resources of Texas and the Dallas area have revealed a vast and varied collection of sites, objects, districts, buildings, and structures recognized for cultural, historic, architectural, or archeological importance on a local, state, or national level. These diverse examples of the cultural and technical achievements contribute to a comprehensive record of the past.

Recognizing the need to document and preserve the important tangible remains of our past, both the federal government and the State of Texas passed laws to protect important historic structures and archeological sites from damage due to growth and development. As massive government-sponsored construction projects, such as the interstate highway system and urban renewal in older cities, became commonplace after World War II, an estimated 25 percent of the nation's finest historic sites were lost. In response to growing public concern, Congress passed the National Historic Preservation Act (NHPA) in 1966. The NHPA established a national policy for the protection of important historic buildings and archeological sites and outlined responsibilities for federal and state governments to preserve our nation's heritage (THC, 2002a). The THC is the state agency charged with responsibility for historic preservation. The agency also serves as the SHPO, administering the NHPA for Texas. After a sunken Spanish treasure ship was plundered off the Texas coast during the late 1960s, the state passed the Texas Antiquities Code in 1969 to protect historic buildings and archeological sites on public land (THC, 2002b).

In addition to these regulatory controls, there are additional programs that have been implemented for the protection of archeological and historic architectural resources. In 2002, the THC published *Preserving Our Heritage: A Statewide Plan for Texas* (THC, 2002c), a roadmap for the state's preservation efforts. Included in the Plan are national and state preservation resources and information about an innovative new program that helps communities strategically plan their preservation efforts, the THC's *Visionaries in Preservation Program* (THC, 2002d). The City of Dallas has long been committed to the preservation of its historic architectural resources. In 2001, the City developed the *Neighborhood Revitalization and Historic Preservation Program* to encourage the restoration of historic buildings and the revitalization of neighborhoods throughout Dallas. The goal of the program is to respond to the broad vision Dallas has for redevelopment, revitalization, and preservation (City of Dallas, 2001c). The City of Dallas is also one of three pilot *Visionaries in Preservation* communities in Texas that are currently participating in the program. This THC program is partnering with the local group Preservation Dallas in an effort to educate neighborhoods, increase awareness of the built environment, identify opportunities for compatible redevelopment and private investment, and establish an enduring preservation ethic for the City. *Discover Dallas!* is a project that seeks to identify historical and architectural resources from the 19th century through the latter part of the 20th century and coordinate diverse organizations into a long-range strategic plan for their preservation (THC, 2002d).

Although many important archeological and historical resources have been lost through the years, many still remain. This is true for the City of Dallas and particularly the Trinity River Corridor. The recognized need to preserve these resources is evident in the regulatory controls and other preservation programs enacted through the years. The City of Dallas has demonstrated its commitment through development and participation in extensive preservation efforts (restoration, neighborhood revitalization, etc.). It has

been demonstrated that preserving the rich history of Dallas is important to citizens, and this preservation trend can be expected to continue into the future.

Parks and Recreation Areas

As discussed previously, over the last several decades, rapid population growth and urbanization have altered the local landscape. This urbanization has continued the long-term trend of converting available open space to urban land uses despite the large amount of public and private park and recreation areas established over the years. As development has occurred, the extent of remaining open space has decreased and with continued population growth and planned development, available parks and recreation areas would be expected to decrease further. Parks and recreation areas have been recognized as an important resource, particularly in urban settings. The protection/preservation of parks and recreation areas is provided for under Section 4(f) of the USDOT Act, Section 6(f) of the LWCF Act of 1965, and the Texas Parks and Wildlife Code. The intent of these regulations is to avoid the use or taking of any public land used as a park unless it is determined that there is no feasible and prudent alternative and that the project/program includes all reasonable planning to minimize harm to the land. Local governments also provide protection from encroachment on parks and recreation areas through development and implementation of local plans, policies, and ordinances (including land use and zoning). Local governments have long recognized the benefits of parks and recreation areas to citizens of a given community and have actively sought, and continue to seek, to preserve existing opportunities and acquire additional lands in anticipation of future needs.

Parks and recreation areas benefit the Dallas community in many ways. Parks and recreation areas add aesthetic value and contribute to enjoyment by offering relief from the harsh city landscape. Parks and recreation areas can also contribute considerably to prevailing property values. Of the most populous cities in Texas, Dallas has among the highest number of acres of parks and recreation areas per 1,000 population (19.7 acres) (TPWD, 2002a). Currently, the Dallas Park and Recreation Department (PARD) maintains more than 21,000 park acres including 17 lakes with 4,400 surface acres of water at 17 park sites, 17,196 acres of greenbelt/parkland, and 61.6 miles of jogging and bike trails at 24 locations. There are 406 neighborhood, community, and regional parks within the City of Dallas. The following details are specific to the Trinity River Corridor:

- more than 90 areas within the Trinity River Corridor designated as parks and recreation areas;
- these areas account for approximately 6,900 acres of land; and
- approximately 6,000 acres of open space within the corridor are associated with the Dallas Floodway and the Trinity River floodplain.

The corridor is unique because of both the current and future open space opportunities afforded by the Trinity River and associated floodway. Although infrastructure development in support of population growth could have a negative affect on prevailing resources in the corridor over the coming years, several plans call for the acquisition of additional lands, enhancement of existing areas, and increased recreation opportunities associated with the Dallas Floodway.

Waters of the U.S., Including Wetlands; Water Body Modification and Aquatic Habitat

Historically, waters of the U.S., including wetlands, have not been recognized for their ecological importance. Over time, many of these areas were filled, dredged, or developed to make the land available for use. From the mid-1800s until about 1970, approximately one-half of Texas' historic wetlands acreage was converted from natural systems in response to society's demand for urban development and sustenance. Since 1970, wetlands have been identified as providing important economic and environmental functions, such as temporarily storing floodwaters, reducing floodwater velocity, filtering sediment and pollutants, and providing important habitat for many species of plants and wildlife. A 1980 statewide inventory of forested wetlands identified 5,973,000 acres of bottomland hardwoods and 95,000 acres of swamps remaining in Texas. These acreages reflect an estimated 63 percent loss of these types of wetlands from their pre-settlement high of more than 16 million acres.

The statewide trends discussed above also reflect the local experience with historic wetland impacts. The DFW metropolitan area accounts for the most urbanized portion of the Upper Trinity River Watershed. Floodplains have been affected both directly and indirectly by urbanization which has included impacts from storm water runoff and agricultural, drainage, and mining activities. Straightening of channels, dredging and filling of streambeds, ditching and draining of wetlands, construction of levees, and removal of natural vegetation has also occurred in certain areas. The most obvious manifestation of this urban development is the increase in impervious surfaces and the corresponding loss of natural vegetation. Land clearing, soil compaction, riparian corridor encroachment, and modifications to the surface water drainage network have all accompanied urbanization of the DFW area.

These human activities are evident within the Trinity Parkway Corridor. Human use of the Trinity River in this portion of Dallas has included activities to straighten, narrow, deepen, fill, block, and otherwise encroach upon the river channel. In the corridor, the entire length of the Trinity River has been reconstructed from well upstream of Westmoreland Road to downstream of Corinth Street, with the only remnant pieces of the old river channel now existing as drainage sumps on the landside of the east and west floodway levees. Additionally, upstream, multi-purpose federal reservoirs have altered seasonal and shorter-term river flows. As a result, much of the channel system has become simplified, stabilized in position, disconnected from part of the historical stream meander corridor and floodplain, and subject to stabilized stream flows that have lost part of their flow variability. These same physical alterations of the

pre-historic Trinity River channel are also responsible for the creation of wetlands in the modern Dallas Floodway in recent decades. Current details regarding waters of the U.S., including wetlands within the Trinity River Corridor include:

- Approximately 1,520 acres of open water features; and
- Approximately 4,600 acres of forested and emergent wetlands (3,470 forested and 1,130 emergent), most consisting of low- to medium-quality shallow depressions within the Dallas Floodway.

A variety of regulatory controls have had a profound effect on waters of the U.S., including wetlands in the area. The two principal overriding controls requiring the protection of wetlands is Section 404 of the CWA and EO 11990 (Protection of Wetlands, 1977). Additionally, in 1991 the Texas Water Commission (combined in 1993 with the Texas Air Control Board to form the TNRCC and eventually the TCEQ in 2002) adopted state goals for "no net loss" of acreage or ecological function of wetlands. These goals reflect the regulatory program under the CWA that prohibits the discharge of soil into waters of the U.S., including wetlands, unless authorized by a permit issued under Section 404 of the CWA. The USACE has authority over such actions and requires the permittee to restore, create, enhance, or preserve nearby wetlands as compensation for any damage. This means of compensatory mitigation is intended to comply with the general goals of the CWA and the specific goal of "no net loss" of wetlands. Regulations have been enacted on a federal, state, and local level to achieve these goals. As an example, according to the Fort Worth District, USACE, a total of 770 projects were authorized in the upper Trinity River basin from December 1, 1999 to September 1, 2002 (most recent data available) with the following specifics:

- 55 of the projects were authorized with individual permits, 570 with nationwide general permits, and the remaining 145 required no permit;
- the nationwide permit authorizations resulted in 93.85 acres of impacts to waters of the U.S., including wetlands, 198.66 acres of compensatory mitigation was provided to offset these impacts;
- during the years 2001 and 2002, a total of 1,427 acres of wetlands, waters, and riparian habitat were restored or protected through USFWS/USACE coordination on individual mitigation plans; and
- current USFWS/USACE coordination to restore and/or protect an additional 2,669 acres of wetlands, waters, and riparian zones enabled in large part by the establishment and enhancement of the 2,185 acres of habitat in the Trinity River, Big Woods on the Trinity, and West Mineola "mitigation banks."

Future trends in wetland regulation are likely to focus on compensatory mitigation requirements. Regulatory agencies are expected to develop procedures to track the success and completion of mitigation efforts as the focus moves toward replacement of specific wetland "functions," rather than replacement of a total wetland area. Research of regulatory publications indicates that mitigation banking is becoming a more favored means of mitigating wetland loss. Consequently, regulatory controls are expected to continue the trend of stabilizing the amount of existing wetlands and the creation of new wetlands through vigorous application of mitigation requirements under the CWA. As discussed earlier, the majority of the waters of the U.S., including wetlands found in the Trinity River Corridor are within the confines of the Dallas Floodway. As such, future development or redevelopment within the urbanized portions of the corridor would likely result in minimal impact with compensatory mitigation provided as required by prevailing regulatory controls. Projects planned within the confines of the Dallas Floodway could affect prevailing resources, however, based on trends; it is likely that the resource would benefit from future planned activities in the area.

Vegetation and Wildlife Habitat

The Trinity River Corridor is located within the most severely altered of Texas' ecoregions - the Blackland Prairie. Most of this ecoregion has been converted from its natural condition to crops or development (TPWD, 2002a). In fact, by the early 1980s, 90 percent of this ecoregion had already been converted into agricultural land or tame pasture. Many wildlife species have disappeared from the Blacklands in the past 125 years. It appears that only those species with the ability to adapt to human encroachment have been able to survive.

Nine percent of the nearly 13 million acres of the Blackland Prairie is urbanized. Blackland Prairie counties contain about 7.6 percent of the land in Texas, but they contain 6.2 million people, or more than 38 percent of the State's population. Population growth within the counties that contain the Blackland Prairie is related to the proximity of each county to major urban centers, such as the DFW metropolitan area. The average rate of urbanization over the last 20 years in the Blackland Prairie has been 167 square miles per year.

Of special consideration in the Blacklands has been the destruction of streamside vegetation along the major drainages that cross the region, including the Trinity River. It was along these corridors that many of the faunal elements, not adapted for life in the prairies, lived and traveled through the region. Urban development and sprawl have further served to restrict natural habitats by fragmenting the prairie into isolated islands too small to support viable populations of many species. Growth in the area has resulted in the loss of biological diversity, the introduction of invasive species, and an overall degradation of the ecosystem. Other human activities, including excessive use of pesticides and other chemicals, as well as over-hunting and animal control practices, have undoubtedly contributed to reducing many wildlife

populations below their capacity to recover. All in all, the pressures of human population growth and development, associated with the excessive use of natural resources, have produced an environment in the Blackland Prairie region which now exceeds the ability of many wildlife species to survive (Sharpless and Yelderman, 1993).

All of the vegetation that now exists within the Trinity River Corridor has been directly affected by human influences. Virtually all uplands along the Trinity River floodplain have been developed for residential or industrial use, and many of the lower lying areas have been protected from flooding by the construction of levees or flood channels. There are currently three predominant terrestrial habitat types within the corridor (aquatic habitats were discussed previously), with the woodlands being the only habitat type considered to be of high quality:

- floodplain grasslands - approximately 7,150 acres (within the Dallas Floodway) that are not considered to be a sensitive habitat for plant or wildlife species because the area is continually disturbed from mowing as part of regular floodway maintenance;
- riparian bottomland forests - approximately 4,630 acres (within the Dallas Floodway) of high quality woodland habitat; and
- urban landscapes - remaining urban areas outside the Dallas Floodway with vegetation generally consisting of ornamental plantings that are not considered to be sensitive habitat for plant or wildlife species.

Protection and preservation of the natural resources in the Trinity River Corridor are provided by a variety of federal, state, and local regulatory controls. There are no specific regulatory controls for woodland areas (considered to be the only high quality habitat in the corridor); rather, protection for the species that may comprise or that may use this habitat is afforded. The overriding federal regulation is the Endangered Species Act (ESA), which is implemented by the TPWD within the State of Texas. Specific to bird populations, the MBTA was enacted to put an end to the commercial trade in birds and their feathers that, by the early years of the 20th century, had impacted the populations of many native bird species. The MBTA ensures that all listed migratory birds and their parts (including eggs, nests, and feathers) are fully protected. Additional relevant regulatory authority is provided by EO 13112 which directs federal agencies to expand and coordinate their efforts to combat the introduction and spread of “invasive species” (i.e., plants and animals not native to the U.S.). In Texas, the Texas Department of Agriculture (TDA) defines and regulates prohibited and restricted noxious weed seeds (TDA, 1981). In addition to these federal and state regulatory controls, local governments have also implemented policies and ordinances promoting protection and preservation of natural resources within their jurisdictions.

As discussed, growth, development, and other related activities within the Trinity River Corridor, have had a substantial impact on the historic vegetation composition of the area. The only remaining "natural" area within the corridor could be considered to be the lands within the Dallas Floodway levees, and even a large portion of this area has been highly disturbed throughout the years (river realignment, grassland mowing, vegetation clearing, etc.).

Water Quality Impacts

The urbanization of the Trinity River watershed has contributed to past and present water quality issues in the area. Over time, the primary sources of water pollution have changed. Historically, industrial and municipal discharges were considered the main sources of water quality impairment in the Trinity River watershed. However, pollutants-carrying storm water runoff from impervious surfaces, lawns, developed sites, and farmland is currently responsible for a substantial portion of the water quality issues in the watershed. Runoff containing pesticides, herbicides, and other contaminants, particularly in the DFW area, have combined to cause deterioration of water quality.

The DFW metropolitan area is the largest inland population center in the U.S. and has had a profound impact on water quality in the upper Trinity River basin. By 1900, the Trinity River water quality for many miles downstream from DFW was impaired. Sewage collection and treatment began in 1910 to 1920, but the situation was still odious and unhealthy (TRA, 1999). With a rapid expansion of industry and population, and only primary wastewater treatment beginning in the late 1920s and secondary treatment in the mid-1930s, water quality conditions in the area were still poor (Land, et al, 1998). Since that time, there have been major wastewater treatment improvements every decade or so, with some consequent improvement in river water quality. However in the early 1970s the river was still heavily polluted and a state survey found no fish in the river (TRA, 1999).

Substantial improvements have been made to the water quality of the Trinity River over the past several decades, and the river in many areas is returning to a more natural state. Nevertheless, the basin is still affected by a variety of activities including continued urbanization, construction of reservoirs, and agriculture. All of these affect the water quality, as well as the physical and biological integrity of the Trinity River, its reservoirs, and tributaries. In several cases, these impacts result in use impairments (TRA, 2000a).

Impacts from urbanization have included physical modifications and heavy management of stream and river channels for flood control; storm water runoff from residential, commercial, and industrial areas; and discharges from municipal wastewater treatment plants. Of these three types of urban impacts, those involving the physical modification of stream channels generally have the greatest impact on biological integrity, while storm water runoff has the greatest impact on use attainability based on human health

concerns. Point sources from municipal discharges have the least effect on use attainability. The impacts on biological integrity within the DFW area, though not severe enough to constitute use impairment, have been documented by the USGS (TRA, 2000a).

Recent trends show water quality improvements in the area. Programs, projects, and regulatory controls implemented by the USACE, EPA, TCEQ, TRA, NCTCOG, and the City of Dallas have all led to comprehensive improvements in water quality compared to past trends. Representative examples include waste water discharge permit programs, water quality certification programs (Section 401 of the CWA), surface water quality monitoring programs (Section 305[b] of the CWA), surface water quality standards (Section 303[c] of the CWA), and the requirements of the Texas Clean Rivers Act (Clean Rivers Program [CRP]).

Despite these regulatory controls and recent trends towards improvement, Upper Trinity River Stream Segment 0805, which is the stream section within the Trinity River Corridor, is listed in the TCEQ 2008 303(d) List as being a "Category 5a" stream segment (TCEQ, 2008), indicating the water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants. Uses not supported include contact recreation and the consumption of fish (fishing is allowed, but not the taking of fish for human consumption). The segments immediately upstream influence water quality conditions in the area as well. Segment 0841 is also listed as a Category 5a and Segment 0822 is listed as a Category 5a in the 2008 303(d) List, and therefore, are considered to have water quality concerns. Steps are currently being taken (planned or underway) by the TCEQ to better understand the causes of the non-support in these river segments (Segments 0805, 0822, and 0841) and identify/reduce the sources of pollution and water quality degradation. Future trends in water quality are likely to be affected by both the expected trends in urban development and natural resource enhancement within the Trinity River Corridor. Although the developable land in the corridor is limited, future land development would add to runoff from the area's impervious paved areas and rooftops. While any additional runoff from developed areas would be subject to regulatory oversight, this general trend would be expected to have a minor negative impact on water quality. Planned improvements to natural resources primarily within the Dallas Floodway (e.g., BVP and DFE), have the potential to beneficially affect the physical and biological integrity of the Trinity River.

Floodplain Impacts

Maintenance of floodplains is vital to the protection of property and the well being of the citizens of Dallas, and the potential loss or alteration can become an immediate issue of concern with regards to human safety and property damage. In their natural condition, floodplains serve vital functions, including temporary storage of floodwaters, moderation of peak flood flows, maintenance of water quality, groundwater recharge, prevention of erosion, and provision of wildlife habitat. They can also provide for

recreational opportunities and establish an aesthetic quality to a given area. These functions are all best served if floodplains are kept in their natural state.

During the early settlement of the Dallas area, new development and associated infrastructure improvements within the 100-year floodplain occurred. Local floodplains have been affected both directly by urban land development within flood conveyance areas, and indirectly by increased storm water runoff from impervious surfaces as well as past agricultural, drainage, and mining activities. Land clearing, soil compaction, riparian corridor encroachment, and modifications to the surface water drainage network have all accompanied urbanization of the area. Flood control improvements and regulatory requirements have stabilized and improved the flood conveyance abilities of floodplains in the area. Over the past several decades, major flood control measures have been implemented within the immediate area and throughout the Trinity River watershed upstream of the corridor.

Consideration of flood control and flood water conveyance in the area began as far back as 1908 when a major flood event resulted in loss of life and extensive damage to the Dallas CBD. This event highlighted the need for flood control in the area and resulted in the construction of the Dallas Floodway. The Dallas Floodway was constructed from 1928 to 1932 through the creation of the Dallas City and County Levee Improvement District in 1926. The initial flood control improvements consisted of a series of levees along one or both sides of the river and pump stations to facilitate the movement of floodwaters to the river. As part of the project, the river was re-routed in areas and as much as 10,500 acres of land was reclaimed for development and growth of the Dallas CBD. Primarily during the 1950s and 1960s (see **Section 3.5.6.3**), additional improvements to the Dallas Floodway were made including strengthening/upgrading of levees, clearing portions of the Dallas Floodway, increasing the capacity of pump stations, construction of new pump stations, and construction of pressure sewers, diversions, and gravity outlets to improve flood water conveyance; these improvements utilized both federal and non-federal funding. The Dallas Flood Control District was formed in 1945 to operate and maintain the Dallas Floodway project. Currently the Dallas Floodway has a valley storage of approximately 71,547.5 acre/feet.

Additional flood control in the area is provided for by the 22 man-made reservoirs with more than 10,000 acre-feet of storage and hundreds of smaller reservoirs, mostly flood control structures built by the Soil Conservation Service (predecessor to the Natural Resource Conservation Service). These reservoirs have an appreciable effect on stream flow and water quality in the basin. In addition, there are 38 water districts, levee districts, or floodwater districts that have been involved in levee construction and improvements. These levee and Dallas Floodway districts provide varying degrees of protection for more than 134,000 acres of land along the Trinity River. Within the Trinity River Corridor, there are approximately 19,180 acres of land designated as being within the 100-year floodplain of the Trinity River.

Between Dallas and the proposed Tennessee Colony Lake site in Anderson County, about 80 percent of the river has a levee on at least one side and about 63 percent has a levee on both sides (TRA, 2001). Completion of the major flood control reservoirs has reduced the catastrophic damages to downstream interests, particularly in the reaches immediately downstream from the flood control reservoirs.

The USACE, FEMA, TCEQ, and the City of Dallas have the regulatory authority necessary to control encroachment upon local floodways and floodplains, and provide compensatory mitigation as required. Applicable resource agencies in the region enforce a policy of no net loss of floodplains through the CDC permit review process discussed earlier (see **Section 4.13.1**). As a result, these flood control improvements and regulatory requirements have stabilized or slightly improved the ability of flood control structures to convey flood waters through the area. The protection of floodplains and floodways is required by EO 11988 *Floodplain Management* and is implemented by the FHWA through 23 CFR 650 Subpart A *Location and Hydraulic Design of Encroachments on Floodplains*. At the local level, floodplain regulations are contained in Sections 51A-5.101 through 5.106 of the City of Dallas Development Code. The intent of these regulations is to avoid or minimize highway encroachments within base floodplains, where practicable, and to avoid land use development that is incompatible with floodplain values. To comply with EO 11988 and 23 CFR 650A, a proposed project must be designed to avoid floodplain impacts, when practicable, and to adequately mitigate unavoidable impacts.

In addition to EO 11988 and the other regulatory requirements described above, there are important regional policies and programs developed since the mid-1980s that are specifically intended to reduce adverse cumulative impacts to floodplains within a watershed. The TREIS was prepared by the USACE in the mid-1980s to address extensive floodplain development that was occurring along the Trinity River within the region. The TREIS focused on actions requiring permits under Section 10 of the River and Harbors Act and Section 404 of the CWA, as amended, with emphasis on addressing cumulative impacts of granting multiple permits. The ROD for the TREIS was signed in 1988 (see **Appendix E**).

The TREIS ROD applies to all project actions requiring a permit under either Section 10 or Section 404 within the SPF floodplain. In general, the criteria developed to reduce hydraulic impacts include the provision for no rise in the 100-year flood or SPF water surface elevations from dredging and/or fill activities along the Trinity River main stem, West Fork, and Elm Fork and tributaries with drainage areas in excess of 100 square miles. The criteria require a maximum loss in storage capacity for the 100-year flood and SPF of 0 percent and 5 percent, respectively, within the same area. For projects proposed on tributaries with drainage areas of 100 square miles or less, criteria allow for up to 15 percent reduction of valley storage within the 100-year floodplain and up to 20 percent reduction of the SPF floodplain valley storage. Projects on tributaries that would increase water surface elevations to a point of inducing additional flooding or damage to others are not permitted. The TREIS raised awareness that a large area

of floodplain lands within the Upper Trinity River Basin could be developed outside the jurisdiction of the USACE and that if developed following only FEMA requirements, large increases in flooding frequency and extent of impacts would continue to occur in adjacent and downstream areas. Subsequently, the CDC process was established as a means to address those floodplain actions that were not within the jurisdictional areas administered by the USACE. The regional CDC process requires no net loss of valley storage due to levee or fill projects along the river and stream systems of the DFW area. This cooperative regional permit process, administered by the NCTCOG, assures that design flow rates on the area's river systems would be stabilized over time.

In response, the affected local governments and the NCTCOG initiated the Trinity River COMMON VISION program, a regional approach to manage floodplain issues. Flood damage reduction, recreation, and environmental quality are the primary goals of the program. The results of this study led to cooperative efforts to identify and implement projects including structural flood control measures; water quality improvement, environmental enhancement, and recreational development measures; and cooperative approaches to watershed management. The COMMON VISION program also includes intergovernmental partnerships among the various local governments with federal and state agencies with regard to floodplain preservation and enhancement. Proper adherence to the policies and recommendations of the COMMON VISION program help to reduce the potential cumulative impacts of projects on floodplains throughout the watershed (NCTCOG, 2001c).

Air Quality Impacts

The amount of pollution emitted into the local atmosphere throughout the years is the net effect of one primary factor, population growth. As discussed above, the DFW metropolitan area has seen tremendous population growth throughout the years and the trend is for that growth to continue. With growth comes increased development, an increase in vehicles, and an increase in daily VMT on the area's transportation systems. Traffic congestion on these roadways has become one of the greatest challenges facing the DFW metropolitan area and is a primary contributor to regional air quality. Other factors that influence air quality are atmospheric conditions. Once pollutants are emitted into the atmosphere, the prevailing weather conditions determine their dispersion. Air pollutants can be enhanced in the area with the increases in temperatures and the lighter prevailing wind conditions the DFW area can experience in the summer months.

Throughout recent decades, multiple regional and local initiatives have been planned and implemented in an effort to reduce emissions of pollutants into the air. Several of these initiatives specific to transportation systems have included increased capacity highways and roadways (through construction of additional travel lanes and bottleneck improvements), intelligent transportation systems, construction of high-occupancy vehicle lanes, and the promoting of alternative transportation (e.g., hike and bike, bus,

light rail). An additional initiative in the area has been the promotion of redevelopment and sustainable development. Land development patterns that encourage walking, bicycling, bus and rail use, and overall shorter automobile trips benefit the transportation systems in the area by reducing vehicles and vehicle congestion (demand) and improving air quality in the long-term. Local governments, with the support of regional transportation authorities (e.g., NCTCOG) or in joint venture projects, promote these types of land development initiatives by changing zoning to allow higher densities, expanding transit services, establishing tax increment refinance zones to support infill, promoting mixed-use development, and working with the private development community. The success of these initiatives has had a tremendous impact on the regional air quality as indicated by current trends. Although the DFW area is currently designated by the EPA as in "non-attainment" for ozone (O_3), the number of days the O_3 standard has been exceeded in the DFW area over the past decade has substantially decreased. Although there have been year-to-year fluctuations, the O_3 trends continue to show improvement.

A variety of federal, state, and local regulatory controls as well as local plans and projects have had a beneficial impact on regional air quality. The CAA (42 USC 7401-7671q), as amended, provides the framework for federal, state, tribal, and local rules and regulations to protect air quality. The CAA required the EPA to establish National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment (EPA, 2008). The TCEQ has the legal authority to implement, maintain, and enforce the NAAQS in Texas. The first State air pollution control act, known as the Clean Air Act of Texas (CAAT), was passed by the Texas Legislature in 1965. In 1967, the Clean Air Act of Texas was superseded by a more comprehensive statute, the Texas Clean Air Act (TCAA). The TCAA was amended multiple times throughout the years and in 1989 the TCAA was codified as part of the Texas Health and Safety Code. Originally, the TCAA stated that the Texas Air Control Board (TACB) was the state air pollution control agency and was the principal authority in the state on matters relating to the quality of air resources. In 1991, the Legislature abolished the TACB and its powers, duties, responsibilities and functions were transferred to the Texas Natural Resource Conservation Commission (TNRCC) which eventually became the TCEQ. The TCAA specifically authorizes the TCEQ to establish the level of quality to be maintained in the State's air and to control the quality of the State's air by preparing and developing a general, comprehensive plan. Authorizations in the TCAA allowed the TCEQ to collect information to enable the commission to develop an inventory of emissions; conduct research and investigations; prescribe monitoring requirements; institute enforcement; formulate rules; establish air quality control regions; encourage cooperation with citizens' groups and other agencies and political subdivisions of the State as well as with industries and the federal government; and to establish and operate a system of permits for construction or modification of facilities. Local governments have some of the same powers as the TCEQ, and can make recommendations to the commission concerning any action of the TCEQ that may affect their territorial jurisdiction, and can execute cooperative agreements with the TCEQ or other local governments. In addition, a city or town may enact and enforce ordinances

for the control and abatement of air pollution not inconsistent with the provisions of the TCAA or the rules or orders of the TCEQ.

The CAA also requires states with areas that fail to meet the NAAQS prescribed for criteria pollutants to develop a State Implementation Plan (SIP). The SIP describes how the state will reduce and maintain air pollution emissions in order to comply with the federal standards. Important components of a SIP include emission inventories, motor vehicle emission budgets, control strategies, and an attainment demonstration. The TCEQ develops the Texas SIP for submittal to the EPA. The original SIP for Texas was approved in 1972. One SIP is created for each state, but portions of the plan are specifically written to address each of the non-attainment areas (e.g., a "Dallas-Fort Worth SIP"). As changes are needed, the SIP is revised rather than rewritten in its entirety. Revisions are often prompted by new federal or state regulations, new modeling techniques, or a change in an area's attainment status. These regulatory controls, as well as other local transportation and development initiatives implemented throughout the DFW metropolitan area by local governments (and others) provide the framework for growth throughout the area consistent with air quality goals.

Two other aspects of air quality regulation relate to CO and MSATs. The EPA establishes National Ambient Air Quality Standards (NAAQS) for six pollutants, including CO. As previously established, ozone is the only pollutant for which the DFW region is in non-attainment. In order to assure there is not an exceedance of either the 1-hour or 8-hour CO standards, a Traffic Air Quality Analysis (TAQA), which was evaluated for direct impacts in **Section 4.14.3**, can be performed by using an EPA approved line dispersion model (i.e., CAL3QHC) in conjunction with an EPA approved emission factor model (MOBILE6). MSATs, which were evaluated for direct impacts in **Section 4.14.5**, are regulated by the EPA who administers a program to reduce MSATs primarily through regulating fuels and vehicle emission controls. Consequently, substantial reductions in MSATs have been achieved and are expected to be realized in the future through this fuel and engine approach to regulation.

Visual Impacts

The visual and aesthetic conditions, or the "look" and "feel" of a particular area can be an important issue to those that live, work, or frequent a given area. This can be of particular importance if visual changes are proposed in areas that include resources such as cultural resources or areas of scenic beauty. The construction of new roads, bridges, and buildings, the placement of signs or utilities can all drastically change the look of a particular area. These changes are most notable in areas where a sense of open space of a particular kind has dominated the landscape for years. This "open" feel is often associated with rural environments, however, as in this case, the expansive Dallas Floodway has provided a sense of open space in a highly urbanized environment, and visual impacts to it are considered a key aspect for evaluating the No-Build and eight Build Alternatives for the Trinity Parkway Project.

Like many places, the visual characteristics of the Dallas CBD and the Trinity River Corridor have changed drastically over time. A once open and natural landscape became a developed, urban corridor. The key factors driving this change over the years were economics and population growth. As the economic climate in the area improved, the population continued to grow. With this increasing population came an increased need for support infrastructure (new roads, rail lines, homes, commercial development, industrial development, utility lines, etc.). Development occurred throughout the CBD and along both sides of the nearby Trinity River. The flood of 1908 brought on a key event that would begin to define both the natural and developed visual characteristics of the area that would last to this day - the need for long-range city planning.

After the 1908 flood, the City began to discuss the needs for such planning, and in 1911, the first long-range planning effort was released. Major points of the plan included using levees to divert the river, moving portions of the river course, bridging the river, consolidating industry and business, creating new parks, and widening and straightening of several streets. By the late 1920s, early 1930s, many of the ideas presented in the plan had been implemented - including work on the river. The river's course was moved between one-half mile and three and one half miles west of its original course and levees were constructed effectively reclaiming more than 10,500 acres from the floodplain. To this day, the levees (which have been changed/upgraded over the years) provide the only discernable topographic relief in the area and are a major visual element in the area.

As mentioned earlier, development of the area over the years has been "planned" as far back as 1911 with development directed by local and regional comprehensive plans, general plans, and/or long-range plans developed throughout the years. These plans, implemented through a variety of tools developed through the years including land use designations, zoning ordinances, building codes, etc. served to "guide" development of the area in a manner that has been determined by the City of Dallas to best suit the social and economic needs of its citizenry. This past "guidance" (and in some instances lack of guidance) has defined the current visual characteristics of the Trinity River Corridor - a substantially developed urban area interspersed with natural and man-made features, vegetation, open space, and views. Development in the corridor consists primarily of commercial/industrial facilities, residential neighborhoods, parks and open space, and transportation and utility corridors. The visual quality and characteristics in the area currently vary. A lot of the development and changes that have occurred in the corridor took place prior to implementation of various codes or ordinances; as a result, visual quality can range from low in the existing commercial/industrial areas to high in the open space and certain residential areas. As mentioned previously, there are a variety of projects planned within the Trinity River Corridor, and the visual characteristics of the area will undoubtedly continue to change as these plans/projects are implemented. The visual characteristics of the corridor would likely improve because of

current codes and ordinances and due to the extensive planning that has taken place with regards to revitalization of the Trinity River Corridor area.

4.24.2.6 Step 4 - Identify Direct and Indirect Impacts that May Contribute to a Cumulative Impact

The direct and indirect impacts expected from the No-Build and the eight Build Alternatives for the Trinity Parkway were discussed in detail earlier in this chapter. The results of the study of direct and indirect impacts are summarized for each Build Alternative in **Table 4-56** for the cumulative impacts resources identified earlier. The direct and indirect impacts associated with the No Build Alternative are summarized as part of **Table 4-59** (see Summary of Existing Condition column) under Step 5, below.

TABLE 4-56. SUMMARY OF DIRECT AND INDIRECT IMPACTS

Resource Category	Impacts of 2A[1]		Impacts of 2B[1]		Impacts of 3A[1]		Impacts of 3B[1]		Impacts of 3C[1]		Impacts of 4A[1]		Impacts of 4B[1]		Impacts of 5[1]	
	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts
4.1 Land Use Impacts																
Land Converted to Transp. ROW	128 acres	None	211 acres	None	329 acres	None	328 acres	None	334 acres	None	410 acres	None	437 acres	None	307 acres	None
Induced Land Re-development	None	127 acres	None	115 acres	None	49 acres	None	57 acres	None	54 acres	None	70 acres	None	72 acres	None	70 acres
4.3 Social Impacts																
Housing Impacts on Minority/Low-Income Pop.	8	None	6	None	6	None	6	None	6	None	11	None	11	None	20	None
Tolling Impacts on Minority/Low-Income Pop.[7]	Moderate	---	Moderate	---	Moderate	---	Moderate	---	Moderate	---	Moderate	---	Moderate	---	Moderate	---
4.7 Cultural Resources and Parklands																
Archeological Resources Affected	Limited areas of high potential	None	Limited areas of high potential	None	Limited areas of high potential	None	Limited areas of high potential	None	Limited areas of high potential	None	Limited areas of high potential	None	Limited areas of high potential	None	Limited areas of high potential	None
Hist. Prop. Affected [4]	7	---	3	1	5	---	4	---	4	---	5	---	3	---	7	---
Change in Parks and Recreation Areas[8]	-1 acre	None	-5 acres	None	-174 acres	None	-154 acres	None	-177 acres	None	-214 acres	None	-270 acres	None	-84 acres	None
4.8 Waters of the U.S., Including Wetlands																
Change in Waters of U.S., Including Wetlands	-4 acres	None	-9 acres	None	-83 acres (-64 ac.)	None	-81 acres (-64 ac.)	None	-91 acres (-64 ac.)	None	-86 acres (-64 ac.)	None	-111 acres (-64 ac.)	None	-12 acres	None
4.9 Vegetation and Wildlife Habitat																
Change in Amount of Woodlands [3]	-5 acres	None	-6 acres	None	-27 acres (-14 ac.)	None	-27 acres (-14 ac.)	None	-34 acres (-14 ac.)	None	-27 acres (-14 ac.)	None	-30 acres (-14 ac.)	None	-11 acres	None
Change in Amount of Grass Areas [3]	-12 acres	-4 acres	-31 acres	-5 acres	-479 acres (-258 ac.)	-3 acres	-467 acres (-258 ac.)	-3 acres	-468 acres (-258 ac.)	-2 acres	-557 acres (-258 ac.)	-15 acres	-573 acres (-258 ac.)	-14 acres	-190 acres	-14 acres
4.12 Water Quality Impacts																
Change to Water Quality	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor	- Temp. minor
4.13 Floodplain Impacts																
Maximum Increase in 100-year Flood Elevation	None	None	None	None	+0.18 feet	None	+0.14 feet	None	+0.41 feet	None	+0.31 feet	None	+1.20 feet	None	None	None

TABLE 4-56. SUMMARY OF DIRECT AND INDIRECT IMPACTS

Resource Category	Impacts of 2A[1]		Impacts of 2B[1]		Impacts of 3A[1]		Impacts of 3B[1]		Impacts of 3C[1]		Impacts of 4A[1]		Impacts of 4B[1]		Impacts of 5[1]	
	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts	Direct Impacts	Indirect Impacts
Maximum Increase in SPF Elevation	None	None	None	None	+0.05 feet	None	+0.09 feet	None	+0.03 feet	None	+0.19 feet	None	+0.71 feet	None	None	None
Change in 100-year Flood Valley Storage [2]	None	None	None	None	-0.7%[2] outside ROD	None	+0.7% [2] within ROD	None	+2.0% [2] within ROD	None	+0.7% [2] within ROD	None	+2.4%[2] within ROD	None	None	None
Change in SPF Valley Storage [2]	None	None	None	None	-2.1%[2] within ROD	None	-0.5% [2] within ROD	None	+0.0% [2] within ROD	None	+0.1% [2] within ROD	None	-0.7%[2] within ROD	None	None	None
4.14 Air Quality Impacts																
Change in Ability to Meet Standards[5]	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insign-ificant
MSATs[6]	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insign-ificant
4.16 Visual Impacts																
Visual Alteration of Floodway Area	None	None	None	None	Moderate	None	Moderate	None	Moderate	None	Moderate	None	Moderate	None	Moderate	None

NOTES:

The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in Section 2.3.9.

1. Direct/indirect impacts were derived from the results of studies reported throughout Chapter 4. All acreages are approximate/estimates.
2. Reported in percentage (%) of existing condition as required by 1988 USACE ROD and CDC criteria, which allow a maximum loss in valley storage 0% for the 100-year flood and of 5% for the SPF; all increases are within the ROD criteria except for the 100-year valley storage estimate for Build Alternative 3A.
3. The acreage figures reflect total expected impacts from right-of-way and excavation of potential borrow areas; where shown, the numbers in parentheses represents the acreage impacts from the potential borrow areas only.
4. Historic architectural resources (i.e., NRHP-listed and -eligible buildings, bridges, and districts) that have already been identified as potentially receiving direct impacts from a Build Alternative have not been counted a second time if the same resource would be potentially affected by indirect impacts.
5. The 9-county DFW non-attainment area, which includes Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant counties, is currently in non-attainment for the 8-hour ozone standard. The region is in attainment for all other NAAQS criteria pollutants, including CO. The direct impact of each Build Alternative on the ability of the region to meet established air quality standards is considered insignificant because the project would not cause pollutants (including CO) to exceed the NAAQS. Prior to FHWA taking final action on the proposed project, it will be consistent with a TIP and MTP that have been determined to conform to the ozone non-attainment SIP. All throughout the region, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions of on-road emissions. In almost all cases, lower emissions will cause MSAT, VOC, and NOx levels to be significantly lower than they are today.
6. The health effects of MSATs are unquantifiable at this time because of the existing limitations to determine pollutant emissions, dispersion, and the impacts of these to human health. However, regardless of the alternative chosen, emissions would likely be lower than present levels in the future year as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent between 2000 and 2020, and even more than these reductions when factoring in the approved 2007 MSAT rule.
7. A "moderate" determination represents the potential for direct economic impacts that would result from the financial burden of tolls on low-income populations before the total off-setting benefits to EJ populations (i.e., context sensitive solutions, improved access, economic opportunities available due to potential development/redevelopment induced by the proposed project, and relocation assistance) are considered.
8. Right-of-way would be required from within the Trinity River Greenbelt Park, and access rights for construction, operation, and maintenance are anticipated to be established by an operating agreement with the City of Dallas. The deed records for the park land indicate that it can be used for transportation. Therefore, even though a change in use would occur, the estimated acreage needed for right-of-way would not constitute a direct use (take) of park land under Section 4(f).

4.24.2.7 Step 5 - Identify Other Reasonably Foreseeable Actions that May Affect Resources

The next step in the cumulative impacts analysis focuses on the impacts that are likely to occur in the future through actions that are independent of the Trinity Parkway project. CEQ regulations indicate that cumulative impacts analyses must add an assessment of "reasonably foreseeable future actions" affecting the resources of interest (40 CFR Section 1508.7). CEQ guidance indicates this step assesses the "realistic potential for the resource to sustain itself in the future" in light of its current condition, trend of that condition, and future projects affecting the resource.

The identification of the reasonably foreseeable future actions for the Trinity River Corridor RSA was based on a review of project, resource, policy, development, and plans and maps prepared by local government agencies, quasi-governmental agencies (e.g., NCTCOG, etc.), and private entities. Future actions were included based on the level of planning and funding availability; however, many are still subject to various regulatory approvals and permitting. Planned transportation projects within this RSA are described in **Table 4-57**; the general locations for these projects are graphically depicted in **Figure 4-4**. Planned land development projects within this RSA sponsored by other public agencies or private interests are described in **Table 4-58**; **Figure 4-5** shows the general locations for these planned projects. All of the reasonably foreseeable transportation and land development projects listed in **Table 4-57** and **Table 4-58** were utilized for the analysis of cumulative impacts for the issues/resources listed in **Table 4-54**, with the exception of air quality and social impacts. As described in Step 2, **Section 4.24.2.4**, the RSAs for air quality and EJ impacts each consist of a customized frame of reference determined to be appropriate for these particular issues/resources. In the case of MSATs (air quality) and system level tolling effects on EJ populations, reasonably foreseeable future transportation projects included within the TIP and MTP (*Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*) were considered as part of the analytical modeling studies have been reported in this SDEIS.

TABLE 4-57. REASONABLY FORESEEABLE ACTIONS - TRANSPORTATION PROJECTS

Map ID[1]	Project Name	Project Sponsor	Summary Description
A[2]	Project Pegasus (IH-30) Canyon/(IH-30 / IH-35E) Mixmaster/(IH-35E) Lower Stemmons Improvements	TxDOT/City of Dallas	Includes total reconstruction of the Canyon/Mixmaster interchange, Lower Stemmons segment (including the IH-35E/DNT connection), and the installation of a continuous HOV system through the Canyon. Also provides for the rehabilitation of the Houston Street viaduct.
B	The Southern Gateway - IH-35E/US-67 Improvements	TxDOT/City of Dallas	Improvements to address transportation deficiencies along the IH-35E/US-67 corridor (the Southern Gateway) to meet the long-term needs in southern Dallas County. Project limits extend from IH-35E south of the CBD to IH-20 and along US-67 from IH-35E to FM-1382 in Dallas County.
C[2]	Woodall Rodgers Freeway Extension (Spur 366) including Margaret Hunt Hill Bridge	TxDOT/City of Dallas	New bridge crossing over Trinity River from CBD to Singleton Boulevard. Improvements at Industrial Boulevard. Project design includes “signature” bridge concept (long-span arch).
D[2]	IH-30 (Trinity River) Bridges - Margaret McDermott Bridge	TxDOT/City of Dallas	Bridge replacement project. Project design includes new “signature” bridge concept (long-span arch).
E[2]	SH-183 from SH-360 to IH-35E - West Fork Corridor Improvements	TxDOT/Cities of Dallas and Irving	Improvements to address transportation deficiencies along the SH-183/West Fork corridor. Project limits extend from IH-35E to SH-360 in eastern Tarrant County. Improvements to SH-183 include mainlane widening and the installation of a continuous HOV system connecting to IH-35E.
F[2]	Houston Street Viaduct	TxDOT/City of Dallas	Transportation enhancement project involving the repair, rehabilitation, and subsequent preservation of this NRHP-listed bridge.
G[2]	Corinth Street Viaduct	TxDOT/City of Dallas	Bridge expansion project involving the construction of an adjacent, parallel structure and preservation of the existing NRHP-eligible bridge.
H[2]	Continental Avenue Viaduct	TxDOT/City of Dallas	Planned conversion of this NRHP-eligible bridge to a “pedestrian only” facility after the Woodall Rodgers Freeway Extension is completed.
I[2]	Hampton/Inwood Road Bridge - from Canada Drive to Harry Hines Boulevard	TxDOT/City of Dallas	EA includes road widening, reconstruction of the Hampton bridge, improvements at Inwood Road.
J[2]	Sylvan/Wycliff Bridge	TxDOT/Dallas County	Bridge replacement project. Replaces the existing at-grade crossing of the Dallas Floodway with an elevated structure.
K	Beckley Avenue	City of Dallas	Roadway widening to a six-lane divided thoroughfare from Singleton Boulevard to IH-30.
L	Oak Lawn Avenue/DNT	NTTA/TxDOT/ City of Dallas/ Dallas County	Includes roadway widening and geometric improvements to Oak Lawn between Maple and IH-35E. Improvements to DNT include bridge replacement over Oak Lawn and adding an auxiliary lane to improve traffic flow from southbound DNT to IH-35E.
M[2]	Trinity Railway Express (TRE) Bridge (Owner)	BNSF and UP Trackage Rights	Involves repair of existing rail bridge and construction of a new parallel rail bridge to serve the TRE from Dallas to Fort Worth.
N[2]	DART Southeast Corridor DART Northwest Corridor	DART	DART Southeast Corridor, extends from eastside of Dallas CBD to Buckner Boulevard in southeast Dallas. DART Northwest Corridor, extends from north side of CBD to Carrollton and Farmers Branch.
O	Industrial Boulevard	City of Dallas	Roadway widening from six to eight lane divided thoroughfare from MLK Jr. Boulevard to Commonwealth Boulevard
P[2]	West Fork Reliever Road	Dallas/Irving/ TxDOT	Project to improve east/west mobility along SH-183
Q	Loop 12/IH-35E Corridor	TxDOT	Project to improve transportation, reduce congestion in the corridor.
R[2]	IH-35E south of US-67 to IH-30	TxDOT	Project for construction of approximately 6.0 miles of reversible, permanent barrier separated HOV lane.
S	IH-30 from IH-35E to IH-45 (the Canyon)	TxDOT	Project to alleviate congestion, make use of unused capacity on collector facilities, and provide alternative routes for incident management.
T[2]	Jefferson Street Bridge	City of Dallas/ TxDOT	Project to realign/move the bridge 100 to 300 feet downstream. Would include demolition of existing bridge and build new bridge.
U	S.M. Wright Downgrade	City of Dallas/ TxDOT	Conversion/downgrade (fewer vehicle lanes) of existing road to parkway.
V[2]	Santa Fe Trestle Hike and Bike Trail	City of Dallas/ TxDOT	Construction of an approximate 1.2 mile hike and bike trail extending from Moore Park to Industrial Blvd., crossing the Trinity River via the AT&SF Trestle Bridge, and spanning the Dallas Floodway.

Notes:

1. Only projects A, B, C, G, H, J, K, O, R, U, and V were considered for the Social Impacts Analysis regarding EJ and affordable housing. The RSA for the EJ and housing analysis consisted of census tracts 34, 40, 41, and 101.02, which is a subarea within the Trinity River Corridor RSA.
2. The projects noted are at least partially located within the Trinity River floodplain and could potentially have hydraulic impacts that would be regulated under the CDC permit process prior to any construction.

FIGURE 4-4. REASONABLY FORESEEABLE ACTIONS - TRANSPORTATION PROJECTS

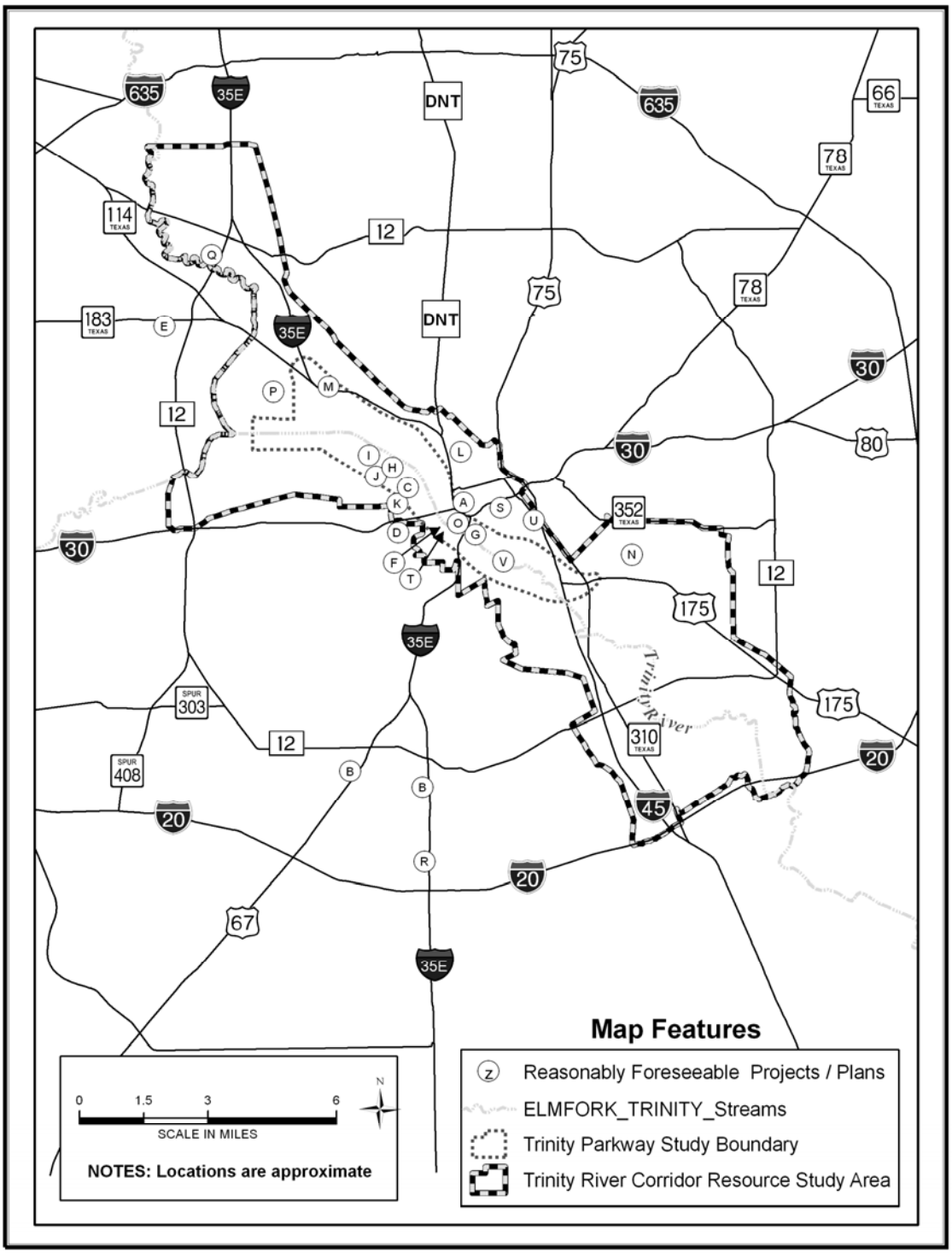


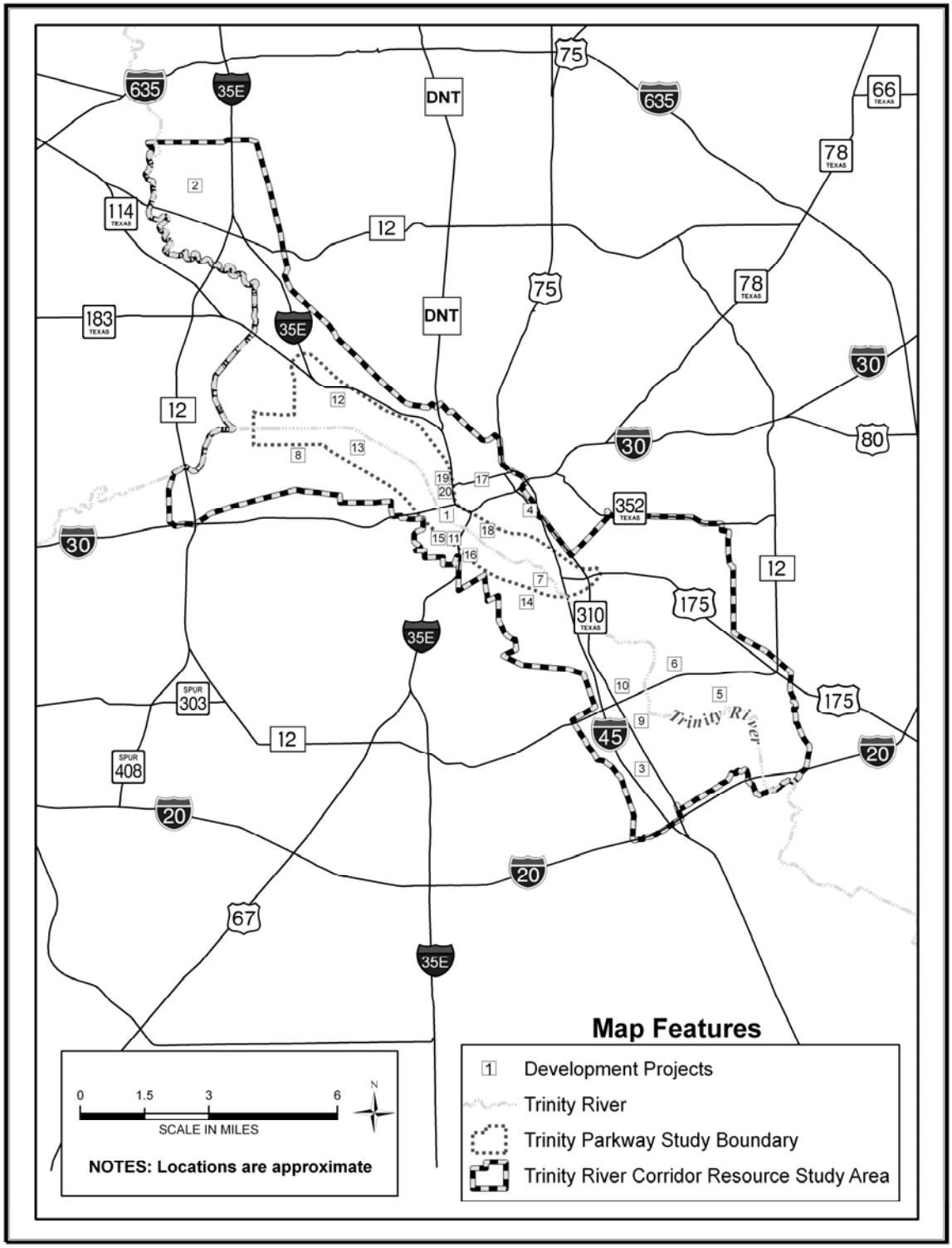
TABLE 4-58. REASONABLY FORESEEABLE ACTIONS - LAND DEVELOPMENT PROJECTS

Map ID[1]	Project Name	Project Sponsor	Summary Description
1[2]	Balanced Vision Plan (Trinity River Corridor Urban Design Study)	City of Dallas	An adopted plan that formulates activities within the Dallas Floodway to develop appropriate balance of multi-modal transportation, flood control, recreation and open space, environmental restoration and management, and economic and community development for the Trinity River corridor in Dallas. Adopted by City, April 2004.
2[2]	Elm Fork Athletic Complex	City of Dallas	Plan provides for overall increased flood protection and floodwater conveyance through infrastructure improvements and reclamation of a portion of the floodplain. Plan provides for expanded recreation opportunities, environmental restoration opportunities, and transportation linkages.
3[2]	Fivemile Creek Master Plan	City of Dallas	Floodplain reclamation and recreation plan for Fivemile Creek and the Trinity River between Loop 12 and IH-20 to Bonnie View to the west in the City of Dallas.
4	Mill Creek Pressure Sewer System	City of Dallas	Plan calls for flood control, drainage improvements, channel restoration, and recreation for Mill Creek located in the Mill Creek sub-watershed in the City of Dallas.
5[2]	Trinity River Audubon Center	City of Dallas	Project involves environmental restoration and conversion of former landfill into emergent wetlands, ponds, native tall grass prairie, and nature center within the Great Trinity Forest.
6[2]	Texas Horse Park at the Trinity	City of Dallas	Project involves the development of an equestrian center within the Great Trinity Forest.
7[2]	Dallas Floodway Extension Project (DFE)	USACE	Flood control project authorized to provide flood damage reduction, ecosystem restoration, recreation, and environmental mitigation. Features include new levees, constructed wetlands, river channel realignment, and recreation opportunities/amenities.
8	Old Trinity River Channel Ecosystem Restoration	USACE	Ecosystem restoration project with minor flood control improvements along remnants of the West Fork channel and a hike/bike trail component.
9[2]	Joppa Preserve Habitat Restoration Plan	USACE	Habitat enhancement and recreational amenities project for Lemmon Lake and Little Lemmon Lake area.
10	Joppa Rodeo and Community Park	Communities Foundation of TX and Dallas County Buffalo Soldiers	Development of rodeo arena, horse stables, and historic town.
11	Burnett Field	City of Oak Cliff	Proposed mixed-use development containing office, retail/commercial, and multi-residential located adjacent to the Dallas Floodway at IH-35E.
12	Mobil Place Planned Development	Exxon/Mobil Corporation	Planned development for commercial office space and parking garage facilities. Located adjacent to Commonwealth Drive and IH-35E in Dallas.
13[2]	Oncor West Levee - Norwood Project	Oncor Electric Delivery Company	Proposed 345 kV electrical transmission line (aerial and underground). Located between the West Levee SW switching station near the west levee south of Singleton Boulevard and the Norwood switching station located between Loop 12 and the Trinity River in Irving.
14	Dallas Police Academy	City of Dallas	Development of a new police academy in the Cadillac Heights neighborhood.
15[2]	Pavaho/Zoo Mitigation Area	City of Dallas	Storm water management program and improvements/construction of wetlands.
16[2]	Moore Park / Gateway Master Plan	City of Dallas	A proposed neighborhood gateway leading to the Trinity River. Includes park expansion with trails, active recreation facilities, and a canoe launch at the Trinity River near the DART Bridge.
17	Woodall Rodgers Park	City of Dallas	Plan includes the development of an open space Deckover park that will cover Woodall Rodgers Freeway from St. Paul to Pearl Streets, connecting the Uptown, Downtown, and Arts Districts of the City of Dallas.
18	JPI - Cedars Site Mixed Use Development	JPI	Plan includes a mixed use retail and residential community consisting of mid and high-rise apartments, condominiums, townhomes, and a hotel.
19	JPI - UPR Site	JPI	Plan includes the development of a mixed use urban development.
20	Chavez Planned Development	CHPD-LP	Plan includes the development of a mixed use urban development.

Notes:

1. Only projects 1, 4, 7, 11, 13, 16, and 18 were considered for the Social Impacts Analysis regarding EJ and affordable housing. The RSA for the EJ and housing analysis consisted of census tracts 34, 40, 41, and 101.02, which is a subarea within the Trinity River Corridor.
2. The projects noted are at least partially located within the Trinity River floodplain and could potentially have hydraulic impacts that would be regulated under the CDC permit process prior to any construction.

FIGURE 4-5. REASONABLY FORESEEABLE ACTIONS - LAND DEVELOPMENT PROJECTS



Estimates of expected impacts from reasonably foreseeable future projects were generally taken directly from the description of each project or plan reviewed (e.g., NEPA documentation, maps, or other reports). Otherwise, qualitative inferences as to impacts were drawn from the description of the project or plan. Details about the expected impacts associated with the projects listed in **Tables 4-57** and **4-58** are provided in **Appendix L-4**. The results of reviewing the reasonably foreseeable future actions for potential impacts within the resource study area are shown in **Table 4-59**, alongside the summary of existing conditions. As noted in the table, existing conditions for the resource indicators are also considered to reflect the future conditions under the No Build scenario. The table does not include any anticipated impacts associated with the Trinity Parkway Build Alternatives. Overall, the foreseeable projects considered in this analysis would create approximately 807 acres of new or redeveloped urban areas. Note that the anticipated impacts shown in this table do not take into consideration potential mitigation or other likely measures stipulated by regulatory authorities (see discussion in Step 3); the influence of such measures is discussed in Steps 7 and 8 of this analysis. A summary discussion of likely future impacts is presented following the table.

TABLE 4-59. SUMMARY OF EXISTING CONDITIONS AND IMPACTS FROM FUTURE ACTIONS

Resource Category	Indicator of Condition	Summary of Existing Condition - 2007 and No Build Alternative [1]	Summary of Impacts from Reasonably Foreseeable Future Projects Other than the Trinity Parkway Project[2]
Land Use Impacts	Land converted to transportation right-of-way	Area contains a well-developed urban road network	358 acres converted to transportation right-of-way
	Other changes in land use	43,500 acres of land within the Trinity River Corridor	5,602 acres included in all foreseeable projects reviewed
Social Impacts	Loss of affordable housing for minority and/or low-Income populations	Affordable housing is available in existing communities	Estimated residential displacements in minority and/or low-income areas: 3
	Tolling Impacts on minority and/or low-Income populations	11% of roads in existing regional transportation system are tolled	Total tolled facilities expected to increase to 30% by 2030
Cultural Resources and Parklands	Affected archeological sites or areas with high potential for archeological resources	Potentially significant historic and prehistoric archeological site deposits are present primarily in floodplains and on terraces	No substantial impacts anticipated
	Affected NRHP-listed/-eligible buildings, bridges, and districts	37	6 affected
	Change in parks/rec. areas	6,900 acres	117 additional acres of park created
Waters of the U.S., Including Wetlands	Change in waters of the U.S., including wetlands	6,120 acres (3,470 forested wetlands, 1,130 emergent wetlands, 1,520 acres open water)	969 additional acres created
Vegetation and Wildlife Habitat	Change in amount of woodlands	4,630 acres	62 additional acres of reforestation
	Change in amount of grass areas	7,150 acres	1,271 fewer acres
Water Quality Impacts	Change to water quality	Stream Segment 0805 listed as not meeting applicable water quality standards and threatened for one or more designated uses	Beneficial impacts of natural resource enhancements may offset adverse impacts from urban development projects
Floodplain Impacts	Maximum increase in 100-year flood and SPF water surface elevations	Not applicable to the No Build Alternative	Beneficial impacts expected from Dallas Floodway enhancement projects

TABLE 4-59. SUMMARY OF EXISTING CONDITIONS AND IMPACTS FROM FUTURE ACTIONS

Resource Category	Indicator of Condition	Summary of Existing Condition - 2007 and No Build Alternative [1]	Summary of Impacts from Reasonably Foreseeable Future Projects Other than the Trinity Parkway Project[2]
	Change to 100-year flood and SPF valley storage capacities [3]	Not applicable to the No Build Alternative	Beneficial impacts expected from Dallas Floodway enhancement projects
Air Quality Impacts	Change in ability to meet standards	Air quality for region currently designated as "non-attainment" for ozone; the region is in attainment for all other NAAQS criteria pollutants, including CO.	No substantial impacts expected[4]
	MSATs [5]	No NAAQS have been established for MSATs. Higher levels of MSATs would be expected to occur within 100 meters (328 feet) of existing roadways based on recent FHWA review of several air quality studies (Section 4.14.5.2).	Insignificant
Visual Impacts	Visual alteration of floodway area	Dallas Floodway with channelized river with adjacent maintained grass areas	Improved visual features outlined in Balanced Vision Plan and DFE (e.g., lakes, river meanders, park areas)

NOTES:
1. Acreages are approximate/estimates and are based on information/data presented earlier in Chapter 3.
2. Acreages are approximate and are totals obtained from the tables in Appendix L-4. Expected future conditions do not take into consideration potential mitigation or other measures stipulated/required by regulatory authorities.
3. 100-year flood and SPF valley storage capacities are measured for the Dallas Floodway only (MLK Jr. Boulevard bridge to the confluence of the main stem of the Trinity River with the West and Elm Forks).
4. Increased development and urbanization would likely result in temporary negative impacts to air quality in terms of construction-related impacts. However, the impact of reasonably foreseeable transportation and development projects on air quality would be minimized by enforcement of federal and state regulations, by the EPA and TCEQ, which are mandated to ensure that such growth and urbanization would not prevent compliance with the ozone standard or threaten the maintenance of the other air quality standards, including CO.
5. Although the health effects of MSATs from reasonably foreseeable projects are unquantifiable at this time due to unavailable or incomplete information, EPA's vehicle and fuel regulations, coupled with fleet turnover, would over time cause substantial reductions of on-road emissions. In almost all cases, lower emissions will cause MSAT levels to be significantly lower than they are today.

Land Use Impacts: Changes in Land Use

As demonstrated by the plans/projects listed in **Tables 4-57** and **4-58**, numerous initiatives would continue to shape development and redevelopment within the City of Dallas and specifically the Trinity River Corridor. The area is expected to see continued urbanization as growth is projected to continue, guided by local land use plans and policies. The specific impacts of continued development within the corridor are speculative due to market forces and individual developer decisions, and could also be both beneficial and adverse. In general, as indicated particularly by various land use plans developed by the City of Dallas in recent years, anticipated beneficial impacts include new economic opportunities, housing alternatives, employment, community services, redevelopment of deteriorated buildings or areas, and recreational resources. Land use planning documents prepared by the City of Dallas and Dallas County seek to achieve a balance of community amenities (e.g., public services, parks/open space, and transportation routes), while maximizing the land that may be developed for various private uses.

Transportation projects play a major role in the process of achieving the appropriate balance of land uses to meet the needs of local residents and businesses. Although implementation of the planned

transportation projects would result in the conversion of approximately 358 acres of land to transportation right-of-way, the projects would improve local and regional traffic circulation by providing reduced congestion/bottlenecks on local streets and highways, additional system capacity, improved regional mobility, accident reduction, and travel time savings. Transportation mobility is an essential aspect of the successful operation of any developed property. While those projects listed in **Table 4-57** would also result in impacts to the human environment, including socioeconomic, physical, and natural environmental impacts, government leaders and agencies at all levels may be expected to continue to seek the optimum balance of land use mixes to meet the needs of the local and regional populace and business community by sustaining growth throughout the region.

Implementation of those plans/projects listed in **Tables 4-57** and **4-58** promotes the strategic initiatives and long-range planning policy of the City of Dallas and other planning organizations, with a focus on providing for growth while instilling a sense of "community" through sustainable development. Future land use calls for approximately 16,300 acres of commercial and industrial development throughout the corridor, with an increase along major transportation systems, and adjacent to portions of the levees. Residential developments would account for just over 9,000 acres and would again be dispersed throughout the corridor but also with increased development immediately adjacent to major transportation systems in the area and along the levees. Within these future land use designations, approximately 1,740 acres of currently vacant/developable land would likely be developed. Based on the review of the land development projects listed in **Table 4-58**, approximately 5,244 acres of land would be affected by non-transportation related improvements that would range from enhancing natural resources for recreation use to complete redevelopment of existing urbanized areas. When combined with the 358 acres for transportation projects, foreseeable projects would potentially affect some aspect of land use on a total of 5,602 acres.

Social Impacts: Environmental Justice and Affordable Housing

Available information regarding the projects considered from **Tables 4-57** and **4-58** was examined to determine whether planned projects would result in additional displacements of residences in or near the communities that would experience residential displacements from the proposed Trinity Parkway. Project Pegasus is expected to result in the displacement of three residences in the East Oak Cliff Neighborhood (Census Tract 41/1), which is predominately African-American.

Social Impacts: Environmental Justice and Tolling

Approximately 11% of the lane-miles of the regional transportation system are currently tolled. An anticipated increase to 30% tolled lanes in 2030 is indicative of an emerging tolling network in the region. Future added capacity transportation projects with toll-free lanes would provide mobility and congestion relief for all users, including low-income users. Tolled and managed HOV facilities are expected to

increase efficiency and assist in meeting region capacity and mobility needs. Users, including low-income populations, who utilize the non-tolled facilities may experience a difference in travel time, compared to users of tolled facilities, and managed HOV facilities. Low-income users who use the tolled facilities and managed HOV facility would pay a greater portion of household income on tolls, compared to the non low-income user.

Cultural Resources: Archeological Resources

Several of the foreseeable projects within the Trinity River Corridor are located in floodplain settings or on terraces associated with the Trinity River and its tributaries. Past investigations in the area have shown the presence of historic and prehistoric archeological sites buried in floodplain sediments and on the adjacent terraces. Conversely, many of the projects are located in areas that have already been heavily disturbed by urban development and would not be expected to contain intact archeological deposits. A cumulative analysis of impacts to archeological resources is limited by the fact that many potentially important archeological sites are as yet unknown. Therefore, only a qualitative evaluation of potential impacts has been performed. Due to the location of some of the plans/projects listed in **Tables 4-57** and **4-58** in areas with high potential for archeological resources, and because many of these foreseeable actions will involve excavation activities, there is potential for adverse impacts to archeological sites. In addition, some of the future actions involve private developments, which would not necessarily be implemented with a high level of cultural sensitivity and would not be subject to federal or state regulatory controls. The majority of the foreseeable transportation projects have a federal funding element, and most of the planned developments have a local, state, or federal project sponsor. These projects would be required to follow state and federal preservation procedures. With the existing federal and state regulations in place, as well as related local preservation initiatives, it is likely that potential impacts to archeological resources in the area would be minimal overall, and in particular, archeological sites with national, state, or local significance would have a high likelihood of being preserved. As a result, no substantial impacts would be anticipated.

Cultural Resources: Historic Architectural Resources

Foreseeable projects within the Trinity River Corridor were compared with NHRP-listed sites to estimate potential impacts. However, information for non-listed but potentially eligible historic structures was only available for the project study area (as discussed earlier in this chapter) so the cumulative analysis was limited to available data from the project study area for historic-eligible structures. It is estimated that with implementation of the plans and projects listed in **Tables 4-57** and **4-58**, that possibly one NRHP-listed (i.e., Houston Street viaduct) and five historic-eligible buildings, bridges, or districts could be affected (i.e., the two viaducts for Corinth Street and Continental Avenue, and three properties along Industrial Boulevard). With the existing federal, state, and local regulatory controls in place as well as other related preservation initiatives and mitigation agreements, it is likely that potential impacts to listed buildings,

bridges, or districts would be minimal and overall preservation in the area is likely. As a result, no substantial impacts would be anticipated.

Parks and Recreation Areas

Implementation of several of the plans/projects listed in **Tables 4-57** and **4-58** would likely result in minor negative impacts to parks/recreation areas (i.e., approximately 2 acres). However, several of the projects would result in overall benefits with the creation of an additional 119 acres of parks/open space with improvements and enhancements in other areas, making a net increase of 117 parkland acres. Additional minor benefits would likely be realized through increased park/open space access, new and improved hike and bike trails and linkages, new or improved recreational amenities, and the enhancement/improvement of natural/vegetated areas.

Waters of the U.S., Including Wetlands; Water Body Modification and Aquatic Habitat

As mentioned previously, urbanization has been the primary cause of wetland loss in and around the Trinity River Corridor, and other impacts to waters of the U.S., including wetlands. Individual developments can cause direct loss of wetlands due to displacement, and primary wetland functions may be lost due to increases in impervious surfaces, which reduces groundwater recharge, may alter wetland hydrology, and may cause a decrease in overall wetland area and functional capability. Affected functions include fish and wildlife habitat, storm water retention, and sediment, and toxics retention. Several of the planned transportation system improvements listed in **Table 4-57** would likely result in further negative impacts to approximately 15 acres of waters of the U.S., including wetlands, within the Trinity River Corridor. Other planned projects (particularly the Balanced Vision Plan and DFE) call for the creation of approximately 984 acres of new water features, including wetlands and other habitat enhancements, within the corridor. The combined impacts of implementing the reasonably foreseeable projects would likely result in an additional 969 acres of waters of the U.S., including wetlands, within the Trinity River Corridor, resulting in an overall major beneficial effect.

Vegetation and Wildlife Habitat

Continued growth and development within the corridor would result in further encroachment and further loss of available habitat and/or habitat fragmentation. Several of the plans/projects listed in **Tables 4-57** and **4-58** would affect existing resources, however, others call for the preservation, enhancement, and/or creation of new woodland or other natural areas. Additional plans/projects would result in further benefits by providing for the creation of small pockets of urban plantings throughout the corridor. Overall, an additional 62 acres of woodland habitat would likely be created with implementation of the future plans/projects, resulting in a minor overall benefit. It is estimated that approximately 1,271 acres of maintained grass areas would be lost within the corridor area; however, over 1,000 acres of this land

would be utilized for the creation of additional forests, wetlands, and open water features (see **Table 4-59**), providing an overall higher value benefit.

Water Quality Impacts

Historically, industrial and municipal discharges were considered the main sources of water quality impairment in the Trinity River watershed. However, storm water runoff carrying pollutants from impervious surfaces are responsible for a substantial portion of the water quality and use impairment issues in the watershed. As it is difficult to precisely determine from available information the effect that future development might have on prevailing water quality, several factors that influence water quality in the Trinity River Corridor are outlined here. Implementing the listed plans/projects would undoubtedly increase the amount of impervious surfaces in the corridor and would result in increased storm water runoff. The multiple federal, state, and local regulatory controls as well as local plans, projects, and initiatives designed to minimize the impacts of development on water quality, would insure that with future development, potential impacts to water quality from future development projects would be minimized but not entirely eliminated. Several of the future plans/projects provide for water quality benefits through the improvement/enhancement of existing streams and wetlands and the creation of additional wetlands. Wetlands are an important resource that serves a variety of functions including sediment filtering, upland and aquatic wildlife habitat, and reduction of flood water velocity. Several of the plans/projects listed in **Tables 4-57** and **4-58** also call for the enhancement of existing recreation areas and the creation of additional open space, which would also be expected to have positive impacts on water quality.

Floodplain Impacts

As evidenced by the other planned transportation system improvements, flood control projects, and development projects listed in **Tables 4-57** and **4-58**, continued infrastructure upgrades, development, and improvements would occur within the Trinity River Corridor. Several of these plans/projects would result in additional storm water runoff due to increased impervious surfaces associated with transportation system improvements and development. Several other plans/projects would result in enhancement and development within the floodplain for recreational uses (e.g., Elm Fork Athletic Complex, Balanced Vision Plan, and DFE Project). As a result, continued improvements to the flood water conveyance system in the area would be required and several of the plans/projects listed in **Table 4-58** would accomplish this goal consistent with growth and development in the area. None of the planned projects is designed specifically to increase valley storage of flood waters in the Dallas Floodway. However, the combined impacts of planned storm water conveyance enhancement and improvement projects and the strict regulatory controls in place with regard to floodplains and flood water management (i.e., regional CDC process, discussed below), indicate that future plans/projects would result in no negative impacts to valley storage and may likely result in an overall minor benefit to the Dallas Floodway from the creation of water

bodies and changes to other ground cover characteristics or obstructions (e.g., the western portion of the AT&SF trestle bridge).

The foregoing conclusion regarding the overall lack of hydraulic impacts from reasonably foreseeable project rests upon the demonstrated effectiveness of the regional CDC process. As discussed in detail in **Section 4.13.1** and summarized in **Step 2** of this analysis (see **Section 4.24.2.4**), the CDC process is a regulatory procedure that focuses on cumulative hydraulic impacts of projects affecting the Trinity River. Authorization for any construction within the CDC jurisdictional area requires the applicant to show that hydraulic impacts would not violate the 1988 ROD criteria. The USACE maintains the hydraulic model, and requires applicants to begin the modeling effort with the latest version of the model which reflects existing conditions as well as the characteristics of projects that have already been approved. If the initial design of a new project does not meet CDC criteria, the applicant must adjust the project design until the hydraulic impacts of the project are reduced to acceptable levels. USACE works closely with applicants seeking a CDC permit to ensure that a project is redesigned until the USACE model shows that the 1988 ROD criteria are met. Assuming that USACE, the City of Dallas, and NCTCOG continue to administer the CDC process as in the past, there are stringent safeguards in place to protect the Dallas Floodway from projects and design features that would diminish its flood conveyance capacity.

Despite the foregoing, cumulative hydraulic modeling would be conducted as part of preparing the FEIS, if a floodway Build Alternative is identified as the preferred alternative. Such modeling would allow a coarse evaluation of the potential combined hydraulic effects of the proposed project, the BVP, as well as the other reasonably foreseeable projects in **Tables 4-57** and **4-58** that are within the Dallas Floodway. However, an attempt to perform collective hydraulic modeling of reasonably foreseeable projects at this point in time would be highly impracticable and of little utility. This is primarily because the City of Dallas is performing hydraulic studies of its design for the BVP, and the process of adapting the BVP design to achieve CDC criteria is expected to extend through the first quarter of 2009. The significance of the BVP in terms of enhancing the Floodway and dynamic nature of the BVP design would make the attempt to combine it with the hydraulic models for the proposed project both premature and unrealistic. In addition, many of the other foreseeable projects are also undergoing design modifications and the level of design information needed to include the project in the USACE hydraulic model is not yet available. Once BVP hydraulic modeling is completed and combined with the proposed project, for cumulative analyses purposes only, the added effects of other foreseeable projects would be explored using the best available information.

Air Quality Impacts

Of the criteria pollutants for which the EPA has established NAAQS, the DFW region is currently in non-attainment for the 8-hour ozone standard, but in attainment for the remaining NAAQS criteria pollutants,

including CO. Although no NAAQS for MSATs exist, the EPA has established nationwide regulatory controls to garner emission reductions. Implementation of transportation system improvements and reasonably foreseeable development in the region would likely result in temporary negative impacts to air quality in terms of construction-related impacts. However, the impact of reasonably foreseeable projects on air quality would be minimized through the EPA and TCEQ enforcement of federal and state regulations, mandated to ensure that despite the increase in urbanization (and likely increase in VMT), compliance with ozone standards is not prevented and the maintenance of air quality standards for all other criteria pollutants, including CO, is not jeopardized. Although the health effects of MSATs from reasonably foreseeable projects are unquantifiable due to unavailable or incomplete information, the EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions of on-road emissions. In almost all cases, lower emissions will cause MSAT levels, as well as VOC and NOx levels, to be significantly lower than they are today. With regard to air quality conformity, reasonably foreseeable transportation projects are primarily managed through the NCTCOG, and the majority of the transportation projects planned for the region are included in the TIP and MTP (*Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*), which have been determined to conform to the SIP.

Visual Impacts

The visual resource in the Trinity River Corridor varies widely as a result of historic development patterns. Much of the area is dominated by industrial buildings and poorly maintained areas that do not offer much in the way of a visual resource. On the other hand, the Dallas Floodway has become the focus of attention as a visual resource amidst surrounding viewscapes characterized by steel and concrete. The City of Dallas has focused tremendous attention on revitalizing both the economic and visual attractiveness of the corridor, and enhancing natural resources within the Dallas Floodway is a centerpiece of those plans. Similarly, plans associated with the USACE DFE would create and enhance the visual quality of the Dallas Floodway. Consequently, reasonably foreseeable projects are expected to have an overall beneficial effect on the Dallas Floodway as a visual resource.

4.24.2.8 Step 6 - Assess Potential Cumulative Impacts to Each Resource

As demonstrated in **Table 4-59**, likely beneficial and adverse cumulative impacts from reasonably foreseeable future projects would be realized even under the No-Build Alternative for the Trinity Parkway. The cumulative impacts expected as a result of the eight Build Alternatives for the Trinity Parkway Project are summarized in **Table 4-60**. The information contained in **Table 4-60** represents the starting point for assessing the potential cumulative impacts to the condition and trend of each resource being analyzed. That is, this analysis considers the available information on direct/indirect impacts of the proposed project in addition to impacts of expected future actions in drawing conclusions as to whether there would be

cumulative impacts, as well as whether the proposed project would contribute substantially to any cumulative impacts. The information in the table below summarizes the information gathered in Steps 1 though 5 and represents the potential cumulative impacts to each resource. These potential cumulative impacts are discussed in Step 7 of this analysis, and cumulative impacts expected to remain after regulatory and other mitigation are discussed in Step 8.

TABLE 4-60. ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

Resource Category	Alternative 2A[1]	Alternative 2B[1]	Alternative 3A[1]	Alternative 3B[1]	Alternative 3C[1]	Alternative 4A[1]	Alternative 4B[1]	Alternative 5[1]
	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts
4.1 Land Use Impacts								
Land Converted to Transportation ROW	486 acres	569 acres	687 acres	686 acres	692 acres	768 acres	795 acres	665 acres
Induced Land Redevelopment	127 acres	115 acres	49 acres	57 acres	54 acres	70 acres	72 acres	70 acres
4.3 Social Impacts								
Housing Impacts on Minority/Low-Income Populations	11	9	9	9	9	14	14	23
Tolling Impacts on Minority or Low-Income[8]	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
4.7 Cultural Resources and Parklands								
Archeological Resources	Potential exists; no substantial impacts anticipated	Potential exists; no substantial impacts anticipated	Potential exists; no substantial impacts anticipated	Potential exists; no substantial impacts anticipated	Potential exists; no substantial impacts anticipated	Potential exists; no substantial impacts anticipated	Potential exists; no substantial impacts anticipated	Potential exists; no substantial impacts anticipated
Historic Properties Affected [2]	9	9	8	7	7	8	7	10
Change in Parks and Recreation Areas	+116 acres	+112 acres	-57 acres	-37 acres	-60 acres	-97 acres	-153 acres	+33 acres
4.8 Waters of the U.S., Including Wetlands								
Change in Waters of U.S., Incl. Wetlands	+965 acres	+960 acres	+886 acres	+888 acres	+878 acres	+883 acres	+858 acres	+957 acres
4.9 Vegetation and Wildlife Habitat								
Change in Amount of Woodlands [3]	+57 acres	+56 acres	+35 acres	+35 acres	+28 acres	+35 acres	+32 acres	+51 acres
Change in Amount of Grass Areas [3]	-1,287 acres	-1,307 acres	-1,753 acres	-1,741 acres	-1,741 acres	-1,841 acres	-1,858 acres	-1,475 acres
4.12 Water Quality Impacts								
Changed Water Quality	Minor benefit	Minor benefit	Minor benefit	Minor benefit	Minor benefit	Minor benefit	Minor benefit	Minor benefit
4.13 Floodplain Impacts								
Maximum Increase in 100-year Flood Elevation	None	None	+0.18 feet	+0.14 feet	+0.41 feet	+0.31 feet	+1.20 feet	None
Maximum Increase in SPF Elevation	None	None	+0.05 feet	+0.09 feet	+0.03 feet	+0.19 feet	+0.71 feet	None
Change in 100-year Flood Valley Storage[4]	None	None	-0.7% outside ROD	+0.7% within ROD	+2.0% within ROD	+0.7% within ROD	+2.4% within ROD	None
Change to SPF Valley Storage [4]	None	None	-2.1% (within ROD)	-0.5% (within ROD)	+0.0% (within ROD)	+0.1% (within ROD)	-0.7% (within ROD)	None
4.14 Air Quality Impacts								
Change in Ability to Meet Standards[5]	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant

TABLE 4-60. ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

Resource Category	Alternative 2A[1]	Alternative 2B[1]	Alternative 3A[1]	Alternative 3B[1]	Alternative 3C[1]	Alternative 4A[1]	Alternative 4B[1]	Alternative 5[1]
	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts	Cumulative Impacts
MSATs[6]	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
4.16 Visual Impacts								
Visual Alteration of Floodway Area[7]	None	None	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

NOTES: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9.**

1. The numeric estimates and qualitative descriptions represent the direct and indirect impacts of the Trinity Parkway (as summarized in **Table 4-56**) when combined with the impacts attributed to reasonably foreseeable future projects (from **Table 4-59**) in the Trinity River Corridor. All acreages are approximate estimates.
2. The historic architectural resources (i.e., NRHP-listed and -eligible buildings, bridges, and districts) noted in **Table 4-56** were compared with the historic architectural resources affected by other projects from **Table 4-59** to ensure that resources would not be counted twice if affected by both a Build Alternative and a reasonably foreseeable future project from **Tables 4-57** and **5-58**.
3. The acreage figures reflect total expected impacts from right-of-way and excavated potential borrow areas; where shown, the numbers below the total in parentheses represents the acreage impacts from the potential borrow areas only.
4. Reported in percentage (%) of existing condition as required by 1988 USACE ROD and CDC criteria, which allow a maximum loss in valley storage of 0% for the 100-year flood and 5% for the SPF.
5. The 9-county DFW non-attainment area, which includes Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant counties, is currently in non-attainment for the 8-hour ozone standard. The region is in attainment for all other NAAQS criteria pollutants, including CO. The cumulative impact on the ability of the region to meet established air quality standards is considered insignificant because the proposed project would not cause pollutants (including CO) to exceed the NAAQS, and the proposed project and majority of reasonably foreseeable transportation projects would be required to be consistent with a TIP and MTP that have been determined to conform to the ozone non-attainment SIP. All throughout the region, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions of on-road emissions. In addition, the impact of reasonably foreseeable future growth and urbanization on air quality would be minimized by enforcement of federal and state regulations by the EPA and TCEQ.
6. Although the cumulative health effects of MSATs are unquantifiable due to unavailable or incomplete information, EPA's vehicle and fuel regulations, coupled with fleet turnover, would over time cause substantial reductions of on-road emissions. In almost all cases, lower emissions will cause MSAT levels to be significantly lower than they are today.
7. The use of the term "moderate" for cumulative impacts evaluated under Alternatives 3A, 3B, 3C, 4A, 4B, and 5 is largely due to the noticeable visual changes that would occur as a result of the proposed project and other foreseeable actions in an area (i.e., the Dallas Floodway) where a sense of open space has dominated the landscape for a long period of time.
8. A greater economic impact would be felt by low-income populations, because the cost of paying tolls would represent a higher percentage of household income for these users. Because of the economic burden, motorists may choose alternative routes that could result in longer travel times or decide to assume the financial expenditure. Overall, the potential cumulative impact is considered to be "moderate." However, with regard to the net benefits, the added capacity of the Trinity Parkway combined with other planned improvements to the transportation network would provide mobility and congestion management benefits for all users.

4.24.2.9 Step 7 - Report the Results

In this step of the cumulative impacts analysis, a summary of the analysis approach and findings (Steps 1 through 6) is presented. The summary below follows the eight-step TxDOT analysis shown in **Table 4-53**.

Approach: This cumulative impacts (or, interchangeably, "effects") analysis follows detailed TxDOT guidance on the topic, as well as guidelines from CEQ and relevant case law. The methods or processes used in the assessment of potential cumulative impacts varied by resource but generally included review of current and historical reports, records, studies, databases, and mapping (including aerial photography) and the use of geographic information systems (GIS) tools in an effort to quantify the potential effect where possible (overlays, etc.).

Step 1, Identify the Resources to Consider in the Analysis: This step requires the identification of important resources substantially affected by the proposed project, and resources that are currently in poor or declining health or are at risk even if the proposed project impacts are not major. **Table 4-54** lists the issues and resources evaluated for direct impacts, and provides an explanation as to why certain issues and resources were included or excluded from the cumulative impacts analysis, based on the foregoing criteria. In essence, environmental "issues" that are not resources (e.g., traffic noise or displacements), while important for assessing direct impacts, are not appropriate for cumulative impacts analysis as they are not part of a larger population or resource that can be used as a basis of comparison. The selection of these cumulative impacts issues was also made with input from involved agencies and selection also reflects comments from the general public made during the scoping process. The resources considered include: (1) Land Use (land converted to transportation right-of-way); (2) Social Impacts (environmental justice and tolling); (3) Cultural Resources and Parklands; (4) Waters of the U.S., Including Wetlands; (5) Vegetation and Wildlife Habitat; (6) Water Quality Impacts; (7) Floodplain Impacts; (8) Air Quality Impacts; and, (9) Visual Impacts. Specific indicators of each resource's condition were identified in **Table 4-55**, and were used as a means of comparing the relative impacts of the Build Alternatives and the No Build Alternative.

Step 2, Define the Study Area for Each Affected Resource: In this step, the spatial and temporal limits for evaluating the potential cumulative impacts of the proposed project were established. The spatial limits were selectively expanded beyond the established Trinity Parkway Study Area to consider the extension of Project impacts as far from the Project Areas as they would likely be felt, taking into consideration each resource's physical characteristics, affected institutional jurisdictions, and relevant political boundaries where appropriate. The resource study area (RSA) for all of the resources identified earlier in **Table 4-54**, with the exception of air quality and environmental justice issues, was designated

as the Trinity River Corridor (see **Plate 4-39**). This RSA boundary emphasizes the "human communities" and "affected institutional jurisdictions" aspects of the guidance and represents a key management unit used through the years by the City of Dallas in developing land use plans that focus on preserving and enhancing the socio-economic conditions and natural resources that characterize a geographic area of approximately 43,500 acres. This RSA is approximately six times the size of the Project Study Area (7,036 acres) and provides a suitable "context" for evaluating most of the resources included in the analysis. RSAs for environmental justice issues were tailored to the specific impacts examined. Cumulative impacts to affordable housing for environmental justice populations examined whether reasonably foreseeable actions would be likely to result in additional residential displacements to the particular communities affected by displacements expected from direct and indirect impacts of the Trinity Parkway; the RSA for this issue kept the focus on the cumulative impacts to affordable housing available for those who would be displaced by the proposed project. The RSA for evaluating system level tolling cumulative impacts on environmental justice populations is bounded by the nine counties that are predominantly served by the regional toll system (of which the proposed Trinity Parkway would be an element). The RSA for evaluating air quality (including MSATs) was designated as the DFW 8-hour ozone non-attainment area covering all or portions of nine counties, including Dallas County. This large area represents the management unit for mobile source pollutants as regulated by federal, state, and local government agencies. The time frame for analyzing the potential impacts of future actions was chosen to generally be the 1970/1980 time frame to the 2030 time frame, which is consistent with the time frame for the direct and indirect impact analyses presented earlier in this chapter.

Step 3, Describe the Current Health and Historical Context for Each Resource: In this step, each resource's abundance and quality at the present time and as projected for the future was evaluated. The current health and historical context for each selected cumulative impacts resources has been summarized previously (see **Chapters 3** and **4**) and was discussed. Regulatory controls have played an important role over the years and have had a profound effect on the current health, condition, or status of select resources. As a result, a discussion of the relevant regulatory controls that have helped "shape" the current condition or status of resources is also included as part of this discussion.

Step 4, Identify Direct and Indirect Impacts that May Contribute to a Cumulative Impact: In this step, the direct and indirect impacts expected from the eight Trinity Parkway Build Alternatives were summarized in **Table 4-56** for the resources identified for cumulative impacts analysis. The direct and indirect impacts associated with the No-Build Alternative are summarized in **Table 4-59** as the summary of existing conditions.

Step 5, Identify Other Reasonably Foreseeable Actions that May Affect Resources: In this step, other reasonably foreseeable actions that were likely to occur within the Trinity River Corridor were

identified. These projects are independent of this proposed action and were determined to likely occur within the timeframe identified earlier in Step 2. The identification of the reasonably foreseeable future actions for the Trinity River Corridor resource study area was based on a review of project, resource, policy, development, and land use plans and maps prepared by federal, state, and/or local government agencies, quasi-governmental agencies (e.g., NCTCOG, etc.), and where appropriate, private entities. The types of projects were grouped into two categories: (1) Planned Transportation Projects and (2) Planned Development Projects. A description of each planned transportation project identified was presented earlier in **Table 4-57** and the general location of each was shown on **Figure 4-4**. Each identified planned development project was presented in **Table 4-58**, with the general location shown on **Figure 4-5**. Large-scale plans/projects were not shown on the figures and were described in tables or in supporting text. Several of the identified plans and projects overlapped with those of other plans. When this occurred, the most current and complete source was relied upon. Additionally, several planned projects were included as a part of other larger, more comprehensive projects, or were determined to likely have no substantial future effect on the resources discussed. **Table 4-59** provided a summary of the likely impacts associated with these reasonably foreseeable actions, and also represents the conditions expected under the No-Build scenario.

Step 6, Assess Potential Cumulative Impacts to Each Resource: In this step, the expected impacts of past, present, and reasonably foreseeable future actions, combined with the direct and indirect impacts associated with the No-Build and the eight Trinity Parkway Build Alternatives provided a qualitative and quantitative assessment (when possible) of likely cumulative impacts. Potential cumulative impacts were assessed by adding the direct and indirect impacts for all of the Build Alternatives (from **Table 4-56**) to the expected impacts of the reasonably foreseeable future projects in the Trinity River Corridor (from **Table 4-59**). The result of combining the information from these tables is summarized in **Table 4-60**, and a brief discussion of potential cumulative impacts for each resource follows.

Land Use Impacts: Changes in Land Use

Cumulative impacts with regard to land use have been examined using as a principal indicator of change the amount of land that would be converted from its existing use to transportation right-of-way. Other transportation projects independent of the Trinity Parkway are expected to convert 352 acres to right-of-way, most of which is existing urban landscape. The direct impacts of the Build Alternatives on this indicator would range from 128 acres (Alternative 2A) to 437 acres (Alternative 4B), making the range in cumulative impacts 486 acres to 795 acres, respectively. On one hand, these impacts would result in a substantial impact to land use in the Trinity River Corridor, displacing many existing developed properties. In contrast, it is estimated that there is approximately 1,740 acres of developable land in the corridor that could serve to replace existing land uses that would be converted for right-of-way. Moreover, as land use is not a “resource” but a choice that is heavily influenced by the local and regional community, this

conversion of land may not categorically be said to be an adverse impact. Instead, the need for transportation corridors is the result of carefully weighing the competing potential land uses to achieve a balance that addresses the combined requirements of an urban society. This weighing of competing interests for land uses is accomplished primarily by the City of Dallas, with input from the community, as well as regional, state, and federal agencies.

An additional aspect of land use impacts is induced development or redevelopment of land, which was estimated as indirect impacts of the Trinity Parkway. Induced change in land use associated with the Industrial Boulevard Alternatives (2A and 2B) would affect 115 to 127 acres, and the Floodway Alternatives (3A, 3B, 3C, 4A, 4B, and 5) would affect 49 to 72 acres. It is expected that these land use changes would be the result of perceived economic opportunities to provide commercial stores that would target the expected influx of motorists near Trinity Parkway access points.

Reasonably foreseeable development projects independent of the Trinity Parkway and sponsored by both municipal and private entities would potentially affect some aspect of land use for approximately 5,000 additional acres. These impacts would range from minor impacts designed to preserve and enhance natural resources (e.g., Balanced Vision Plan) to major urban redevelopments. As with other changes in land use, these changes would occur within a framework of municipal planning and development regulations designed to promote established civic plans and policies.

Social Impacts: Environmental Justice and Affordable Housing

Cumulative impacts to communities with minority and/or low-income populations in the project area have been assessed in terms of loss of affordable housing resulting from the displacement of residences. All of the Build Alternatives would result in six residential displacements within the South Dallas Neighborhood District, affecting a predominately African-American neighborhood with a median household income of $15,781, median value of owner-occupied homes of $26,300, and median contract rent of $298. Build Alternative 2A would displace an additional two residences in this same district, within populations with similar income and housing characteristics. In addition to the six displacements noted above, Build Alternatives 4A and 4B would displace five residences within the La Bajada Neighborhood which is predominately Hispanic with a median household income of $27,159, median value of owner-occupied housing $35,100, and median rent of $324. Build Alternative 5 would affect the six South Dallas properties plus 13 residences within the La Bajada Neighborhood, as well as one additional house in the East Oak Cliff Neighborhood District, which has a median household income of $14,205, median owner-occupied home value of $24,400, and median rent of $355. No indirect impacts are expected that would displace residences, but other foreseeable projects are expected to result in the loss of three additional homes in the East Oak Cliff Neighborhood District. Consequently, cumulative impacts affecting

affordable housing within the RSA would result in the loss of 9 to 23 residences depending on the Build Alternative.

Social Impacts: Environmental Justice and Tolling

The project level analysis in Subsection 8 of **Section 4.3.3.2** accounts for most cumulative impacts because of its consideration of the entire regional transportation system in the MPO planning area and inclusion of the projected 2030 highway and transit networks in its origin/destination select link analysis that was provided by NCTCOG. In this way, other reasonably foreseeable transportation projects and land development projects are included in the analysis. As stated previously, the anticipated *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* transportation network for North Central Texas would consist of approximately 8,569 mainlane lane-miles, of which 30 percent (approximately 2,542 lane-miles) are proposed to be tolled. Of the anticipated lane-miles accounted for in the 2030 network, the proposed Trinity Parkway tolled lanes would contribute approximately 52.8 tolled lane-miles (8.8 miles with three lanes in each direction).

The NCTCOG data indicated that several of the TSZs that would utilize the Trinity Parkway had relatively higher percentages of ethnic and racial minority populations, and that nearly half of the daily trips on the toll road would originate from these TSZs.

Clearly there would be an economic impact to any motorist who utilizes the Trinity Parkway toll road. The economic impact would be higher for low-income users because the cost of paying tolls would represent a higher percentage of household income than for non-low-income users. Because of the greater economic burden of paying a toll to use the Trinity Parkway, low-income users may decide to use existing free non-tolled general purpose mainlanes and frontage (i.e., IH 35E or other components of the IH 35E corridor road network which would allow the motorist to travel generally the same corridor as the Trinity Parkway from beginning to end; see Subsection 7 of **Section 4.3.3.2**). Motorists using alternative routes during peak hour may experience longer travel times due to increased congestion on non-tolled roads relative to the tolled road. The difference in travel times between the Trinity Parkway and the non-tolled alternatives would likely be highest during peak hours of travel when traffic congestion within the IH 35E corridor would be the greatest.

Region-wide, the economic impact of tolling would be higher for low-income users that use the toll system since the cost of paying tolls would represent a higher percentage of their household income. Users, including low-income populations, who use the existing non-tolled facilities, may experience a difference in travel time as compared to users of the tolled facilities. A positive impact for low-income populations is that planned future added capacity transportation projects with toll-free lanes would provide mobility and congestion relief for all users.

It is reasonable to assume that there would be a cumulative effect on environmental justice populations upon build-out of the regional toll system; however, given the lay-out and orientation of the system, it is not likely that a driver would routinely travel the entire length of the entire system during the course of normal activities. As previously acknowledged, the economic impact of tolling would be higher for low-income motorist because the cost of paying tolls would represent a higher percentage of household income than for non-low-income households.

The Trinity Parkway, as an element of the system of toll roads now being developed for the greater-DFW area, would contribute to a cumulative impact on low-income users of the system. If one were to assume an average commute distance of 14 miles in the greater-DFW area (assumption based on the NCTCOG TransCAD® model) and applied that distance to toll facilities at the estimated toll rate of 14.5 cents per mile the total year 2010 future value cumulative cost for one round-trip along a toll facility would be approximately $4.06. Assuming the average household would make 250 round-trips per year, the annual cost for the average commute distance at these different rates would be approximately $1,050 per year, which equates to 4.9 percent of a household income at the 2008 HHS poverty level for a family of four.

Cultural Resources: Archeological Resources

Archeological resources are most susceptible to private developments that are not subject to regulatory controls. Because some of the planned developments in the area would not take place on public land and likely do not involve federal funds, potential exists for adverse impacts to archeological resources.

Cultural Resources: Historic Architectural Resources

It is estimated that with implementation of the plans and projects listed in **Tables 4-57** and **4-58**, combined with Trinity Parkway**,** that possibly seven to 10 NRHP-listed or -eligible buildings, bridges, or districts could be affected. Most of these impacts are associated with the Build Alternatives for the Trinity Parkway. This number of historic architectural resources with some level of potential impacts represent a substantial part (i.e., 19 to 27 percent) of the 26 total NRHP-listed historic structures in the Trinity River Corridor plus the 11 NRHP-eligible historic structures in the project area.

Parks and Recreation Areas

Implementation of several of the plans/projects listed in **Tables 4-57** and **4-58** is expected to result in an increase of approximately 117 acres of parkland. The combination of this increase with the impacts of the Trinity Parkway would cause highly variable net changes in parklands depending on the Build Alternative. As shown in **Table 4-60**, the potential impacts on parklands would range from a loss of 153 acres (Alternative 4B) to an increase of 116 acres (Alternative 2A). The maximum expected loss of 153 acres would not be considered substantial, as it represents approximately 2.2 percent of the 6,900 acres of

parks and recreation areas within the Trinity River Corridor RSA. Moreover, the vast majority of open space areas within the RSA are expected to be preserved in perpetuity because of municipal and federal regulations, plans, and policies. Note that any potential losses of parkland would affect the Trinity River Greenbelt Park, which has been determined to not represent a Section 4(f) resource (see discussion in **Section 4.7.3.2**).

Waters of the U.S., Including Wetlands; Water Body Modification and Aquatic Habitat

Overall beneficial cumulative impacts are expected for waters of the U.S., including wetlands, primarily because of the plans for creating such water-related features in the Balanced Vision Plan and DFE. The net change in waters of the U.S., including wetlands, is expected to range from an increase of 858 acres to 965 acres, which would represent an approximately 14 to 16 percent increase to the existing 6,120 acres of forested wetlands, emergent wetlands, and open water in the resource study area.

Vegetation and Wildlife Habitat

Cumulative impacts to high quality wildlife habitat (woodlands) are expected to be beneficial. The Build Alternatives would have very little impact on woodlands (i.e., would remove from 5 to 34 acres), and this impact would be offset by the anticipated net creation of 62 acres of woodlands by other foreseeable projects. When compared with the existing total of approximately 4,630 acres of woodlands and 3,470 acres of forested wetlands in the Trinity River Corridor, a net minor cumulative benefit is expected.

Substantial cumulative impacts are anticipated for grass-dominated areas within the Trinity River Corridor, but these changes do not result in an overall adverse impact to wildlife habitat. That is, much of the planned loss of maintained grass areas within the corridor would be for the creation of lakes, woodlands, forested wetlands, and emergent wetlands. Consequently, most of the estimated 1,271 acres of grass area conversion from other foreseeable projects would result in the creation of these types of habitat, and less than half of the estimated loss of grass areas would be converted to urban cover. Only the Dallas Floodway Build Alternatives would contribute appreciably to a cumulative loss of grass areas, ranging from 467 acres (Alternative 3B) to 573 acres (Alternative 4B). Taken together, the cumulative impacts of Dallas Floodway Build Alternatives and other foreseeable actions would range from 1,287 acres to 1,858 acres. These impacts would represent approximately 18 to 26 percent of the existing 7,150 acres of grass areas in the Trinity River Corridor. The contribution of the Trinity Parkway Build Alternatives to this total would range from less than one percent (Alternatives 2A and 2B) to approximately 8 percent (Alternative 4B).

Water Quality Impacts

Historically, industrial and municipal discharges were considered the main sources of water quality impairment in the Trinity River watershed. However, storm water runoff carrying pollutants from

impervious surfaces are responsible for a substantial portion of the water quality and use impairment issues in the watershed. It is difficult to determine the effect that future development might have on prevailing water quality, but there would likely be impacts. Implementing the listed plans/projects would undoubtedly increase the amount of impervious surfaces in the corridor and would result in increased storm water runoff. The multiple federal, state, and local regulatory controls as well as local plans, projects, and initiatives designed to minimize the impacts of development on water quality, would insure that with future development, potential impacts to water quality would likely be substantially reduced. Several of the future plans/projects provide for water quality benefits through the improvement/enhancement of existing streams and wetlands and the creation of additional wetlands. Wetlands are an important resource that serves a variety of functions including sediment filtering, upland and aquatic wildlife habitat, and reduction of flood water velocity. Several of the plans/projects listed in **Tables 4-57** and **4-58** also call for the enhancement of existing recreation areas and the creation of additional open space. When combining this with the planned stream improvements and wetland enhancement/creation that would occur as part of several future plans/projects, it is likely that minor long-term water quality benefits would be realized.

Floodplain Impacts

The cumulative impacts of the Dallas Floodway's ability to handle extreme storm water are expected to be insignificant for any of the Build Alternatives in combination with other foreseeable projects. The Dallas Floodway Build Alternatives (i.e., 3A, 3B, 3C, 4A, 4B) have been designed so as to ensure the continued functioning of the Dallas Floodway for flood conveyance. Likewise, all other plans for the enhancement of natural resources within the Dallas Floodway include detailed design considerations that are expected to improve valley storage capacity, and otherwise enhance the Dallas Floodway. The CDC regulatory structure overseeing any activity within the Dallas Floodway is a driving force in the preparation of all project designs and is expected to continue to influence all aspects of the preparation of any plans for projects in the Dallas Floodway. The CDC process is founded upon a cumulative impacts hydrologic model maintained by USACE, which is used to test the hydraulic impacts of all projects that would be constructed in the Floodway; if a proposed project fails to meet CDC hydraulic criteria, it must be redesigned and retested until it does. Consequently, it would be necessary for the final design of any Build Alternative and any of the foreseeable projects in the Dallas Floodway to be within the 1988 USACE ROD criteria in order to be authorized by USACE, the City of Dallas, and NCTCOG.

.

Air Quality Impacts

The cumulative air quality impacts are addressed at the regional level by analyzing the air quality impacts of transportation projects in *Mobility 2030: The Metropolitan Transportation Plan (MTP) for the Dallas-Fort Worth Area* and the TIP. The proposed project design concept and scope and project cost are not yet consistent with the conforming MTP and TIP, and measures are being taken to address the issue. Prior

to FHWA taking final action on the proposed project, it will be consistent with a conforming MTP and TIP/STIP. The majority of reasonably foreseeable transportation projects were included in the MTP and the TIP, which have been determined to conform to the State Implementation Plan (SIP).

The DFW region is expected to continue to experience substantial population growth, urbanization, and economic development. However, in recent years, local governments have promoted land development patterns that encourage alternative modes of transportation and improve air quality in the long-term by changing zoning to allow higher density mixed-use development, expanding transit services, and establishing tax incentives for infill. In addition, trends over the last decade show a decrease in the number of days the O_3 standard has been exceeded in the DFW area. Local and regional programs, such as the NCTCOG's Sustainable Development Funding Program, that encourage public/private partnerships that leverage the land use/transportation relationship to enhance air quality are fixtures in the long range transportation and development plans for the area.

Some adverse impacts to air quality may be experienced from air toxics emissions from growing industrial activities throughout the region. However, the cumulative impact of reasonably foreseeable future growth and urbanization, including such industrial activities, would be minimized by enforcement of federal and state regulations enacted by the EPA and TCEQ. These agencies are mandated to ensure that such growth and urbanization would not prevent compliance with the ozone standard or threaten the maintenance of the other air quality standards. Throughout the region, EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions of on-road emissions including CO, MSATs, and the ozone precursors (VOC and NOx). Modeling results (**Section 4.14.3**) under the worst case conditions indicate that CO concentrations would not exceed the NAAQS. A quantitative MSAT emissions analysis (**Section 4.14.5**) indicates that by 2030, although VMT increases, MSAT emissions would substantially decrease when compared to 2007.

Visual Impacts

All of the Trinity Parkway Build Alternatives within the Dallas Floodway are expected to have a strong visual impact on the Dallas Floodway, when considered as a visual resource. At the present time, the Dallas Floodway does not offer a substantial viewshed, but other projects planned for the Dallas Floodway (e.g., Balanced Vision Plan, and DFE projects) would focus on enhancing the visual quality of natural resources in the Dallas Floodway. Consequently, such projects would serve to substantially offset the visual intrusion of any of the Dallas Floodway Build Alternatives within this greenbelt that is the subject of much planning to enhance its visual attractiveness. The City of Dallas is the primary agency with regulatory authority to influence the visual resources both in the Dallas Floodway as well as elsewhere in the corridor, and would be expected to continue to influence all construction projects that could affect visual resources.

4.24.2.10 Step 8 - Assess and Discuss Mitigation Issues for all Adverse Impacts

Introduction

The approach taken thus far in this analysis has been to identify and report the potential "unmitigated' impacts to each of the resources, but this step takes into consideration mitigation that would be likely. As noted above in Step 3 of this analysis, federal, state, and local lawmaking bodies have enacted statutes, regulations, and ordinances designed to preserve and enhance the abundance and quality of natural resources. As this regulatory framework has become part of the current planning process, and would undoubtedly continue into the future, it becomes an important aspect of preparing a cumulative impacts analysis as it relates to the following key assumptions:

- All reasonably foreseeable actions would be completed as currently planned and within the timeframe specified for this analysis (i.e., by the year 2030).
- The sponsors of government and private projects would abide by relevant federal, state, and local laws designed to protect each resource and that regulatory agencies would perform their duties in accordance with legal requirements and internal guidelines.
- All relevant federal, state, and local laws and regulations designed to protect each resource would not substantially change from the present.
- The cause-and-effect relationships between the key resources, ecosystems, and human communities and the various stress factors that have been identified from historical experience would continue into the future.

This step in the cumulative impacts analysis applies the foregoing assumptions and the relevant regulatory controls (discussed in Step 3) to the potential cumulative impacts outlined in **Table 4-60** and discussed in Step 7. The objective of this step is to ascertain expected cumulative impacts to each resource that would remain after full compliance with the regulatory requirements at all levels and reflect long-term impacts in light of mitigation that would likely be applied. Development and successful implementation and monitoring of mitigation measures can lessen a potential adverse impact, or in some instances, negate it in its entirety.

Mitigation Opportunities Associated with Other Planned Projects in the Trinity River Corridor

As demonstrated in **Table 4-59**, likely beneficial and adverse cumulative impacts from reasonably foreseeable future projects would be realized even under the No-Build Alternative for the Trinity Parkway. Beneficial impacts would include increases in the amount of woodlands, water-related resources, and parklands. The development and implementation of potential mitigation measures to adequately address these "predicted" adverse cumulative impacts associated with other planned activities in the corridor is generally beyond the jurisdiction of the sponsoring agency (the FHWA as Lead Agency; TxDOT and the

NTTA as Cooperating Agencies). However, the FHWA, TxDOT, and the NTTA can assist through support of general planning strategies, policies, actions, or goals that would aid in reducing or lessening the likelihood of future adverse cumulative impacts associated with other planned future projects within the corridor. Representative examples of this general planning involvement could include:

- Participating in timely, coordinated transportation and development planning that includes communication with all interested parties and agencies (as appropriate)
- Promoting or supporting sustainable development initiatives in the area (as appropriate)
- Promoting or supporting the development of alternative modes of transportation in the area (as appropriate)
- Rehabilitating existing transportation systems within existing right-of-ways (as appropriate)

By supporting these initiatives, and being actively involved in these future activities (as appropriate), the potential for adverse cumulative impacts associated with continued development or redevelopment of the corridor (by others) would likely be lessened.

Mitigation as a Result of Cumulative Impacts Associated with the Trinity Parkway Project

In contrast to the previous discussion, selection of one of the eight Trinity Parkway Build Alternatives could lead to a continuation of a trend, an increase in the trend, or in some cases, a reversal of the trend for any of the resources summarized in **Tables 4-59** and **4-60**. For example, implementing one of the Build Alternatives would continue the trend of converting land to transportation-related right-of-way, including land that might otherwise be used for establishing parks/recreation areas within the Dallas Floodway (Build Alternatives 3A, 3B, 3C, 4A, 4B, and 5 only). In such cases, development and implementation of project-specific mitigation measures or environmental commitments can be appropriate in an effort to reduce or minimize (to established regulatory thresholds) these predicted adverse cumulative impacts resulting from the project.

Mitigation is typically considered to be the attempt to offset potential adverse impacts. This can be accomplished by avoiding, minimizing, repairing, rehabilitating, restoring, or compensating for likely adverse impacts. Mitigation measures are generally required or imposed by the agency with jurisdictional authority over a given resource. One example could be the USACE requiring wetland creation or enhancement to offset the potential adverse impacts of a given project. However, as stated, mitigation can also take the form of general planning strategies, policies, actions, or goals either implemented or adhered to in an effort to avoid, reduce, or minimize adverse impacts. As in this case, there is sometimes no defined agency with jurisdictional authority related to a particular cumulative impacts issue. Rather, general strategies, policies, actions, or goals can be implemented or adhered to by the Lead and Cooperating Agencies in an effort to minimize any predicted adverse impacts. By doing this, potential

adverse cumulative impacts issues are disclosed to the public and other agencies, even though no "specific" mitigation can be implemented. The information can, however, be useful for future decision making in the area and to possibly identify other opportunities for avoidance and minimization of adverse cumulative impacts.

Both the general strategies, policies, actions, or goals that would be supported or promoted by the FHWA, TxDOT, and the NTTA in an effort to minimize potential adverse cumulative impacts associated with the Trinity Parkway project and the "resource specific" mitigation that would likely be required by the agency with jurisdiction over a given resource are described in the following sections. The remainder of this step outlines likely Details regarding "resource specific" mitigation measures can be found in **Chapter 7** (as appropriate).

Land Use Impacts: Changes in Land Use

There is not a universally-accepted hierarchy of land uses, and the choice to construct transportation projects in the Trinity River Corridor or otherwise develop or redevelop land reflects a balancing of competing land uses to meet city and regional needs. Mitigation is part of transportation planning, however, and all transportation projects are subject to an extensive environmental review process to ensure that the amount of right-of-way needed for a project is minimized. Similarly, municipal and private development actions are subject to established policies and procedures that allow a weighing of public interests (e.g., zoning and development ordinances). Other than the collaborative planning process involving multiple governmental agencies at the federal, state, regional, and municipal level, no additional mitigation would appear warranted to address changes in land use.

Social Impacts: Environmental Justice and Affordable Housing

A variety of institutional safeguards are in place to ensure that members of environmental justice populations that are displaced from their residences have access to affordable housing within or near the same community. Residents who would need to relocate would be entitled to the benefits and programs under the Uniform Relocation Assistance Act, which emphasizes relocation to affordable housing within a reasonable distance of the displaced property. Special relocation considerations would be made to accommodate residents in need of additional assistance. For example, Last Resort Housing would also be available in the event of a housing shortage or for residents who cannot find comparable housing within their means. This may involve the use of replacement housing payments that exceed the Uniform Relocation Assistance Act maximum amounts or the use of other methods of providing comparable decent, safe, and sanitary housing within a person's financial means (see also **Section 4.5.2, Chapter 7**, and **Appendix C**).

In addition to relocation assistance, the availability of affordable housing despite the projected losses of housing is central in understanding the magnitude of cumulative impacts to housing as it relates to minority and/or low-income communities affected by the proposed project. Although data is not readily available to provide a real-time snapshot of affordable housing for specific neighborhoods, information from the City of Dallas Housing Department indicates that the variety of HUD and city-sponsored programs have resulted in an adequate supply of affordable housing that meets current demands and is expected to do so in the future (see **Section 4.5.3**). Moreover, many of the programs and services (e.g., Community Housing Development Organization Program, City of Dallas Land Bank, and Dallas Mortgage Assistance Program) to make affordable housing available and to assist households in finding and financing housing requirements have emphasized and continue to emphasize the neighborhoods that would be affected by cumulative impacts to affordable housing resources. Additionally, the city's future land use plan leaves unchanged the single family residential tracts in the west and south portions of the project area to preserve existing neighborhoods.

Social Impacts: Environmental Justice and Tolling

The Metropolitan Planning Organization (MPO) is responsible for coordination and implementation of transportation planning within its MPO boundary. This effort includes updating the area wide MTP known as *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*, conducting regional surveys and approving toll road systems in the metropolitan area. Where the MTP is changed or approved to include an inter-connected network of toll roads, the EJ/Title VI impacts are analyzed not only for the individual toll facilities but also cumulatively for the entire system. To this end, an EJ/Title VI analysis is required to ensure that no person is excluded from participation in, denied benefits of, or discriminated against in planning efforts, including the development of the MTP. Continuing efforts by the MPO would ensure that recommendations of the MTP do not adversely impact the protected populations disproportionately when compared to the unprotected class population.

The MTP identified a number of possible mitigation measures that may be considered to minimize potential disproportionate impacts on low-income populations from tolled lanes. Some of these measures would require cooperation between or among various governmental entities or agencies and do not constitute current commitments, but possible solutions that may be developed and implemented after appropriate study and consideration. Possible mitigation measures may include but are not limited to:

- Improvements to non-tolled roadway facilities and alternative transportation modes;
- Increased public transit access through improved headways and/or routes;
- Increased efforts to promote ridesharing and vanpooling;
- Improvements in transportation systems management, through measures such as improved signal timing, additional left/right turn bays, and additional bus bays;

- Funding of alternative transportation infrastructure (rail transit, bicycle and pedestrian facilities, etc.); and
- Funding of non-toll projects within the current transportation plan which would add capacity to non-tolled general purpose lanes.

These are measures that would contribute to facilitating travel for low-income persons who may be unable to afford traveling on tolled lanes.

Cultural Resources: Archeological Resources

The potential cumulative impacts to archeological resources would be heavily influenced by requirements for coordination with state and local authorities that are structured to avoid adverse impacts. Mitigation beyond regulatory programs is not anticipated.

Cultural Resources: Historic Architectural Resources

The potential cumulative impacts to the NRHP-listed buildings, bridges, or districts would be subject to careful scrutiny by regulatory authorities at the state and local level. As noted earlier in Step 3, this regulatory oversight is designed to ensure adverse impacts of transportation or other development projects do not adversely affect the characteristics that make these properties historic. Where impacts are unavoidable, mitigation may include efforts to document historic architectural resources such as creation of a cultural history, a Historic American Buildings Survey, or a Historic American Engineering Record. Mitigation beyond the relevant regulatory programs would not be expected.

Parks and Recreation Areas

As noted above, adverse cumulative impacts would be expected to parklands for Build Alternatives 3A, 3B, 3C, 4A, 4B, and 5. Most of the impacts identified would affect the Trinity River Greenbelt Park, which is not a resource regulated under Section 4(f). However, if the preferred alternative is determined to have proximity impacts to Section 4(f) parks, the requirements associated with Section 4(f) regulations would need to be met. Also, in an effort to minimize cumulative impacts associated with parks/recreation areas, the FHWA, TxDOT, and NTTA would:

- Develop and implement alternatives that avoid or minimize potential impacts to parks/recreation areas (where feasible);
- Consider improved access to existing parks/recreation amenities in the area when appropriate;
- Consider development of additional parks/recreation opportunities in the area when possible;
- Consider enhancing or improving existing parks/recreation amenities and opportunities when possible; and

- Consider providing parks/recreation access and linkages as part of transportation systems improvements when possible.

It is expected that the application of mitigation measures such as improving access to existing amenities or creating new parks/recreation areas within the Dallas Floodway would serve to mitigate the impacts to park resources.

Waters of the U.S., Including Wetlands; Water Body Modification and Aquatic Habitat

As overall beneficial impacts are expected for waters of the U.S., including wetlands, no specific mitigation would be necessary to address this resource from a cumulative impacts standpoint. It should be noted, however, that the regulatory programs protecting wetlands mandate no net loss of wetlands on a project-by-project basis. Consequently, mitigation would be required for all adverse impacts to wetlands by any of the Build Alternatives, even though cumulative impacts in **Table 4-60** are likely to result in dramatic benefits to the wetland inventory in the resource study area. For example, federal wetlands regulatory guidelines stress the avoidance of adverse impacts to wetlands with the goal of no overall net permanent loss of wetland functions. Project-specific aspects of direct impacts of the Build Alternatives to waters of the U.S., including wetlands, are discussed further in **Chapter 7**.

Vegetation and Wildlife Habitat

As cumulative impacts to high quality wildlife habitat (woodlands) are expected to be beneficial, further mitigation should not be needed. Cumulative impacts to maintained grass-dominated areas would be substantial, but mitigation is expected to be limited. More than half of the cumulative impacts to grass areas would be caused by projects other than the Trinity Parkway that would convert grass areas to aquatic features or wooded areas that would afford a greater diversity of use by people and wildlife. No mitigation would be considered for such conversions intended to enhance scenic beauty and wildlife habitat. As there are no regulatory programs that constrain the conversion of maintained grass areas to urban uses, mitigation for such losses would not appear warranted. It should be noted that grass areas not needed for paved surfaces or buildings would be revegetated after disturbance, thereby resulting in only a temporary loss of grass areas. Otherwise, grass areas that would be replaced by urban surfaces would generally not warrant further mitigation.

Water Quality Impacts

Mitigation with reference to impacts to water quality would be implemented as part of federal, state, and local programs regulating water quality. Measures beyond regulatory programs would not appear warranted to address cumulative impacts to water quality, as the long-term impacts are expected to be beneficial. That is, several of the future plans/projects provide for water quality benefits through the improvement/enhancement of existing streams and wetlands and the creation of additional wetlands.

Floodplain Impacts

As noted earlier, Dallas Floodway Build Alternatives have been designed so as to effectively eliminate any impacts on the flood conveyance functions of the Dallas Floodway, and all other plans that would affect natural resources within the Dallas Floodway would also be subject to the same regulatory oversight. It is expected that continued interaction between project sponsors and the USACE would ensure that any construction activities within the Dallas Floodway meet 1988 ROD criteria, thus obviating any need for additional mitigation beyond regulatory compliance. In addition, any Floodway Build Alternatives would be required to comply with both FEMA and FHWA requirements regarding floodplains.

Air Quality Impacts

The evaluation of cumulative impacts did not result in the identification of any negative impacts for which specific mitigation actions are necessary and required. In an effort to reduce congestion, TxDOT and NCTCOG would continue to promote appropriate congestion reduction strategies through the CMAQ program, the CMP, and the MTP (*Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*). The cumulative impact of reasonably foreseeable future growth and urbanization on air quality would be minimized by enforcement of air quality regulations by federal and state agencies, including the EPA and TCEQ, which are mandated to ensure that such growth and urbanization would not prevent compliance with the ozone standard or threaten the maintenance of the other air quality standards, including CO. In light of the extensive regulation of transportation projects at the regional level, and MSATs at the national level, no additional mitigation would appear to be warranted. As discussed earlier, the TIP and MTP for the area have been determined to conform to the ozone non-attainment SIP. In addition, it should be noted that the EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions of on-road emissions including CO, MSATs, and the ozone precursors VOC, and NOx.

Visual Impacts

Mitigation of adverse visual impacts of the Build Alternatives within the Dallas Floodway would in part be accomplished over time by offsetting visual improvements to the Dallas Floodway from the Balanced Vision Plan and DFE. It is also expected that context sensitive design considerations would serve to ameliorate the impacts of a Dallas Floodway alternative. The City of Dallas is expected to continue to have an active role in preparing final design features, should a Dallas Floodway alternative be chosen.

Conclusion

As demonstrated, implementing any of the Build Alternatives would likely result in cumulative impacts to expected future conditions (the No-Build Alternative) for several resources throughout the Trinity River Corridor. In many cases, the cumulative impacts are expected to be neutral or beneficial. Potential

adverse cumulative impacts may be expected with regard to environmental justice populations, archeological sites, historic properties, loss of maintained grass areas, impacts to parkland areas, and visual alteration of the Dallas Floodway. Mitigation measures to address the potential environmental justice impacts, impacts to cultural resources, and visual impacts would be expected to minimize the potential impacts assessed. **Section 4.24.2.11** provides additional analysis of the potential cumulative impacts of the regional toll and managed/HOV system, and provides additional conclusions.

4.24.2.11 Cumulative Impacts of the Regional Toll and Managed/HOV System

The analysis in the preceding sections (**Sections 4.24.2.1** through **4.24.2.10**) examined the potential project level cumulative impacts for the proposed project. The following discussion focuses on the potential cumulative impacts of the regional toll and managed/HOV system.

The system level indirect impact section (**Section 4.24.1.9**) identified the need to study the impacts from the regional toll and managed/HOV lane network as it expands for the 2030 proposed transportation system. Each resource evaluated for potential project level cumulative impacts is examined from a regional perspective to address the cumulative impacts the proposed priced facility network would have on each resource. Because of the accessibility of data resources supplied by the NCTCOG, the RSA for the regional study is the MPA. It should be noted that the analysis presented in this section is subject to change pending the 2009 update to the MTP.

Land Use

Metropolitan areas have come under intense pressure to respond to federal mandates to link planning of land use, transportation, and environmental quality from persons concerned about managing the side effects of growth such as sprawl, congestion, housing affordability, and loss of open space. The planning models used by MPOs were not designed to address these questions, creating a gap in the ability of planners to systematically assess these issues.

The relationships between land use, transportation, and the environment are at the heart of growth management. The emerging concern that construction of new suburban highways induces additional travel, vehicle emissions, and land development, making it implausible to “build our way out” of congestion has reshaped the policy context for metropolitan transportation planning. Recognizing the effects of transportation on land use and the environment, the CAA and the Intermodal Surface Transportation Efficiency Act (ISTEA) mandated the MPOs integrate metropolitan land use and transportation planning. In 1998, the Transportation Equity Act for the 21st Century (TEA-21) succeeded the ISTEA to refine this process. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), signed into law in 2005, mandated additional consistency between

transportation improvements and planned growth and development patterns, and established additional provisions that include linking land use planning more closely to the NEPA process.

The NCTCOG is promoting sustainable development as a specific objective of *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* because of the direct link between land use, transportation, and air quality. NCTCOG has defined sustainable development as:

- Land use and transportation practices that promote economic development while using limited resources in an efficient manner.
- Transportation decision making based on impacts on land use, congestion, VMT, and the viability of alternative transportation modes.
- Planning efforts which seek to balance access, finance, mobility, affordability, community cohesion, and environmental quality.

The essence of sustainable development is the wise use of scarce resources so that future generations may enjoy them. At the regional level, the key to maintaining sustainable patterns of development is to allow cities the option to present a variety of land use, zoning, mobility, and service packages to the development market and residents. This can be accomplished by providing planning support for a diverse range of mobility options such as rail, automobiles, bicycling, transit, and walking.

The DFW MPA is forecasted to grow to almost 8.5 million people and 5.3 million jobs by the year 2030, producing nearly a 63 percent increase in population and a 64 percent increase in employment. If not planned for and implemented in a responsible way, this type of rapid growth would have negative impacts on the region. If development continues to grow away from the urban core, the VMT would substantially rise per household, per person, and per employee. Higher densities, mixed land uses, and increased transportation alternatives, which are characteristics of the urban core, reduce overall VMT. This leads to lower emissions of VOC and NOx, improving air quality. NCTCOG's analysis of travel patterns showed that mixing land uses has a similar beneficial impact on travel as density. There are five types that categorize all land in the DFW MPA: employment dominant, employment leaning, mixed, household leaning, and household dominant. The localized mixing and integration of land uses occur at a variety of densities in urban, suburban, and rural settings in the region.

The MTP (*Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*) land development policies were created by combining regional expectations with local city plans, including anticipated population growth and land use. NCTCOG relies on the information provided by cities as a basis for their land development policies. By understanding the cities' expectations, NCTCOG is better able to educate the public and municipalities on the best alternatives for regional land development.

NCTCOG conducted a series of demographic sensitivity analyses scenarios to quantitatively assess the potential impacts of alternative growth scenarios on the region between 2010 and 2030. Historically, the DFW area has grown outward with new developments turning rural areas into suburban cities. Within the alternative growth scenarios presented by NCTCOG, households and employment locations were redistributed throughout the region to simulate alternative market assumptions; however, the control numbers for population and employment remained the same. **Table 4-61** presents the statistics produced through the analysis of each scenario. Brief descriptions of each scenario are:

- Rail Scenario: NCTCOG redistributed population and employment growth occurring between 2010 and 2030, while maintaining the population and employment control totals for the region. Growth was taken from rural areas of the region and added primarily to passenger rail station areas.
- Infill Scenario: NCTCOG redistributed population and employment growth occurring between 2010 and 2030, while maintaining the population and employment control totals for the region. Growth was taken from rural areas of the region and added primarily to infill areas along existing freeways/tollways.
- Rail with County Control Totals (RCCT) Scenario: NCTCOG redistributed population and employment growth occurring between 2010 and 2030, while maintaining the population and employment control totals for the region and each individual county. Growth was taken from rural areas of the region and added primarily to passenger rail-oriented areas.
- Vision North Texas (VNT) Scenario: NCTCOG redistributed population and employment growth occurring between 2010 and 2030, while maintaining the population and employment control totals for the region. Growth was distributed based on overall VNT participant feedback.
- Forward Dallas Scenario: Created for the City of Dallas, NCTCOG redistributed population and employment growth occurring between 2010 and 2030 based on the final alternative demographic dataset created during the Forward Dallas! Comprehensive Plan process (see **Section 3.1.1.1**).

TABLE 4-61. ALTERNATIVE GROWTH SCENARIOS COMPARED TO HISTORICAL GROWTH MODEL

Data of Interest	Rail Scenario	Infill Scenario	RCCT Scenario	VNT Scenario	Forward Dallas!
MPA Average of Trip Length	- 8%	+ 3%	- 0.01%	- 10.85%	- 2.9%
MPA Rail Transit Boardings	+ 52%	+ 9%	+ 8%	+ 11.13%	+ 7.4%
MPA Non-Rail Transit Boardings	+ 29%	+ 11%	+ 5%	+ 15.98%	+ 11%
MPA Vehicle Miles Traveled	- 6%	- 5%	- 1.2%	- 9.43%	- 2.2%
MPA Vehicle Hours Traveled	- 9%	- 7%	- 1.7%	- 14.31%	- 5.7%
Total Vehicle Hours of Delay	- 24.0%	- 19.0%	- 4.0%	- 32.5%	- 14.5%
Lane Miles Needs	- 13.0%	- 10.0%	- 13.3%	- 30.90%	- 32.1%
Financial Needs (billions)	- $9.5	- $6.7	- $2.9	- $15.6	- $7.0
Roadway Pavement Needs	- 8.3 sq. mi.	- 6.5 sq. mi	- 0.7 sq. mi.	- 19.8 sq. mi.	- 1.6 sq. mi.
NOx Emissions	- 4.1%	- 3.9%	- 1.2%	- 8.47%	- 2.4%
VOC Emissions	- 5.3%	- 5.2%	- 1.5%	- 11.02%	- 3.0%

The results of the analysis show a strong correlation between passenger rail and VNT scenarios, both reducing the greatest amount of ozone related emissions and the amount of MPA vehicle miles traveled and hours of delay.

Mobility 2030: The Metropolitan Transportation Plan (MTP) for the Dallas-Fort Worth Area does not pick, favor, or choose any regional land use scenario. This data is provided by NCTCOG as an educational guide for the cities and municipalities that comprise the Dallas/Fort Worth metropolitan area. The alternative growth scenarios are presented as suggested alternatives the municipalities could incorporate into their land use policies in order to improve regional transportation and environmental issues. Because NCTCOG has no power to control regional growth and land development, the MTP provides these alternatives as guidance to city planners and developers as the most efficient way to grow. By presenting these options, NCTCOG's transportation goals are better served.

Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area does not utilize any of these alternative growth scenarios as a basis for development since these regional scenarios cannot be realistically implemented. The proposed roadway system (includes priced facilities) developed by the MTP is based on projected growth and land use changes that are predicted to occur in the future. The MTP growth model takes each municipality's land use growth projections as a basis for the 2030 MTP. Each municipality has its own method of addressing development within their boundaries depending on the growth they are experiencing. This growth includes mixed use, redevelopment, new development, industrial, commercial, high density, low density, transit oriented, rural growth, etc. The 2030 MTP was modeled using each city's growth projections and combining them with future growth patterns extrapolated from existing patterns for the region. These patterns do not follow, support, or conform to

any regional scenarios presented in the 2030 MTP and the scenarios are used only as a guide for future consideration for growth and land use development.

The RTC is an independent transportation policy body of the MPO and is comprised of elected officials representing the region's counties and municipalities as well as the region's transportations providers (DART, TxDOT, NTTA, etc.). The RTC is responsible for overseeing *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* as it relates to transportation and creates policies for regional transportation including toll policies, managed lane policies, Comprehensive Development Agreement (CDA) policies, and other transportation related issues.

The RTC has taken a proactive approach to improving regional traffic congestion and air quality through its Sustainable Development Policy adopted in 2001. The RTC established basic policy directions, which serve as strategies to meet finance constraints, diversify mobility, and improve air quality. The objectives of these practices are to:

- Respond to local initiatives for town centers, mixed-use growth centers, transit-oriented developments, infill/brownfield developments, and pedestrian-oriented projects.
- Complement rail investments with coordinated investments in park-and-ride, bicycle, and pedestrian facilities.
- Reduce the growth in VMT per person.

Although *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* and the RTC state that these practices should be followed, the local municipalities have direct jurisdiction over land use, and public agencies such as DART, TxDOT, and NTTA have jurisdiction over the regional transportation system. These agencies and municipalities would need to work with the NCTCOG and the RTC to implement these sustainable development policies. These policies represent an important new trend in local development patterns that are based on an increased desire for a greater variety of transportation options, mixed-use developments, and unique communities with a sense of place. This trend contributes to the region's increasing emphasis on sustainable development and the ability to attain federal air quality attainment.

This sustainable land use is one tool the NCTCOG uses to reduce the need for new infrastructure (utilities, transportation, emergency response, government facilities, water, etc.). Without sustainable land use, the addition cost of new infrastructure items would increase beyond the current cost.

Sustainable land use is only one part of the solution. The cost of implementation of a full sustainable land use plan is expensive and only municipalities have the power in the state of Texas to affect and

implement land use zoning, codes, and enforcement. Furthermore, no government entity has the authority or power to instruct developers or people where to develop or live.

The future roadway network outlined in *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* supports the predicted land use changes and growth in the region. Current and anticipated funding from the federal government for transportation will not meet the demands for the transportation infrastructure needed to support the predicted population growth and land use changes. Toll roads and managed lanes are the methods that the MTP employs to ensure the transportation demands from future growth are met based on limited transportation funds.

The development of a priced facilities network is consistent with the land use policies discussed in *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*. One component of the managed lane system is planned access to high density development areas. As more mixed-use development centers are planned in the region, managed lane facilities would continue to connect to these centers, allowing HOV and transit vehicles access to the transportation system. This would help remove SOV users from the mainlanes and increase mobility, efficiency and reliability on all traffic facilities.

The proposed 2030 priced facility network may affect land use within the MPA boundaries by helping to enhance land development opportunities. However, priced facility network is only one factor in creating favorable land development conditions; other prerequisites for growth in the region include demand for new development, favorable local and regional economic conditions, adequate utilities, and supportive local land development regulations and policies. The proposed 2030 priced facility network as currently envisioned may, with the right conditions, help influence and facilitate the additional planned regional land use conversion, redevelopment, and growth.

Social Impacts: Environmental Justice

Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area presents a system of transportation improvements needed to maintain mobility in the DFW area over the next 20 plus years and serves as a guide for the expenditure of state and federal funds for the region. Its development was coordinated among local governments, transit authorities, TxDOT, FHWA, and FTA. The plan is based on regional transportation needs through the process of forecasting future travel demand, evaluating system scenarios, and selecting those options which best meet the mobility needs of the region. It also serves as a guide for the implementation of multi-modal transportation improvements, policies, and programs through the year 2030.

As part of the development of *Mobility 2030: The Metropolitan Transportation Plan (MTP) for the Dallas-Fort Worth Area*, NCTCOG conducted an environmental justice study for the existing transportation

system compared to the MTP 2030 proposed transportation system. NCTCOG concluded that the MTP 2030 transportation improvements and recommendations for the NCTCOG region would not cause disproportionately high and adverse impacts to environmental justice populations. However, it did not account for the impact of tolls on environmental justice populations.

To further analyze the effects of expansion of toll roads and managed lanes in the NCTCOG region, a regional study was performed for environmental justice populations comparing regional build and no build scenarios. The regional no build scenario utilized the existing roadway network in 2009 with 2030 population demographics. The regional build scenario used the proposed MTP roadway network in 2030 with 2030 population demographics.

Regional traffic analysis performance reports and regional origin-destination studies were developed for the NCTCOG's MPA transportation network for the build and no build regional toll/managed lane scenarios. The analysis was conducted to investigate the possible cumulative impacts from the construction of toll roads and managed lanes to environmental justice populations and to determine if there would be disproportionately high and adverse cumulative impacts to these populations.

Traffic Analysis Performance Reports

Traffic analysis performance reports were developed for the regional build and no build scenarios for the entire MPA transportation network. The average daily vehicle trips for both scenarios are 24,912,520 trips.

A comparison of the average loaded speed per roadway classification is shown in **Table 4-62**. Average loaded speed, based on the NCTCOG's performance reports, is defined as "the average speed on roadways with traffic on the road; it is the volume-weighted average of loaded speed." The average loaded speed is the average speed a vehicle is traveling along a specific roadway classification during traffic. This is calculated using the miles traveled divided by the time it took to travel a fixed distance. This calculation illustrates the usage of the roadway system by roadway classification. The results show that the regional build scenario would result in an increase in roadway speed for all roadway classifications.

TABLE 4-62. 2030 AVERAGE LOADED SPEED (MPH)

Roadway Classification	Build Scenario			No Build Scenario			Percent Change		
	AM	PM	Daily	AM	PM	Daily	AM	PM	Daily
Freeways (includes toll roads)	52.88	54.16	57.11	38.92	44.49	50.10	26.40%	17.85%	12.27%
Major Arterials	27.14	28.83	31.82	20.69	22.00	26.52	23.77%	23.69%	16.66%
Minor Arterials	24.01	25.55	27.38	20.45	22.09	25.21	14.83%	13.54%	7.93%
Collectors	20.14	21.62	23.00	17.54	18.93	21.22	12.91%	12.44%	7.74%
Frontage Roads	25.65	27.48	29.61	19.63	21.22	24.67	23.47%	22.78%	16.68%
HOV Lanes (includes managed lanes)	49.73	51.78	52.81	44.37	47.72	50.37	10.78%	7.84%	4.62%

Source: NCTCOG TransCAD® data for 2030 regional build and no build scenarios (April 2008 Performance Reports).

In addition, an evaluation of the regional no build scenario versus the regional build scenario was conducted for the MPA using LOS per lane mile by roadway classification. The results are shown in **Table 4-63**. The regional no build scenario shows an increase in lane-miles in LOS F for all roadway classifications with the exception of HOV/managed lanes.

TABLE 4-63. LEVEL OF SERVICE FOR THE TRAFFIC STUDY AREA (2030)

Roadway Classification	Build Scenario		No Build Scenario	
	Lane-Miles	LOS	Lane-Miles	LOS
Freeways (includes toll roads)	7,602	A-B-C (3,826 lane-miles) 50%	4,486	A-B-C (890 lane-miles) 20%
		D-E (2,264 lane-miles) 30%		D-E (1,220 lane-miles) 27%
		F (1,512 lane-miles) 20%		F (2,376 lane-miles) 53%
Major Arterials	8,739	A-B-C (4,793 lane-miles) 55%	4,085	A-B-C (1,120 lane-miles) 17%
		D-E (1,848 lane-miles) 21%		D-E (640 lane-miles) 16%
		F (2,098 lane-miles) 24%		F (2,325 lane-miles) 57%
Minor Arterials	7,568	A-B-C (5,407 lane-miles) 71%	9,282	A-B-C (3,654 lane-miles) 39%
		D-E (829 lane-miles) 11%		D-E (1,574 lane-miles) 17%
		F (1,332 lane-miles) 18%		F (4,054 lane-miles) 44%
Collectors	9,007	A-B-C (6,992 lane-miles) 78%	8,217	A-B-C (4,568 lane-miles) 56%
		D-E (724 lane-miles) 8%		D-E (914 lane-miles) 11%
		F (1,291 lane-miles) 14%		F (2,735 lane-miles) 33%
Frontage Roads	4,152	A-B-C (3,182 lane-miles) 76%	2,622	A-B-C (1,254 lane-miles) 48%
		D-E (402 lane-miles) 10%		D-E (375 lane-miles) 14%
		F (568 lane-miles) 14%		F (993 lane-miles) 38%
HOV Lanes (includes managed lanes)	898	A-B-C (612 lane-miles) 68%	182	A-B-C (76 lane-miles) 42%
		D-E (190 lane-miles) 21%		D-E (45 lane-miles) 25%
		F (96 lane-miles) 11%		F (61 lane-miles) 33%
Source: NCTCOG TransCAD® data for 2030 regional build and no build scenarios (April 2008 Performance Reports).				

Regional Origin-Destination Study

An origin-destination study was conducted by NCTCOG for the MPA toll road/managed lane network for environmental justice populations. The assumptions and limitations of origin-destination studies are discussed in **Section 4.3.3.2**. **Plates 4-46** and **4-47** show the basis of the NCTCOG analysis and the identified TSZs that contain environmental justice populations (i.e. TSZs that contain greater than 50

percent minority and/or low-income populations) and the existing and future toll roads and managed lanes used in the origin-destination analysis. **Plates 4-46** and **4-47** show the majority of environmental justice communities are located within the IH 635 and IH 820 loops in Dallas and Tarrant Counties, respectively, and in the southern section of the MPA.

The entire MPA was evaluated for the existing and future toll network. The total TSZs that comprise the origin-destination study area within the MPA is 4,813. A total of 1,542 of these are considered environmental justice TSZs.

For the regional no build scenario, 4,720 TSZs are anticipated to regularly utilize the existing toll roads in the MPA in 2030 (originating at least one trip per day); this represents 98.1 percent of the total TSZs in the MPA. Under the regional no build scenario, 1,530 environmental justice TSZs are anticipated to regularly utilize the existing toll facilities (originating at least one trip per day); this represents 99.2 percent of the environmental justice TSZs in the MPA. Data analysis indicates that from the 246,462 total trips which would originate from all of the TSZs that would utilize the existing toll facilities in the MPA, approximately 14.8 percent (36,400 trips) of the total trips would originate from environmental justice TSZs.

The Build scenario is anticipated to contain 4,770 TSZs that would regularly utilize the future toll facilities in the MPA in 2030 (originating at least one trip per day); this represents 99.1 percent of the total TSZs in the MPA. From the total environmental justice TSZs identified in the MPA, 1,541 are anticipated to regularly utilize the proposed toll facilities in 2030 (originating at least one trip per day) for the Build scenario; this represents 99.9 percent of the total environmental justice TSZs in the MPA. Data analysis indicates that from the 516,988 total trips which would originate from TSZs that would utilize the future proposed toll roads, approximately 16.4 percent (85,011 trips) originate from environmental justice TSZs.

Table 4-64 outlines the origin-destination results for the MPA study area.

TABLE 4-64. ORIGIN-DESTINATION RESULTS

	2030 No Build Scenario (existing toll facilities)	**2030 Build Scenario (future toll facilities)**
Total TSZs in the MPA	4,813	4,813
Total environmental justice TSZs in the MPA	1,542	1,542
TSZs utilizing toll facilities	4,720 (98.1%)	4,770 (99.1%)
Environmental justice TSZs utilizing toll facilities	1,530 (99.2%)	1,541 (99.9%)
Trips from TSZs utilizing toll facilities	246,462	516,988
Trips from environmental justice TSZs utilizing toll facilities	36,400 (14.8% of total trips)	85,011 (16.4% of total trips)
Source: NCTCOG TransCAD® data for 2030 regional build and no build scenarios (April 2008 Origin-Destination data).		

Results and Conclusions

The origin-destination results show an increase in usage of toll roads from the 2030 No Build scenario to the 2030 Build scenario for the NCTCOG MPA region. Both the Build and No Build scenarios showed trips generated from a majority of the TSZs in the MPA (98.1 to 99.1 percent), including a majority of environmental justice TSZs (99.2 to 99.9 percent).

Trips on the future toll facilities in the Build scenario would increase 110 percent from the current toll road facilities. Environmental justice TSZ trips would increase 134 percent. Because of the increase in trips generated by environmental justice TSZs, low-income populations would be impacted by the regional increase in toll facilities because low-income populations would use a greater percentage of their income for toll road and managed lane usage. As shown on **Plates 4-46** and **4-47**, existing toll roads and managed lanes are not adjacent to the majority of environmental justice TSZs, but future proposed toll roads and managed lane facilities would be built closer to environmental justice populations.

Results from the performance reports prepared for the MPA showed an increase in roadway speed and an improvement in LOS for the majority of the roadway classifications in the Build scenario compared to the No Build scenario. The Build scenario for the MPA would improve roadway conditions throughout the NCTCOG region by increasing roadway speed and improving the LOS on the roadway network.

Although environmental justice populations would see an increase in spending for toll facilities, the entire MPA region would also see an increase in spending and usage as the toll road and managed lane system expands. The majority of environmental justice populations were identified by the NCTCOG travel demand model to potentially make trips along existing and future toll facilities. In addition, for populations (including environmental justice populations) who would opt to use non-toll options, the Build scenario for 2030 (which includes all proposed toll facilities and managed lanes) would provide a roadway network that would operate at better traffic conditions (greater speeds and an improved LOS) on all roadways than the No Build scenario and would provide a benefit for all users over the No Build scenario.

Based on the previous discussion and analysis, the Build scenario for the NCTCOG MPA would not cause disproportionately high and adverse cumulative impacts on minority or low-income populations as per Executive Order 12898 regarding environmental justice.

As discussed, the analysis does not show any disproportionately high and adverse impacts to environmental justice populations; therefore, no project-specific mitigation measures are appropriate for cumulative impacts in this document. However, NCTCOG will continue its efforts to work with all communities in the planning process to identify transportation challenges and explore and develop the appropriate strategies to respond to the issues. Examples include programs and projects to improve

availability and accessibility to alternate transportation options including discounted transit fares and tolls, HOV discounts on toll roads and managed lanes, better accessibility to regional transportation systems, and community level congestion management. Specific strategies and projects will be developed through discussions with local governments and community representatives.

Air Quality

The NCTCOG serves as the MPO for the Dallas-Fort Worth area. It serves a 16-county metropolitan region centered on Dallas and Fort Worth. Since the early 1970s, MPOs have had the responsibility of developing and maintaining a MTP. The MTP is federally mandated; it serves to identify transportation needs; and guides federal, state, and local transportation expenditures.

ISTEA strengthened the role of the MTP and made it the central mechanism for the decision-making process regarding transportation investments. The passage of the TEA-21 in 1998 continued this emphasis. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was signed into law on August 10, 2005. SAFETEA-LU addresses the challenges on our transportation system such as improving safety, reducing traffic congestion, improving efficiency in freight movement, increasing intermodal connectivity, and protecting the environment. Both SAFETEA-LU and the CAAA impose certain requirements on an urbanized area's long-range transportation plan.

Transportation plans such as *Mobility 2030: The Metropolitan Transportation Plan (MTP) for the Dallas-Fort Worth Area*, according to SAFETEA-LU metropolitan planning regulations, must be "fiscally constrained," that is, based on reasonable assumptions about future transportation funding levels. Because the Dallas-Fort Worth area is designated as a nonattainment area for the 8-hour ozone standard, the CAAA require the transportation plan to be in conformity with the SIP for air quality to demonstrate that projects in the MTP meet air quality goals. *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* specifically addresses regional ozone, in addition to its studies of general regional air quality, and the final result showed that the regional roadway network (including toll roads and managed lanes) would show a decrease in nitrogen oxides and emissions of volatile organic compounds.

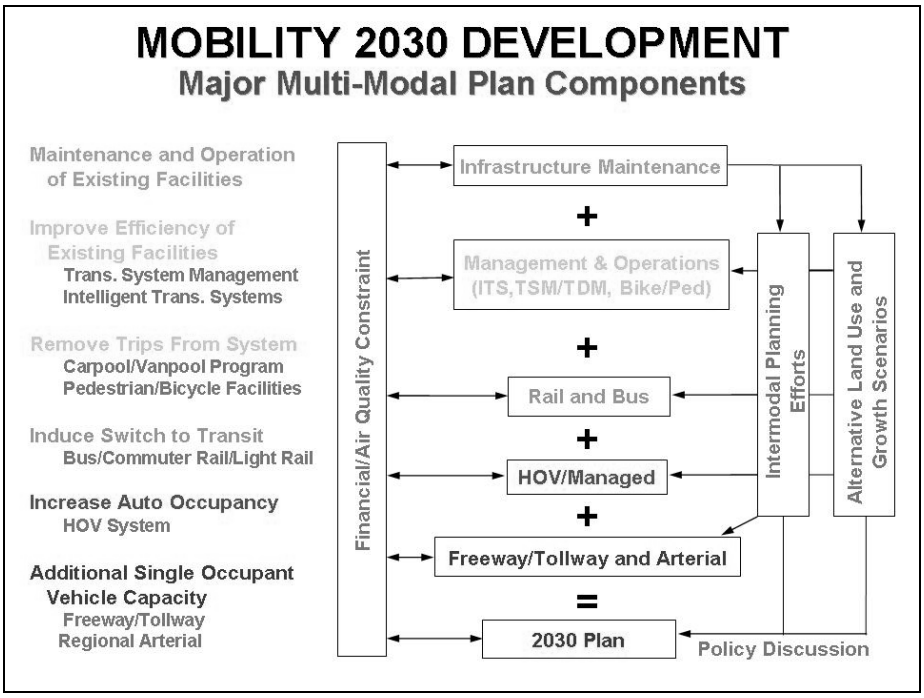
Transportation conformity is a process which ensures federal funding and approval goes to transportation activities that are consistent with air quality goals. Transportation activities that do not conform to state air quality plans cannot be approved or funded.

The CAAA established specific criteria, which must be met for air quality non-attainment areas. The criteria are based on the severity of the air pollution problem. Transportation conformity is a CAAA requirement that calls for the EPA, U.S. Department of Transportation (U.S. DOT), and various regional,

state, and local government agencies to integrate air quality and transportation planning development processes. Transportation conformity supports the development of transportation plans, programs, and projects that enable areas to meet and maintain national air quality standards for ozone, PM, and CO, among other pollutants, which impact human health and the environment. Through the SIP, the air quality planning process ties transportation planning to the conformity provisions of the CAAA. This ensures that transportation investments are consistent with state and local air quality objectives. The NCTCOG is responsible for the conformity analysis in the Dallas-Fort Worth area. If the criteria are not met, EPA can then impose sanctions on all or part of the state. Sanctions include stricter industrial controls and the withholding of federal highway and transit funds.

Dallas County has been designated as part of a nine-county nonattainment area for 8-hour ozone by the EPA. In accordance with the metropolitan planning regulations, *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* must include a CMP to systematically address congestion. The evaluation of additional transportation system improvements beyond the committed system began with a detailed assessment of transportation improvements that would not require building additional facilities for SOVs. Various improvements/modes including congestion management strategies, bicycle and pedestrian facilities, rail facilities, HOV lanes, managed lanes, and toll road facilities were investigated prior to determining the need for additional freeway capacity improvements. **Figure 4-6** shows the implementation of these resources and how they are integrated into the MTP (*Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*).

FIGURE 4-6. MOBILITY 2030 TRANSPORTATION PLAN COMPONENTS



Transportation system performance information was developed as a product of the Dallas-Fort Worth Regional Transportation Model (DFWRTM) travel model throughout the MTP development process. This information guided development of the system alternatives and indicated the impact of various improvements. The improvements recommended in *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* include regional congestion management strategies, bicycle and pedestrian facilities, managed HOV lanes, light/commuter rail and bus transit improvements, ITS technology, freeway and tollway lanes, and improvements to the regional arterial and local thoroughfare system such as intersection improvements and signal timing. Because *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area* is financially and air quality constrained, other more cost effective methods are reviewed before SOV lanes (freeways and toll roads) are added into the roadway system. ITS, mass transit, and Managed/HOV lanes are ways to meet regional transportation demands under the financially constrained MTP while improving regional air quality.

The additional introduction of priced facilities into the existing roadway network would not cause significant cumulative impacts to air quality. The regional priced facility system would provide additional travel capacity to the roadway network, which would allow a greater flow of traffic throughout the region, decreasing the amount of cars traveling at lower speeds or idling conditions. This would result in less fuel combustion and lower emissions including MSATs, CO, and ozone related pollutants. As noted in the direct and indirect discussions, EPA's vehicle and fuel regulations, coupled with fleet turnover, are expected to result in substantial reductions of on-road emissions, including MSATs, CO and ozone precursors.

Water Quality

Water quality is regulated on the state level by the TCEQ. The TCEQ monitors all major water bodies (rivers, lakes, and streams) and reports the conditions of these streams in a biennial Texas Water Body Inventory report. Section 303(d) of this report details those water bodies the TCEQ has identified as impaired due to water contamination.

The 303(d) list identifies five major water systems as impaired with pollutants and bacteria in the MPA. These major water bodies are the Upper Trinity River, the West Fork Trinity River, the East Fork Trinity River, the Elm Fork Trinity River, and the Clear Fork Trinity River. The construction of the proposed priced facility system would cross and impact these water bodies at multiple locations and could cause water quality impacts.

As stated previously, the TCEQ regulates water quality through SW3P, MS4, and BMPs. All construction of these priced facilities would follow these water quality permits that would prevent further pollution to

these impaired waters and to waters that are not impaired. Additionally any indirect land use development that would occur from the construction of these facilities would follow TCEQ regulations for water quality through SW3P and MS4. Therefore, the regional priced facility network would not have a significant cumulative impact to water quality.

Waters of the U.S., Including Wetlands

The USACE regulates waters of the U.S. under Section 404 of the Clean Water Act. The MPA is under the jurisdiction of the Fort Worth District of the USACE. Fill of any waters of the U.S., including wetlands, is required to be permitted through the USACE.

While the USACE has specific guidelines for identifying waters of the U.S., several methods exist to preliminarily identify these waters. USGS topographic maps and TCEQ's Water Quality Inventory database provide information for the location of larger rivers and streams that would fall under USACE jurisdiction. The National Wetlands Inventory maps created and maintained by the USFWS attempt to identify potential wetlands through the use of infrared aerial photography. Some areas of the MPA are currently not mapped.

Although this data is incomplete, it serves as a background for the identification of waters of the U.S. Government and private developments must be authorized by permit prior to any fill into waters of the U.S., and the identification of these waters of the U.S. is completed at the project level with field surveys.

From the available data, the regional priced facility system would impact and cause fill to waters of the U.S., including potential wetlands. These roadway projects would be required to comply with permitting and mitigation for the impacts to these waters of the U.S. Any land use change or development that would occur from this regional priced facility system would also be required to follow permitting and mitigation requirements for fill and loss of waters of the U.S.

Through the permitting and mitigation process, the USACE has implemented a "no net loss" policy for permanent impacts to waters of the U.S., including wetlands. This ensures that loss of these waters would require mitigation that is equal to or greater than the loss. Because the USACE would regulate and require mitigation for loss of these waters of the U.S., the priced facility network would not cause a cumulative impact to waters of the U.S.

Vegetation and Wildlife Habitat

An inventory of regional vegetation is not available for the MPA. General descriptions of vegetation typical for various regions and ecological areas are available from many resources. These resources (e.g. the *Vegetation Types of Texas*, etc.) vary in description of areas and regions, and do not update

their descriptions from the original publications. Project specific vegetation descriptions based on field surveys are the best method to map the vegetation that would be affected by a project.

Currently, the MPA lies in the Blackland Prairies and Cross Timbers and Prairies ecological regions identified by TPWD. The construction of most of the proposed priced facility system would occur in areas already developed that contain urban type vegetation. The projects outside the urban areas could impact natural vegetation, and the changes in land use and development that may be caused by these facilities would impact vegetation surrounding these projects.

The NCTCOG does not address impacts to vegetation or mitigation for loss of vegetation in *Mobility 2030: The Metropolitan Transportation Plan for the Dallas-Fort Worth Area*. TxDOT Districts can mitigate for loss of vegetation based on the MOU and MOA with TPWD, which focuses on special habitat types for wildlife and protected species. Wetlands are under the jurisdiction of the USACE and mitigation for the loss of these wetlands (which includes the vegetation) would occur through the permitting process. The USFWS can regulate and require mitigation for loss of vegetation that is designated habitat for a threatened or endangered species. Finally, cities can implement ordinances to protect trees, natural land, or open green spaces.

Although impacts to vegetation would occur from the priced facility system, these impacts would be regulated at the project level for each individual roadway project. Because of this project mitigation, there would be no significant cumulative impacts to vegetation from the priced facility system.

Floodplain

Portions of the regional priced facility system are anticipated to cross the 100-year floodplain within the boundaries of the MPA. Potential impacts from priced facilities are best calculated at the project level in order to assess the impact of clearing, soil compaction, riparian corridor encroachment, and surface water drainage modifications on watershed areas adjacent to the proposed priced facilities to be constructed by 2030. The Trinity River and Brazos River, along with their associated sub-basins, make up the majority of the watershed area within the MPA (approximately 240 square miles of floodplain). Currently, digital FEMA floodplain maps are not available for the total nine-county MPA; missing are digital maps for Ellis, Kaufman, Rockwall, and Parker Counties.

Flood control of the regional priced facility system is regulated under EO 11988 *Floodplain Management* and is implemented by the FHWA through 23 CFR 650 Subpart A, *Location and Hydraulic Design of Encroachments on Floodplains.* As mentioned in the project level cumulative impacts analysis, floodplain regulations are contained in local zoning and land use regulations at the local level. The intent of the regulations is to avoid or minimize highway encroachments within base floodplains, where practicable,

and to avoid land use development that is incompatible with floodplain values. Each city within the MPA, along with the TCEQ, USACE, and FEMA, has the regulatory authority to control encroachment upon floodways and floodplains, and provide compensatory mitigation as required; other state and federal agencies with jurisdiction over floodplains or projects affecting floodplains include TCEQ, USACE, FEMA, and FHWA. The applicable resource agencies enforce a policy of "no net loss" of floodplains through established processes such as the Trinity River Corridor CDC permit review process. Under the CDC process, local governments retain ultimate control over the floodplain permitting decisions. In addition, counties within the MPA have adopted floodplain management regulations in order to participate in the National Flood Insurance Program (NFIP). The NFIP enables property owners in participating communities to purchase insurance as protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages.

Though impacts to floodplains would likely occur under the regional priced facility system in conjunction with reasonably foreseeable actions in the region, these cumulative actions are subject to the requirements of all applicable federal, state, and local regulations, including EO 11988. These regulations ensure that floodplain impacts would be mitigated so that purpose and function of the floodplains would be maintained. Additionally, as projects are implemented which modify land elevations within floodplains or produce significant hydrologic or hydraulic changes affecting floodplain limits, the procedures for revising FEMA floodplain maps would need to be followed.

Conclusion

The regional priced facility system would cause minor impacts to some of the identified resources in this section. Regional mitigation for some of these resources would be addressed by the NCTCOG. As part of *Mobility 2030: The Metropolitan Transportation Plan (MTP) for the Dallas-Fort Worth Area,* NCTCOG will specifically address two issues: air quality and environmental justice populations. The Transportation Planning Process, at a regional level, provides ways to mitigate for potential impacts that could occur. The priced facility projects would be included in the STIP/TIP and MTP, and the STIP/TIP and MTP would conform to the State Implementation Plan (SIP). This assurance addresses that each project is in compliance with the STIP/TIP and MTP for air quality under CAAA and environmental justice under Executive Order 12898.

Land use impacts cannot be mitigated at a regional level, but at a municipality level because these entities have direct control over land use. These municipalities would work with NCTCOG to address regional infrastructure changes in their comprehensive plans. State and federal regulatory agencies that have direct jurisdiction over natural and cultural resources would be responsible for requiring avoidance, minimization and mitigation from any entity whose proposed project (transportation or other type) has a direct impact to any of these resources.

Finally, as required by NEPA, mitigation for impacts would occur at the project level. Because of these potential mitigation measures, the regional proposed priced facility system would not have a significant cumulative impact to the resources identified in this section.

4.25 COMPARISON OF REASONABLE ALTERNATIVES

This chapter of the Trinity Parkway SDEIS has described social, economic, and environmental impacts of the reasonable alternatives, including the No-Build Alternative. As noted throughout this SDEIS, the identification of a preferred alternative would not be made until the impacts and comments on the SDEIS and from the Public Hearing have been fully evaluated.

The preceding discussion of impacts included several categories where the impacts were similar for the various Build Alternatives. In these cases, a general discussion of the impacts was presented. In other cases, specific impacts were reported for each alternative, allowing for a greater degree of differentiation between alternatives. **Table 4-65** compares the alternatives against important factors and impact categories that permit distinctions to be made about each alternative.

TABLE 4-65. IMPACTS OF SDEIS ALTERNATIVES

Comparison Factors	Unit of Measure	Trinity Parkway Alternatives								
		1 (No-Build)	2A	2B	3A	3B	3C	4A	4B	5
Roadway Characteristics										
Total Length	Miles	---	8.83	8.83	8.67	8.67	8.67	8.84	8.84	8.90
Total Estimated Right-of-Way	Acres	---	264	350	371	372	379	462	490	372
Total Cost (Construction + Agency + Right-of-Way)	2007 Dollars ($) (Millions)	---	2,079	1,606	1,079	1,142	1,290	1,216	1,384	1,479
Traffic Utilization for Year 2030[1]										
Commonwealth to Hampton/Inwood	Average Daily Traffic (ADT)	---	122,200	122,200	127,000	94,900	94,900	126,000	126,000	126,000
Hampton/Inwood to Wycliff/Sylvan		---	100,900	100,900	118,800	128,300	128,300	111,100	111,100	111,100
Wycliff/Sylvan to Woodall Rodgers		---	111,600	111,600	127,900	127,800	127,800	119,000	119,000	119,000
Woodall Rodgers to Houston/Jefferson		---	100,400	100,400	112,600	106,900	106,900	113,600	113,600	113,600
Houston/Jefferson to Corinth		---	107,000	107,000	103,800	113,200	113,200	106,300	106,300	106,300
Corinth to MLK		---	96,100	96,100	89,300	105,100	105,100	99,700	99,700	99,700
MLK to IH-45		---	100,200	100,200	119,500	124,900	124,900	105,100	105,100	105,100
IH-45 to US-175		---	127,900	127,900	109,000	111,400	111,400	101,300	101,300	101,300
Measures of Effectiveness for Year 2030 (Measured within the Trinity Parkway Study Area)[1]										
Daily VMT	Vehicle Miles Traveled (M)	10.27	10.47	10.47	10.50	10.50	10.50	10.45	10.45	10.45
Daily VHT	Vehicle Hours Traveled	293,784	288,936	288,936	288,983	291,131	291,131	289,344	289,344	289,344
Average Speed	mph	34.96	36.22	36.22	36.35	36.07	36.07	36.11	36.11	36.11
Lane Length	Miles	1,349	1,366	1,366	1,389	1,399	1,399	1,379	1,379	1,379
Congestion Delay	Vehicle Hours	44,917	41,097	41,097	40,412	41,679	41,679	41,167	41,167	41,167
Lane Miles at LOS D, E or F	Percent	46.03	42.69	42.69	41.83	43.08	43.08	42.31	42.31	42.31
Socioeconomic										
Consistent with Local Plans and Policies (e.g., BVP[2])	Yes/No	No	No	No	No	Yes	Not Known[10]	No	Not Known[10]	No
Residential Relocations	Number	---	8	6	6	6	6	11	11	20
Commercial Displacements	Number	---	272	228	27	34	29	30	24	39
Community and Public Facility Displacements[3]	Number	---	5	11	---	---	---	---	---	3

TABLE 4-65. IMPACTS OF SDEIS ALTERNATIVES

Comparison Factors	Unit of Measure	Trinity Parkway Alternatives								
		1 (No-Build)	2A	2B	3A	3B	3C	4A	4B	5
Consistent with EJ Order	Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Change in Parks/Recreation Areas[4]	Acres	---	-1	-5	-174	-154	-177	-214	-270	-84
Physical Environment										
Archeological Sites[5]	Number	---	---	---	3	3	3	3	3	2
Historic Properties[6]	Number	---	7	3	5	4	4	5	3	7
Air Quality - Consistent with the conforming TIP/MTP	Yes/No	No[11]	No[11]	No[11]	No[11]	No[11]	No[11]	No[11]	No[11]	No[11]
Projected CO Concentrations Below the NAAQS	Yes/No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSATs – Expected change[7]	Decrease/Increase	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
Noise Receivers Impacted	Number	---	209	202	128	128	128	166	166	226
Hazardous Material Sites Impacted [8]	Number	---	34	35	15	17	17	16	16	21
Water Quality Impacts	Yes/No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Visual Impacts	Low/Med/High	Low	High	Med	Med	Med	Med	Med	Med	Med
Natural Environment										
Waters of the U.S. including Wetlands	Acres	---	-4	-9	-83	-81	-91	-86	-111	-12
100-Year (Base) Floodplain Impacts	Acres	---	53	76	303	290	297	384	418	267
100-year Valley Storage	Acre-Feet (% Change)	41758	---	---	41480 (-0.7)	42071.1 (+0.7)	42575.5 (+2.0)	42048.9 (+0.7)	42742.7 (+2.4)	---
SPF Valley Storage	Acre-Feet (% Change)	71547.5	---	---	70080.6 (-2.1)	71215.1 (-0.5)	71565.2 (+0.0)	71626.1 (+0.1)	71043 (-0.7)	---
SPF Max. Increase in Flood Elevation	Feet	---	---	---	+0.05	+0.09	+0.03	+0.19	+0.71	---
SPF Flood Level at Elm/West Fork	Feet, relative to 435.99 feet	---	---	---	-0.51	-0.25	-0.16	-0.08	+0.45	---
Max. SPF Velocity in Channel Area	Feet/Second	---	---	---	10.6	10.6	11.23	11.12	11.26	---
Max. SPF Velocity in Overbank Area	Feet/Second	---	---	---	5.37	4.89	5.11	4.63	4.8	---

TABLE 4-65. IMPACTS OF SDEIS ALTERNATIVES

Comparison Factors	Unit of Measure	Trinity Parkway Alternatives								
		1 (No-Build)	2A	2B	3A	3B	3C	4A	4B	5
Threatened/ End. Species	Yes/No	No	No	No	No	No	No	No	No	No
Woodlands	Acres	---	-5	-6	-27	-27	-33	-27	-29	-11
Maintained Grass Areas[9]	Acres	---	-12	-31	-479	-467	-468	-557	-573	-190
Section 4(f) Involvement										
Potential Sec. 4(f) Properties - Parks	Yes/No	No	No	No	No	No	No	No	No	No
Potential Sec. 4(f) Properties - NRHP Historic Districts	Number	---	1	1	---	---	---	---	---	---
Potential Sec. 4(f) Properties - NRHP Historic Bridges	Number	---	2	1	5	4	4	5	3	6
Potential Sec. 4(f) Properties - NRHP Historic Properties	Number	---	4	1	---	---	---	---	---	1

Notes: The information for Alternatives 3A, 3B, and 4A is shaded to denote for the reader that these alternatives are not considered approvable by the USACE due to concerns detailed in **Section 2.3.9.**

M = Millions; **ADT** = Average Daily Traffic; **VMT** = vehicle miles traveled; **VHT** = vehicle hours traveled; **LOS** = Level of Service; **NRHP** = National Register of Historic Places; **EJ** = Environmental Justice; **SPF** = Standard Project Flood; **mph** = miles per hour; **---** = no impacts anticipated for this alternative.

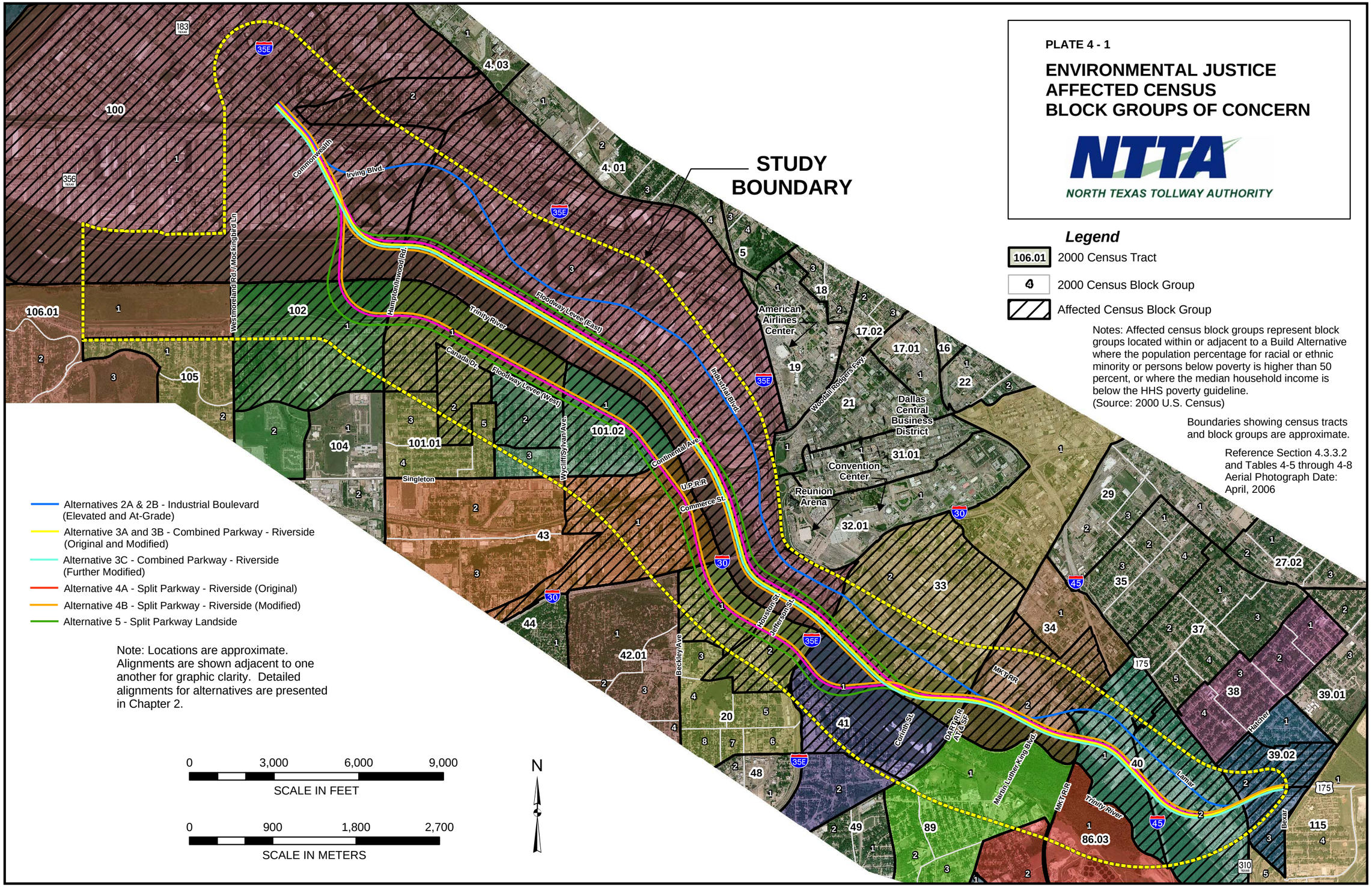
1. Subject to change pending the 2009 update to the MTP.
2. The "BVP" is the City of Dallas Balanced Vision Plan, a master plan for parks and lakes in the Trinity Floodway.
3. The number shown is the total number of buildings displaced at these facilities, not the number of facilities affected.
4. Right-of-way would be required from within the Trinity River Greenbelt Park, and access rights for construction, operation, and maintenance are anticipated to be established by an operating agreement with the City of Dallas. The deed records for the park land indicate that it can be used for transportation. Therefore, even though a change in use would occur, the estimated acreage needed for right-of-way would not constitute a direct use (take) of park land under Section 4(f).
5. The number shown includes archeological sites identified within proposed right-of-way limits and potential borrow areas for roadway embankment material.
6. The number shown is the total number of NRHP-listed or eligible properties identified within the area of direct impact (i.e. proposed right-of-way or adjacent), but does not reflect potential impacts.
7. The EPA predicts substantial future MSAT reductions as the agency's new light-duty and heavy-duty on-road fuel and vehicle rules come into effect (Tier II, light-duty vehicle standard, Heavy-Duty Diesel Vehicle (HDDV) standards and low sulfur diesel fuel, and the EPA's proposed Off-Road Diesel Engine and Fuel Standard). These projected air emission reductions will be realized even with the predicted continued growth in vehicle miles traveled.
8. Hazardous waste/material sites within or adjacent to proposed right-of-way.
9. The figures for impacts to maintained grass areas for Alternatives 3A, 3B, 3C, 4A, and 4B include an estimated 258 acres from excavation sites.
10. These alternatives are new and the public has yet to comment.
11. Implementation of the No Build Alternative would require an MTP revision and new conformity determination. In regards to the Build Alternatives, although the MTP includes a Trinity Parkway reliever route as a key element to the functioning of the plan, the proposed project design concept and scope and project cost are not yet consistent with the conforming MTP and 2008-2011 TIP. Measures are being taken to address the issue. Prior to FHWA taking final action on this proposed project, it will be consistent with a conforming MTP and TIP/STIP.

[END OF CHAPTER 4 EXCEPT FOR PLATES]

PLATE 4 - 1

ENVIRONMENTAL JUSTICE AFFECTED CENSUS BLOCK GROUPS OF CONCERN

NTTA
NORTH TEXAS TOLLWAY AUTHORITY



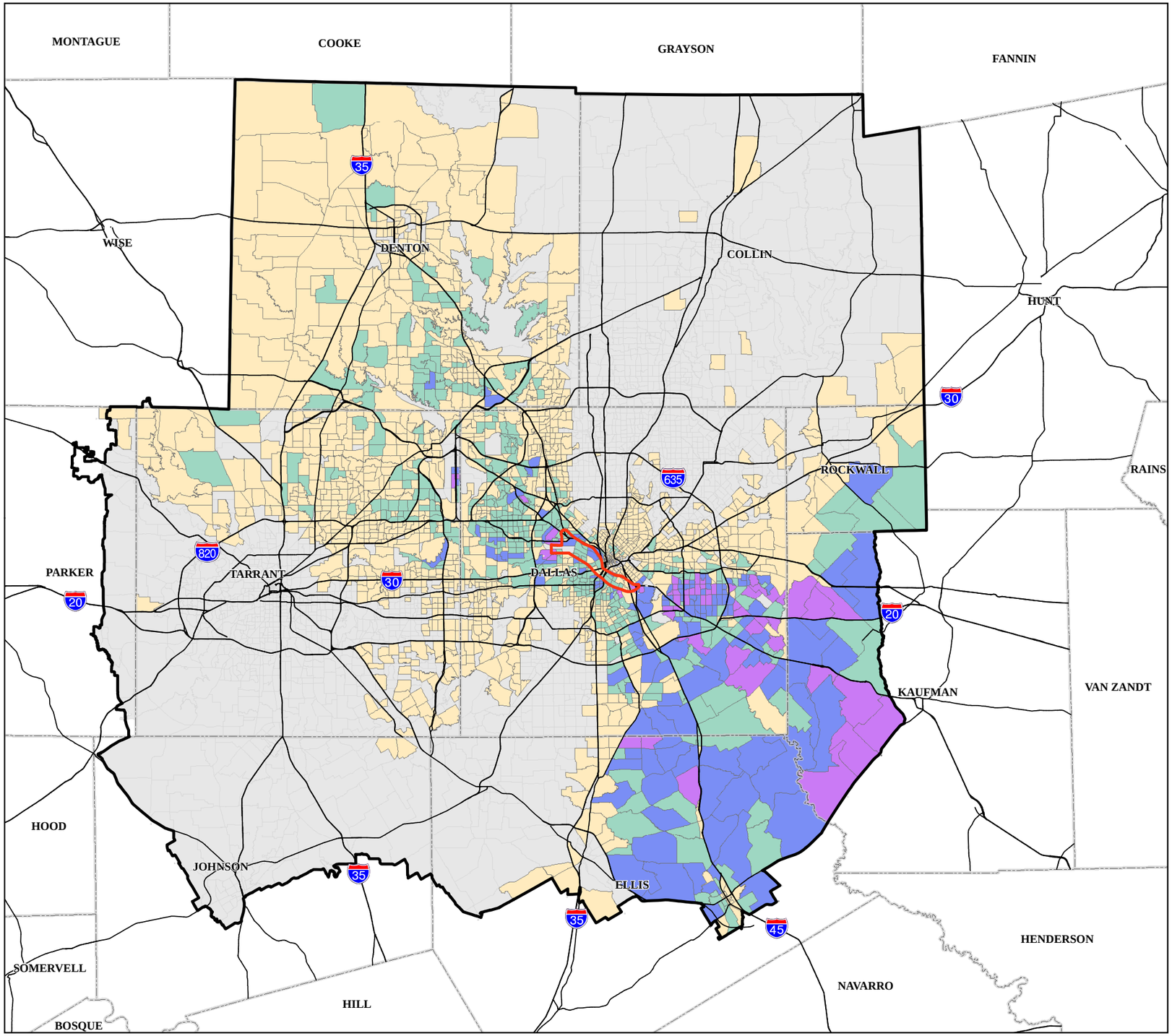


PLATE 4 - 2

DISTRIBUTION OF TRIPS PER DAY FROM TRAFFIC SURVEY ZONES (TSZs)

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

Legend

Number of Trips Originating from TSZs

- 565-66 Trips (62 TSZs have 7,656 trips, 26% of total trips)
- 65-30 Trips (155 TSZs have 6,813 trips, 24% of total trips)
- 29-11 Trips (461 TSZs have 7,764 trips, 27% of total trips)
- 10-1 Trips (1,636 TSZs have 6,582 trips, 23% of total trips)
- < 1 Trip (2,117 TSZs)
- Trinity Parkway Alternatives Corridor
- MPA Boundary

Total 4,874 TSZs in NCTCOG MPA

2,314 TSZs have at least 1 trip

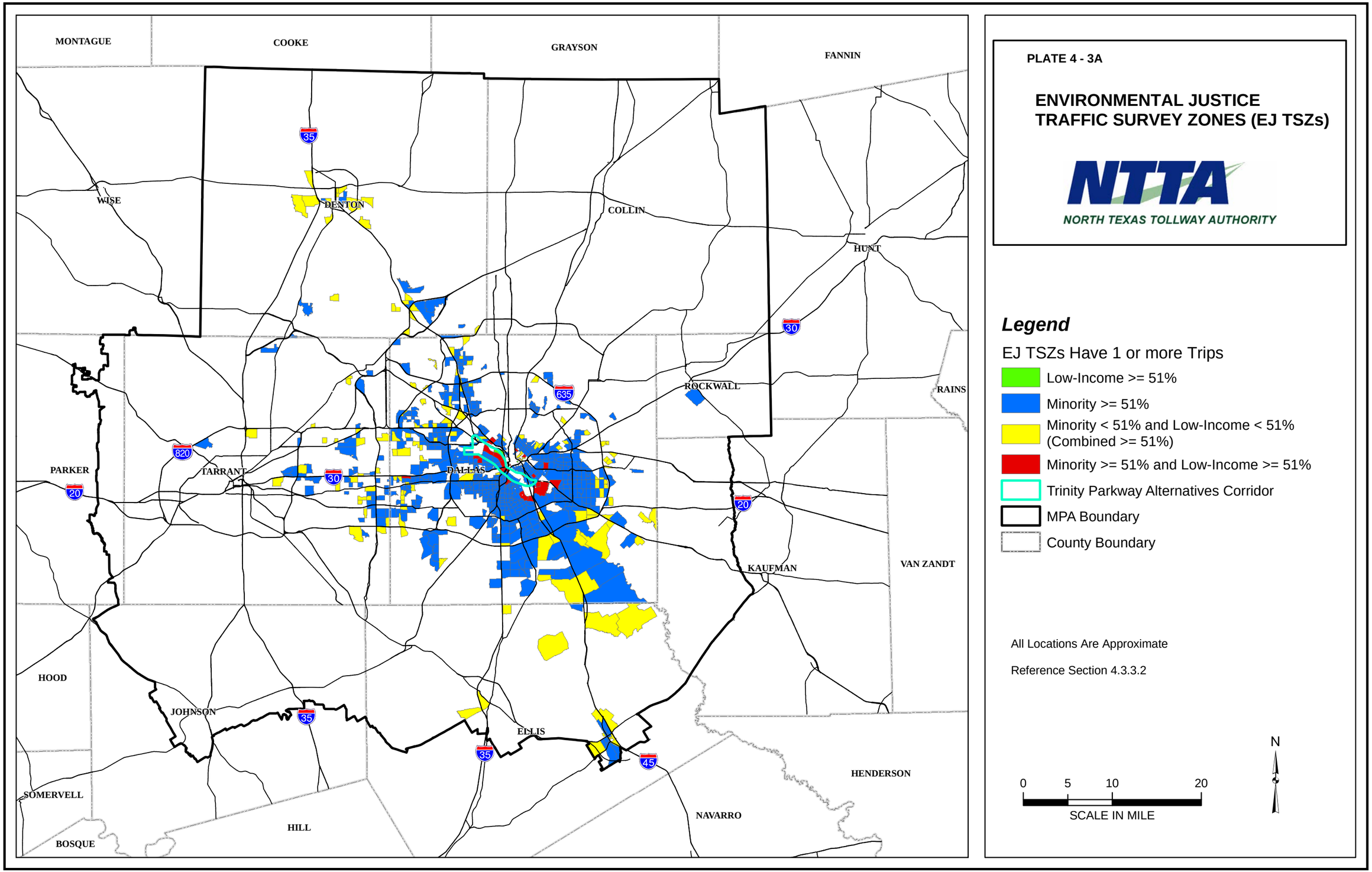
Total Trips = 28,815

All Locations Are Approximate

Reference Section 4.3.3.2

0 5 10 20
SCALE IN MILE

N


MONTAGUE
COOKE
GRAYSON
FANNIN
WISE
DENTON
COLLIN
HUNT
ROCKWALL
RAINS
PARKER
TARRANT
DALLAS
KAUFMAN
VAN ZANDT
HOOD
JOHNSON
ELLIS
HENDERSON
SOMERVELL
HILL
NAVARRO
BOSQUE
35
30
635
820
20
45
PLATE 4 - 3A
ENVIRONMENTAL JUSTICE
TRAFFIC SURVEY ZONES (EJ TSZs)
NTTA
NORTH TEXAS TOLLWAY AUTHORITY
Legend
EJ TSZs Have 1 or more Trips
Low-Income >= 51%
Minority >= 51%
Minority < 51% and Low-Income < 51%
(Combined >= 51%)
Minority >= 51% and Low-Income >= 51%
Trinity Parkway Alternatives Corridor
MPA Boundary
County Boundary
All Locations Are Approximate
Reference Section 4.3.3.2
0
5
10
20
SCALE IN MILE
N

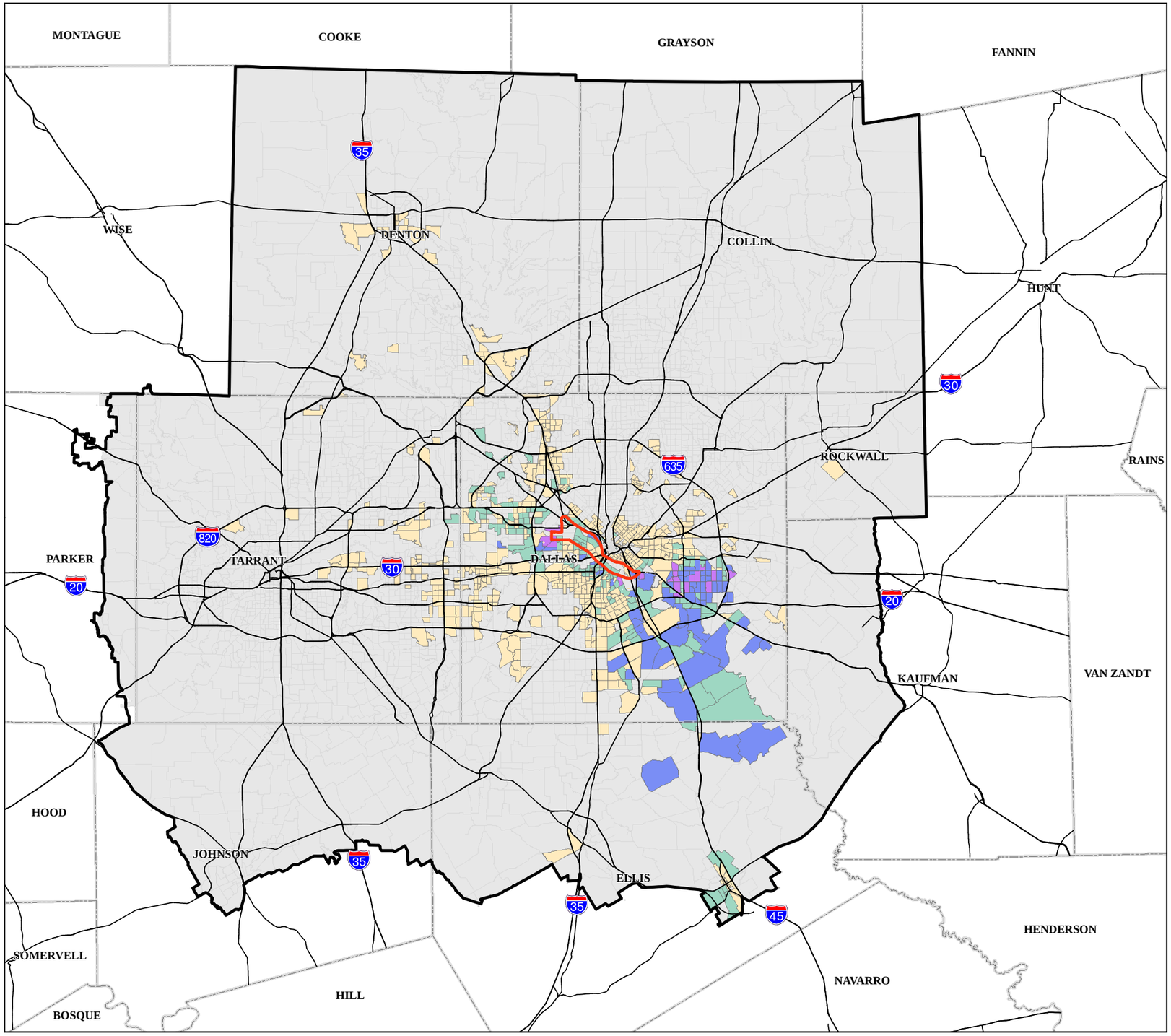


PLATE 4 - 3

DISTRIBUTION OF TRIPS PER DAY FROM ENVIRONMENTAL JUSTICE TRAFFIC SURVEY ZONES (EJ TSZs)

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

Legend

Number of Trips Originating from EJ TSZs

- 565-80 Trips (23 EJ TSZs have 3,443 trips, 24% of total trips)
- 79-37 Trips (70 EJ TSZs have 3,626 trips, 26% of total trips)
- 36-15 Trips (160 EJ TSZs have 3,628 trips, 26% of total trips)
- 14-1 Trips (640 EJ TSZs have 3,333 trips, 24% of total trips)
- < 1 Trip (2,117 TSZs)
- Trinity Parkway Alternatives Corridor
- MPA Boundary

893 EJ TSZs have at least 1 trip

Total Trips = 14,030

All Locations Are Approximate

Reference Section 4.3.3.2

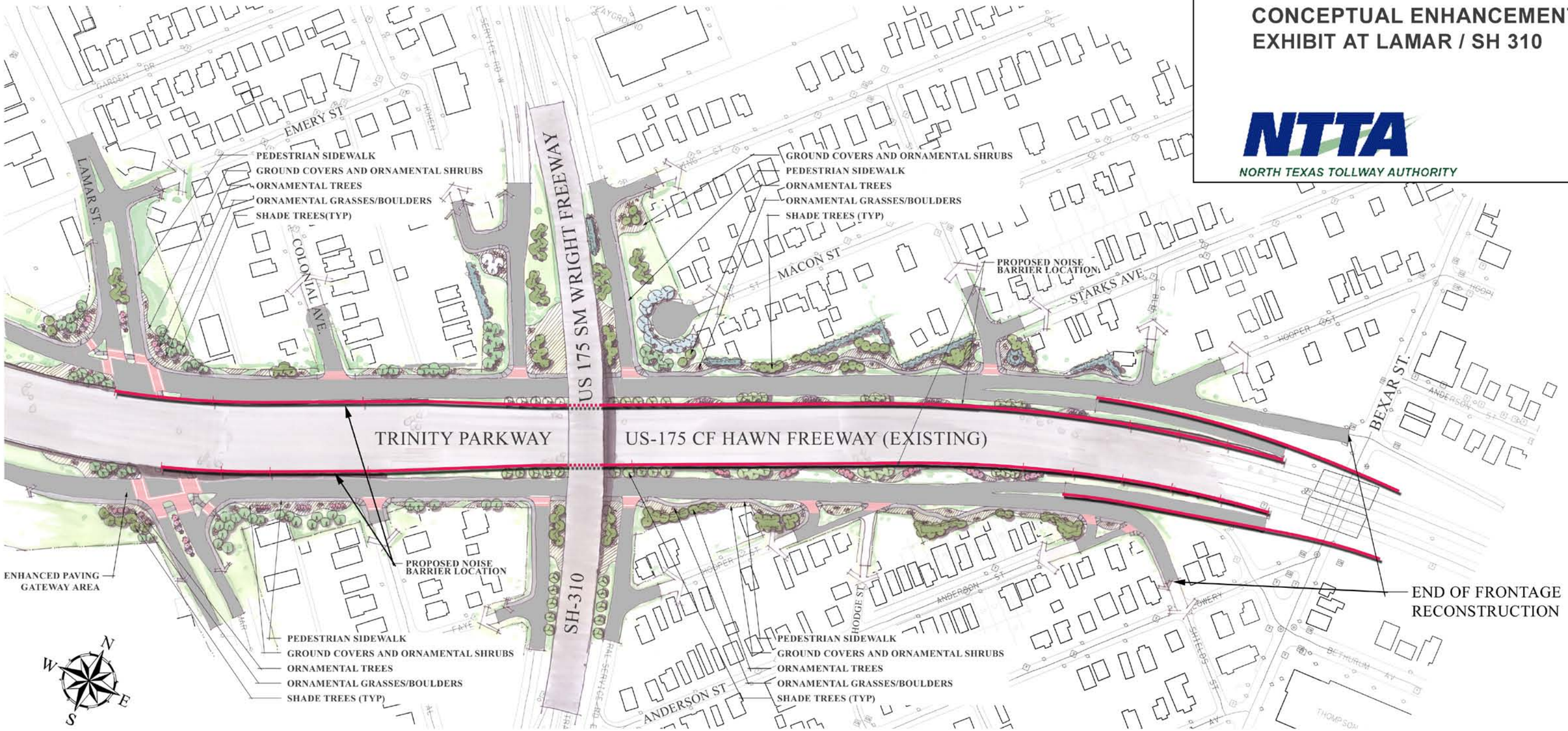
0 5 10 20
SCALE IN MILE

N

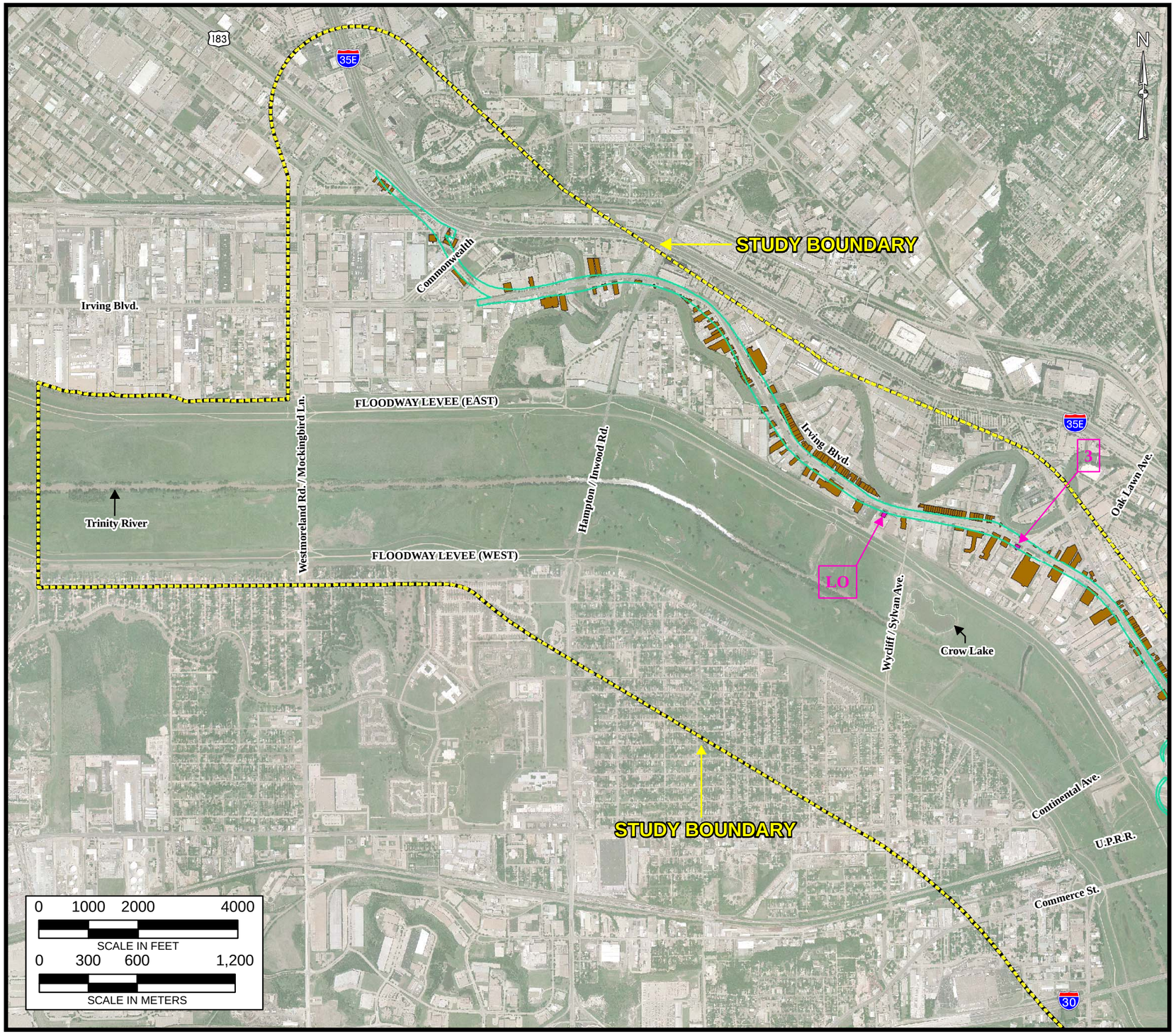
PLATE 4-4

CONCEPTUAL ENHANCEMENT EXHIBIT AT LAMAR / SH 310

NTTA
NORTH TEXAS TOLLWAY AUTHORITY



0 50 100 200 300 400 600
SCALE IN FEET



MATCH LINE

PLATE 4 - 5A

DISPLACEMENTS - ALTERNATIVE 2A

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 2A
INDUSTRIAL BLVD (ELEVATED)

BUILDING DISPLACEMENTS

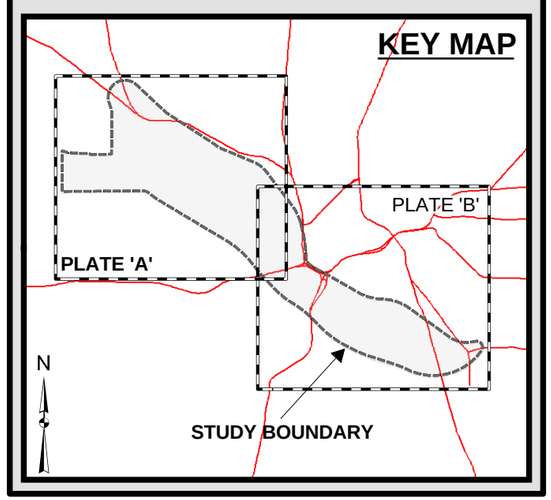
BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13



MATCH LINE

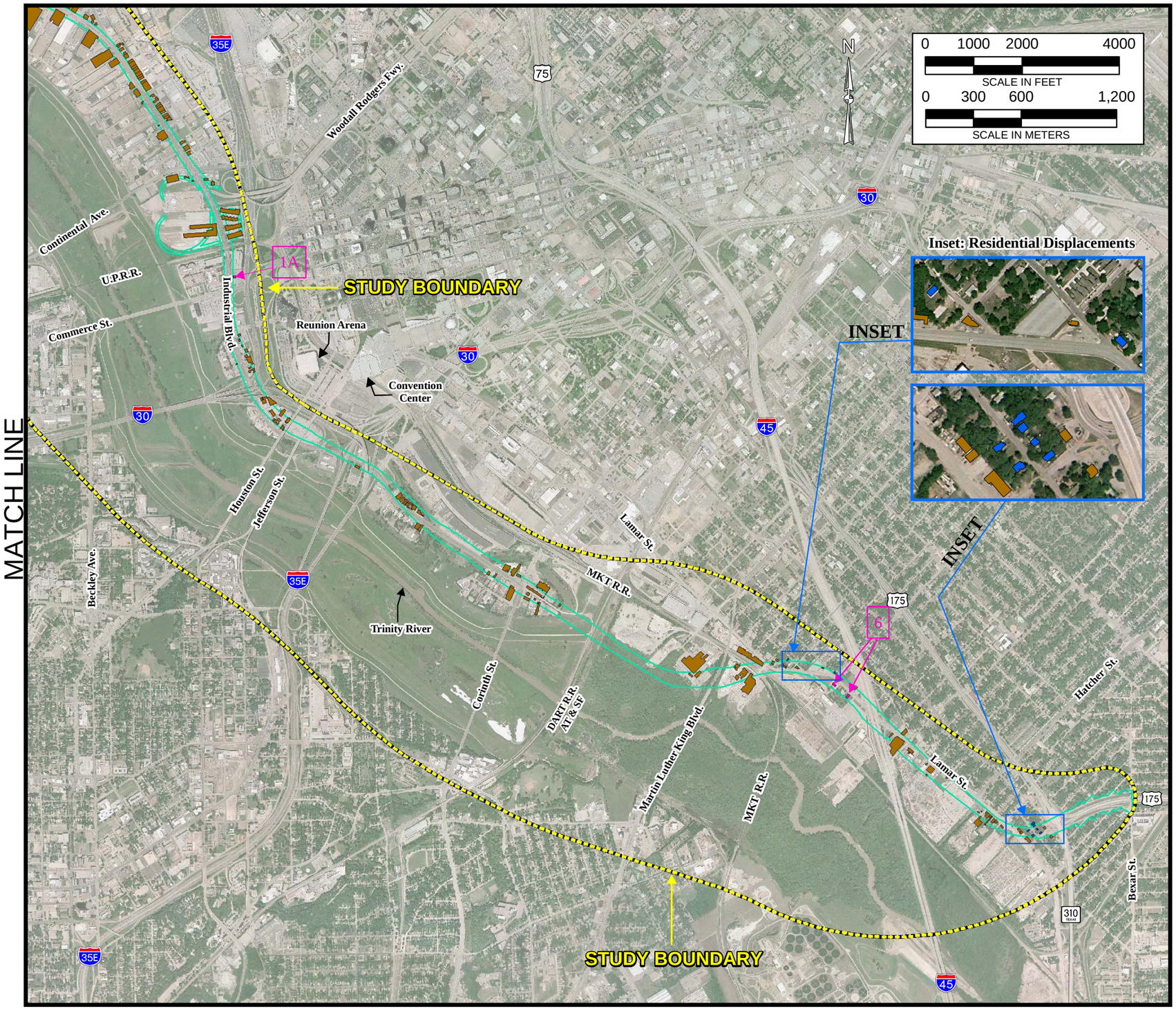


PLATE 4 - 5B

DISPLACEMENTS - ALTERNATIVE 2A

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 2A
INDUSTRIAL BLVD (ELEVATED)

BUILDING DISPLACEMENTS

BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13

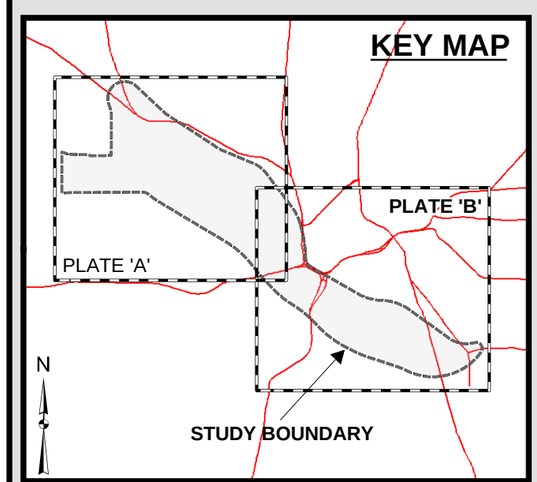
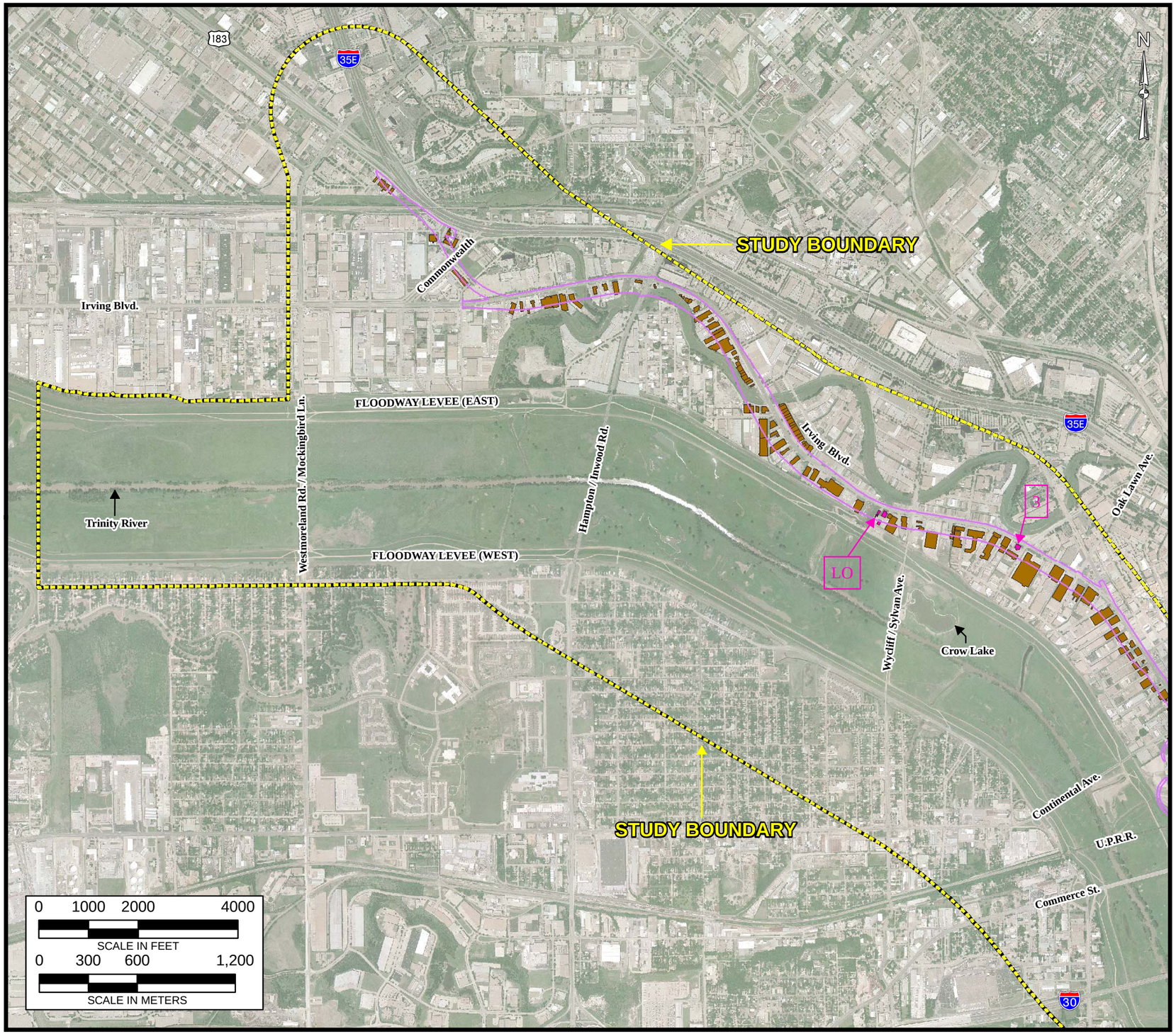


PLATE 4 - 6A

DISPLACEMENTS - ALTERNATIVE 2B

NTTA
NORTH TEXAS TOLLWAY AUTHORITY



MATCH LINE

PROPOSED ROW AREA

ALTERNATIVE 2B
INDUSTRIAL BLVD (AT-GRADE)

BUILDING DISPLACEMENTS

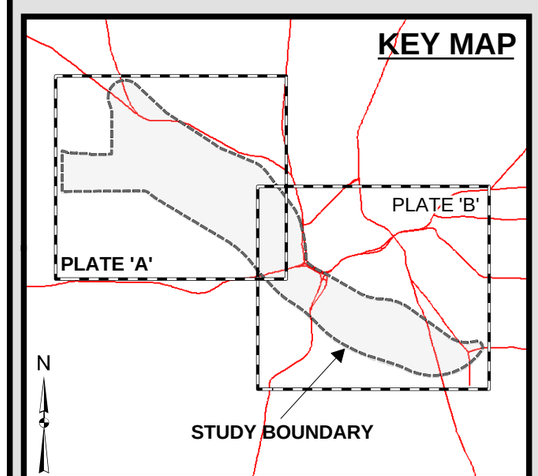
BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13



MATCH LINE

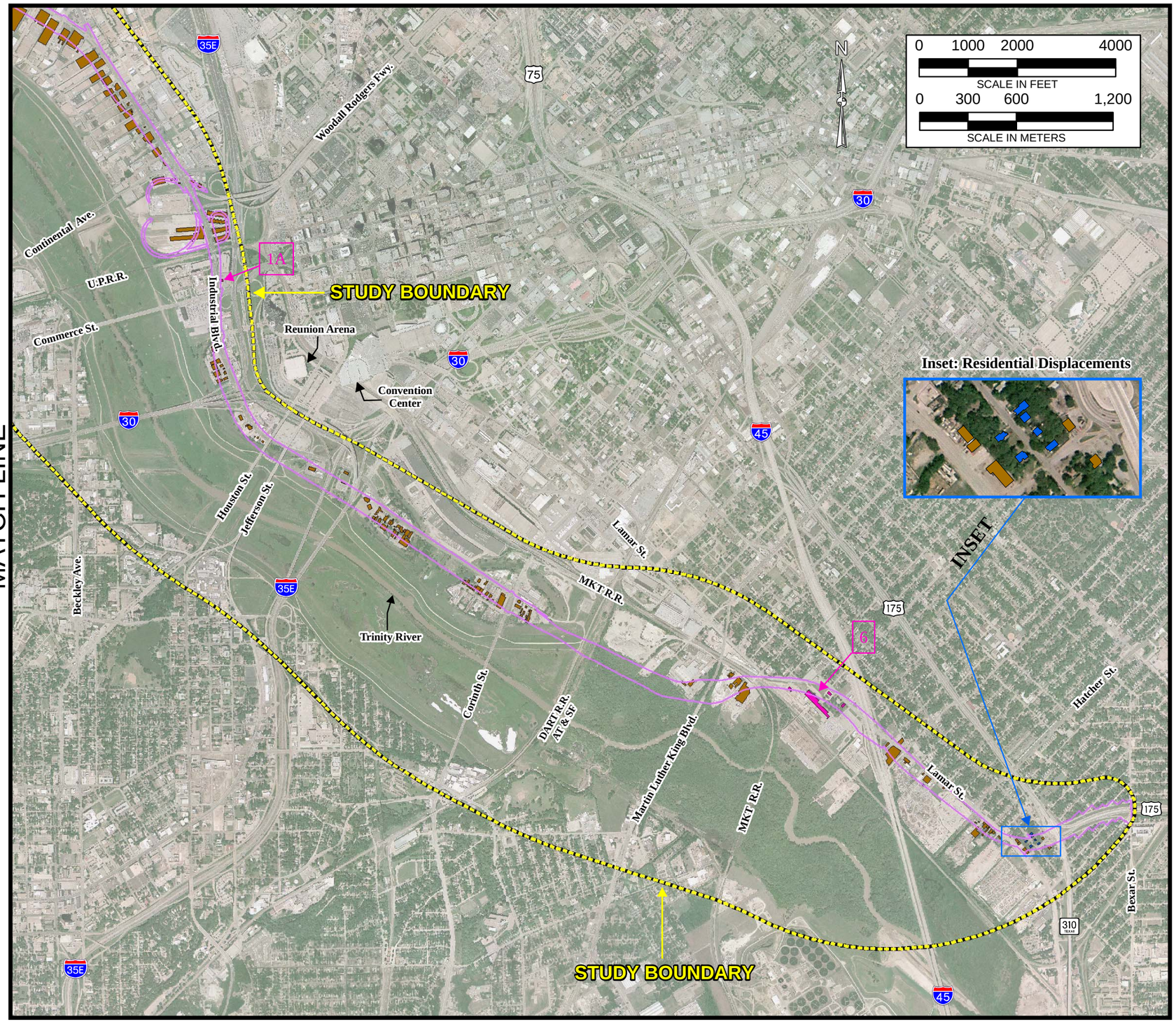


PLATE 4 - 6B

DISPLACEMENTS - ALTERNATIVE 2B

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 2B
INDUSTRIAL BLVD (AT-GRADE)

BUILDING DISPLACEMENTS

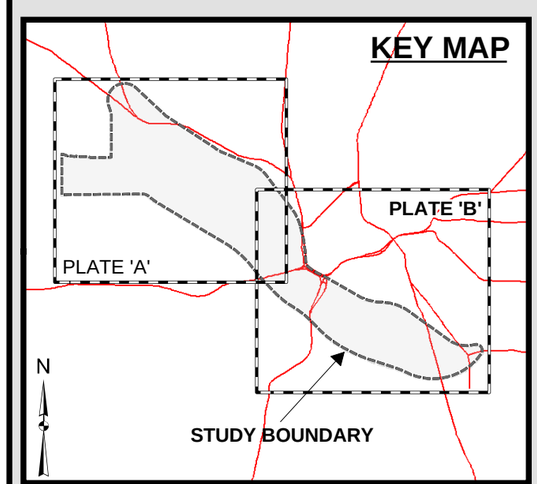
BUSINESS / COMMERCIAL DISPLACEMENT

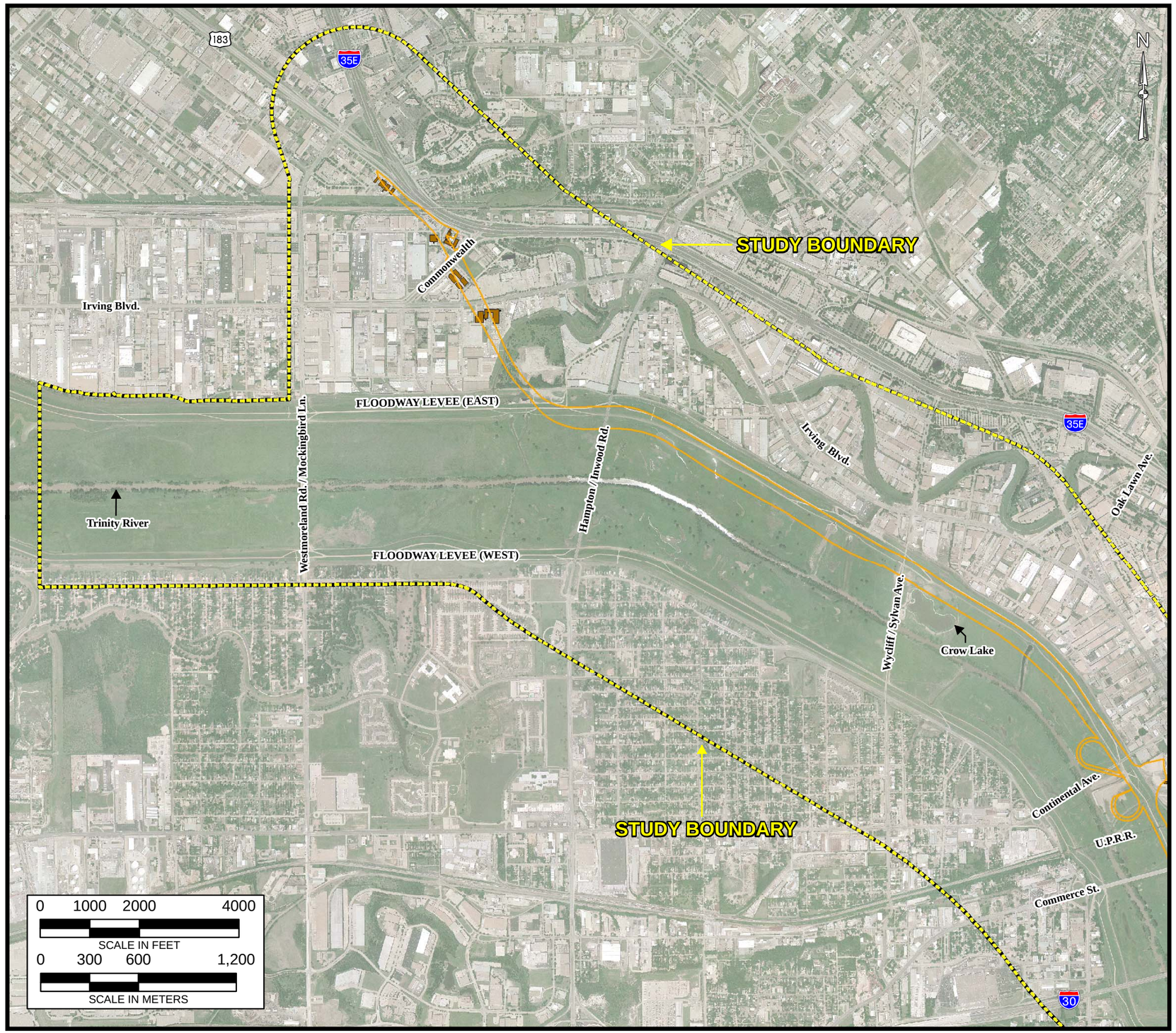
PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13





MATCH LINE

PLATE 4 - 7A

DISPLACEMENTS - ALTERNATIVE 3A

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 3A
COMBINED PARKWAY - RIVERSIDE (ORIGINAL)

BUILDING DISPLACEMENTS

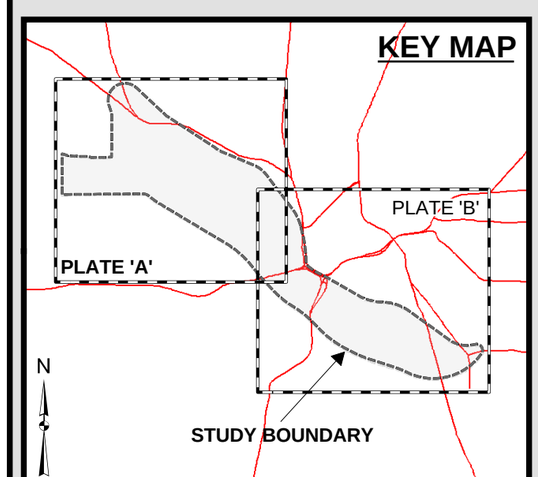
BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13



MATCH LINE

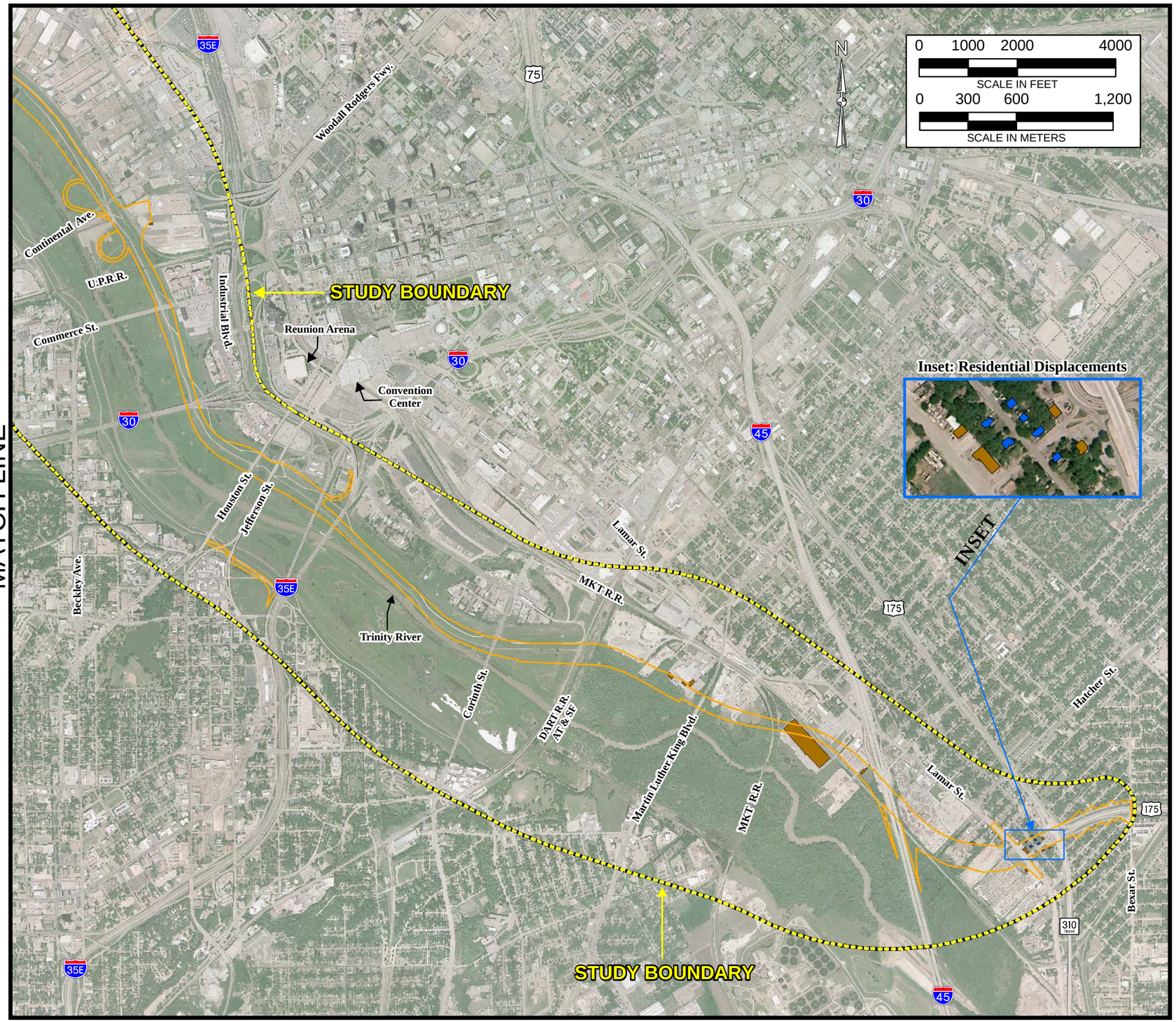


PLATE 4 - 7B

DISPLACEMENTS - ALTERNATIVE 3A

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 3A COMBINED PARKWAY - RIVERSIDE (ORIGINAL)

BUILDING DISPLACEMENTS

BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13

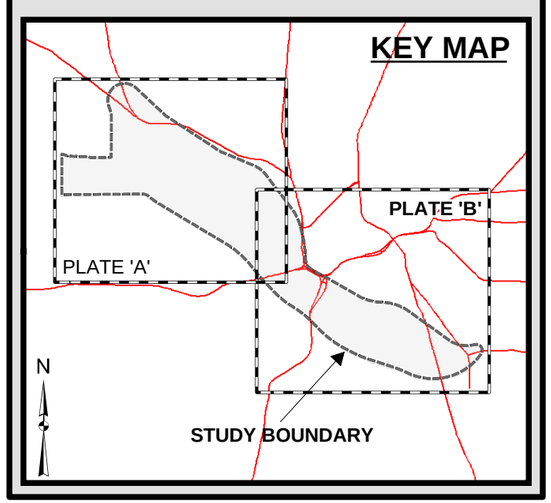
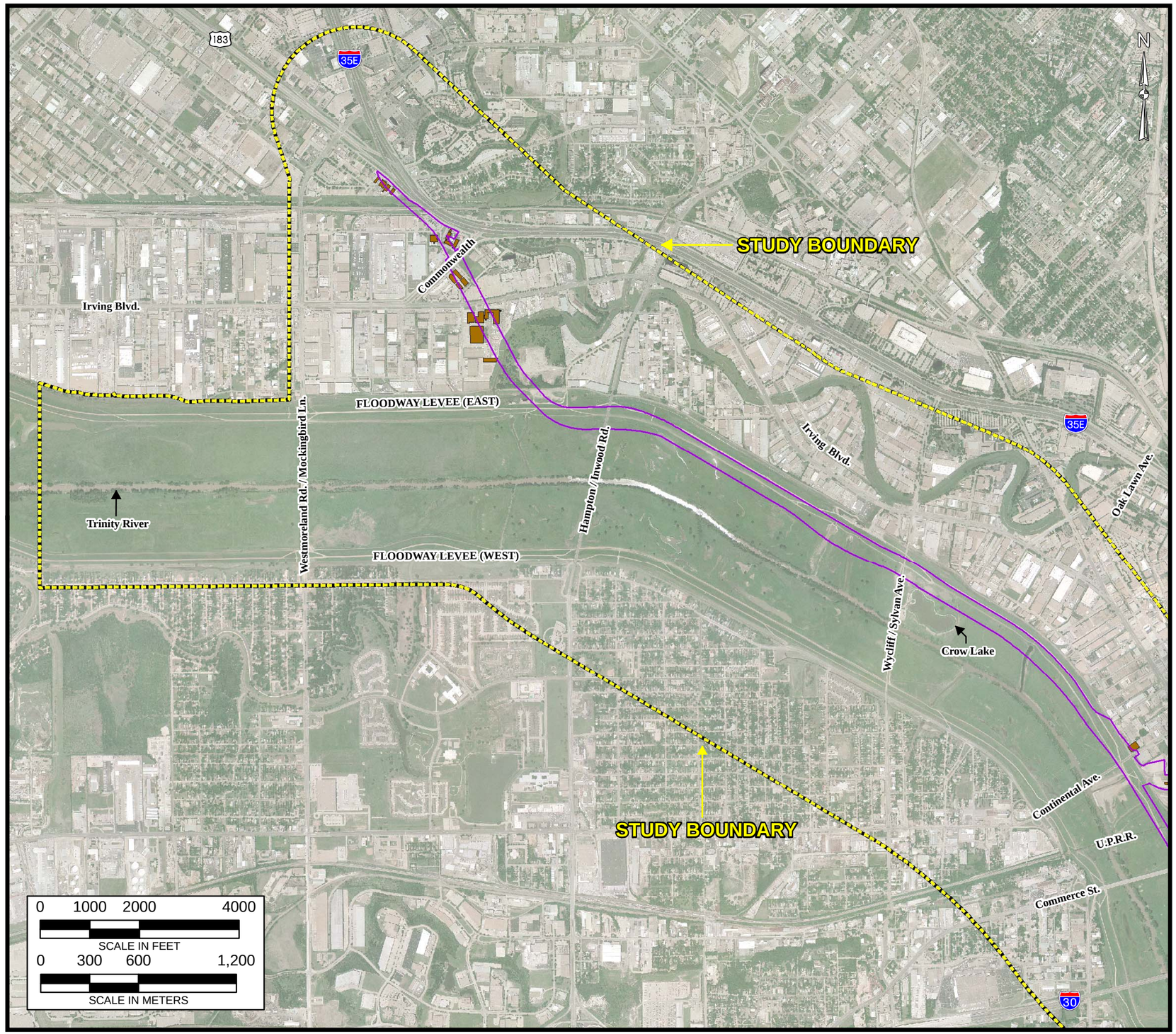


PLATE 4 - 8A

DISPLACEMENTS - ALTERNATIVE 3B

NTTA
NORTH TEXAS TOLLWAY AUTHORITY



MATCH LINE

PROPOSED ROW AREA

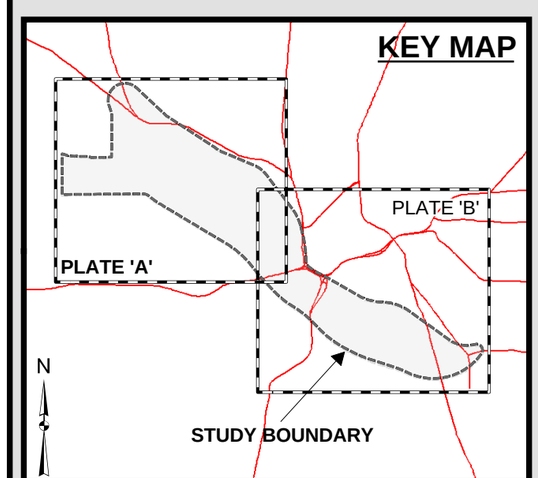
ALTERNATIVE 3B COMBINED PARKWAY - RIVERSIDE (MODIFIED)

BUILDING DISPLACEMENTS

- BUSINESS / COMMERCIAL DISPLACEMENT
- PUBLIC DISPLACEMENT
- RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13



MATCH LINE

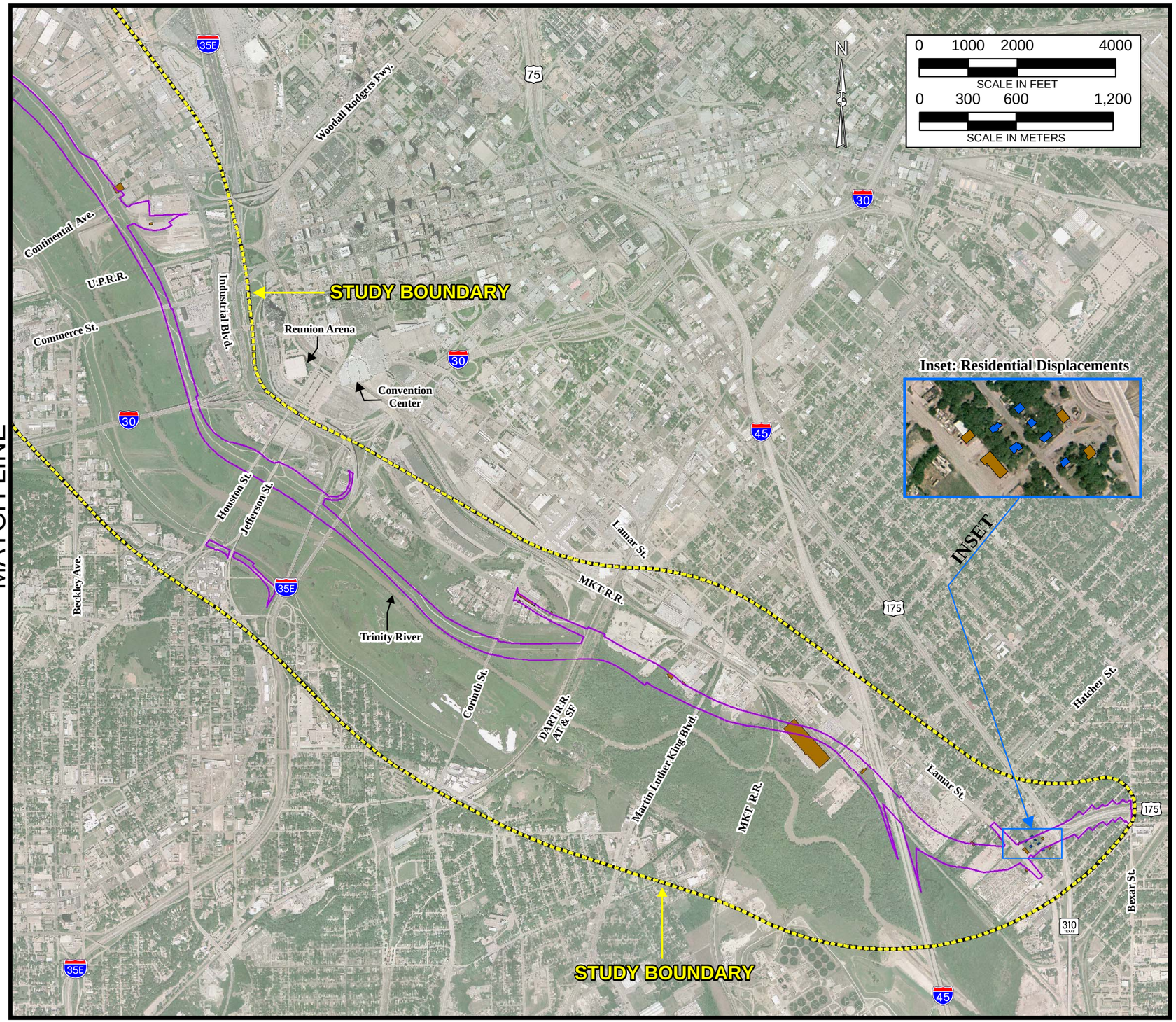


PLATE 4 - 8B

DISPLACEMENTS - ALTERNATIVE 3B

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 3B
COMBINED PARKWAY -
RIVERSIDE (MODIFIED)

BUILDING DISPLACEMENTS

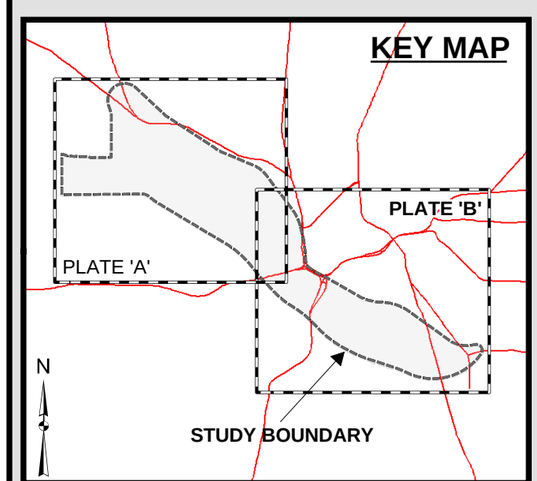
BUSINESS / COMMERCIAL DISPLACEMENT

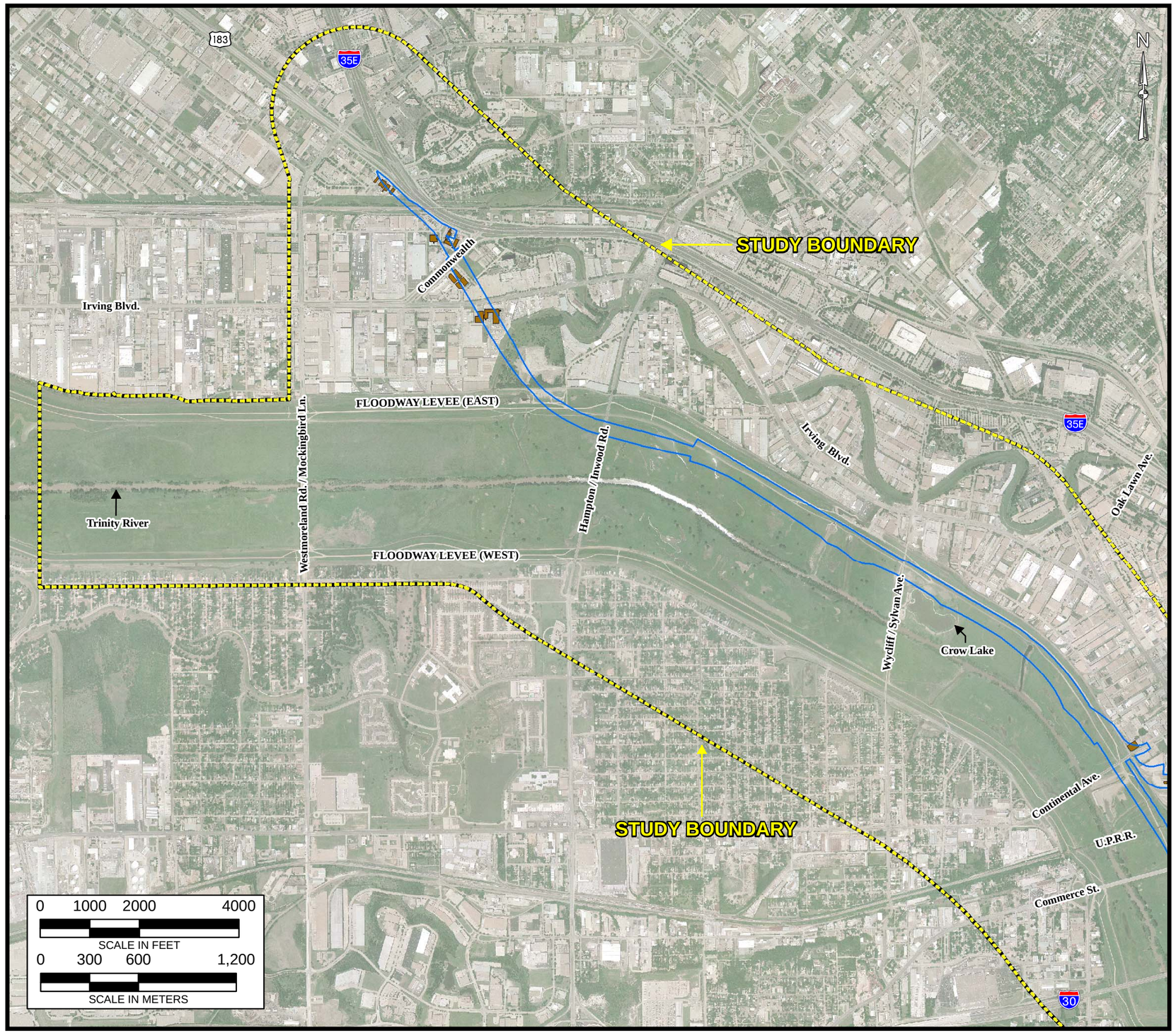
PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13





MATCH LINE

PLATE 4 - 9A

DISPLACEMENTS - ALTERNATIVE 3C

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 3C
COMBINED PARKWAY - RIVERSIDE (FURTHER MODIFIED)

BUILDING DISPLACEMENTS

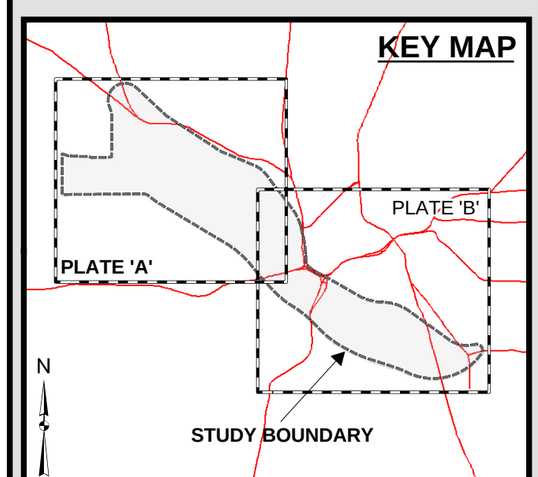
BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13



MATCH LINE

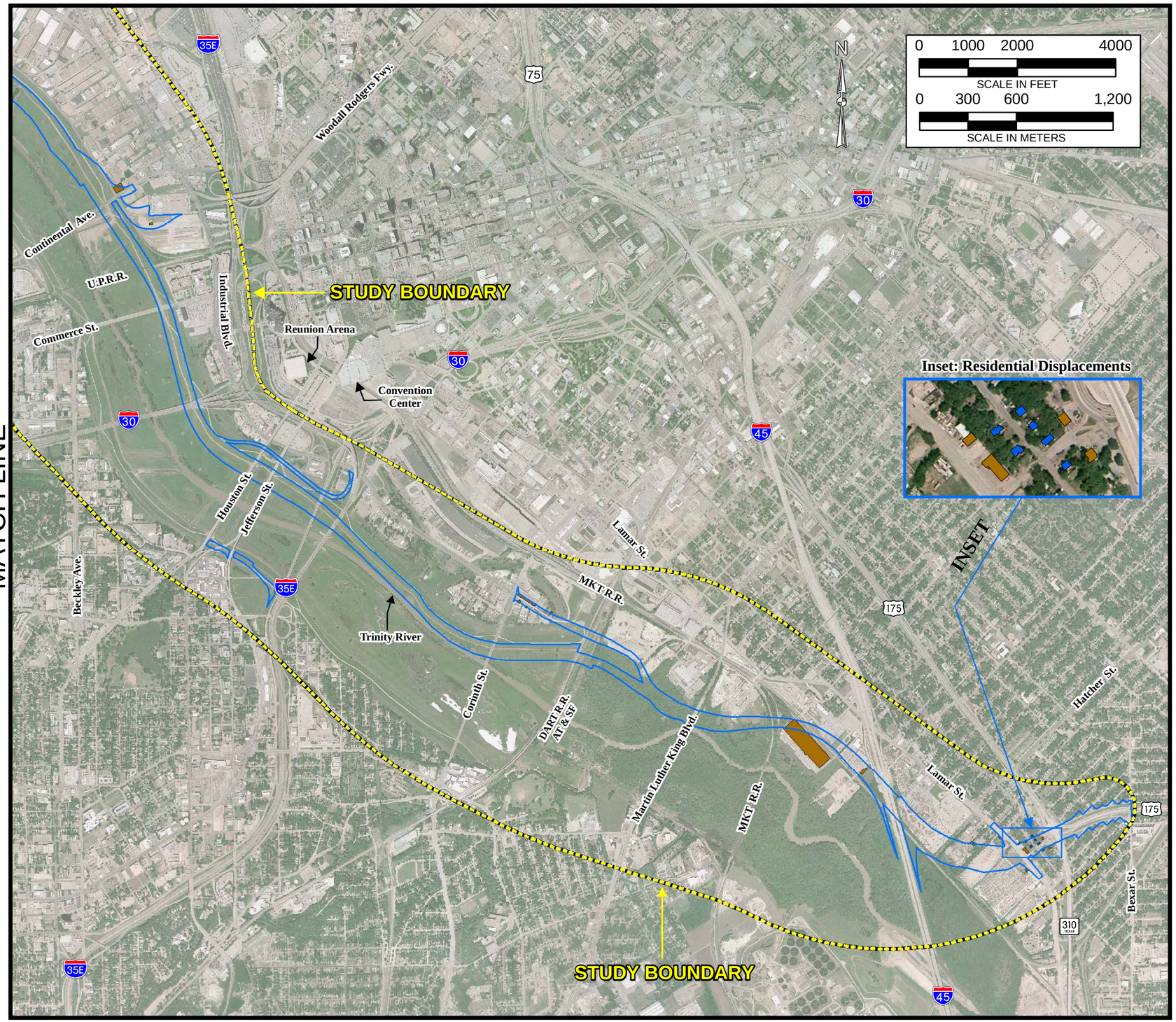


PLATE 4 - 9B

DISPLACEMENTS - ALTERNATIVE 3C

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 3C
COMBINED PARKWAY -
RIVERSIDE (FURTHER MODIFIED)

BUILDING DISPLACEMENTS

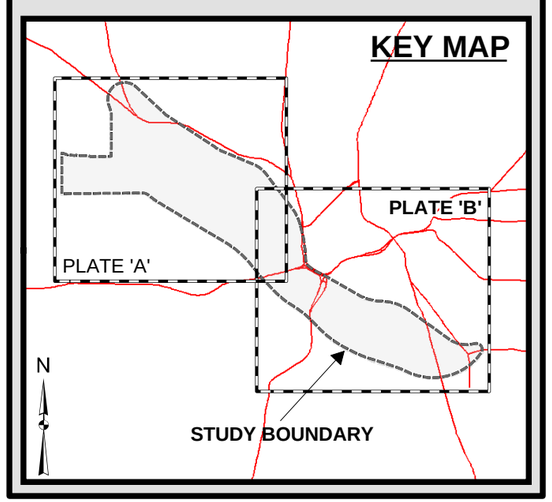
BUSINESS / COMMERCIAL DISPLACEMENT

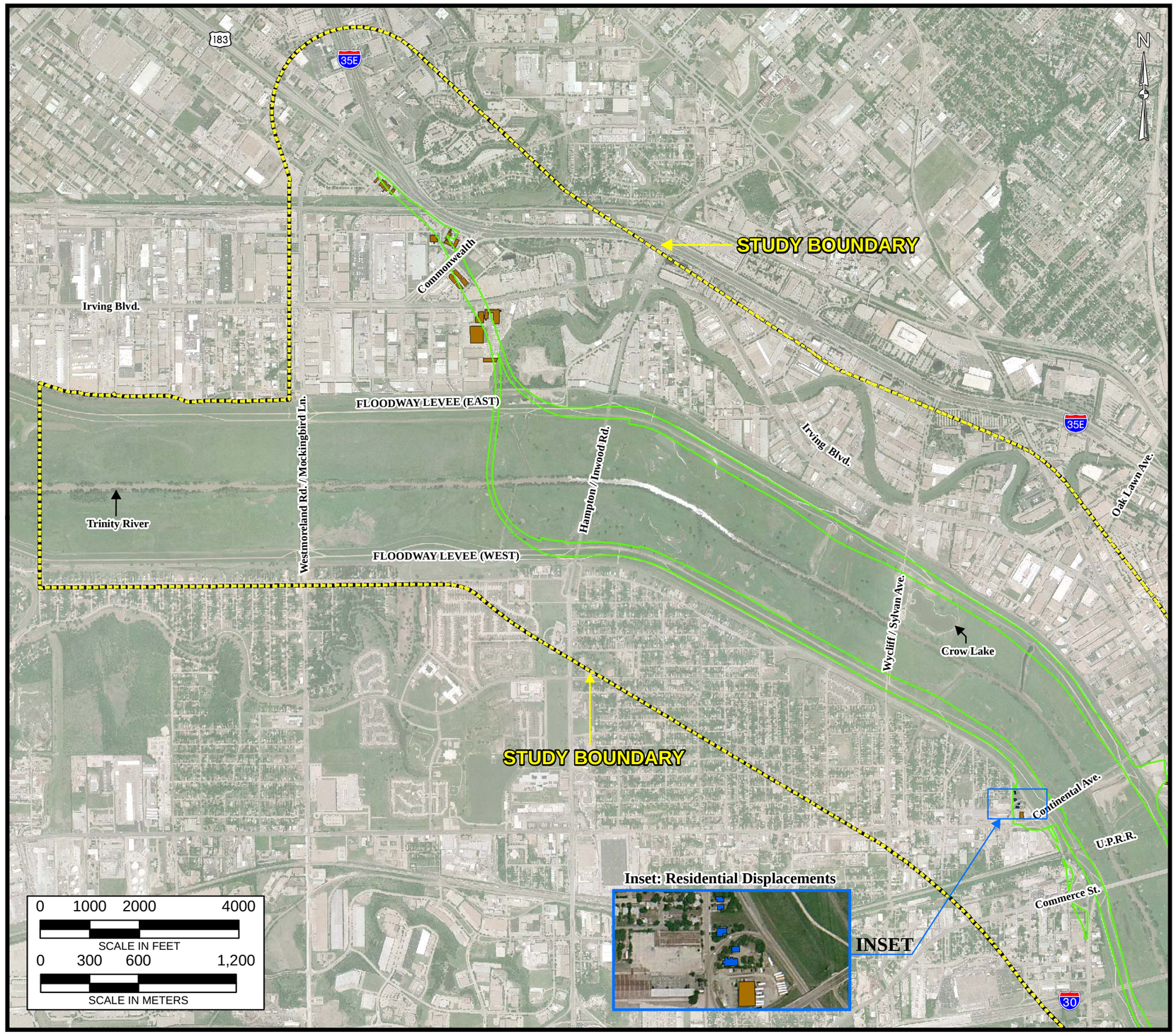
PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13





MATCH LINE

PLATE 4 - 10A

DISPLACEMENTS - ALTERNATIVE 4A

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 4A
SPLIT PARKWAY -
RIVERSIDE (ORIGINAL)

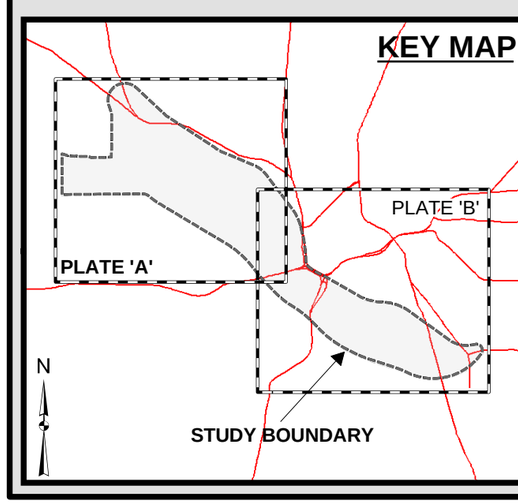
BUILDING DISPLACEMENTS

BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES: LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13



MATCH LINE

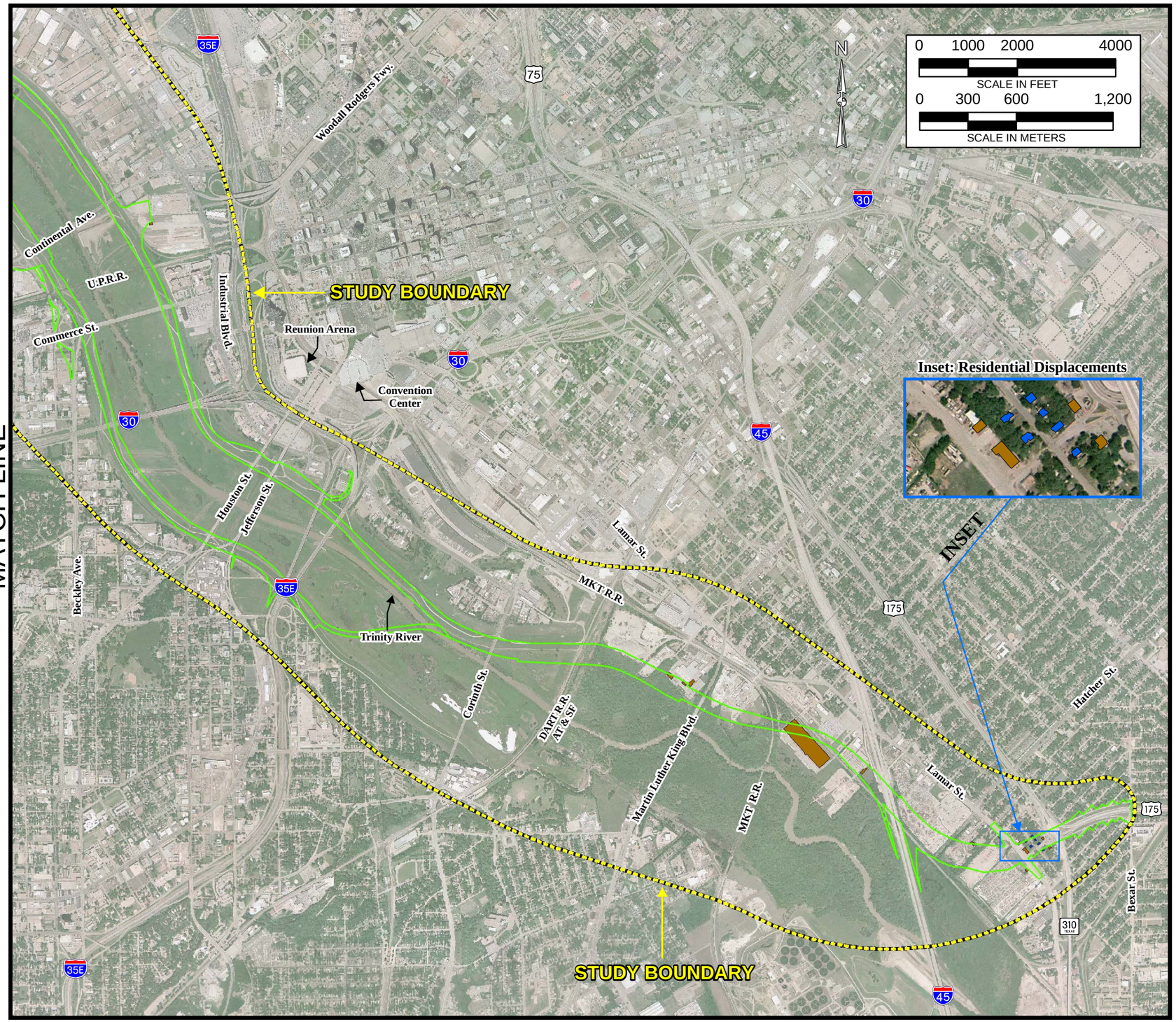


PLATE 4 - 10B

DISPLACEMENTS - ALTERNATIVE 4A

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 4A
SPLIT PARKWAY -
RIVERSIDE (ORIGINAL)

BUILDING DISPLACEMENTS

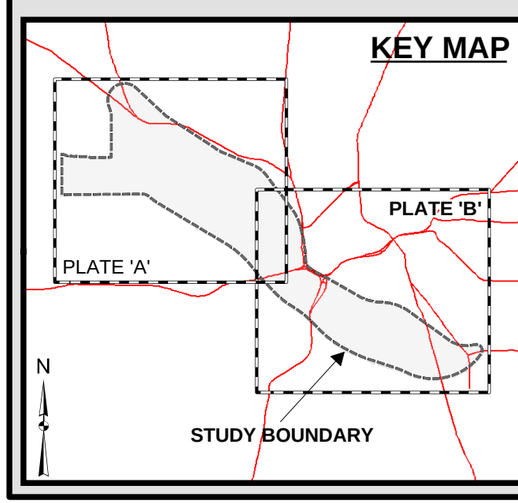
BUSINESS / COMMERCIAL DISPLACEMENT

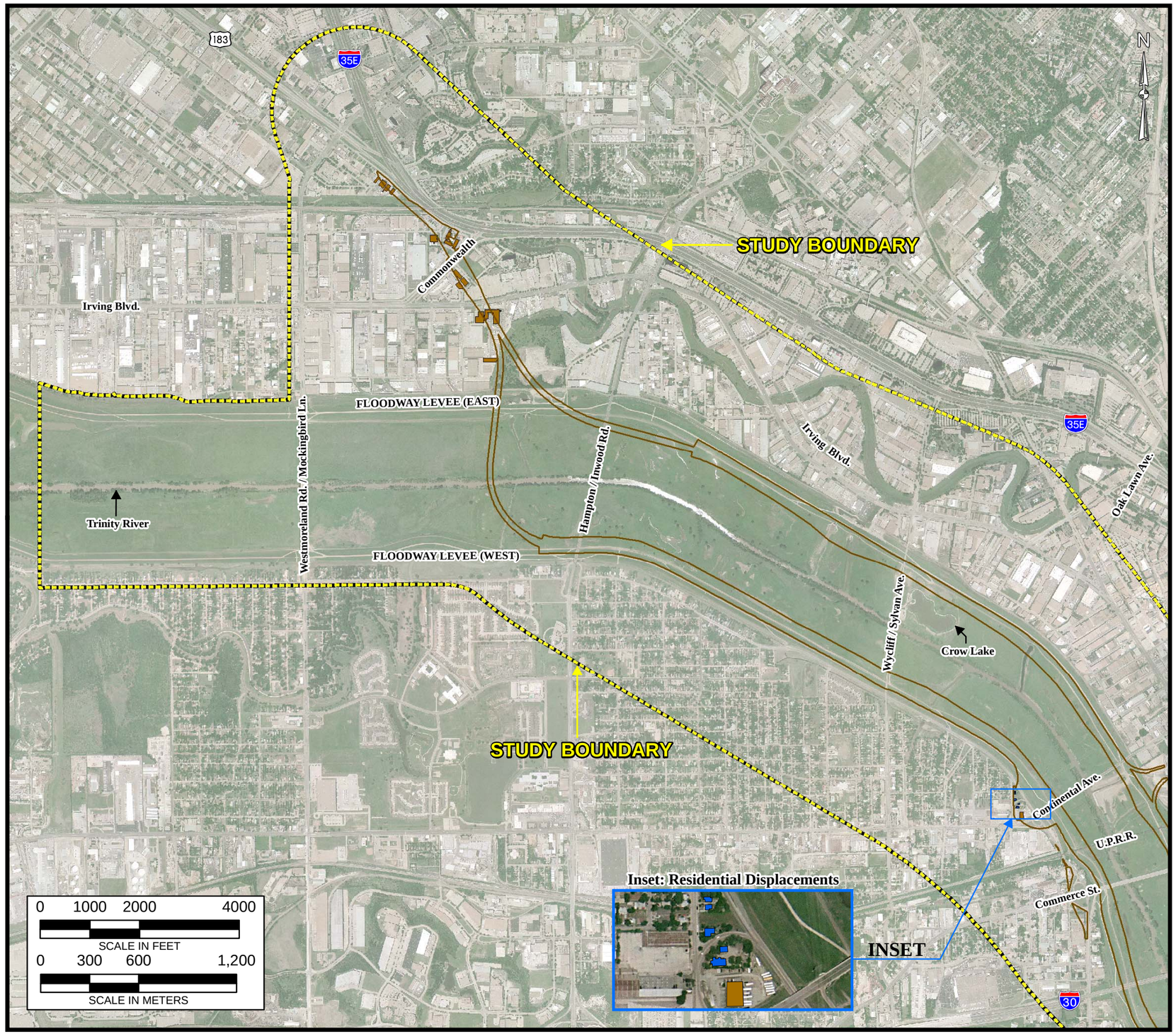
PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13





MATCH LINE

PLATE 4 - 11A

DISPLACEMENTS - ALTERNATIVE 4B

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 4B
SPLIT PARKWAY -
RIVERSIDE (MODIFIED)

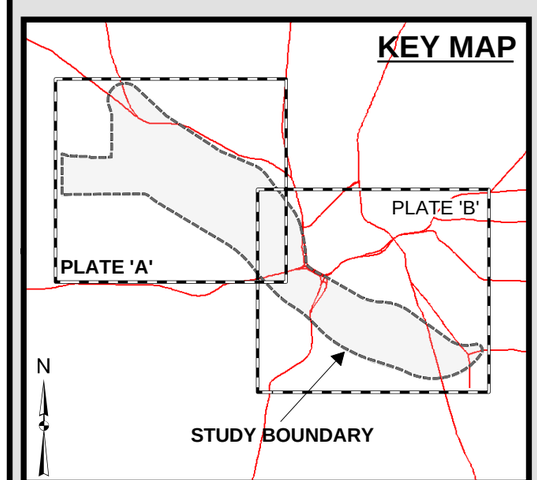
BUILDING DISPLACEMENTS

BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES: LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13



MATCH LINE

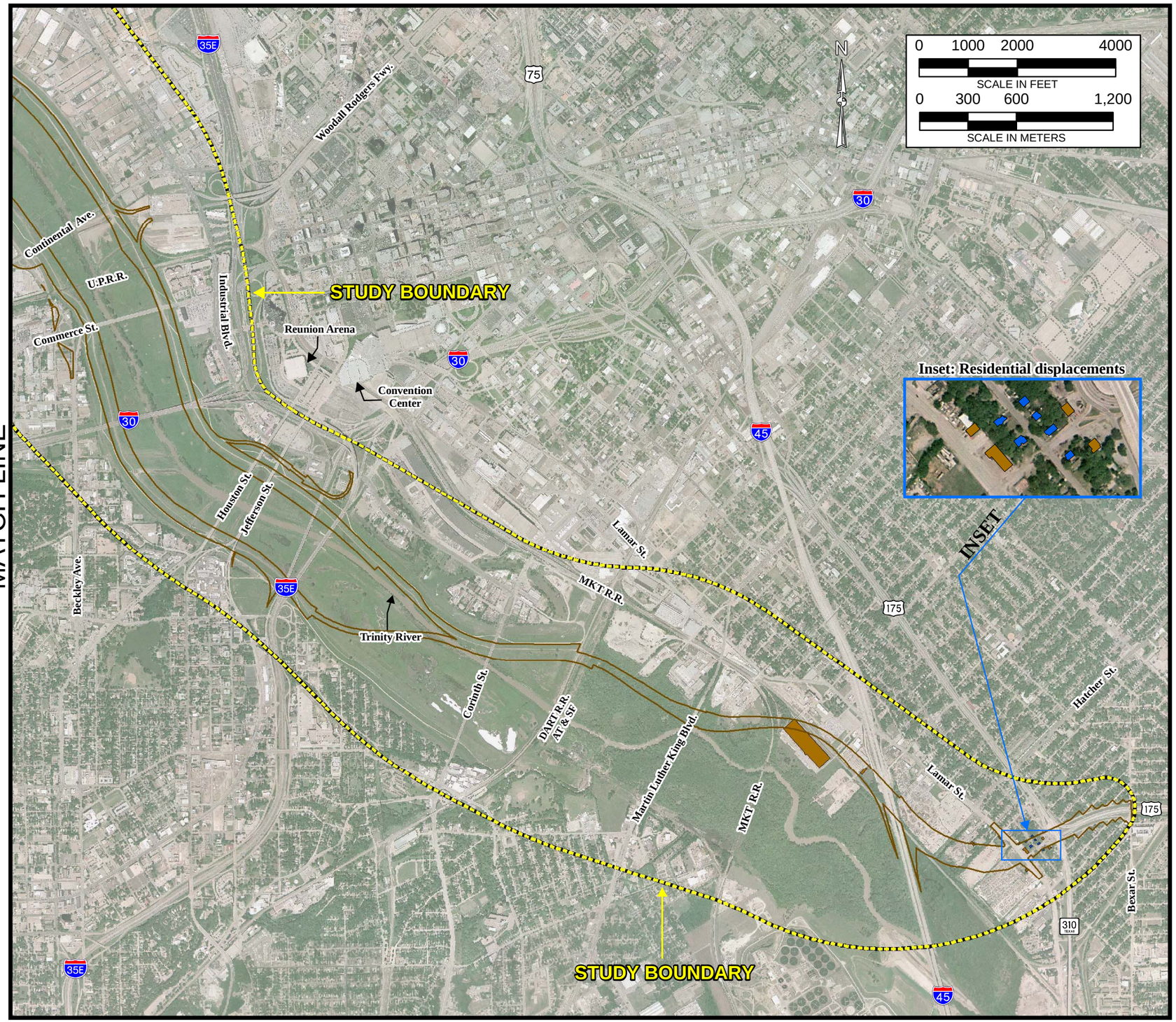


PLATE 4 - 11B

DISPLACEMENTS - ALTERNATIVE 4B

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 4B
SPLIT PARKWAY -
RIVERSIDE (MODIFIED)

BUILDING DISPLACEMENTS

BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13

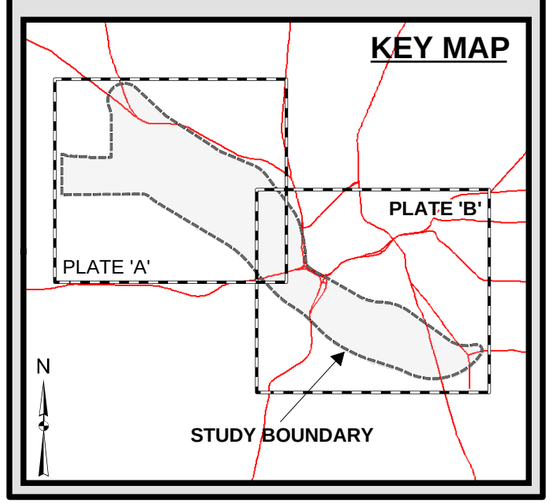
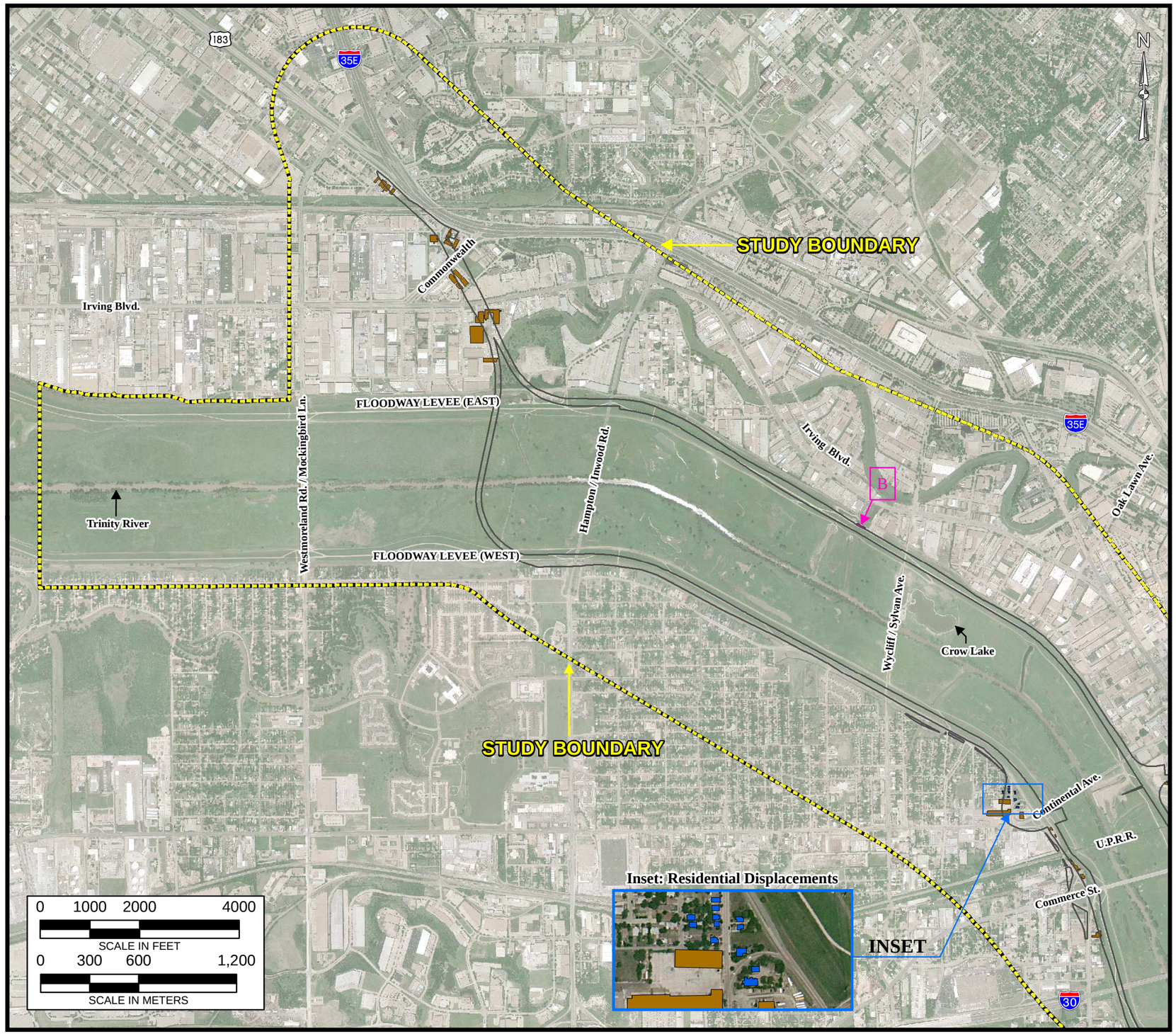


PLATE 4 - 12A

DISPLACEMENTS - ALTERNATIVE 5

NTTA
NORTH TEXAS TOLLWAY AUTHORITY



MATCH LINE

PROPOSED ROW AREA

ALTERNATIVE 5
SPLIT PARKWAY - LANDSIDE

BUILDING DISPLACEMENTS

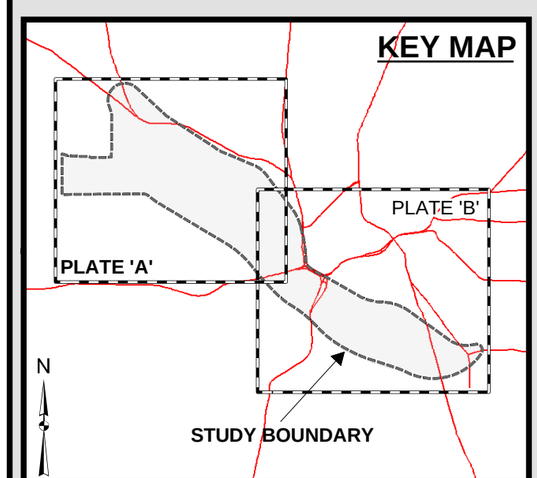
BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13



MATCH LINE

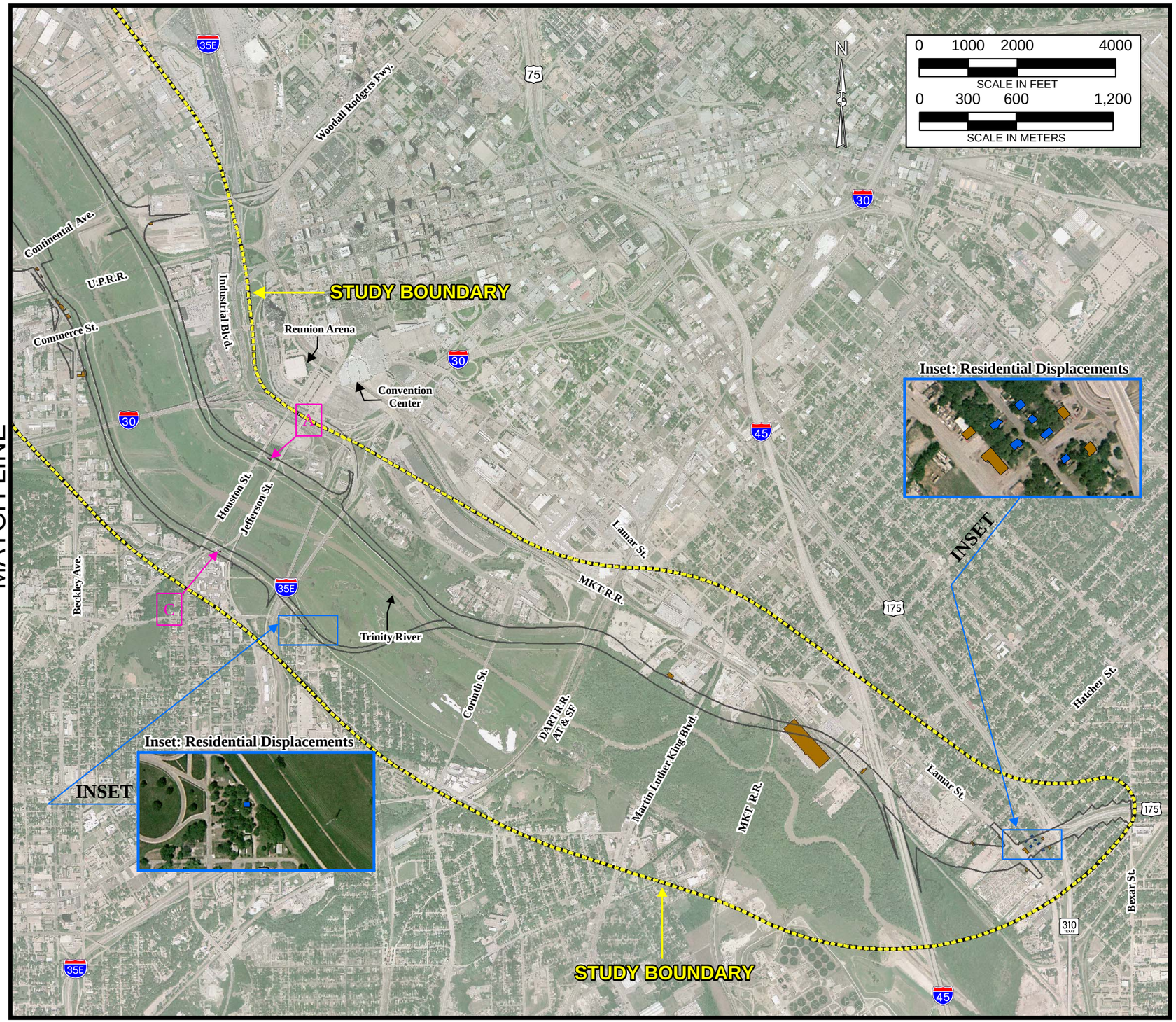


PLATE 4 - 12B

DISPLACEMENTS - ALTERNATIVE 5

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

PROPOSED ROW AREA

ALTERNATIVE 5
SPLIT PARKWAY - LANDSIDE

BUILDING DISPLACEMENTS

BUSINESS / COMMERCIAL DISPLACEMENT

PUBLIC DISPLACEMENT

RESIDENTIAL DISPLACEMENT

NOTES:

LOCATIONS ARE APPROXIMATE
AERIAL PHOTOGRAPH DATE: APRIL, 2006
REFERENCE SECTION 4.5.1.2 AND TABLE 4-13

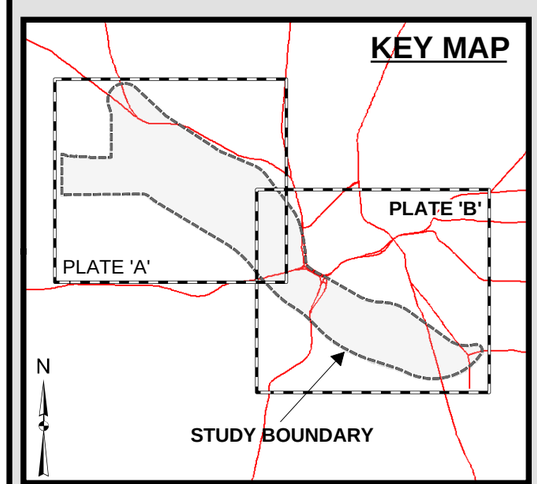
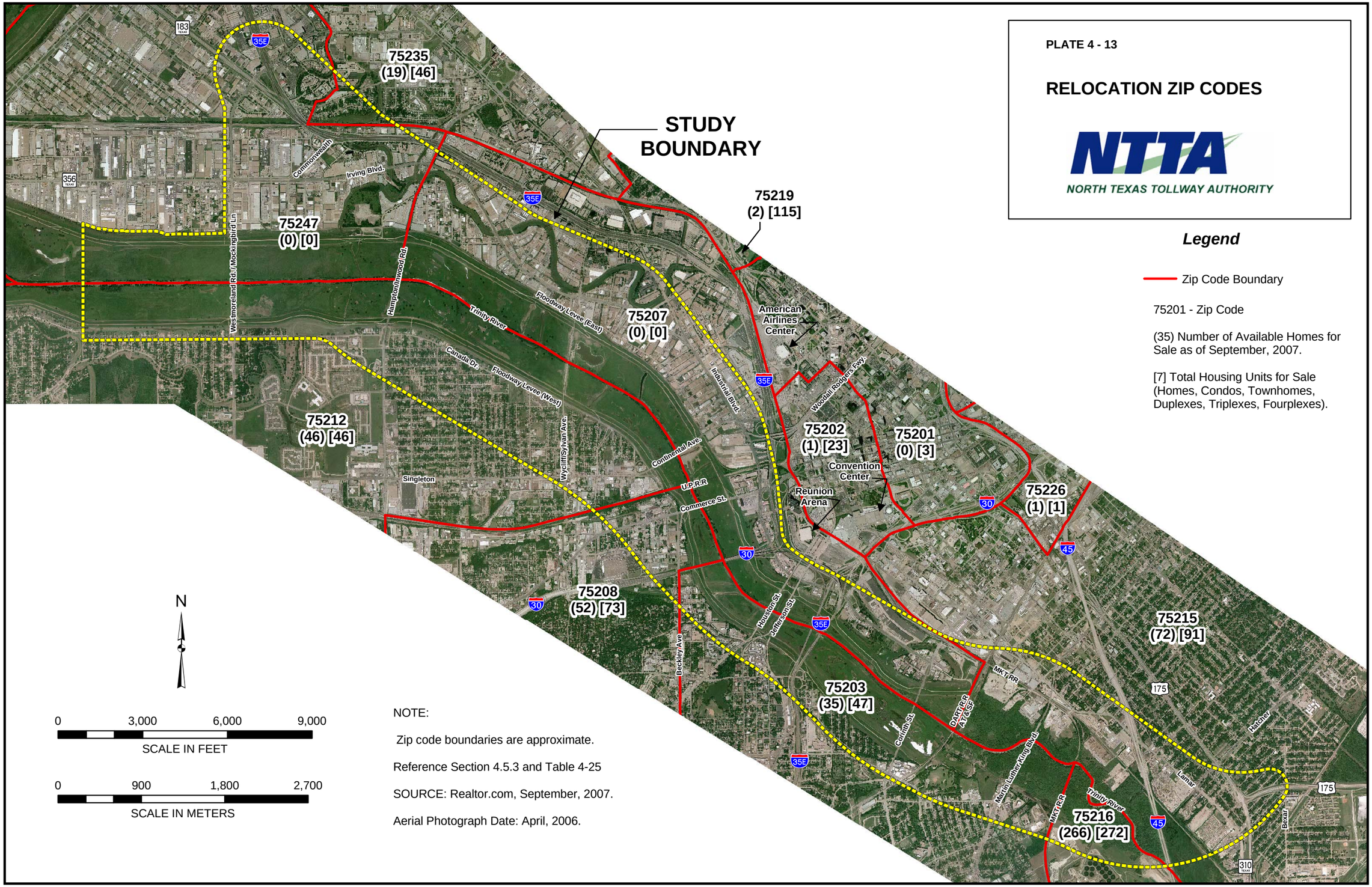


PLATE 4 - 13

RELOCATION ZIP CODES

NTTA
NORTH TEXAS TOLLWAY AUTHORITY



N

0 3,000 6,000 9,000
SCALE IN FEET

0 900 1,800 2,700
SCALE IN METERS

NOTE:

Zip code boundaries are approximate.

Reference Section 4.5.3 and Table 4-25

SOURCE: Realtor.com, September, 2007.

Aerial Photograph Date: April, 2006.

Legend

Zip Code Boundary

75201 - Zip Code

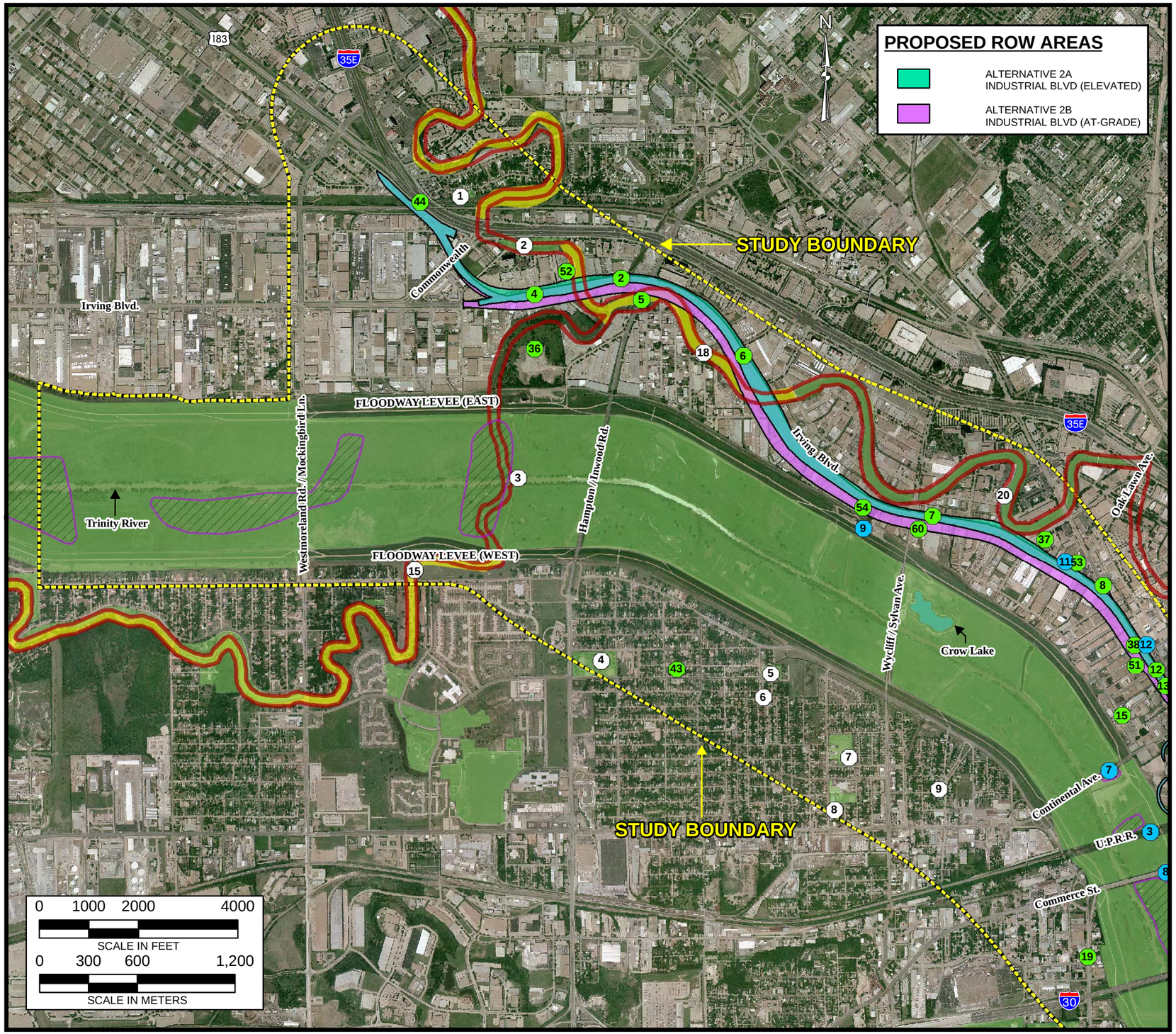
(35) Number of Available Homes for Sale as of September, 2007.

[7] Total Housing Units for Sale (Homes, Condos, Townhomes, Duplexes, Triplexes, Fourplexes).

PLATE 4 - 14A

HUMAN ENVIRONMENT - ALTERNATIVES 2A/2B

NTTA
NORTH TEXAS TOLLWAY AUTHORITY



MATCH LINE

CULTURAL RESOURCES:

- 4 — NRHP - LISTED RESOURCE
- 8 — NRHP - ELIGIBLE RESOURCE
- AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- AREA OF 2006 ARCHEOLOGICAL INVESTIGATION (BACKHOE TRENCHING)

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.7.1.2, 4.7.2.2, AND TABLE 4-29

HAZARDOUS / REGULATED MATERIALS SITES:

- 10 — POTENTIAL HIGH RISK HAZARDOUS / REGULATED MATERIALS SITE

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.17.2 AND TABLE 4-47

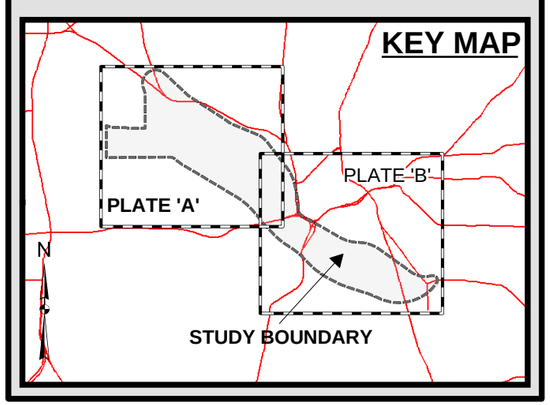
SOURCE: EPA AND TCEQ REGULATORY DATABASES

PARKS & RECREATION AREAS:

- EXISTING PARK OR RECREATION AREA
- PLANNED PARK OR RECREATION AREA
- 10 — PARK OR RECREATION AREA FEATURE IDENTIFIER

NOTES: LOCATIONS ARE APPROXIMATE. REFERENCE SECTION 4.7.3.2 AND TABLE 4-32

SOURCE: DALLAS PARK AND RECREATION DEPT. DALLAS COUNTY OPEN SPACE PLAN



MATCH LINE

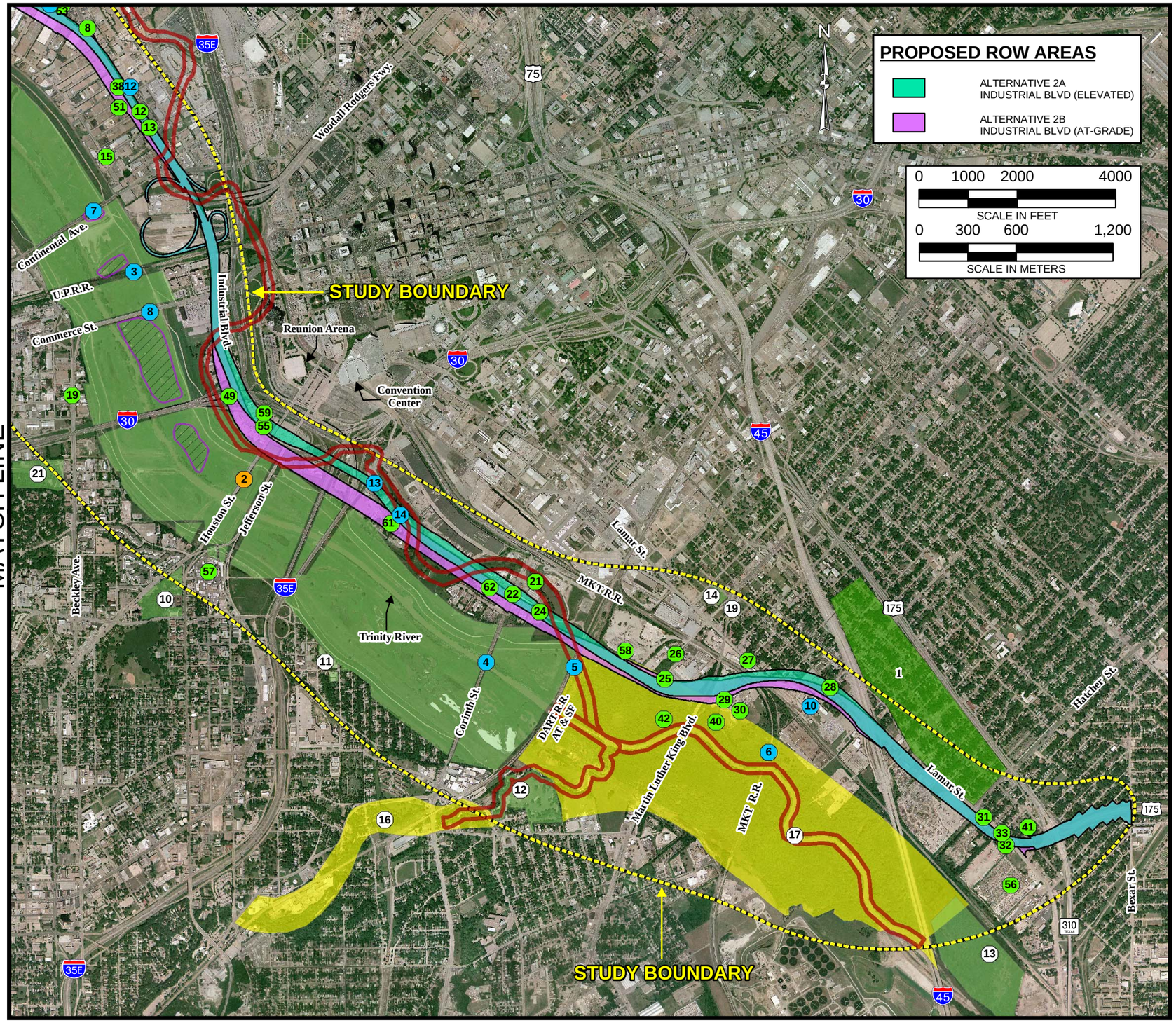


PLATE 4 - 14B

HUMAN ENVIRONMENT - ALTERNATIVES 2A/2B

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

CULTURAL RESOURCES:

- 4 — NRHP - LISTED RESOURCE
- 8 — NRHP - ELIGIBLE RESOURCE
- 1 — NRHP - LISTED DISTRICT
- AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- AREA OF 2006 ARCHEOLOGICAL INVESTIGATION (BACKHOE TRENCHING)

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.7.1.2, 4.7.2.2, AND TABLE 4-29

HAZARDOUS / REGULATED MATERIALS SITES:

- 10 — POTENTIAL HIGH RISK HAZARDOUS / REGULATED MATERIALS SITE

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.17.2 AND TABLE 4-47

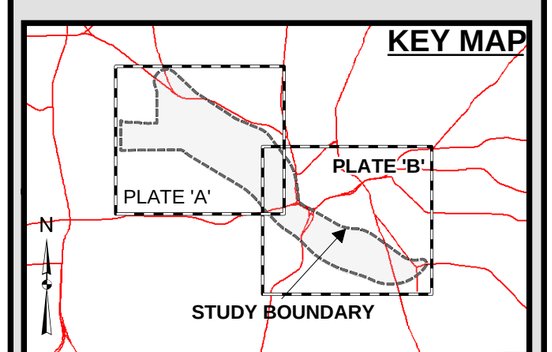
SOURCE: EPA AND TCEQ REGULATORY DATABASES

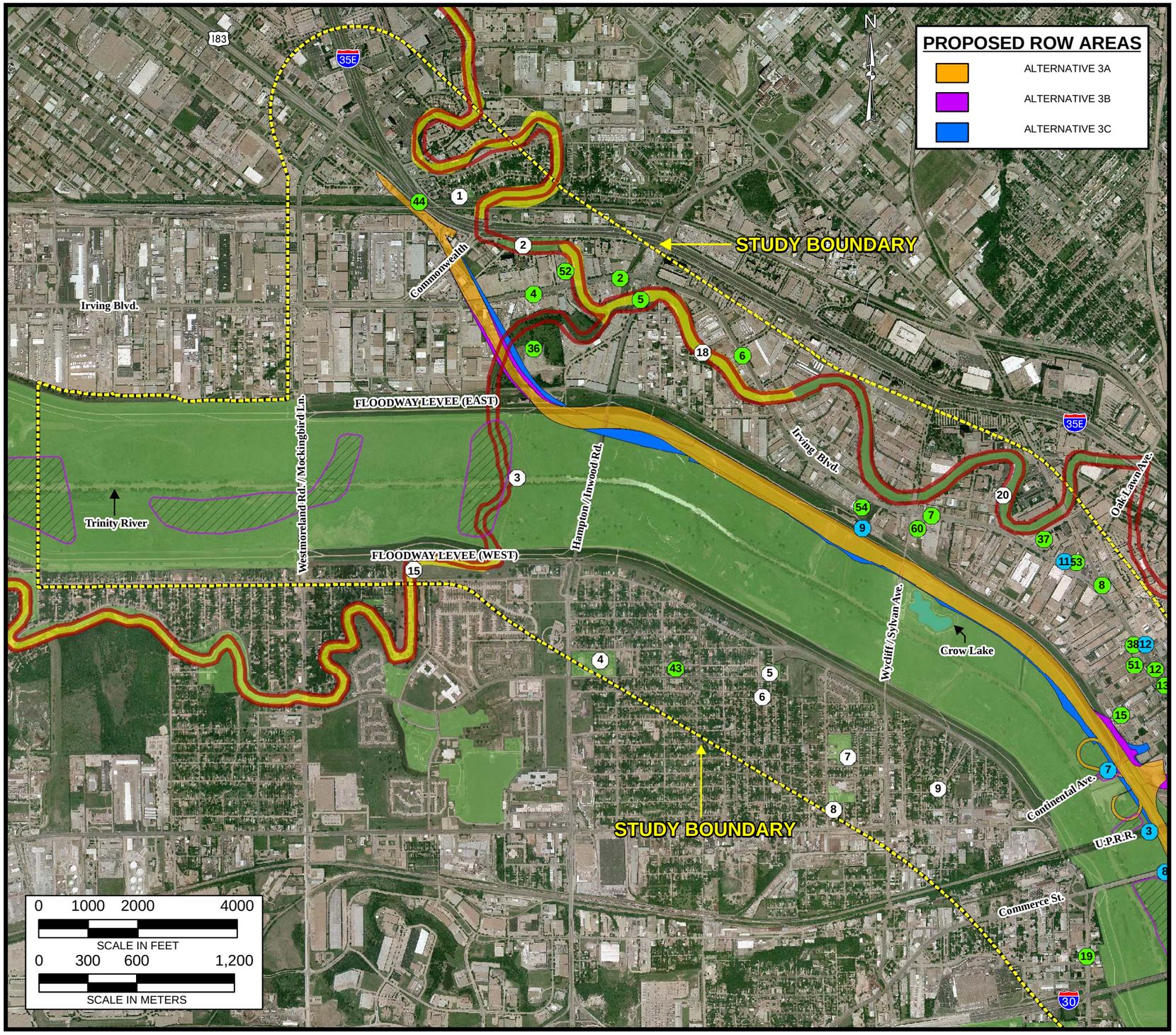
PARKS & RECREATION AREAS:

- EXISTING PARK OR RECREATION AREA
- PLANNED PARK OR RECREATION AREA
- 10 — PARK OR RECREATION AREA FEATURE IDENTIFIER

NOTES: LOCATIONS ARE APPROXIMATE. REFERENCE SECTION 4.7.3.2 AND TABLE 4-32

SOURCE: DALLAS PARK AND RECREATION DEPT. DALLAS COUNTY OPEN SPACE PLAN





MATCH LINE

PLATE 4 - 15A

HUMAN ENVIRONMENT - ALTERNATIVES 3A/3B/3C

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

CULTURAL RESOURCES:

- 4 — NRHP - LISTED RESOURCE
- 8 — NRHP - ELIGIBLE RESOURCE
- AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- AREA OF 2006 ARCHEOLOGICAL INVESTIGATION (BACKHOE TRENCHING)

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.7.1.2, 4.7.2.2, AND TABLE 4-29

HAZARDOUS / REGULATED MATERIALS SITES:

- 10 — POTENTIAL HIGH RISK HAZARDOUS / REGULATED MATERIALS SITE

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.17.2 AND TABLE 4-47

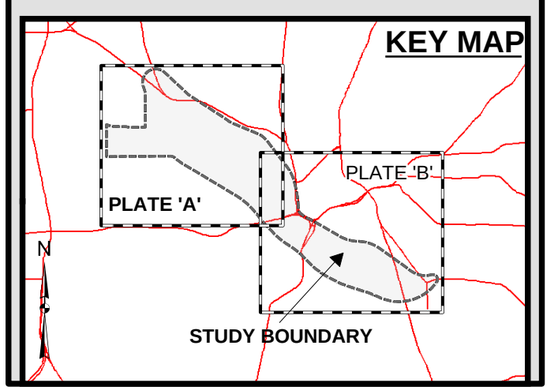
SOURCE: EPA AND TCEQ REGULATORY DATABASES

PARKS & RECREATION AREAS:

- EXISTING PARK OR RECREATION AREA
- PLANNED PARK OR RECREATION AREA
- 10 — PARK OR RECREATION AREA FEATURE IDENTIFIER

NOTES: LOCATIONS ARE APPROXIMATE. REFERENCE SECTION 4.7.3.2 AND TABLE 4-32

SOURCE: DALLAS PARK AND RECREATION DEPT. DALLAS COUNTY OPEN SPACE PLAN



MATCH LINE

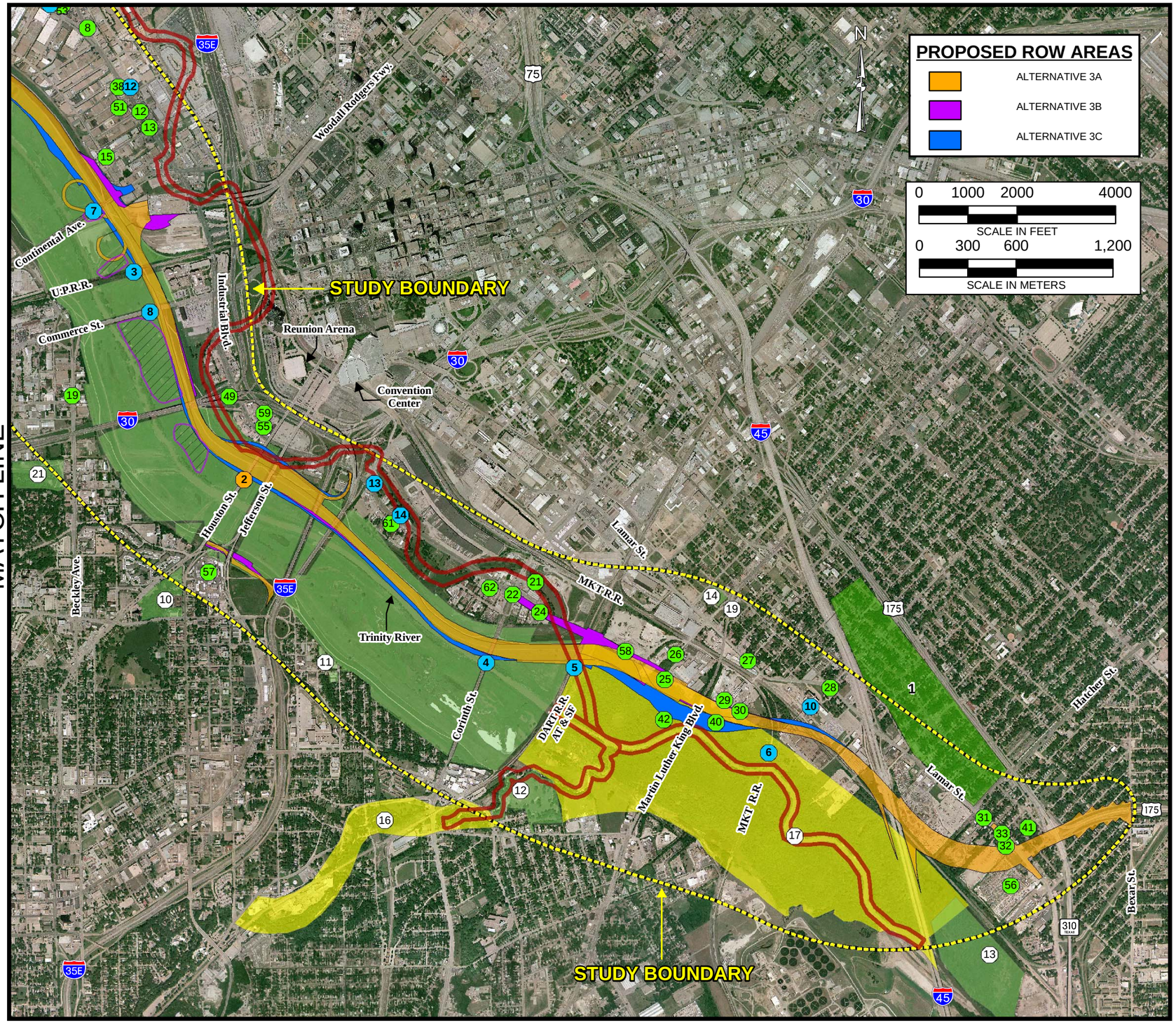


PLATE 4 - 15B

HUMAN ENVIRONMENT - ALTERNATIVES 3A/3B/3C

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

CULTURAL RESOURCES:

- 4 — NRHP - LISTED RESOURCE
- 8 — NRHP - ELIGIBLE RESOURCE
- 1 — NRHP - LISTED DISTRICT
- AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- AREA OF 2006 ARCHEOLOGICAL INVESTIGATION (BACKHOE TRENCHING)

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.7.1.2, 4.7.2.2, AND TABLE 4-29

HAZARDOUS / REGULATED MATERIALS SITES:

- 10 — POTENTIAL HIGH RISK HAZARDOUS / REGULATED MATERIALS SITE

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.17.2 AND TABLE 4-47

SOURCE: EPA AND TCEQ REGULATORY DATABASES

PARKS & RECREATION AREAS:

- EXISTING PARK OR RECREATION AREA
- PLANNED PARK OR RECREATION AREA
- 10 — PARK OR RECREATION AREA FEATURE IDENTIFIER

NOTES: LOCATIONS ARE APPROXIMATE. REFERENCE SECTION 4.7.3.2 AND TABLE 4-32

SOURCE: DALLAS PARK AND RECREATION DEPT. DALLAS COUNTY OPEN SPACE PLAN

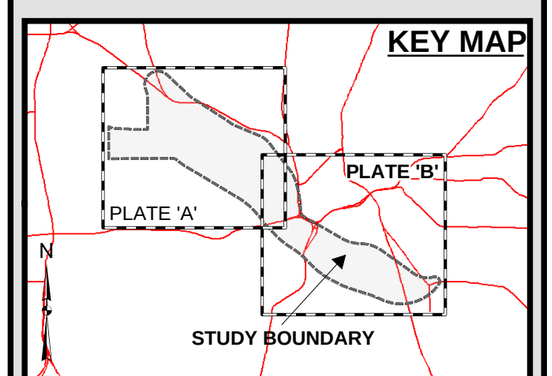
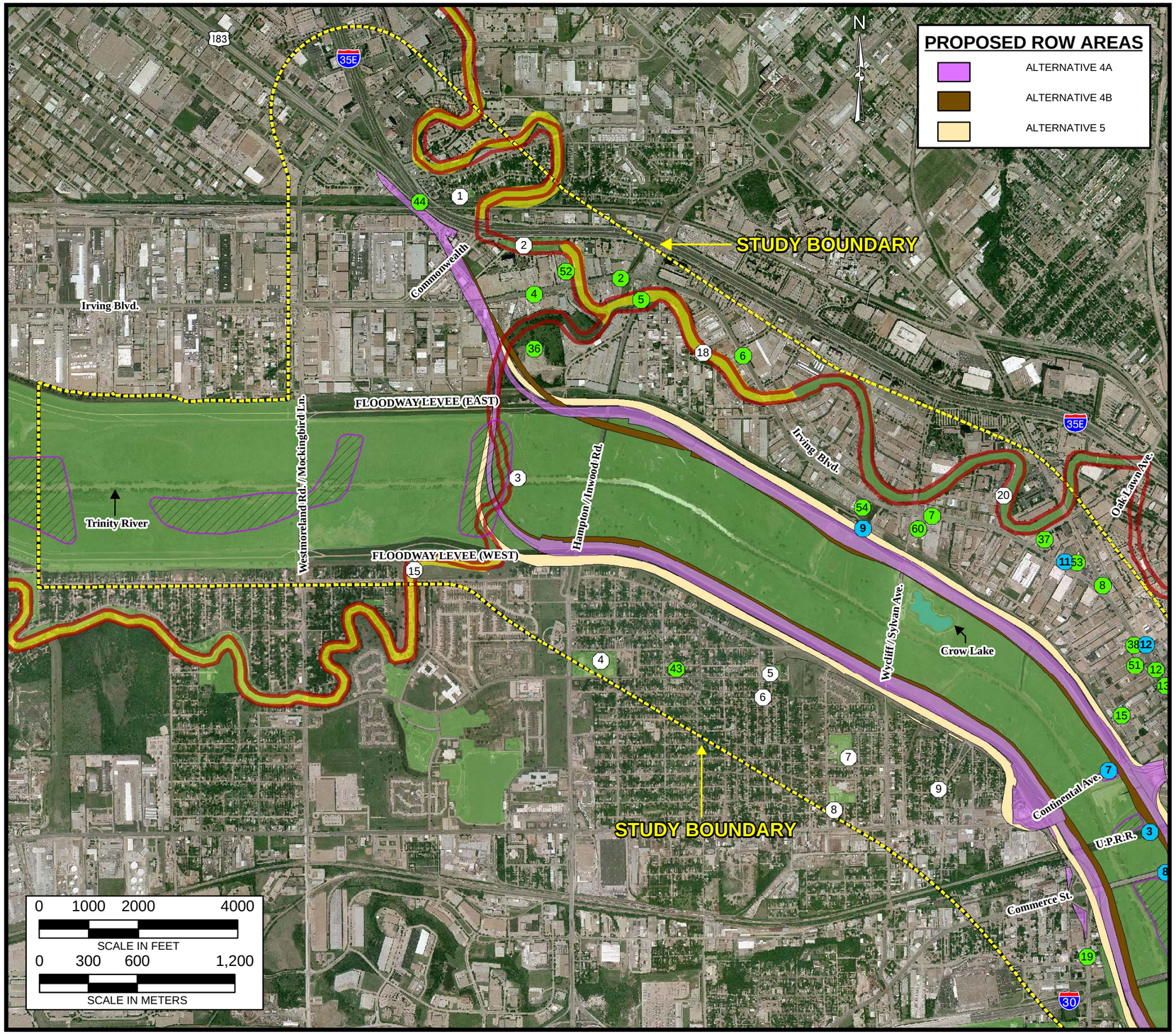


PLATE 4 - 16A

HUMAN ENVIRONMENT - ALTERNATIVES 4A/4B/5

NTTA
NORTH TEXAS TOLLWAY AUTHORITY



MATCH LINE

CULTURAL RESOURCES:

- 4 — NRHP - LISTED RESOURCE
- 8 — NRHP - ELIGIBLE RESOURCE
- AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- AREA OF 2006 ARCHEOLOGICAL INVESTIGATION (BACKHOE TRENCHING)

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.7.1.2, 4.7.2.2, AND TABLE 4-29

HAZARDOUS / REGULATED MATERIALS SITES:

- 10 — POTENTIAL HIGH RISK HAZARDOUS / REGULATED MATERIALS SITE

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.17.2 AND TABLE 4-47

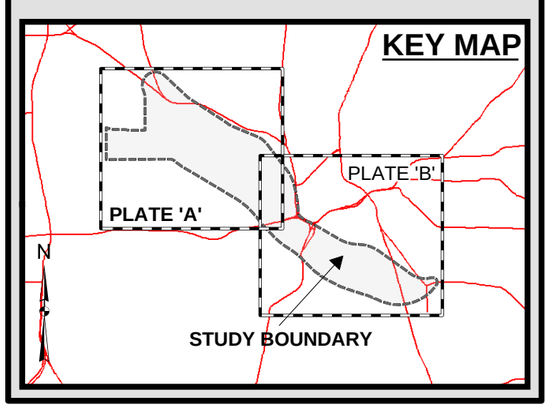
SOURCE: EPA AND TCEQ REGULATORY DATABASES

PARKS & RECREATION AREAS:

- EXISTING PARK OR RECREATION AREA
- PLANNED PARK OR RECREATION AREA
- 10 — PARK OR RECREATION AREA FEATURE IDENTIFIER

NOTES: LOCATIONS ARE APPROXIMATE. REFERENCE SECTION 4.7.3.2 AND TABLE 4-32

SOURCE: DALLAS PARK AND RECREATION DEPT. DALLAS COUNTY OPEN SPACE PLAN



MATCH LINE

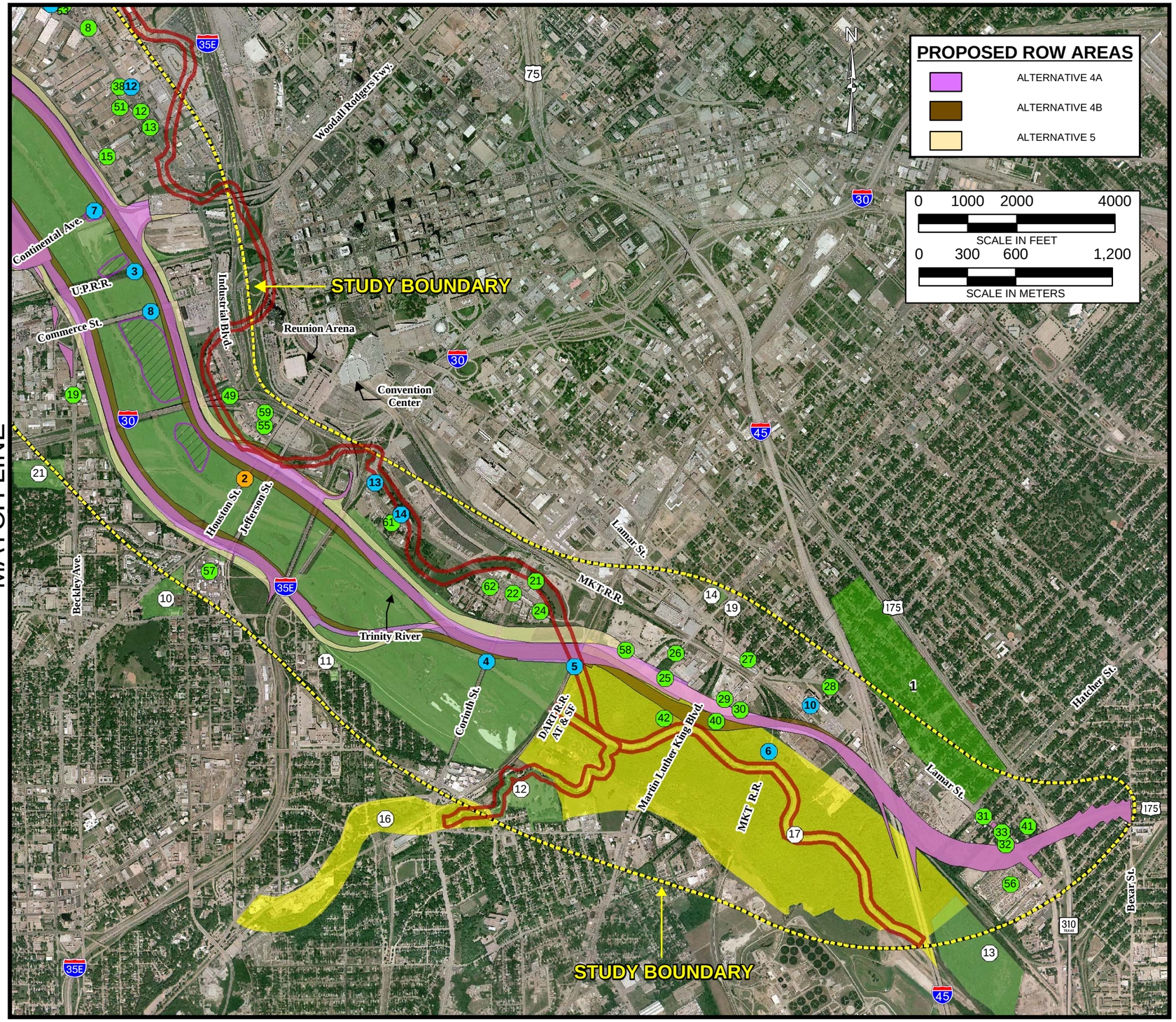


PLATE 4 - 16B

HUMAN ENVIRONMENT - ALTERNATIVES 4A/4B/5

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

CULTURAL RESOURCES:

- 4 — NRHP - LISTED RESOURCE
- 8 — NRHP - ELIGIBLE RESOURCE
- 1 — NRHP - LISTED DISTRICT
- AREA OF HIGH ARCHEOLOGICAL POTENTIAL
- AREA OF 2006 ARCHEOLOGICAL INVESTIGATION (BACKHOE TRENCHING)

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.7.1.2, 4.7.2.2, AND TABLE 4-29

HAZARDOUS / REGULATED MATERIALS SITES:

- 10 — POTENTIAL HIGH RISK HAZARDOUS / REGULATED MATERIALS SITE

NOTES: LOCATIONS ARE APPROXIMATE. REFER TO SECTION 4.17.2 AND TABLE 4-47

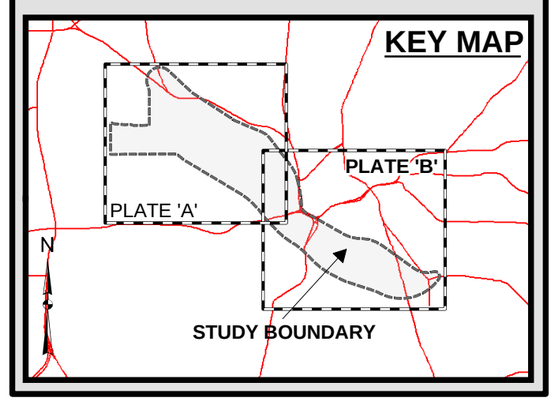
SOURCE: EPA AND TCEQ REGULATORY DATABASES

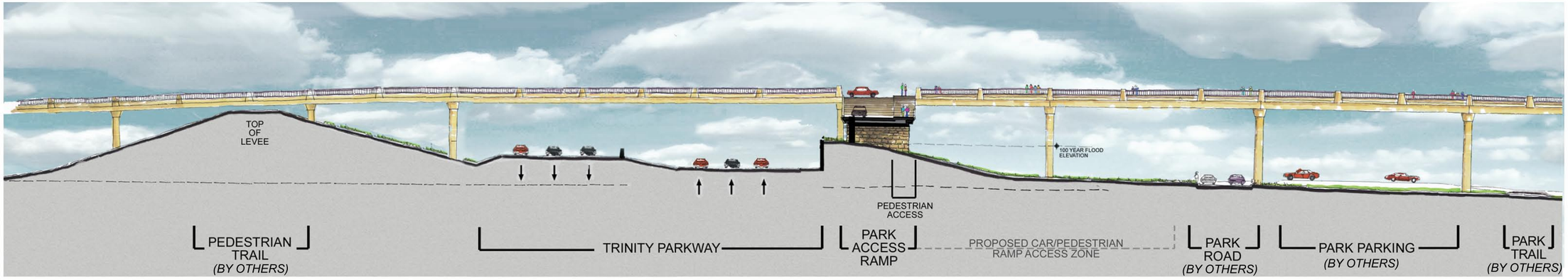
PARKS & RECREATION AREAS:

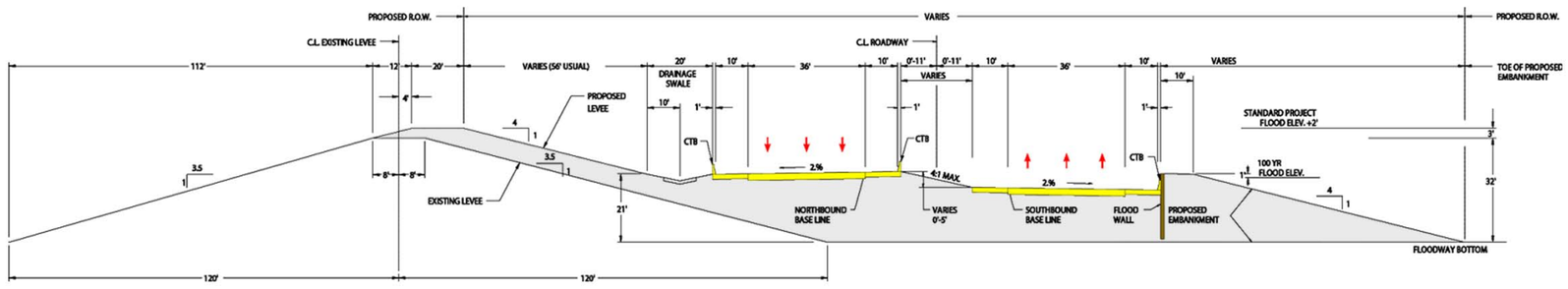
- EXISTING PARK OR RECREATION AREA
- PLANNED PARK OR RECREATION AREA
- 10 — PARK OR RECREATION AREA FEATURE IDENTIFIER

NOTES: LOCATIONS ARE APPROXIMATE. REFERENCE SECTION 4.7.3.2 AND TABLE 4-32

SOURCE: DALLAS PARK AND RECREATION DEPT. DALLAS COUNTY OPEN SPACE PLAN

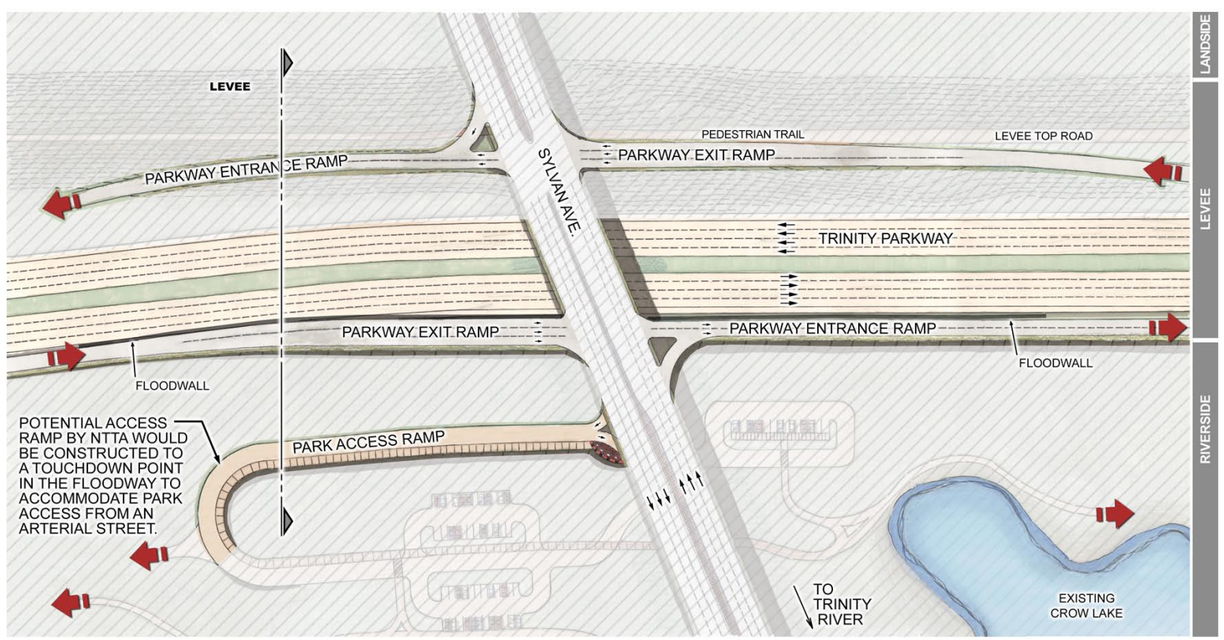






Combined Parkway (3A and 3B)

Typical Vehicular / Pedestrian / Bicycle Access
(Via **Ramp From Arterial Street**)



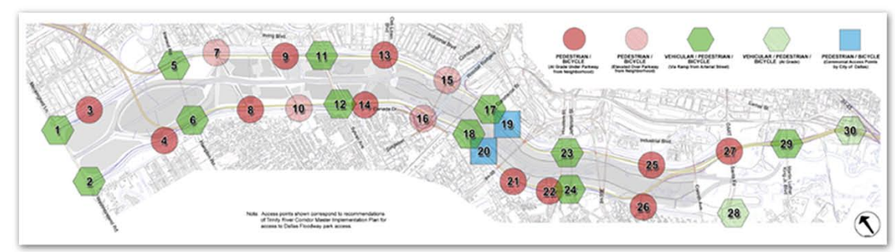
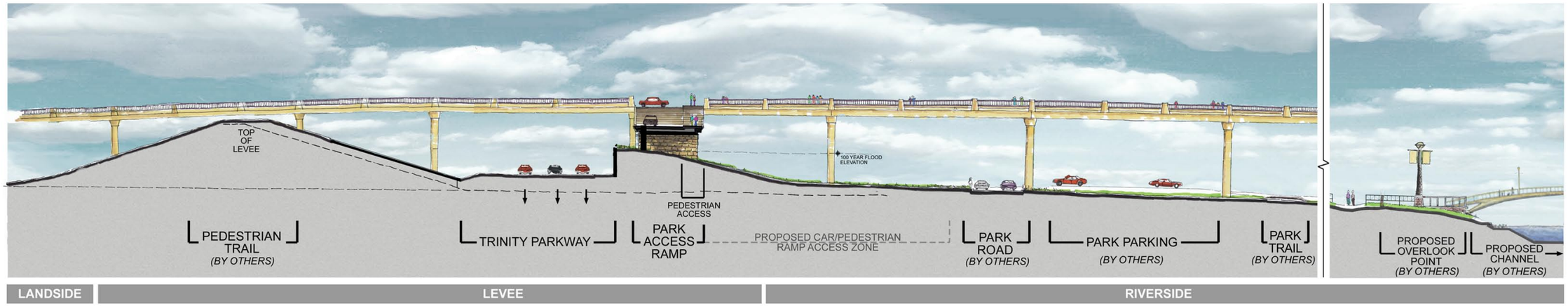
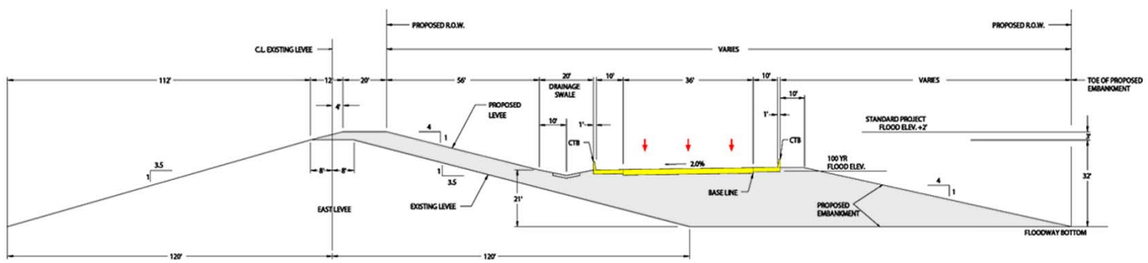


PLATE 4-17

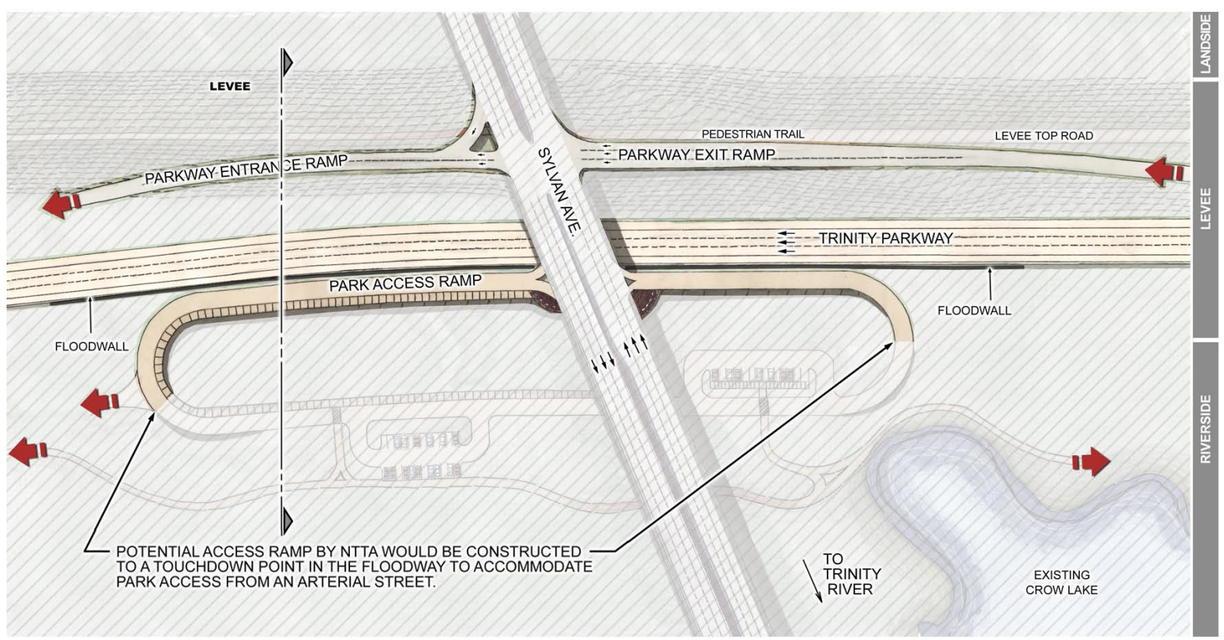
COMBINED PARKWAY ON RIVERSIDE - TYPICAL PARK ACCESS FROM ARTERIAL STREET (ALTERNATIVES 3A AND 3B)

Note: The park access improvements shown in this conceptual drawing would be subject to City and USACE review and approval. Many of the potential elements shown outside proposed Trinity Parkway right-of-way (e.g., landscaping, pedestrian trails, park road, and parking areas) would be undertaken by others, not NTTA, and are subject to change.





Split Riverside (4A)



Typical Vehicular / Pedestrian / Bicycle Access
(Via **Ramp From Arterial Street**)

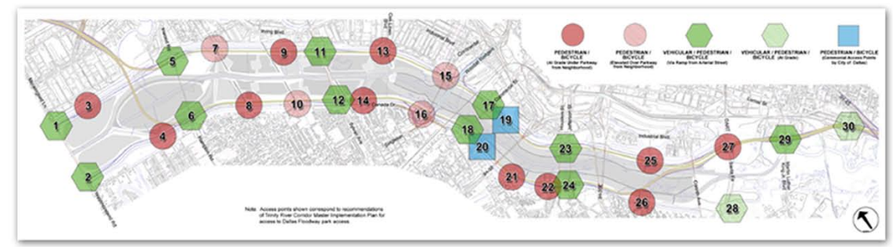
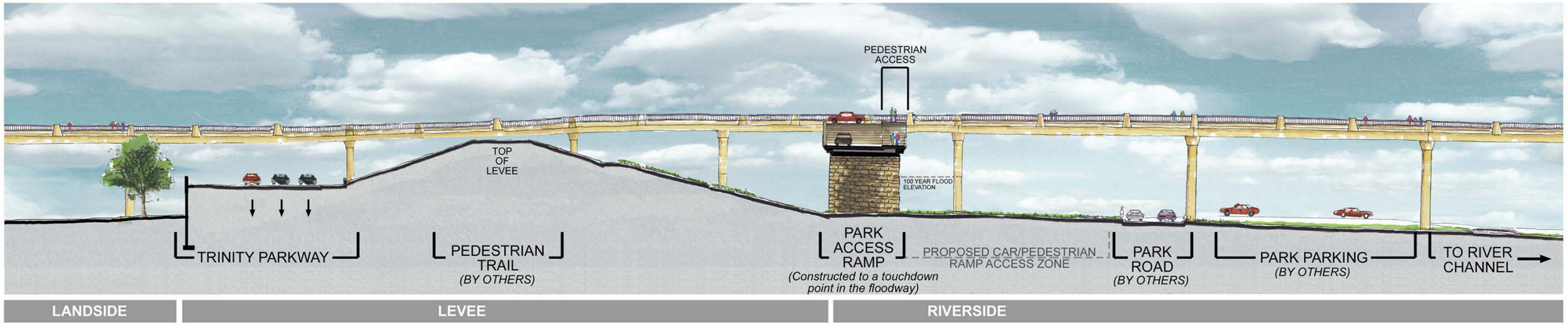


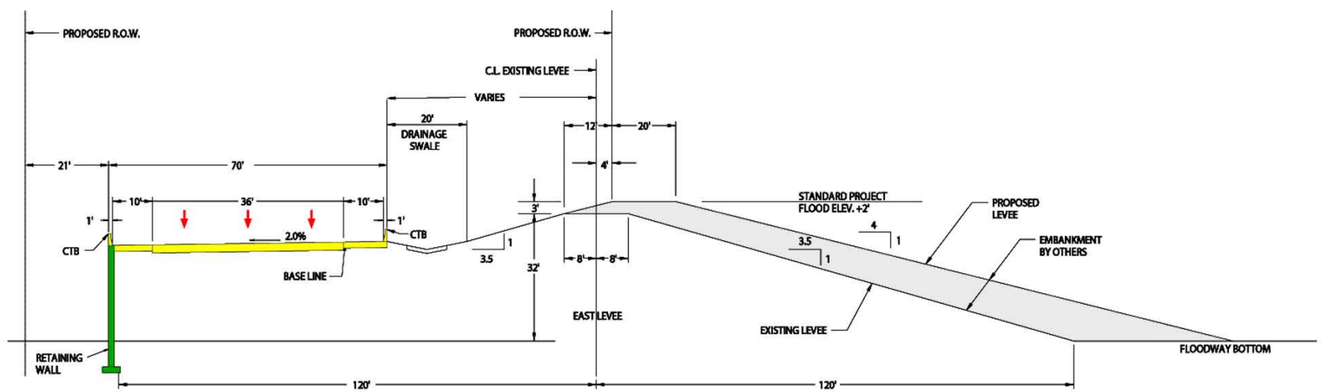
PLATE 4-18

SPLIT PARKWAY ON RIVERSIDE - TYPICAL PARK ACCESS FROM ARTERIAL STREET (ALTERNATIVE 4A)

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

Note: The park access improvements shown in this conceptual drawing would be subject to City and USACE review and approval. Many of the potential elements shown outside proposed Trinity Parkway right-of-way (e.g., landscaping, pedestrian trails, park road, and parking areas) would be undertaken by others, not NTTA, and are subject to change.





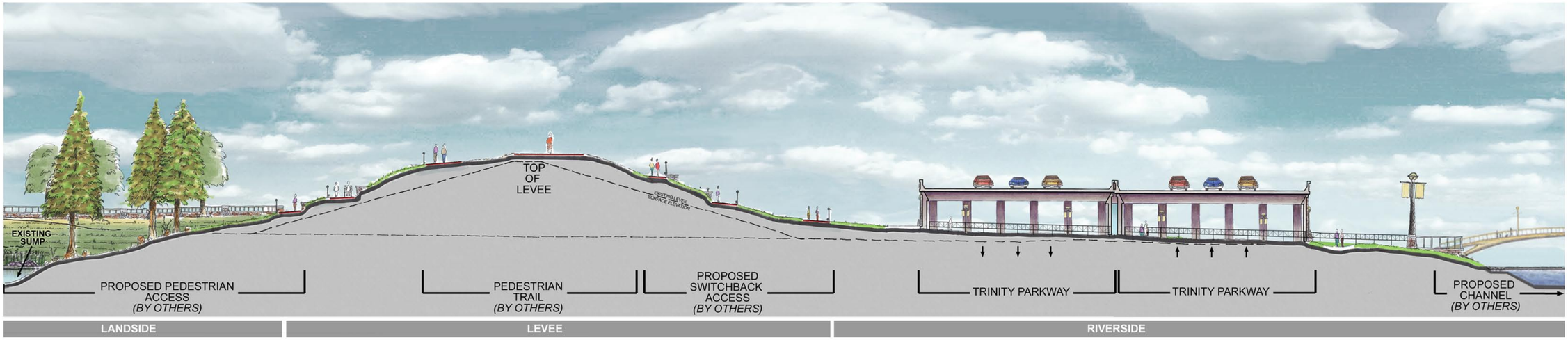
Split Landside (Alt 5)

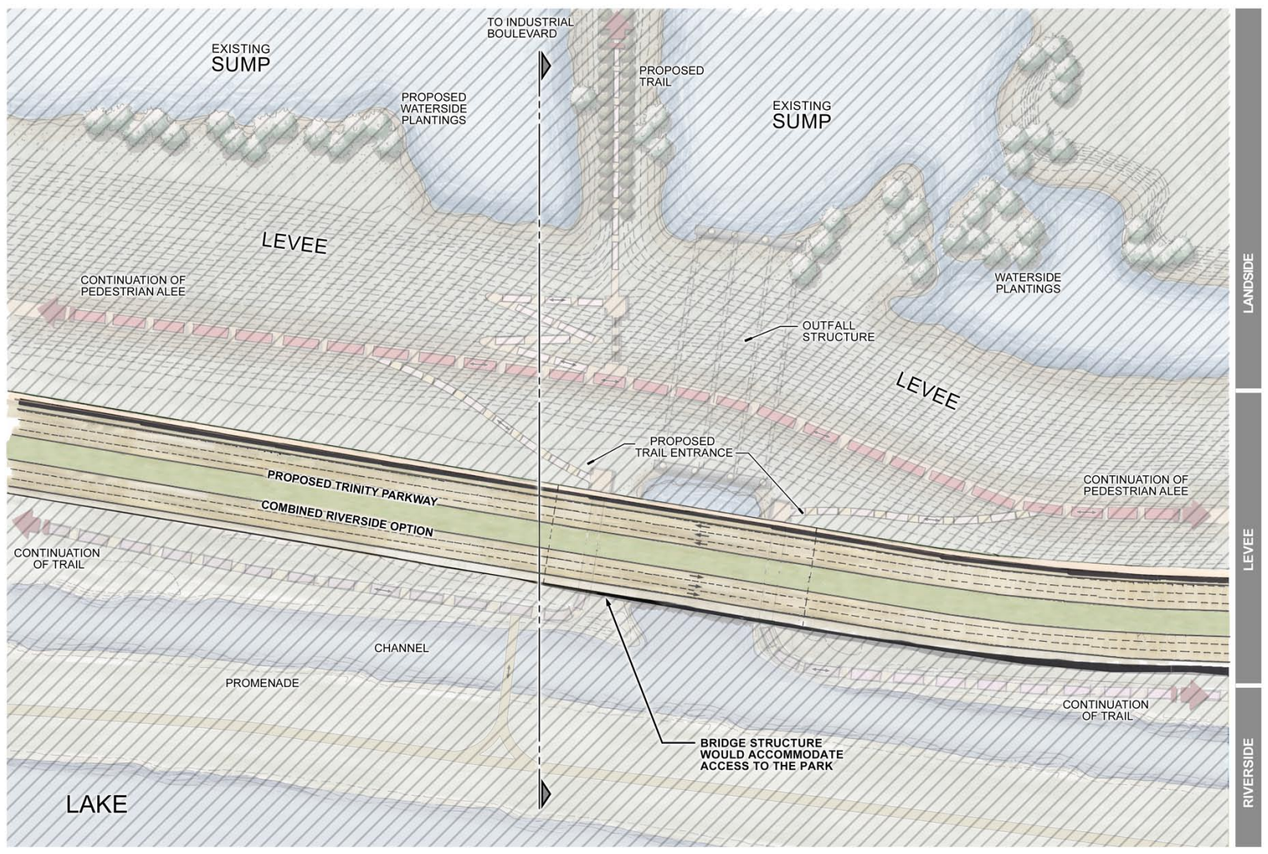
PLATE 4-19

SPLIT PARKWAY ON LANDSIDE - TYPICAL VEHICULAR / PEDESTRIAN / BICYCLE PARK ACCESS FROM EXISTING ARTERIAL STREET (ALTERNATIVE 5)

NORTH TEXAS TOLLWAY AUTHORITY

Note: The vegetation and park access improvements shown in this conceptual drawing would be subject to City and USACE review and approval. Many of the potential elements shown outside proposed Trinity Parkway right-of-way (e.g., landscaping, pedestrian promenade, park road, park trails, and parking areas) would be undertaken by others, not NTTA, and are subject to change.





Typical Vehicular /Pedestrian / Bicycle Underpass Access
(Via **Trail Under Parkway**)

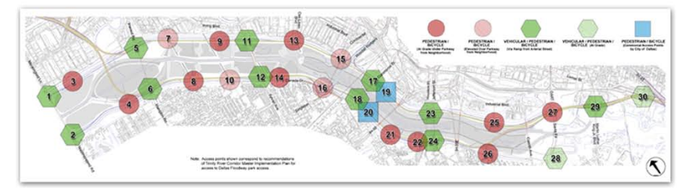
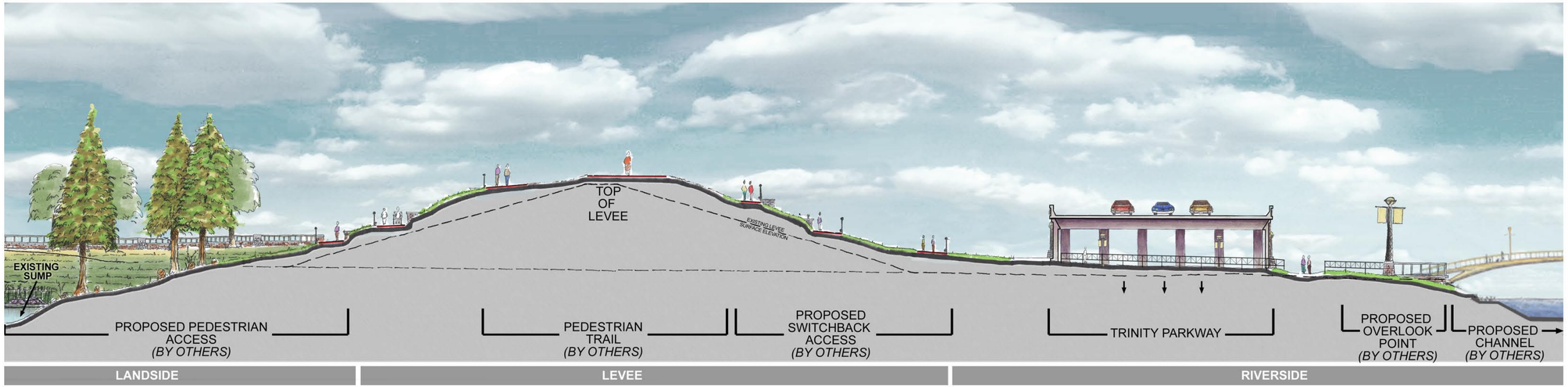


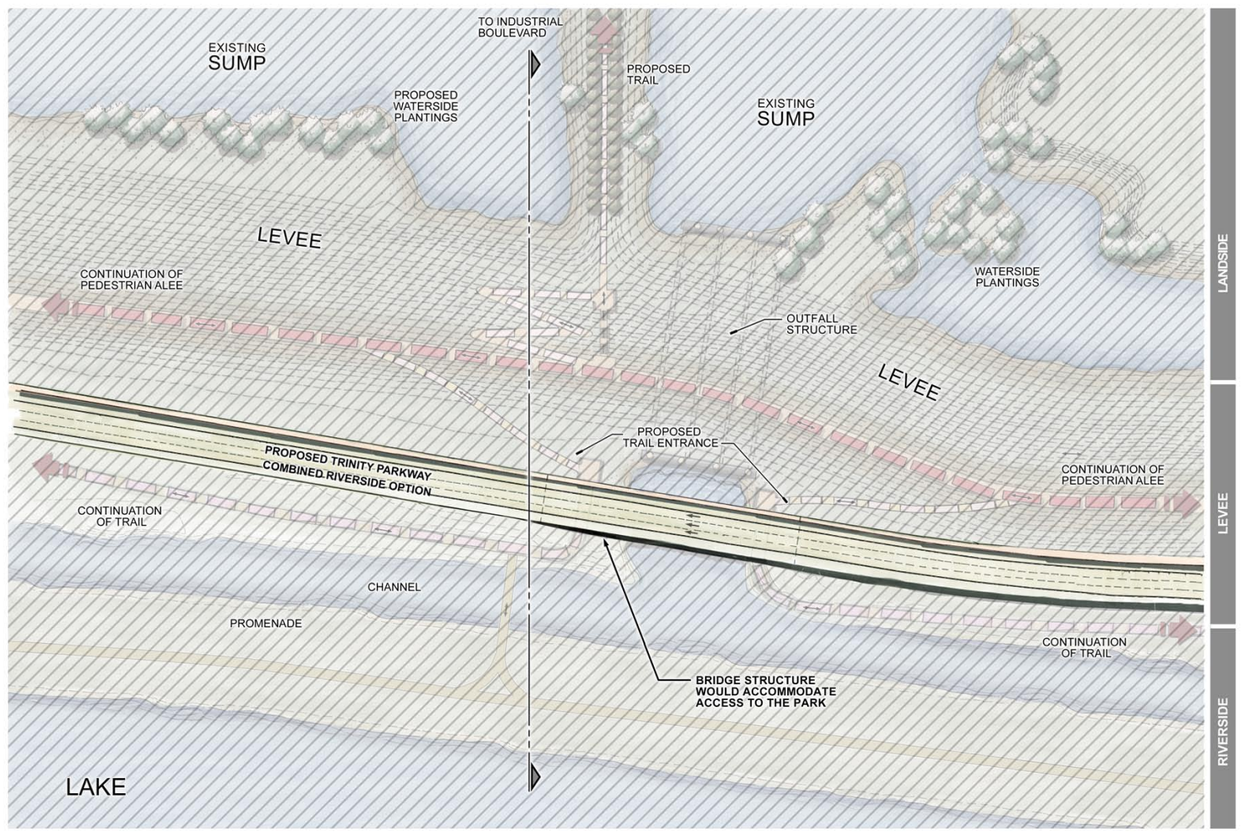
PLATE 4-20

COMBINED PARKWAY ON RIVERSIDE - TYPICAL VEHICULAR / PEDESTRIAN / BICYCLE UNDERPASS PARK ACCESS (ALTERNATIVES 3A AND 3B)

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

Note: The vegetation and park access improvements shown in this conceptual drawing would be subject to City and USACE review and approval. The potential elements shown outside proposed Trinity Parkway right-of-way (e.g., land-scaping, pedestrian promenade, park road, park trails, and parking areas) would be undertaken by others, not NTTA, and are subject to change.





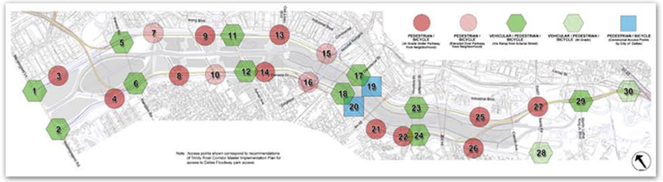
Typical Vehicular /Pedestrian / Bicycle Underpass Access
(Via **Trail Under Parkway**)

PLATE 4-21

SPLIT PARKWAY ON RIVERSIDE - TYPICAL PARK ACCESS FROM UNDERPASS (ALTERNATIVE 4A)

NTTA
NORTH TEXAS TOLLWAY AUTHORITY

Note: The vegetation and park access improvements shown in this conceptual drawing would be subject to City and USACE review and approval. The potential elements shown outside proposed Trinity Parkway right-of-way (e.g., land-scaping, pedestrian promenade, park road, park trails, and parking areas) would be undertaken by others, not NTTA, and are subject to change.



Typical Vehicular / Pedestrian / Bicycle Access (Via **Trail Under Parkway**)

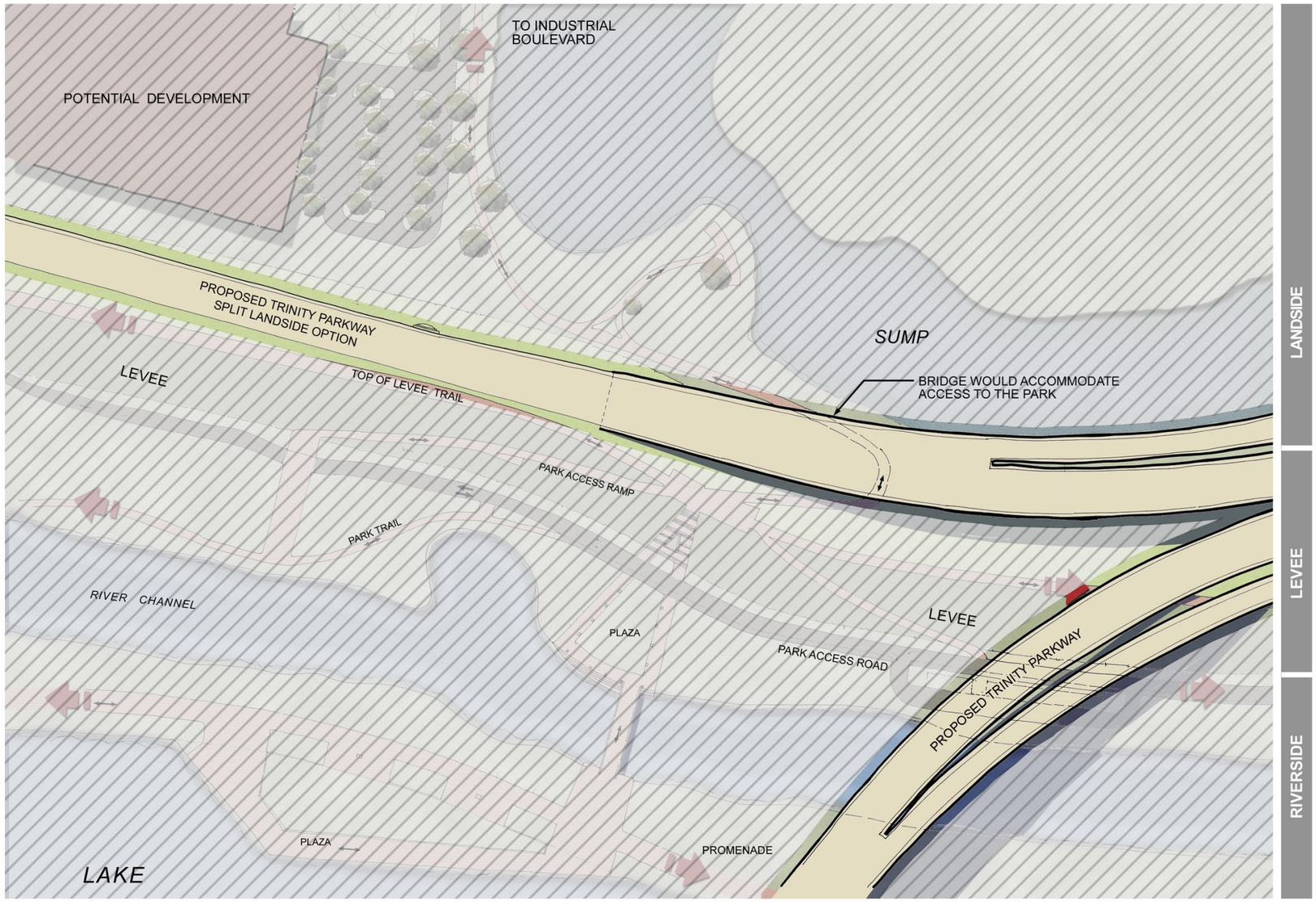


PLATE 4-22

SPLIT PARKWAY ON LANDSIDE - TYPICAL PEDESTRIAN / BICYCLE UNDERPASS PARK ACCESS (ALTERNATIVE 5)

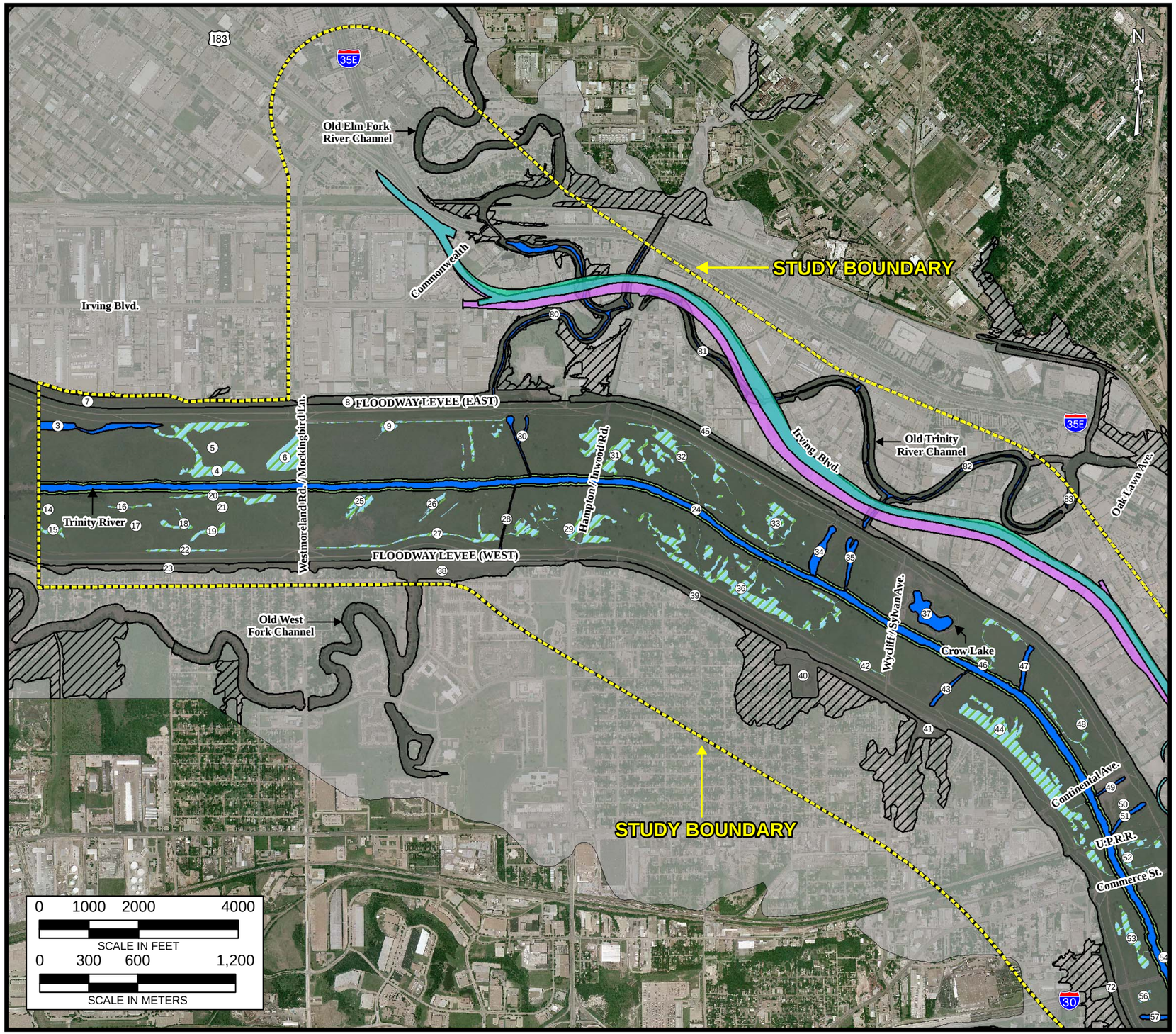
NTTA
NORTH TEXAS TOLLWAY AUTHORITY

Note: The vegetation and park access improvements shown in this conceptual drawing would be subject to City and USACE review and approval. The potential elements shown outside proposed Trinity Parkway right-of-way (e.g., land-scaping, pedestrian promenade, park road, park trails, and parking areas) would be undertaken by others, not NTTA, and are subject to change.

PLATE 4 - 23 A

NATURAL FEATURES - ALTERNATIVES 2A/2B

NTTA
NORTH TEXAS TOLLWAY AUTHORITY



MATCH LINE

PROPOSED ROW AREAS

- ALTERNATIVE 2A INDUSTRIAL BLVD (ELEVATED)
- ALTERNATIVE 2B INDUSTRIAL BLVD (AT-GRADE)

FLOOD PLAINS:

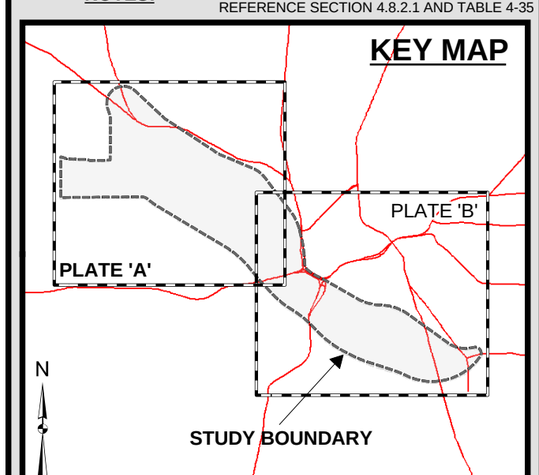
- FEMA FLOODWAY AND 100 YR FLOODPLAIN
- FEMA 100 YEAR FLOODPLAIN
- AREAS PROTECTED BY LEVEES FROM 100 YR FLOOD

SOURCE: DATED JUNE 22, 2007
48113C0160L 48113C0195L
48113C0170L 48113C0310L
48113C0180L 48113C0215L
48113C0190L 48113C0330L
48113C0305L

NOTES: LOCATIONS ARE APPROXIMATE. REFERENCE SECTION 4.13.3

WOODLANDS AND WATERS OF THE UNITED STATES

- OPEN WATER / RIVER CHANNEL
- EMERGENT WETLAND
- FORESTED WETLAND
- WOODLAND
- (10) WETLAND & WATERWAY FEATURE IDENTIFIER

NOTES: LOCATIONS ARE APPROXIMATE. REFERENCE SECTION 4.8.2.1 AND TABLE 4-35

KEY MAP