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# SUPPLEMENTAL ALIGNMENT ALTERNATIVE ANALYSIS FOR DALLAS-FORT WORTH HIGH-SPEED RAIL CORE EXPRESS SERVICE

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## **1.0 PURPOSE OF THIS ANALYSIS**

The purpose of this supplemental alternative alignment analysis for the Dallas-Fort Worth Core Express Service (DFWCES) is to make a “fresh eyes” review of the many possibilities for a high-speed (HSR) passenger rail alignment between Dallas and Fort Worth. The DFWCES Draft Environmental Impact Statement (DEIS) process resulted in two alignment alternatives: the Trinity Railway Express (TRE) corridor and the Interstate Highway (IH) 30/State Highway (SH) 360/TRE Corridor (Hybrid). Other alignments were considered in earlier studies but later eliminated for various reasons.

This supplemental analysis by the North Central Texas Council of Government (NCTCOG) reexamines several of the alignment alternatives and develops additional alignment alternatives in an effort to determine if there are other reasonable alignments that should be reconsidered as part of the DFWCES DEIS. This analysis is also intended to complement the NCTCOG HSR station location studies for the Fort Worth, Arlington, and Dallas stations. The HSR alignment compatibility with the station locations will be included in the overall evaluation of the suitability of the alignment, as well as the station location.

## **2.0 Review of Previous Studies and Reports**

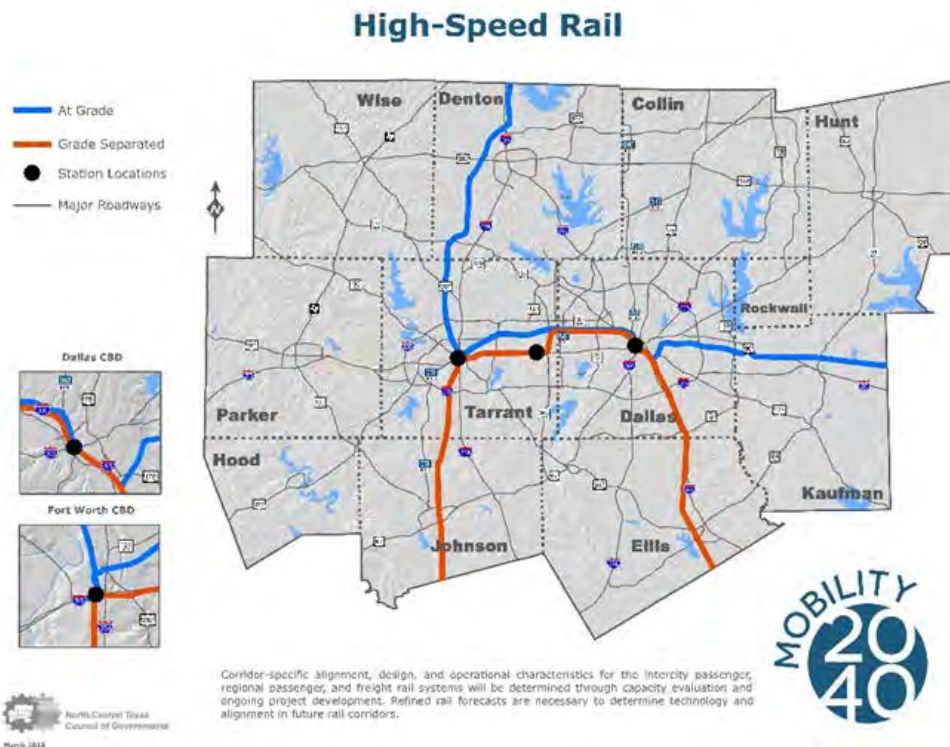
The idea of HSR between Dallas and Fort has been considered on a corridor basis and as part of the regional planning process. Two recent studies conducted by the Texas Department of Transportation (TxDOT) have developed and evaluated potential alignments. The following sections summarize the context of each study/report and recommendations. Additionally, a private effort is underway to develop HSR between Dallas and Houston.

## 2.1 Mobility 2040

The NCTCOG Regional Transportation Council (RTC), adopted *Mobility 2040: The Metropolitan Transportation Plan for North Central Texas (Mobility 2040)* as the long-range regional transportation plan for the Dallas-Fort Worth region in March 2016. *Mobility 2040* included recommendations for high-speed passenger service in four proposed corridors - Oklahoma City to South Texas, Fort Worth to Shreveport, Fort Worth to Dallas, and Dallas to Houston as identified in Figure 1. Though the plan does not specify an exact route for HSR, it does include policies related to the development and planning of HSR in the Dallas-Fort Worth region:

- TR3-005: Support the planning and development of HSR to, through, and within the North Central Texas region by leading project development efforts and coordinating with federal and state initiatives as appropriate.
- TR3-011: Establish policies fostering HSR system interoperability resulting in a “one seat ride” system operation to, through, and within the North Central Texas region.
- TR3-012: Establish policies encouraging regional access by identifying grade-separated HSR station locations in downtown Fort Worth, Arlington, and downtown Dallas.
- TR3-013: Support the planning and development of sustainable land uses near grade-separated HSR locations by coordinating with the cities of Fort Worth, Arlington, and Dallas.
- TR3-014: Support the planning and development of sustainable land uses near at-grade HSR station locations by coordinating with the cities hosting stations.

Figure 1 – Mobility 2040 HSR Recommendations



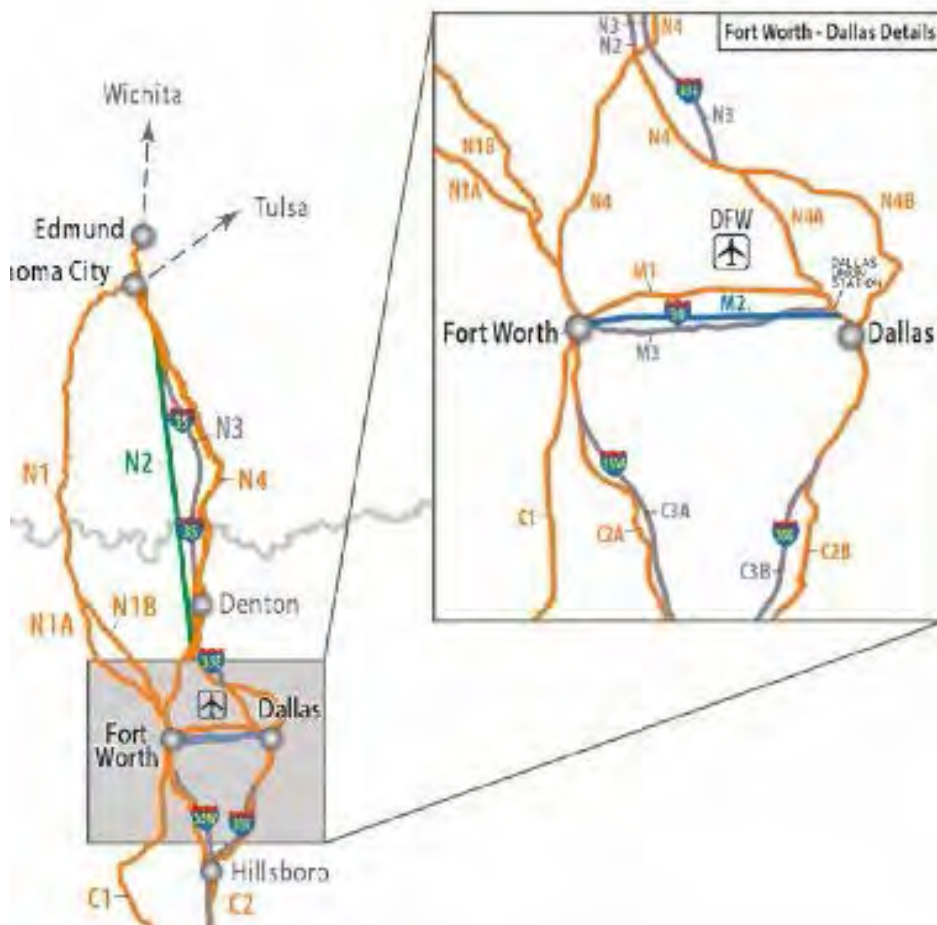
Source: *Mobility 2040*, Exhibit 6-20

## 2.2 Texas-Oklahoma Passenger Rail Study

The Texas-Oklahoma Passenger Rail Study (TOPRS) began in late 2013. The study evaluated a range of passenger rail service options along an 850-mile corridor from Oklahoma City to South Texas. The TOPRS Draft Alternatives Analysis (included in Appendix D of the TOPRS DEIS) considered three east-west routes (see Figure 2) between the Fort Worth Intermodal Transportation Center (ITC) and Dallas Union Station: M1, M2, and M3.

- M1 runs on the TRE with alternative loops to the Dallas Fort Worth International Airport and the Arlington Entertainment District.
- M2 runs on a proposed aerial structure above the median of IH 30 with an intermediate stop in Arlington.
- M3 begins at the Fort Worth ITC, then crosses Tower 55 (near the IH 30/IH 35W interchange) to enter the Union Pacific Railroad (UPRR) corridor and runs on it to Dallas Union Station with an intermediate stop in Arlington.

Figure 2 – Excerpt from TOPRS Alternative Analysis Route Map



Source: TOPRS Alternatives Analysis Report, November 2014, page 2-3

The M3 segment alternative between Fort Worth and Dallas included the possible use of UPRR track. During stakeholder meetings, UPRR advised TxDOT that they would not consider adding new intercity passenger trains to this corridor so segment alternative M3 was removed from the study.<sup>1</sup>

It should be noted that there was no clarification in the TOPRS report as to what specifically the UPRR would not consider: sharing the tracks, sharing the right-of-way or having another rail line paralleling the UPRR right-of-way. As a result of the meeting with UPRR, the study eliminated the UPRR corridor alignment and recommended two corridor concepts between Fort Worth and Dallas be carried forward into a project-level environmental impact statement (EIS) - one that parallels the TRE commuter rail corridor and one that parallels the IH 30 corridor. Both connect the downtown areas of Fort Worth and Dallas.

### **2.3 Dallas-Fort Worth Core Express Service Study**

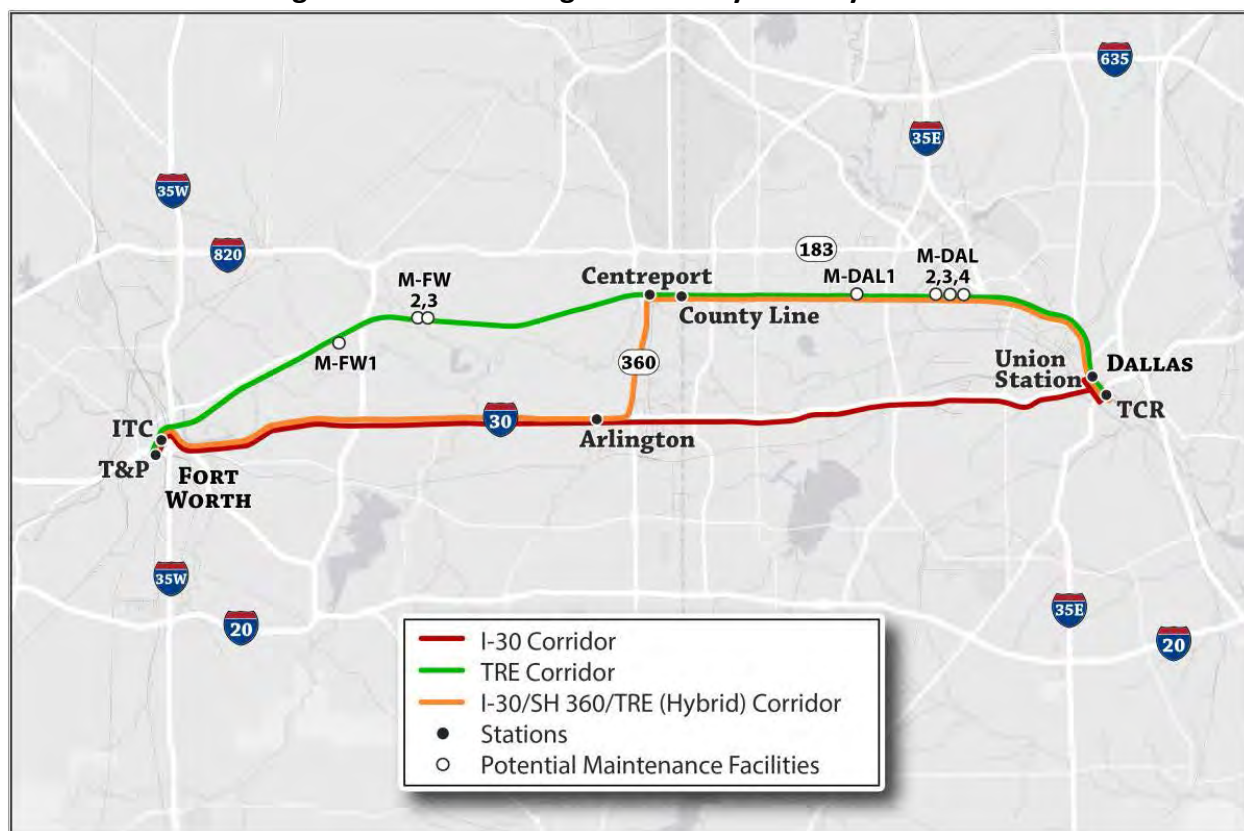
In 2014, TxDOT, in coordination with the Federal Railroad Administration (FRA), and other stakeholders, began the process of preparing an environmental study to examine the feasibility of a faster, limited-stop passenger rail service that would connect Dallas and Fort Worth to possible future HSR lines being planned. The study evaluated potential route alternatives for the DFWCES, including connections to the planned TOPRS linking Fort Worth to Oklahoma City and Laredo, Texas, and the proposed HSR line connecting Dallas to Houston. The November 2014 TOPRS Draft Alternatives Analysis was the basis for the preparation of the EIS by identifying and evaluating alternative corridors, alignments, stations, and maintenance facilities for the project.

As part of the EIS scoping process for the DFWCES, NCTCOG suggested additional potential corridors that would connect the TRE and IH 30. Based on input from NCTCOG, a third corridor that combined alignment portions of IH 30 from Fort Worth to SH 360 and the TRE from SH 360 to Dallas was added for consideration in early 2015. Figure 3 shows the corridors considered. Three operating speeds were considered for each of the corridor alternatives: 90 miles per hour (mph), 125 mph, and 220 mph.

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<sup>1</sup> TOPRS DEIS Appendix D Alternatives Analysis Report, page 2-5

Figure 3 – DFWCES Alignment Analysis Study Corridors



Source: DFWCES Alternatives Analysis Final Report, June 2017, page ES-4

The study used a two-step screening process to evaluate alternatives using criteria based on the purpose and need, engineering feasibility, and environmental considerations. The first step eliminated alternatives that did not meet the overall project purpose and need, engineering feasibility, or had environmental fatal flaws.

Based on the Step 1 evaluation, the IH 30 Alternative Corridor best met the purpose and need; however, this corridor was determined to be fatally flawed for the following reasons and was eliminated:

- It is not consistent with the active planning and construction initiatives of IH 30 between SH 360 and downtown Dallas (e.g., IH 30 managed lanes, SH 360 interchange).
- The complexity of its construction and impact on multi-level interchanges in Dallas County [IH 30/President George Bush Turnpike (PGBT) and IH 30/IH 35E] along IH 30 significantly increases the construction cost compared to the other corridor alternatives.

The second step evaluated alternatives based on purpose and need, financial considerations, regional development, connectivity, and several environmental screening factors. The study determined the two remaining alternatives (TRE corridor and the IH 30/SH 360/TRE Hybrid corridor) were both viable corridors. The project team produced plan-profile drawings of these



two alternatives, which provided a moderate amount of detail regarding the horizontal and vertical alignments.

The DFWCES Draft Alternatives Analysis report was produced in draft form in December 2015 with the final report published in June 2017. In late 2016, the DFWCES DEIS was placed on hold due to expiration of project funding.

## **2.4 HSR Dallas to Houston**

Texas Central Partners (TCP) is a private entity funding and developing an EIS study for a proposed HSR system between the Dallas and Houston areas. The proposed alignment generally follows the north-south UPRR in Dallas County with a proposed terminal station near IH 30 and Lamar, just south of downtown Dallas. TCP proposes Japanese Shinkansen high-speed rail technology. TCP has committed to constructing and operating the proposed system without public funding.

## **3.0 METHODOLOGY**

As shown in Figure 4, the process for this supplemental alignment study included four major steps: review of previous studies and reports, establishment of design criteria and evaluation criteria, development of alignments, and alignment evaluation. The following sections describe the information and methodology used during this process.

**Figure 4 – NCTCOG Supplemental Alignment Alternative Analysis Study Process**



### **3.1 Design Standards**

A search for available HSR design standards was conducted. There are no uniform, adopted design standards for HSR in the US. Although some information was found on the Japanese technology being used for the Dallas to Houston TCP project, specific engineering specifications were not available. Design standards (see Figure 5) for the California high-speed rail project were available and provided more detail. These criteria were used as a basis for the development of the alignments and typical sections.

**Figure 5 – California High-Speed Train Design Criteria**



Source: [http://www.hsr.ca.gov/docs/programs/eir\\_memos/Proj\\_Guidelines\\_TM2\\_1\\_2R00.pdf](http://www.hsr.ca.gov/docs/programs/eir_memos/Proj_Guidelines_TM2_1_2R00.pdf)

### 3.1.1 Horizontal Curvature

Minimizing the sharpness of horizontal curves is a key factor in enabling the train to achieve high speeds and reduced travel time. Using the recommendations in the California design standards, Table 1 was compiled to show the relationship between speed and curvature.

**Table 1 – HSR Minimum Curvature Radii**

Speed	Radius (feet) based on Superelevation			Degree of Curvature (degree, minutes, seconds)		
	Desirable <sup>a</sup>	Minimum <sup>b</sup>	Exceptional <sup>c</sup>	Desirable <sup>a</sup>	Maximum <sup>b</sup>	Exceptional <sup>c</sup>
40 <sup>1</sup>	1,000	700	580	5d21m00s	8d01m30s	9d48m45s
60 <sup>1</sup>	2,400	1,600	1,300	2d22m15s	3d33m45s	4d21m15s
79 <sup>1</sup>	4,100	2,700	2,500	1d22m00s	2d03m15s	2d17m00s
90 <sup>1</sup>	5,400	3,600	2,900	1d03m00s	1d34m45s	1d56m00s
110 <sup>1</sup>	8,100	5,400	4,400	0d42m00s	1d03m15s	1d17m15s
125 <sup>1,2</sup>	10,500	7,000	5,700	0d 32m 30s	0d 49m 00s	0d 41m 45s
220 <sup>1,2</sup>	35,000	22,000	19,500	0d 9m 45s	0d 15m 30s	0d 17m 30s

Sources: 1. Draft DFWCES Conceptual Basis of Design Report, December 2015

2. California High-Speed Train Project Design Criteria, March 2019

Notes: a. Desirable: Basis of engineering design.

b. Maximum/Minimum Values: Limiting values, to be used as infrequent as possible.

c. Exceptional Values: Extreme permissible values and should be avoided if at all possible.

The sharpness of curves impacts the amount of right-of-way that must be acquired. Smaller degrees of curvature can require the alignment to traverse away from the existing transportation corridors and into areas populated with residential, commercial, or industrial property. Sharp curves (higher degrees of curvature) can minimize the impact on adjacent property by more closely following an existing transportation or utility corridor; however, sharper curves reduce the speed at which the train can operate.

### **3.1.2 Vertical Curvature**

The operating speed of a high-speed train is also controlled by the vertical alignment. Vertical alignments for passenger trains are set to provide a comfortable vertical acceleration rate, to account for the limits of the braking capability of trains, and to minimize the power needed to operate the train. The desirable grade in the California HSR design standards is 1.25 percent or lower with an absolute maximum grade of 2.5 percent. Draft DFWCES standards listed 1.5 percent as a desirable grade for the mainline track with 2.5 percent as an absolute maximum.

Vertical clearance over highways and railroads was not specifically addressed in the California HSR specifications; however, the assumptions used in the development of alignments for DFWCES were:

- Minimum clearance over roadways is 17 feet plus 11 feet for bridge structure
- Minimum clearance over railroads is 24 feet plus 11 feet for bridge structure
- Clearance from top of HSR to overhead structure is 24 feet
- Straddle bents add 6 feet of depth

### **3.1.3 Conceptual Typical Sections**

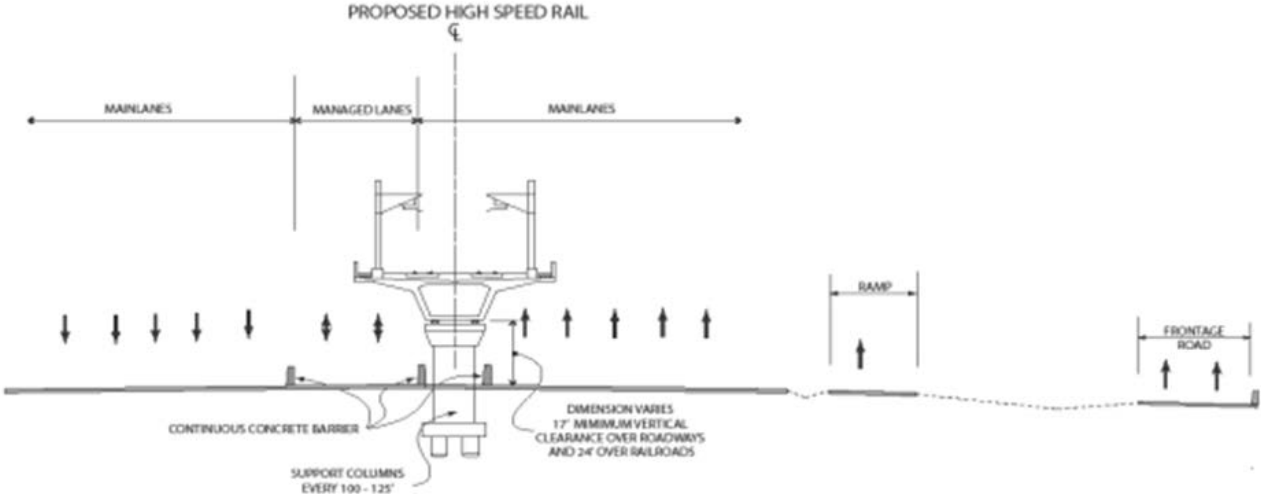
Because of the higher operating speed, HSR must be within an exclusive guideway system and completely isolated from other modes of transportation. For this analysis, it was assumed that the HSR tracks will be elevated to pass over existing roadways and railroads.

Figures 6 through 8 show conceptual typical section of a possible HSR facility. Figures 6 and 7 show HSR within the median or adjacent to IH 30. Figure 8 shows how the guideway could be adjacent to an existing railroad corridor. The potential HSR facility will have its own exclusive right-of-way adjacent to railroad right-of-way, but in the case of existing IH 30, it could share the existing right-of-way. Whenever the distance from the roadway to the support structure is insufficient for safety, it must be protected from the other modes of transportation with physical barriers as shown in Figures 6 and 7.



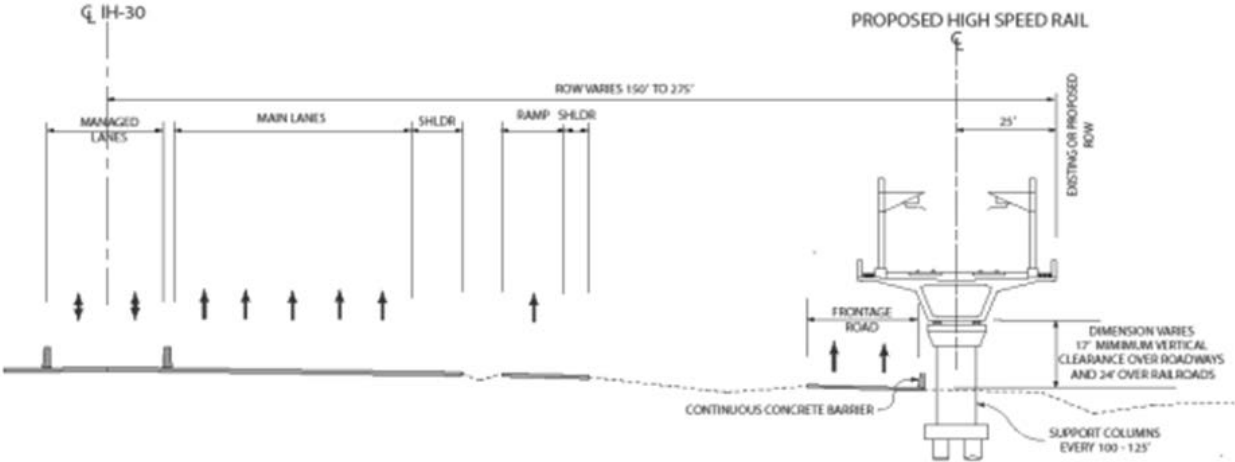
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Figure 6 – Conceptual Typical Section IH 30 from Fort Worth to SH 360



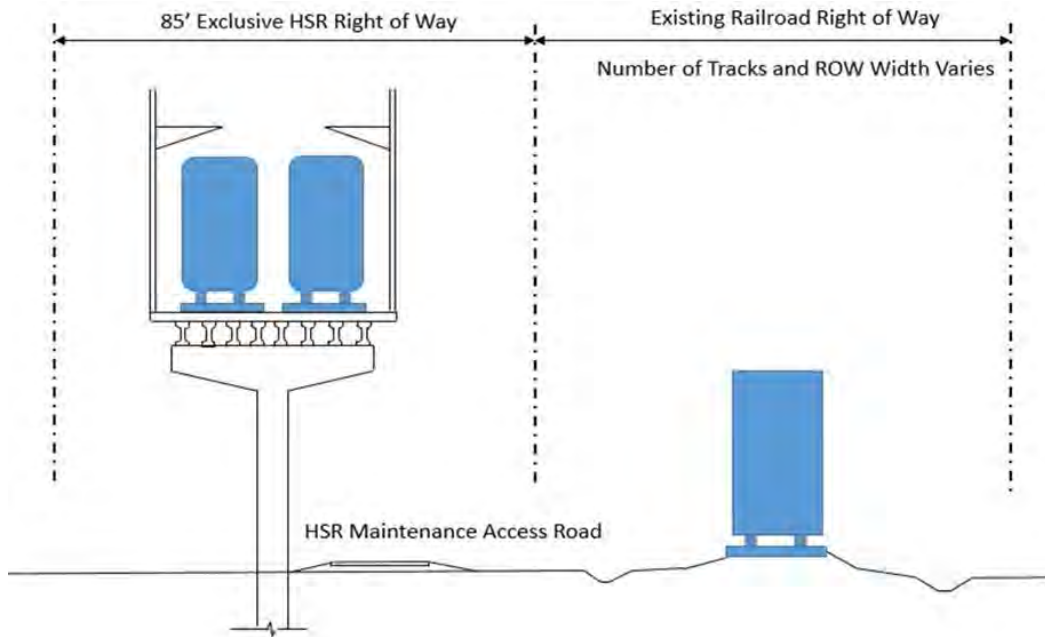
Source: NCTCOG, 2017

Figure 7 – Conceptual Typical Section IH 30 from PGBT to Loop 12



Source: NCTCOG, 2017

**Figure 8 – Conceptual Typical Section Showing HSR Adjacent to a Railroad**



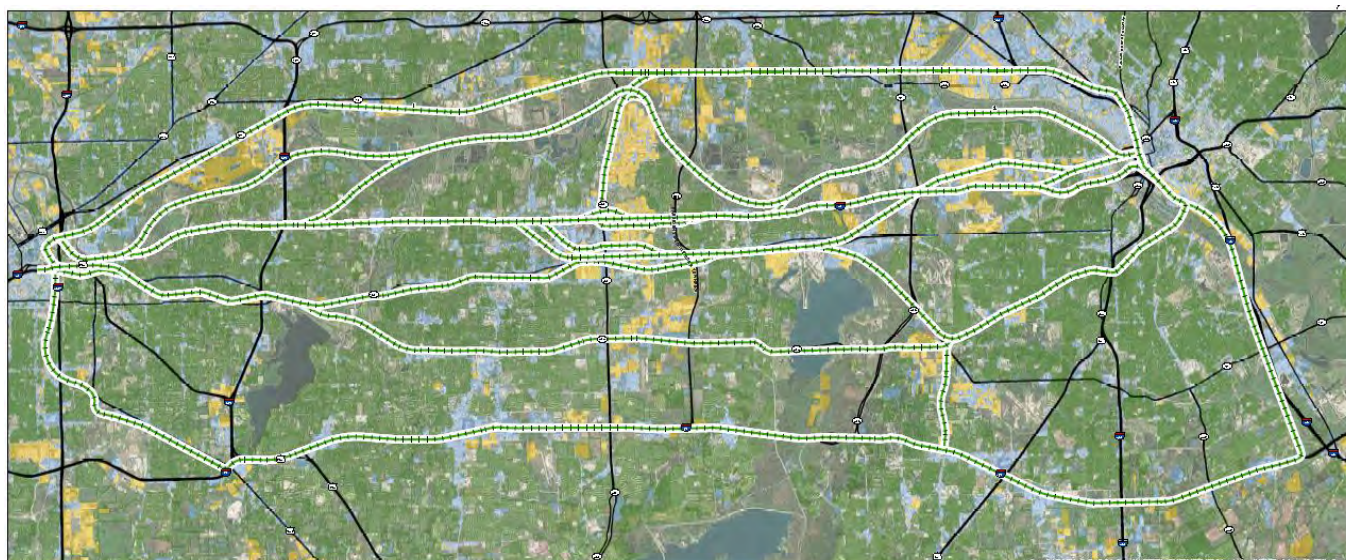
Source: NCTCOG, 2017

### 3.2 Development of Alignment Alternatives

The purpose of this study is to provide a “fresh eyes” review of the possible alignment alternative for HSR between Fort Worth and Dallas. The NCTCOG team mapped previous alignment alternates from earlier efforts of TOPRS and DFWCES DEIS, and also studied additional alignment alternatives in the UPRR, SH 303, and IH 20 corridors.

Fourteen alignment alternatives were identified for analysis (see Figure 9). This includes the two alternatives included in the latest draft version of the DFWCES DEIS. In general, these alignment alternatives follow existing west to east manmade and natural corridors: TRE, West Fork Trinity River, IH 30, UPRR, SH 303, and IH 20. Appendix A includes larger scale maps of each alternative. Where possible, the DFWCES HSR would be located within the right-of-way of the existing transportation corridor. It should be noted that in all alignment alternatives parallel to the UPRR tracks, the DFWCES HSR would not occupy the UPRR right-of-way. The elevated track would be in its own adjacent and parallel right-of-way.

Figure 9 – NCTCOG Developed Alignment Alternatives



Source: NCTCOG, March 2017

As part of the alternatives analysis process, a peer review was conducted utilizing members of NCTCOG staff. Approximately 20 staff members from all areas of the NCTCOG Transportation Department met on November 30, 2016. An overview of the DFWCES HSR alignment alternatives analysis was presented, along with a map showing the 18 alignment alternatives. The group was asked to list the pros and cons for each alternative, rank all alternatives in relation to one another, and provide suggestions for any revisions to the alignments. The comments from the peer review were compiled into a spreadsheet included as Appendix B to this report. The results were used to aid in prioritizing the alternatives and identifying fatal flaws in the alignments.

Additionally, using available information from the DFWCES DEIS plan-profile sheets of the TRE and hybrid alignments and construction plans for some of the interchanges on IH 30, an approximate top of rail elevation and the distance above natural ground at a few points along the alignments was analyzed. Although not exact, this analysis provides an evaluation of the reasonableness of the vertical profile and clearances above natural ground and structures at key points along the route. In general, the height of the rail will be governed by the minimum distance above roadways and railroads.

### 3.3 Evaluation Criteria and Matrix

To evaluate the relative pros and cons of the 18 different alignment alternatives identified, several criteria were selected based on desired performance outcomes and available data to help distinguish the differences between the alignment alternatives:

- Length – The length of the alignment can be used as an indication of the project cost and the travel time. Although most of the 18 alignment alternates were within 5 percent of one another, the outliers such as the IH 20 corridor stood out as the least desirable.

- Percentage on or adjacent to existing transportation corridor – Locating the new HSR infrastructure (e.g., elevated viaduct, tracks, support structures) next to an existing transportation corridor, whether it be a highway or a railroad, is generally perceived as less disrupting to adjacent landowners and residents than routing the new tracks through a greenfield. This criterion lists the percent of the alignment length that is within or adjacent to an existing transportation corridor such as IH 30 or UPRR.
- Percent length adjacent to residential areas – To minimize impacts (e.g., noise, visual intrusion) to residential areas, this criterion was included. The lower the percentage of the alignment adjacent to residential areas, the lesser residential impacts by the alignment.
- Number of public facilities within 100 feet – Using geographic information system (GIS) capabilities, the number of public facilities within 100 feet of the new HSR right-of-way were counted. Impact on schools, places of worship, municipal, and other public buildings will weigh on the acceptability of an alignment alternative.
- Percent length above 125 mph – Current HSR technology will enable trains to travel at speeds in excess of 250 mph. Although the speed of DFWCES alignments will be limited due to the distance between Fort Worth and Arlington (approximately 15 miles) and Arlington to Dallas (approximately 15 miles), it is important to configure the alignment so the HSR can achieve the fastest speed for the longest duration possible. This results in the lowest travel time, a desired outcome of the system. Using the capabilities of GIS, the length of the straight segments (not including curved segments) were measured and compared to the entire length as a percentage. It should be noted acceleration and deceleration distances resulting from curves and stations were not considered in the analysis.
- Meets “one seat ride” policy – The RTC has approved a policy of a “one seat ride” for the HSR system in the Dallas-Fort Worth region. This applies to not only the TCP project from Houston to Dallas, but also the Fort Worth to San Antonio leg of the proposed system. This criterion response is a simple “YES” or “NO.” It should be noted that a “NO” does not constitute a fatal flaw in the analysis but only an indication of a pro or con.
- Meets three-station policy – The RTC also approved a policy of having three HSR stations: Fort Worth, Arlington, and Dallas. This criteria response is a simple “YES” or “NO.” A “NO” response does constitute a fatal flaw in this analysis.
- Adjacent to former Dallas Naval Air Station – The attractiveness of the former Dallas Naval Air Station near Lake Mountain Creek Lake in Dallas as a repair facility for HSR rolling stock is highlighted in this criterion as a pro or a con.

## **4.0 Screening Results**

The alignment alternative evaluation matrix was populated with data from GIS and responses to the YES and NO questions. Data ranges were established and used to represent answers as minimal impact (green), moderate impact (yellow), and significant impact (red). An additional category color (purple) was added to represent a fatal flaw condition. A column was added for comments related to significant issues and fatal flaws. The color-coded criteria matrix was refined and adjusted based on input from the evaluation team and peer review session. An excerpt of the evaluation matrix is shown in Figure 10. The full spreadsheet can be found in Appendix C.



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**Figure 10 – Excerpt from Evaluation Matrix**

Map Reference Number	Alignment Option	Alignment Description (West to East)	Length (Miles)	% Length On or Adjacent to Existing Transportation Corridor	% Length Adjacent to Residential Areas	Number of Public Facilities Within 100 Feet	% Length Above 125 mph <sup>1</sup>	Secondary Criteria			Issues and Fatal Flaws (FF)
								Meets One-Seat Ride Policy <sup>2</sup>	Meets Three-Station Policy	Adjacent to Former Dallas Naval Air Station	
1	TRE Corridor	Alignment shares part the TRE right of way from Fort Worth to the proposed Dallas TCR station	33.7	100.0%	0.4%	11	93.9%	YES	NO	NO	Irving opposition; No Arlington Entertainment District Station; right of way constraints through Irving; Residential neighborhood impacts
2	IH 30 / West Fork Trinity River Corridor (near Fort Worth)	Alignment is within the IH 30 right of way until just east of Fort Worth where it curves north to follow the West Fork Trinity River basin until it crosses the Trinity River and then it parallels the UPRR right of way to the proposed Dallas TCR station	35.2	13.0%	2.1%	3	65.0%	YES	NO	NO	Trinity River environmental impacts; No Arlington Entertainment District Station; Circuitous route resulting in slower speed
3	IH 30 Corridor	Alignment is within the IH 30 right of way from Fort Worth to the proposed Dallas TCR station	32.1	93.8%	0.2%	4	93.0%	YES	YES	NO	Conflict with SH 360, PG&T, Loop 12, Hampton and IH 30/IH 35E Interchanges (FF)
3A	IH 30 Corridor Adjusted	Alignment is within the IH 30 right of way except for adjustments to avoid SH 360, PG&T and Loop 12 Interchanges. Alignment then shifts at Hampton Rd to be adjacent to the UPRR right of way all the way to the proposed Dallas TCR station	32.2	97.3%	0.2%	3	88.6%	YES	YES	NO	Added cost of right of way to avoid interchanges; Additional curves results in slower speed
4	IH 30/Entertainment District/UPRR Corridor (Station between Stadiums)	Alignment is within IH 30 right of way until Arlington entertainment district where it traverses between AT&T and Globe Life Stadiums then parallels UPRR right of way all the way to the proposed Dallas TCR station	32.7	88.1%	1.8%	8	89.9%	YES	YES	YES	Added cost for right of way to parallel UPRR right of way
4A	IH 30/Entertainment District/UPRR Corridor (Station at Globe Life Park)	Alignment is within IH 30 right of way until Arlington entertainment district where it traverses through site of old Globe Life Stadiums then parallels UPRR right of way all the way to the proposed Dallas TCR station	32.7	91.0%	1.6%	10	89.9%	YES	YES	YES	Added cost for right of way to parallel UPRR right of way

### 4.1 Review of Alignment Options

The following provides a description of each alignment option, along with the pros and cons and recommendations. Appendix A includes maps for each alignment option.

#### Alignment Option 1 - TRE Corridor

This alignment shares part of the TRE rail right-of-way from downtown Fort Worth to the proposed TCP station in Dallas. The DFWCES tracks would be parallel to the TRE tracks and would be constructed on an elevated structure, which would provide for a completely closed system. Although the HSR and TRE would not share tracks, the lines would share right-of-way in some areas. This alignment is one of the two alternatives that are included in the latest draft of the DFWCES DEIS.

Two advantages of this alignment are it is not much longer than the IH 30 or UPRR corridor alignments and it does parallel an existing transportation corridor. A partial sharing of right-of-way is also an advantage.

However, the alignment does not provide for a station in the Arlington Entertainment District. This could be considered a fatal flaw by the RTC; however, the FRA and TxDOT do not have an Arlington station as a requirement in the DFWCES DEIS consideration. The city of Arlington has

indicated the Arlington station preferred location is in the Entertainment District and, as such, a station along the TRE would not be acceptable.

Objections have been raised by the city of Irving over the alignment through Irving. The DFWCES HSR tracks would be elevated approximately 35 to 45 feet above natural ground through the downtown area. Additionally, some portions of the HSR tracks would be immediately adjacent to residential areas, which border the existing TRE corridor.

This alignment is not recommended for further study.

**Alignment Option 2 – IH 30/West Fork Trinity River Corridor (Near Fort Worth)**

This alignment begins in downtown Fort Worth and travels north along the TRE corridor until it reaches SH 280, then turns southeast along the SH 280/US 287 right-of-way until it reaches IH 30. It then parallels IH 30 east for approximately 1.5 miles until it turns northeast and follows the river basin of the West Fork Trinity River until it joins the TRE corridor east of the TRE Medical Center Station in Dallas. It then follows the TRE/UPRR/IH 35E corridor to the proposed TCP Dallas station just south of IH 30.

The HSR alignment within the river basin of the West Fork Trinity River will present several challenges, including constructability, environmental impacts, and serviceability during high water periods. Other issues include the circuitous route with few long straight sections, which will not allow the train to achieve the desired high speeds of up to 125 mph.

Additionally, the alignment does not provide for a station in the Arlington Entertainment District. This could be considered a fatal flaw by the RTC; however, the FRA and TxDOT do not have an Arlington station as a requirement in the DFWCES DEIS consideration. The city of Arlington has indicated the Arlington station preferred location is in the Entertainment District and, as such, a station along the TRE would not be acceptable.

This alignment is not recommended for further study.

**Alignment Option 3 – IH 30 Corridor**

This alignment begins in downtown Fort Worth and travels north along the TRE corridor, then southeast along the SH 280/US 287 right-of-way until it reaches IH 30. From there it follows the IH 30 right-of-way east until it crosses the Trinity River in Dallas, then turns south to follow the TRE/UPRR/IH 35E corridor to the proposed TCP Dallas station just south of IH 30.

Much of the alignment is within the existing IH 30 right-of-way, which is an advantage. Although this alignment is the most direct route, the alignment faces significant issues where it crosses major interchanges (SH 360, PGBT, Loop 12, Hampton Road, and IH 35E/IH 30). The elevated HSR structure would have to pass over the interchange ramps, which would put the level of the tracks 125 to 150 feet above natural ground.

This alignment was determined to be fatally flawed and is not recommended for further study.



**Alignment Option 3A – IH 30 Corridor Adjusted**

This alignment is the same as Alignment 3 except the alignment was adjusted to avoid the multilevel interchanges at SH 360, PGBT, Loop 12, and IH 30/IH 35E. In Arlington, the alignment crosses SH 360 just south of the interchange and follows Avenue E, then West Tarrant Road until it passes south of the PGBT interchange. It then joins and parallels IH 30 to Loop 12 where it passes north of the interchange. It then continues along IH 30 until just west of Hampton Road where it turns northeast and travels along a new route to join up with the UPRR corridor. The alignment continues to parallel the UPRR right-of-way until it crosses the Trinity River between the Margaret Hunt Hill and Commerce Street Bridges, then follows the TRE/UPRR/IH 35E corridor to the proposed TCP Dallas station just south of IH 30.

Advantages of this alignment include the use of existing right-of-way and a relatively straight alignment that provides for higher speeds. By avoiding the major interchanges, this alignment does not have the fatal flaws seen in Alignment 3. However, avoiding the major interchanges would add right-of-way costs and introduce additional curves, which may result in slower speeds in western Dallas County.

This alignment is not recommended for further study.

**Alignment Option 4 – IH 30/Entertainment District/UPRR Corridor (Station between Stadiums)**

This alignment begins in downtown Fort Worth and travels north along the TRE corridor, then southeast along SH 280/US 287 until it reaches IH 30. From there it follows the IH 30 right-of-way east until it reaches the Arlington Entertainment District. The alignment curves southeast and traverses between the AT&T and Globe Life Park stadiums. It then curves east and crosses SH 360 near the Six Flags Mall. It follows Dalworth Street, crosses PGBT, and intersects the UPRR corridor in Grand Prairie. From there the alignment parallels the UPRR right-of-way, crosses IH 30 at Loop 12, and continues paralleling the UPRR right-of-way across the Trinity River between the Margaret Hunt Hill and Commerce Street Bridges, then turns south and follows the UPRR/IH 35E corridor until it reaches the proposed TCP Dallas station just south of IH 30.

An advantage of this alignment is the economic development opportunity of placing the station in the middle of the Arlington Entertainment District. Other advantages include the ability to cross SH 360 and PGBT where the roadways are depressed under the UPRR tracks. This reduces the height of the DFWCES HSR structures. The alignment also includes long straight segments that provide for higher speeds. However, purchasing right-of-way adjacent to UPRR would increase right-of-way costs.

The city of Arlington has expressed concern with the alignment as it may adversely affect aesthetics and access to the two stadiums.

The alignment is recommended for further study.

**Alignment Option 4A – IH 30/Entertainment District/UPRR Corridor (Station at Globe Life Park)**

This alignment alternative is the same as Alignment 4 except that the alignment traverses through the Globe Life Park stadium site. Globe Life Park is scheduled for replacement, so this alternative could afford a unique economic development opportunity to include the HSR station into the old stadium redevelopment plans.

This alignment begins in downtown Fort Worth and travels north along the TRE corridor, then southeast along SH 280/US 287 until it reaches IH 30. From there it follows the IH 30 right-of-way east until it reaches the Arlington Entertainment District. The alignment curves southeast and traverses through Globe Life Park stadium. After the stadium, the alignment curves east and follows East Randol Mill Road across SH 360 to just past Great Southwest Parkway where it curves south and parallels Dalworth Street, crosses PGBT, and continues paralleling Dalworth Street until it intersects with Main Street and the UPRR corridor. It then parallels the UPRR right-of-way, crossing the Trinity River between the Margaret Hunt Hill and Commerce Street Bridges, then south to the TCP Dallas station.

Purchasing right-of-way adjacent to UPRR would increase right-of-way costs. The city of Arlington suggested adjustments to this alignment that would locate the alignment immediately adjacent to Globe Life Park as opposed to through the park.

This alignment is recommended for further study.

**Alignment Option 5 – IH 30/UPRR Corridor**

This alignment is the same as Alignment 3 except the DFWCES HSR tracks shift from IH 30 to parallel the UPRR right-of-way at Loop 12 instead just west of Hampton Road.

This alignment begins in downtown Fort Worth and travels north along the TRE corridor, then southeast along the SH 280/US 287 right-of-way until it reaches IH 30. It continues along IH 30 until Loop 12 where it turns northeast to travel along the UPRR corridor. The alignment continues to parallel the UPRR right-of-way until it crosses the Trinity River between the Margaret Hunt Hill and Commerce Street Bridges, then follows the TRE/UPRR/IH 35E corridor to the proposed TCP Dallas station just south of IH 30.

This alignment is not adjusted to avoid the major interchanges at SH 360, PGBT, and Loop 12. As such, the HSR structure would have to pass over the interchange ramps, which would put the level of the tracks 125 to 150 feet above natural ground. Additionally, purchasing right-of-way adjacent to UPRR would increase right-of-way costs.

This alignment was determined to be fatally flawed and is not recommended for further study.

**Alignment Option 5A – IH 30/UPRR Corridor Adjusted**

This alignment is the same as Alignment 5 except the alignment was adjusted to avoid the multilevel interchanges at SH 360, PGBT, and Loop 12. In Arlington, the alignment crosses SH 360 just south of the interchange and follows Avenue E to West Tarrant Road until it passes south of the PGBT interchange. It then joins and parallels IH 30 to Loop 12 where it turns northeast to travel along the UPRR corridor. The alignment continues to parallel the UPRR right-of-way until it crosses the Trinity River between the Margaret Hunt Hill and Commerce Street Bridges, then follows the TRE/UPRR/IH 35E corridor to the proposed TCP Dallas station just south of IH 30.

The advantage of this route is the long straight segments that permit achievement of higher speeds. It also takes advantage of a great deal of existing IH 30 right-of-way. However, avoiding the major interchanges would add right-of-way costs and introduce additional curves, which may result in slower speeds in western Dallas County. Additionally, purchasing right-of-way adjacent to UPRR would increase right-of-way costs.

This alignment is recommended for further study.

**Alignment Option 6 – IH 30/SH 360/TRE Corridor**

This alignment begins in downtown Fort Worth and travels north along the TRE corridor, then southeast along SH 280/US 287 until it reaches IH 30. From there it follows the IH 30 right-of-way east until it reaches SH 360 in Arlington where it curves north. It then follows the SH 360 right-of-way north to the TRE corridor and curves east to share part of the TRE right-of-way all the way to the proposed TCP Dallas station.

Transitioning from IH 30 to SH 360 and SH 360 to the TRE would add right-of-way costs and introduce additional curves which may result in slower speeds. Additionally, the city of Irving has expressed concern regarding the visibility of the elevated tracks through the downtown area. The HSR tracks would be immediately adjacent to residential areas, which border the existing the TRE corridor.

This alignment is one of the two alignments included in the latest draft of the DFWCES DEIS and is recommended for further study.

**Alignment Option 7 – I H 30/West Fork Trinity River Corridor (near IH 820)**

This alignment begins in downtown Fort Worth and travels north along the TRE corridor to SH 280, then southeast along SH 280 until it reaches IH 30. It then follows IH 30 until just east of IH 820 where it curves northeast and follows the West Fork Trinity River basin until it crosses the Trinity River and joins the TRE corridor east of the TRE Medical Center station. It then follows the TRE corridor/UPRR corridor to the proposed TCP Dallas station.

The placement of the HSR alignment within the river basin of the West Fork Trinity River will present several challenges, including constructability, environmental impacts, and serviceability during high water periods. Another significant issue is the circuitous route and few long straight sections does not allow the train to achieve the desired high speeds of up to 125 mph.

This alignment is not recommended for further study.

**Alignment Option 8 – IH 30/SH 360/West Fork Trinity River Corridor (near TRE)**

This alignment begins in downtown Fort Worth and travels north along the TRE corridor to SH 280, then southeast along SH 280 until it reaches IH 30. It then is within the IH 30 right-of-way to Arlington where it curves north to be within the SH 360 right-of-way. It then curves east just south of the TRE corridor and follows the West Fork Trinity River basin until it joins the TRE corridor east of the TRE Medical Center station. It then follows the TRE corridor/UPRR corridor to the proposed TCP Dallas station.

The HSR alignment within the river basin of the West Fork Trinity River will present several challenges, including constructability, environmental impacts, and serviceability during high water periods. Another significant issue is the circuitous route and few long straight sections does not allow the train to achieve the desired high speeds of up to 125 mph. Additionally, purchasing right-of-way to avoid the SH 360 interchange would increase right-of-way costs.

This alignment is not recommended for further study.

**Alignment Option 9 – IH 30/West Fork Trinity River Corridor (near Grand Prairie)**

This alignment begins in downtown Fort Worth and travels north along the TRE corridor to SH 280, then southeast along SH 280 until it reaches IH 30. It then follows IH 30 to Grand Prairie where it curves north and follows the West Fork Trinity River basin, crosses the Trinity River, and joins the TRE corridor east of the TRE Medical Center station. It then follows the TRE corridor/UPRR corridor to the proposed TCP Dallas station.

This alignment is not adjusted to avoid the major interchanges at SH 360 and PGBT. As such, the HSR structure would have to pass over the interchange ramps, which would put the level of the tracks 125 to 150 feet above natural ground. The HSR alignment within the river basin of the West Fork Trinity River will present several challenges, including constructability, environmental impacts, and serviceability during high water periods. Another significant issue is the circuitous route and few long straight sections does not allow the train to achieve the desired high speeds of up to 125 mph.

This alignment was determined to be fatally flawed and is not recommended for further study.

**Alignment Option 9A – IH 30 adjusted/West Fork Trinity River Corridor (near Grand Prairie)**

This alignment is the same as Alignment 9 except for adjustments to avoid SH 360 and PGBT interchanges. This alignment begins in downtown Fort Worth and travels north along the TRE corridor to SH 280, then southeast along SH 280 until it reaches IH 30. It then follows IH 30 to Grand Prairie where it curves north and follows the West Fork Trinity River basin, crosses the Trinity River, and joins the TRE corridor east of the TRE Medical Center station. It then follows the TRE corridor/UPRR corridor to the proposed TCP Dallas station.

This alignment would require purchasing right-of-way to avoid the SH 360 and PGBT interchanges, which would increase right-of-way costs. The HSR alignment within the river basin of the West Fork Trinity River will present several challenges, including constructability, environmental impacts, and serviceability during high water periods. Another significant issue is the circuitous route and few long straight sections does not allow the train to achieve the desired high speeds of up to 125 mph.

This alignment is not recommended for further study.

**Alignment Option 10 – UPRR Corridor**

This alignment begins in downtown Fort Worth and parallels the UPRR right-of-way all the way to the proposed TCP Dallas station. A minor deviation in Fort Worth takes the alignment along Lancaster Drive for a short distance; however, the Fort Worth station location study will determine whether this is a viable route. The alignment crosses SH 360 and PGBT at locations where the roadways pass under the UPRR tracks. As a result, the height of the DFWCES structures are much less than they would be near IH 30. The alignment crosses IH 30 at Loop 12 and continues to parallel the UPRR right-of-way until it crosses the Trinity River between the Margaret Hunt Hill and Commerce Street Bridges, then follows the TRE corridor/UPRR corridor to the proposed TCP Dallas station.

The alignment is not sharing the UPRR right-of-way; rather it is parallel and immediately adjacent to the northern edge of the UPRR right-of-way. In some areas, such as Arlington and Grand Prairie, it could be within the right-of-way of Division and Main Streets. The alignment has many positive aspects, such as paralleling an existing well-established railroad corridor, it is relatively straight, has few locations where high structure is required, and it mostly avoids residential areas. The alignment also passes next to the former Dallas Naval Air Station, which could be an opportunity to repurpose the former station into a maintenance facility for HSR rolling stock. However, purchasing right-of-way at Tower 55/IH 35W and adjacent to UPRR would increase right-of-way costs.

One major disadvantage occurs in Fort Worth where the alignment must traverse over, through, or under the IH 30/IH 35W interchange. The alignment would need to terminate in the downtown Fort Worth area, then be able to travel south to San Antonio.

This alignment is recommended for further study.

**Alignment Option 11 – UPRR/Dallas Area Rapid Transit (DART) Red Line/TCP Corridor**

This alignment begins in downtown Fort Worth and parallels the UPRR right-of-way until just east of the former Dallas Naval Air Station. It then curves southeast across non-transportation related land to intersect Loop 12 (South Walton Walker Boulevard). It then follows Loop 12 (South Walton Walker Boulevard) until it crosses the BNSF/DART Red Line corridor. It then parallels the BNSF/DART Red Line right-of-way across the Trinity River and intersects the proposed TCP corridor near North Corinth and South Lamar Streets. It then turns north and parallels the proposed TCP right-of-way to the proposed Dallas HSR station.

The alignment has the same advantages of paralleling an existing railroad corridor and passing by the former Dallas Naval Air Station. However, the BNSF/DART Red Line portion of the alignment is problematic; the alignment passes through approximately five miles of well-established residential neighborhoods. Another disadvantage is the route has many curves which will limit the speed of the train. Additionally, this alignment would require purchasing a significant amount of right-of-way at Tower 55/IH 35W adjacent to the UPRR and BNSF/DART Red Line corridors, and for a new alignment to connect the UPRR and BNSF/DART Red Line.

This alignment is not recommended for further study.

**Alignment Option 12 – UPRR/SH 303/DART Red Line/TCP Corridor**

This alignment parallels the UPRR right-of-way from downtown Fort Worth until just east of IH 820 where it diverts southeast to parallel SH 303 until it reaches the BNSF/DART Red Line corridor near Loop 12. It then parallels the BNSF/DART Red Line right-of-way across the Trinity River and intersects the proposed TCP corridor near North Corinth and South Lamar Streets. It then turns north and parallels the proposed TCP right-of-way to the proposed Dallas HSR station.

The alignment has the same advantages of paralleling an existing railroad corridor and passing by the former Dallas Naval Air Station. However, the BNSF/DART Red Line portion of the alignment is problematic. The alignment passes through approximately five miles of well-established residential neighborhoods. Another disadvantage is the route has many curves which will limit the speed of the train. Additionally, this alignment would require purchasing a substantial amount of right-of-way at Tower 55/IH 35W and adjacent to the UPRR and BNSF/DART Red Line corridors.

The alignment does not provide for a station in the Arlington Entertainment District. This could be considered a fatal flaw by the NCTCOG RTC; however, the FRA and TxDOT do not have an Arlington station as a requirement in the DFWCES DEIS consideration. The city of Arlington has indicated the Arlington station preferred location is in the Entertainment District; a station along the TRE or IH 20 would not be acceptable.

This alignment is not recommended for further study.



**Alignment Option 13 – UPRR Waxahachie Line /US 287 BUS/IH 20/TCP Corridor**

This alignment begins in downtown Fort Worth and travels in a southbound direction paralleling the UPRR right-of-way until just south of Berry Street where it turns southeast paralleling the UPRR Waxahachie Line right-of-way and crosses IH 35W. It then continues southeast paralleling the UPRR right-of-way to US 287 Business. It then follows US 287 Business until it intersects the IH 20 corridor. It then curves east and is within IH 20 right-of-way until the intersection with the proposed TCP right-of-way. It then curves north and parallels the proposed TCP right-of-way until the proposed Dallas HSR station.

Disadvantages of this alignment include the challenges to avoid the Tower 55 intersection of east-west and north-south railroad lines, as well as the height of the IH 30/IH 35W interchange. Additionally, the alignment along IH 20 is problematic because of the steep grade near Spur 408, which would exceed HSR recommendations for vertical grades. This alignment is the longest and would increase travel time and would require purchasing a substantial amount of right-of-way at Tower 55/IH 35W and adjacent to the UPRR and TCP corridors. Additionally, the route has many curves which will limit the speed of the train.

The alignment does not provide for a station in the Arlington Entertainment District. This could be considered a fatal flaw by the NCTCOG RTC; however, the FRA and TxDOT do not have an Arlington station as a requirement in the DFWCES DEIS consideration. The city of Arlington has indicated the Arlington station preferred location is in the Entertainment District; a station along the TRE or IH 20 would not be acceptable.

This alignment was determined to be fatally flawed and is not recommended for further study.

**Alignment Option 14 – UPRR Waxahachie Line/US 287 BUS/IH 20/BNSF/DART Red Line/TCP Corridor**

This alignment is the same as Alignment 13 except it turns north at the intersection of the BNSF railroad right-of-way in Duncanville. This alignment begins in downtown Fort Worth and travels in a southbound direction paralleling the UPRR right-of-way until just south of Berry Street where it turns southeast paralleling the UPRR Waxahachie Line right-of-way and crosses IH 35W. It then continues southeast paralleling the UPRR right-of-way to US 287 Business. It then follows US 287 Business until it intersects the IH 20 corridor. It then curves east and is within the IH 20 right-of-way until it turns north at the intersection of the BNSF railroad right-of-way in Duncanville. It then parallels the BNSF/DART Red Line right-of-way across the Trinity River and intersects the proposed TCP corridor near North Corinth and South Lamar Streets. It then turns north and parallels the proposed TCP right-of-way to the proposed Dallas HSR station.

Disadvantages of this alignment include the challenges to avoid the Tower 55 intersection of east-west and north-south railroad lines, as well as the height of the IH 30/IH 35W interchange. Additionally, the alignment along IH 20 is problematic because of the steep grade near Spur 408, which would exceed HSR recommendations for vertical grades. This alignment is longer

and would increase travel time and would require purchasing a substantial amount of right-of-way at Tower 55/IH 35W and adjacent to the UPRR, BNSF, and DART Red Line corridors.

The alignment has the advantage of paralleling an existing railroad corridor. However, the BNSF/DART Red Line portion of the alignment is problematic. The alignment passes through approximately five miles of well-established residential neighborhoods. Another disadvantage is the route has many curves which will limit the speed of the train.

The alignment does not provide for a station in the Arlington Entertainment District. This could be considered a fatal flaw by the NCTCOG RTC; however, the FRA and TxDOT do not have an Arlington station as a requirement in the DFWCES DEIS consideration. The city of Arlington has indicated the Arlington station preferred location is in the Entertainment District; a station along the TRE or IH 20 would not be acceptable.

This alignment was determined to be fatally flawed and is not recommended for further study.

## **4.2 Observations**

The purpose of the analysis is to provide a “fresh eyes” review of the world of possible alignment alternatives between Fort Worth and Dallas. Because this is a HSR project, the main goal is to provide faster service between the three stations: Fort Worth, Arlington, and Dallas. Although HSR technology has the capability of speeds in excess of 200 mph, this applies to systems that have long reaches of straight level track and a relatively flat vertical profile. The DFWCES is different. The distance between the stations is approximately 15 miles and the horizontal and vertical alignments would not meet design requirements for 200 mph operations. As a result, the speeds will most likely stay below 125 mph; therefore, the main goal is still to provide the alignment that has the least number of curves to promote a faster service.

The 14 alignments that were identified are located in a broad band between Fort Worth and Dallas: the TRE corridor to the north and the IH 20 corridor to the south. The most efficient alignments were the ones with the shortest distance and fewest curves. The IH 30 and UPRR alignments were the most favorable in this regard. Both alignments had challenges, but through adjustments to the routing and the placement of the corridor right-of-way, the issues could be resolved favorably.

The majority of the alignments follow existing transportation corridors and have a lower cost and are more favorable than establishing a new alignment through areas where there are no roadways or railroads.

The lower impact to residential areas is more favorable as public resistance to new transportation facilities is greater when it directly impacts established residential neighborhoods. The alignments following existing transportation corridors are perceived as more favorable due to the fact the adjacent areas typically have long-established commercial and industry areas immediately adjacent to the corridor.

The alignments following the West Fork of the Trinity River were not recommended for further study primarily due to the impact on environmentally sensitive areas. Construction and operational activities in these sensitive areas would be a major concern for environmental groups and will most likely lead to a lengthy environmental approval process.

The major highway corridors between Fort Worth and Dallas include multilevel interchanges at major crossroads. Although the HSR tracks would be elevated on structure, there is a limit as to how high the structure can be constructed. For purposes of this analysis, it was assumed that the height of the HSR structure above natural ground could be as high as the typical direct connect flyover ramps in a multilevel interchange. This is approximately 125 feet. The IH 30 corridor includes multilevel interchanges at IH 820, SH 360, PGBT, Loop 12, and IH 35E/IH 30. The IH 30 alignment alternative that closely parallels IH 30 for the entire distance between Fort Worth and Dallas was not recommended for further study even though it was the straightest. Instead, the IH 30 adjusted alternative that avoided the multilevel interchanges was recommended. By adjusting the alignments to avoid the highest ramps, the height of the HSR structures can be reduced significantly.

The TOPRS report recommended the TRE route as one of the two alignments that would be carried forward into the DFWCES DEIS study. This recommendation does not conform to the RTC policy of three stations: Fort Worth, Arlington, and Dallas. To comply, the Arlington station would have to be located on the TRE corridor at Cooper Street or possibly in the Rock Island station area. This is not keeping with the intent of the policy to be near the Arlington Entertainment District for the purpose of promoting economic development.

The alignment alternatives paralleling UPRR provide many advantages, including existing well-established commercial and industrial corridors and major highways passing under the tracks rather than over, which significantly reduces the height of the HSR structure. However, UPRR management has expressed opposition to adding new intercity passenger trains to their corridor. This is understandable due to the very heavy amount of train traffic on the corridor. Any use of the UPRR tracks or right-of-way would not be acceptable to UPRR. In the case of the DFWCES HSR alignment alternatives, the HSR trains would be on their own dedicated tracks and would be isolated from existing highways and railroads. The new HSR corridor could be adjacent to the existing UPRR railroad right-of-way and not impact UPRR operations. UPRR management may still have objections.

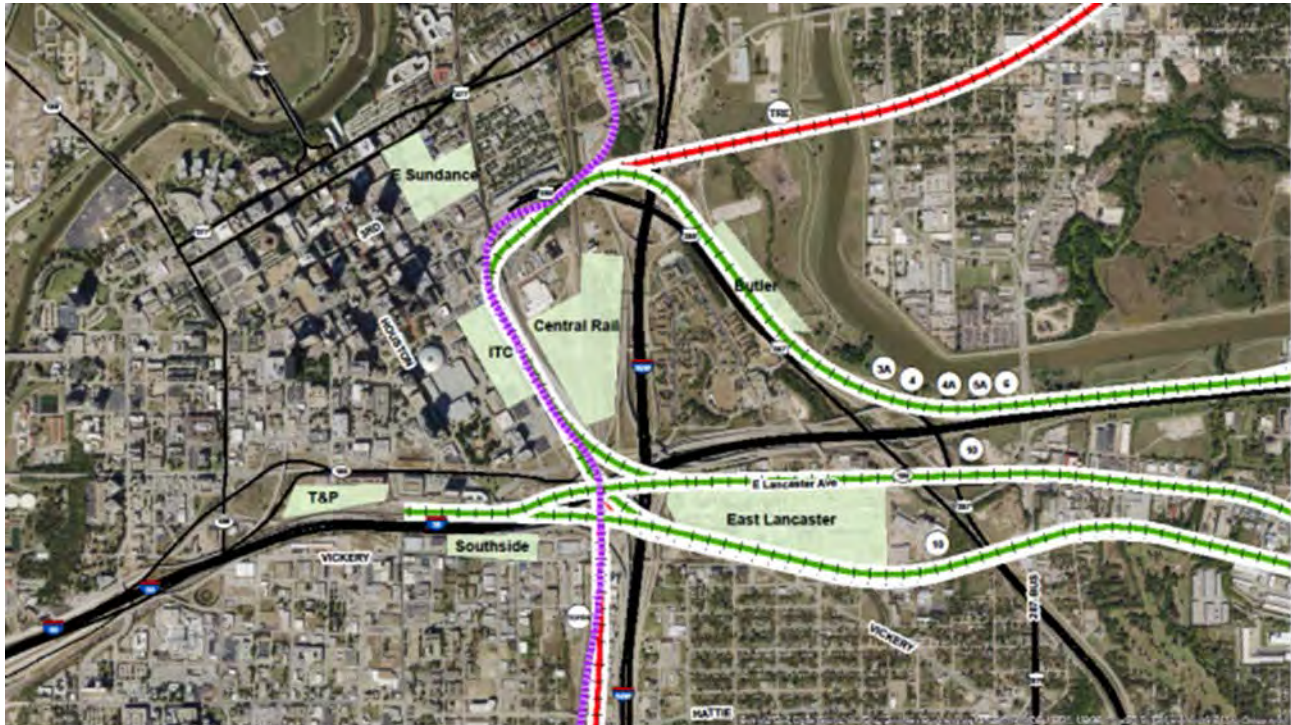
## **5.0 STATION LOCATION STUDIES**

Concurrent with this alignment analysis, NCTCOG initiated a HSR Station Location Study for the stations in Fort Worth, Arlington, and Dallas. Three separate consulting engineering teams were retained for the station location studies. The interaction between the station location consultants and the NCTCOG alignment alternatives analysis team was an iterative process whereby the station location consultants conducted an analysis as to the best location(s) for the station and the NCTCOG alignment alternatives team provided input as to whether the alignment alternatives can access the location in a reasonable manner.

## 5.1 Fort Worth Station Location

The alignment alternatives development for the Fort Worth station included Alignments 3A, 4, 4A, 5A, 6, and 10 (see Figure 11 and map in Appendix D). The first five alignments followed the same route into the downtown area. Alignment 10 followed the UPRR corridor until it split into two alignments, one on the UPRR and the other on Lancaster Avenue.

Figure 11 – Potential Areas for Fort Worth HSR Station



Source: NCTCOG, 2017

The consultants for the Fort Worth Station location study identified seven potential areas for a HSR station. The following lists the selected station locations in order of highest to lowest score. The criteria and process used by the station consultant to rank the locations is detailed in the final station report.

1. Fort Worth ITC
2. East Sundance
3. Central Rail
4. Texas & Pacific (T&P)
5. Southside
6. Butler
7. East Lancaster



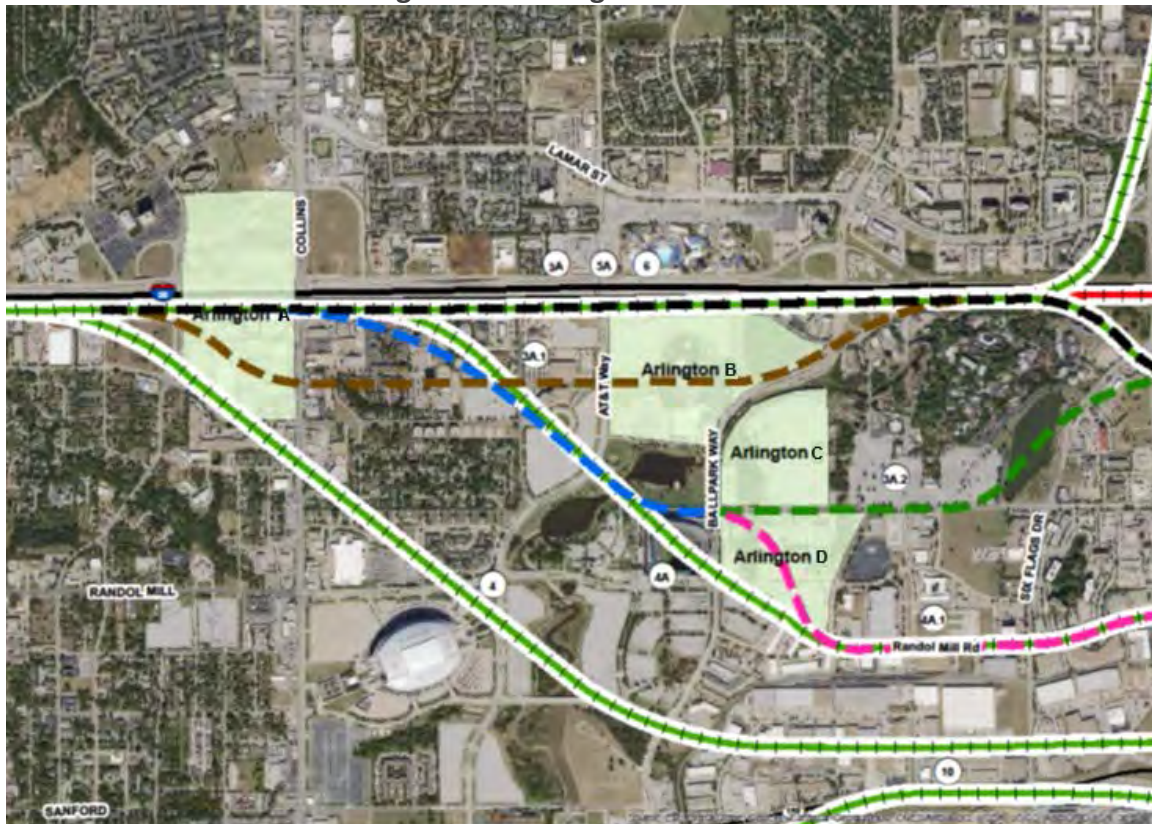
The study recommended the Fort Worth ITC as the station location because it is consistent with the most likely HSR alignment into the core of Fort Worth and brings significant opportunities for economic and cultural growth. The final station study can be found at <https://www.nctcog.org/nctcg/media/Transportation/DocsMaps/Plan/Transit/FWHSR.pdf>. The evaluation of the station locations relationship to the alignment alternatives by the NCTCOG alternative analysis team can be found in the matrix in Appendix E.

## 5.2 Arlington Station Location

The alignment alternatives developed for the Arlington station included Alignments 3A, 4, 4A, 5A, 6, and 10 (see map in Appendix F). Alignments 3A, 5A, and 6 closely parallel IH 30 while Alignments 4 and 4A traverse through the Entertainment District and the merge with the UPRR corridor in Grand Prairie. Alignment 10 follows the existing UPRR corridor.

The consultants for the Arlington location study identified four potential areas for a HSR station (see Figure 12 and map in Appendix F) and adjustments to the alignments were suggested. One comment eliminated Alignment 4 and modified Alignment 4A to avoid Globe Life Park. Two other adjustments were made to the alignments along IH 30.

Figure 12 – Arlington Station Locations



Source: NCTCOG, 2017

The station consultant selected four potential station locations which are listed in order of highest to lowest score. The criteria and process used by the station consultant to rank the locations is detailed in the final report, which can be accessed at <https://www.nctcog.org/nctcg/media/Transportation/DocsMaps/Plan/Transit/ArlingtonHSR.pdf>.

1. East Ballpark (Area D)
2. Six Flags (Area C)
3. South IH 30 (Area B)
4. West of Collins (Area A)

The study results were presented to the Arlington City Council on June 13, 2017. The council voted to recommend station location areas B, C, and D, with a preference for B. The evaluation of the station locations relationship to the alignment alternatives by the NCTCOG alternative analysis team can be found in the matrix in Appendix E.

## **6.0 RECOMMENDED ALIGNMENTS FOR FURTHER STUDY**

Based on this analysis, 6 of the 18 alignment alternatives identified in this study are recommended for further study in the DFWCES DEIS process (see map in Appendix G). The DFWCES Alternatives Analysis matrix in Appendix C provides a summary of the evaluation criteria, as well as issues to be considered with each alignment.

- Alignment Option 3A (IH 30 Adjusted) – This alignment has the fewest curves, avoids the major interchanges, provides for a station in the Arlington Entertainment District, parallels existing transportation corridors and, for the most part, is within existing public right-of-way. However, it should be noted the Arlington Station Study modified this alignment in the area of Cooper Street to swing to the south for a short distance.
- Alignment Option 4A (IH 30/Entertainment District/UPRR Corridor) – This alignment has few curves except at the Arlington station, avoids the major interchanges, provides for a station in the Arlington Entertainment District, and parallels existing transportation corridors. However, it should be noted the Arlington Station Study modified this alignment so it passes to the north of Globe Life Park; see Alignment Option 4A.
- Alignment Option 4A (IH 30/Entertainment District/UPRR Corridor) – This alignment has few curves except at the Arlington station, avoids the major interchanges, provides for a station in the Arlington Entertainment District, and parallels existing transportation corridors. However, it should be noted the Arlington Station Study modified this alignment so it passes to the north of Globe Life Park. It then either rejoins Alignment 3A east of SH 360 or it joins the original Alignment 4 along Randol Mill Road.
- Alignment Option 5A (IH 30 Adjusted/UPRR Corridor) – This alignment has few curves, avoids major interchanges, provides for a station in the Arlington Entertainment District, parallels an existing transportation corridor, and is primarily within existing public right-of-way.
- Alignment Option 6 (IH 30/SH 360/TRE Hybrid) – This alignment has several curves, avoids major interchanges, provides for a station in the Arlington Entertainment District, parallels



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existing transportation corridors, and is primarily within existing public right-of-way. It is also one of the two alignments in the current DFWCES DEIS.

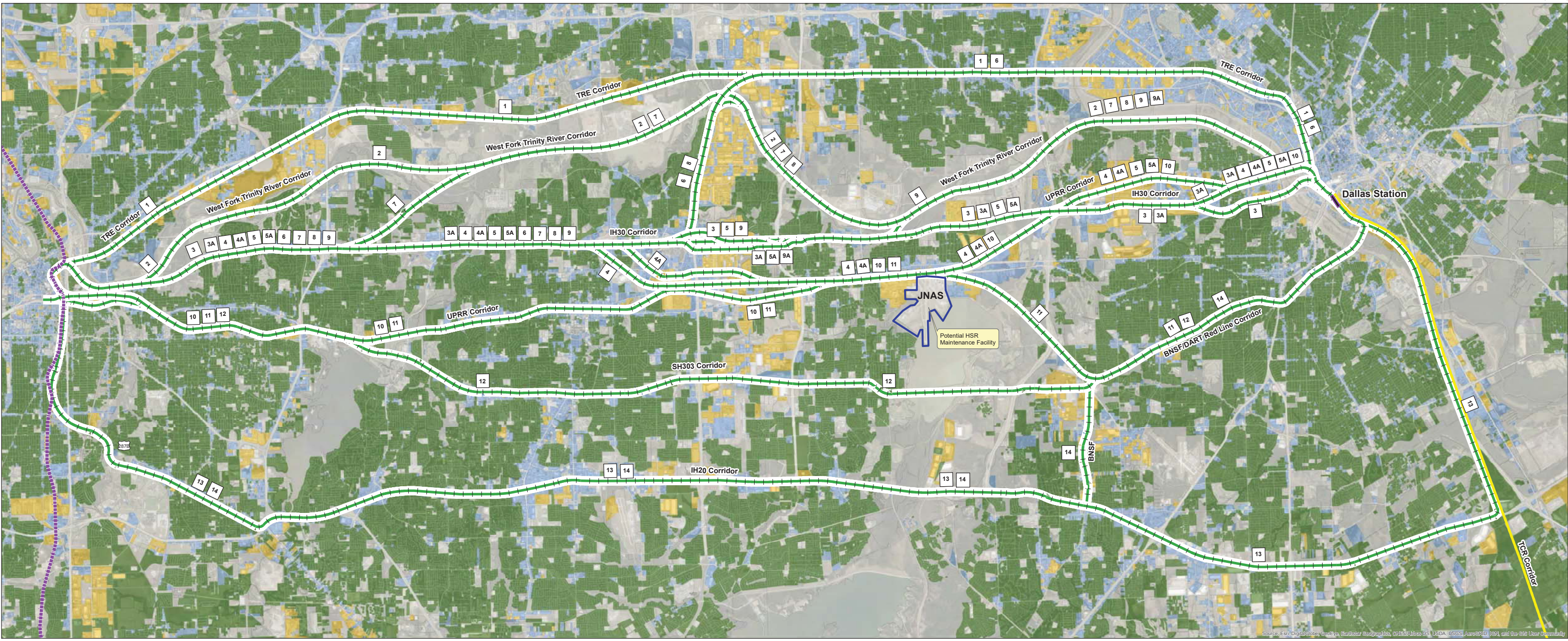
- Alignment Option 10 (UPRR Corridor) – This alignment has few curves, provides for a station in the Arlington Entertainment District, parallels an existing transportation corridor, and crosses major highways at relatively low heights above natural ground.

# Appendices

## **Appendix A – Alignment Option Maps**



# Dallas-Fort Worth CES HSR Alignment Options



1 in = 1 miles

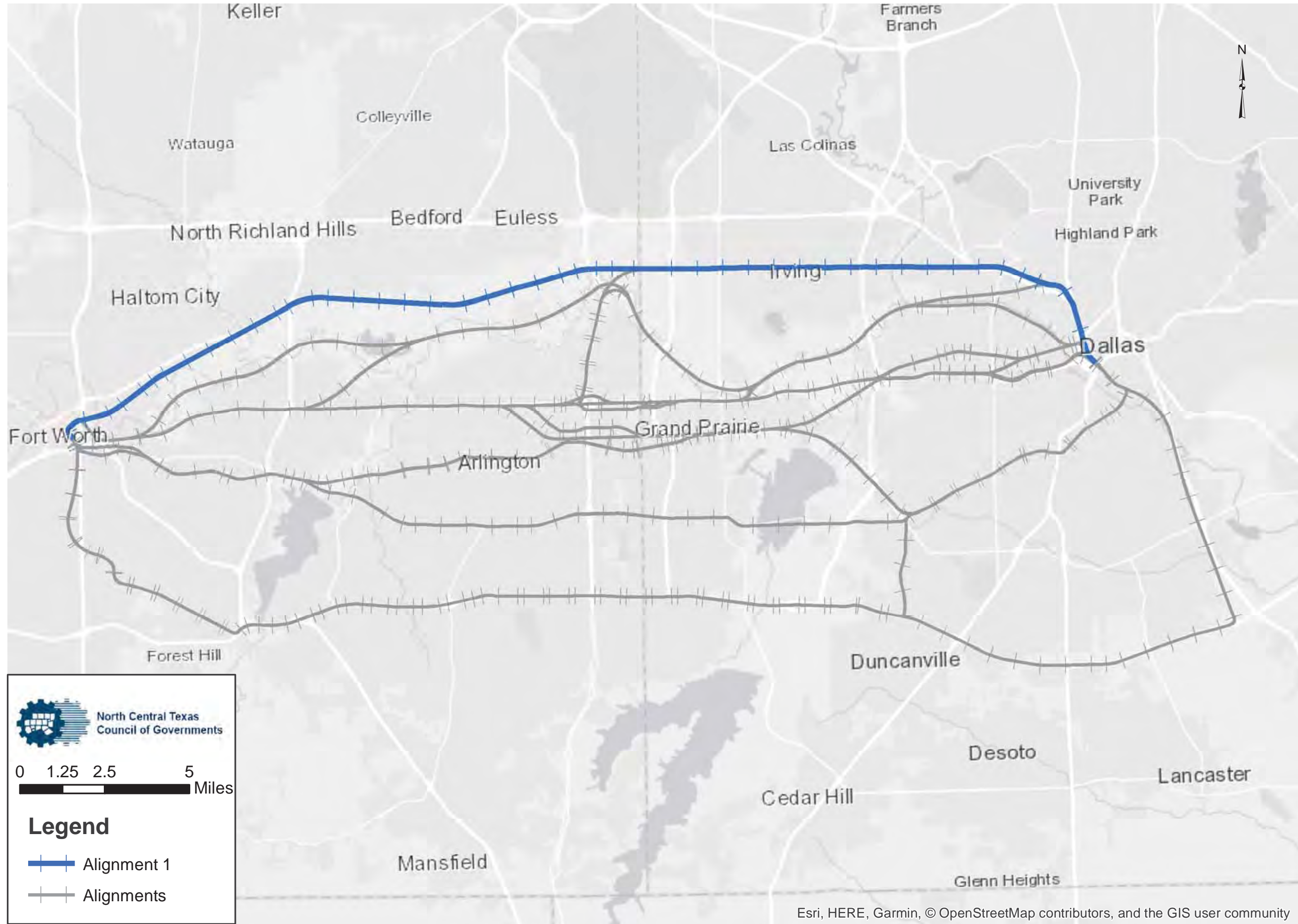


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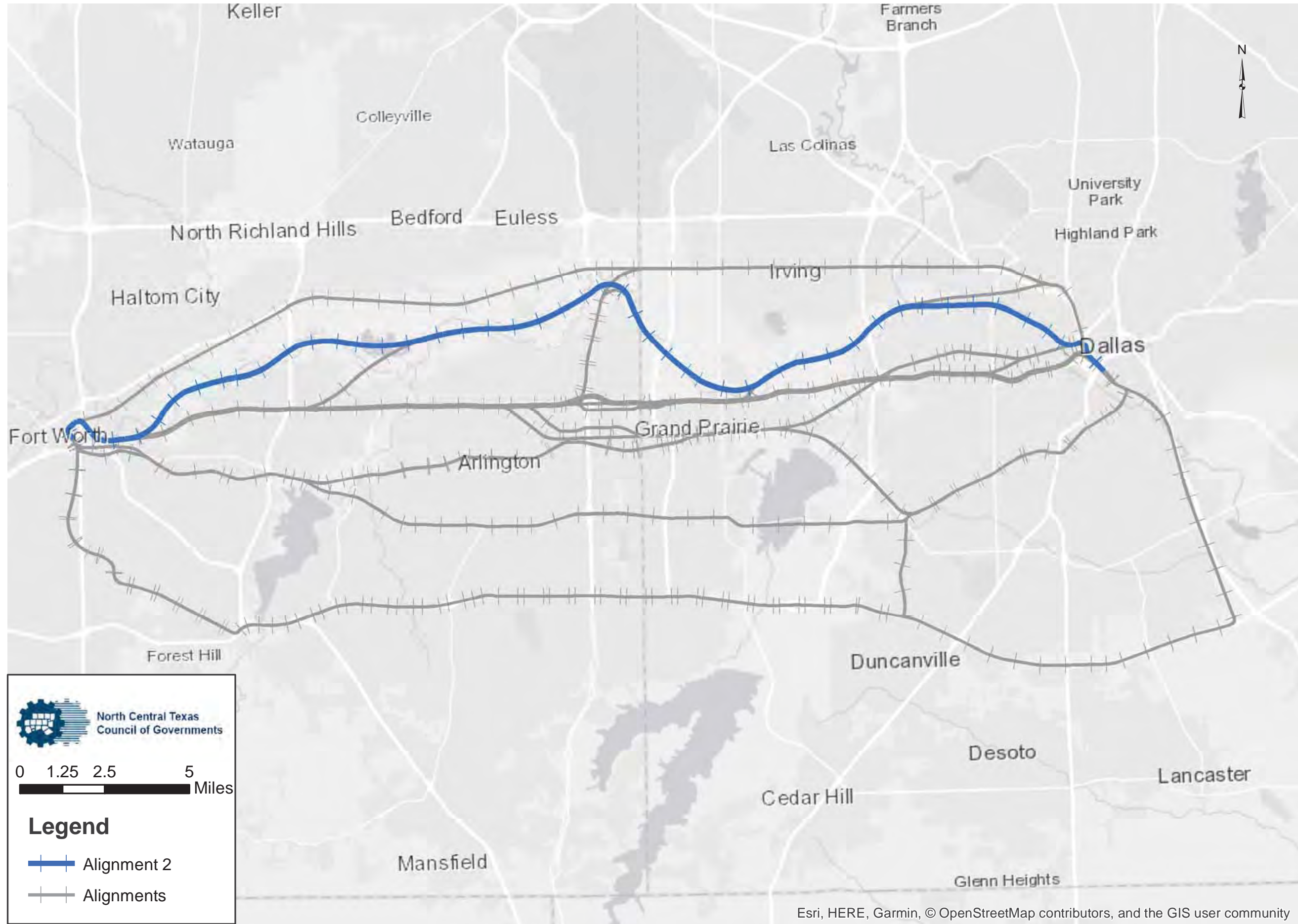
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- Texas Central HSR
- TOPRS
- Commercial
- Industrial
- Residential
- Public\_ROW



# Alignment Option 1 - TRE Corridor

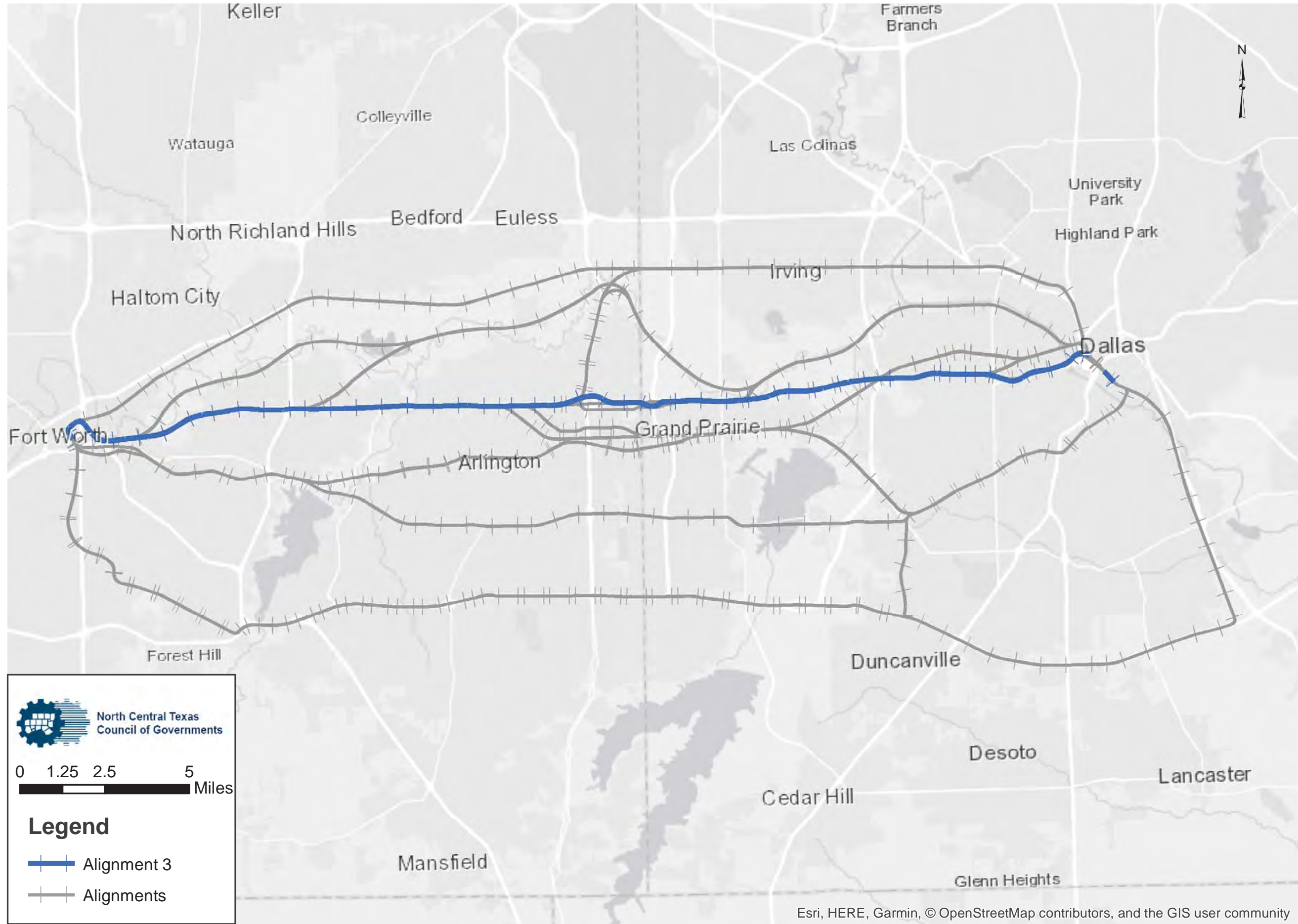



# Alignment Option 2 - IH 30/West Fork Trinity River Corridor (Near Fort Worth)







# Alignment Option 3 - IH 30 Corridor



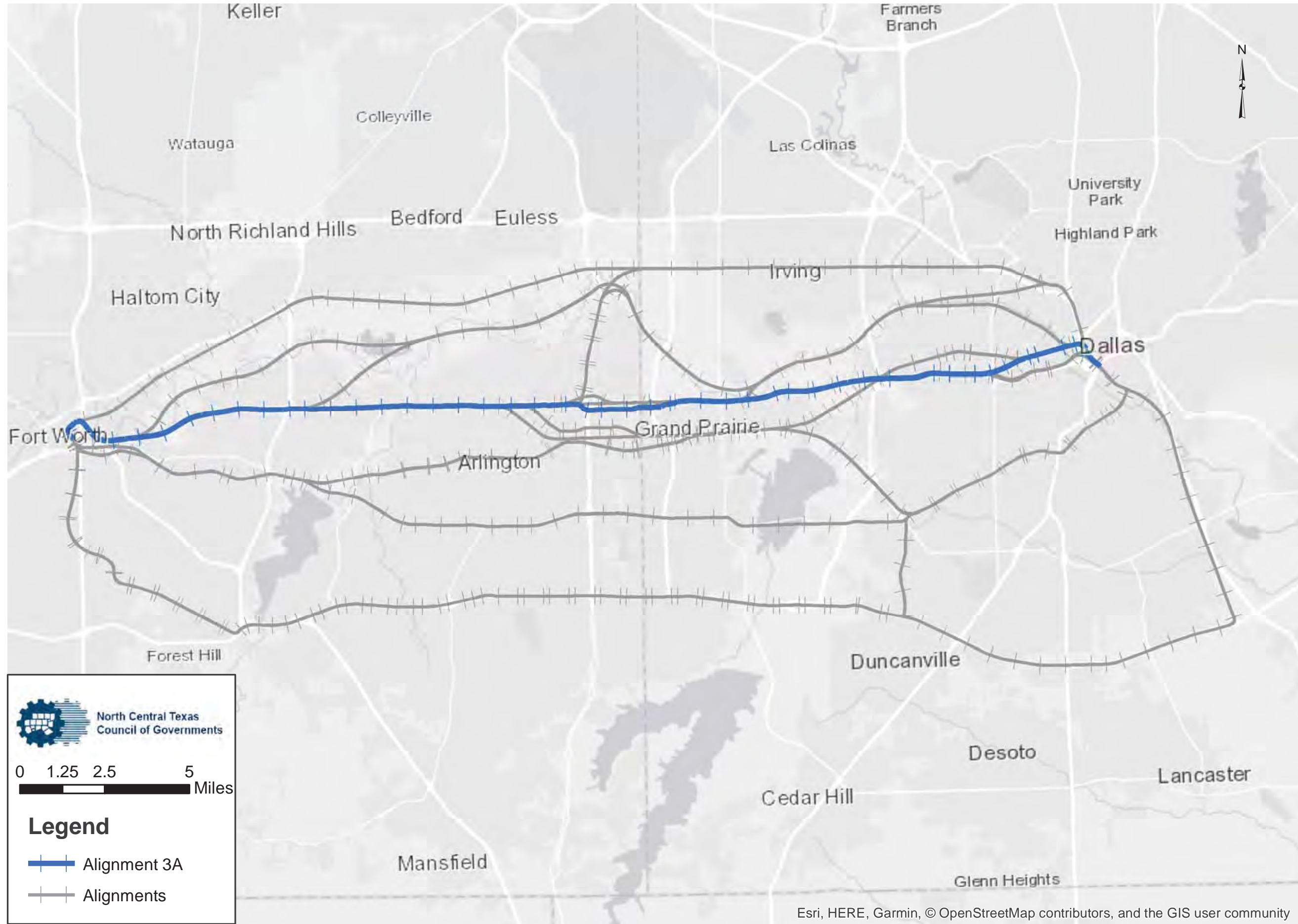
 North Central Texas  
Council of Governments


0 1.25 2.5 5  
Miles

**Legend**

-  Alignment 3
-  Alignments

# Alignment Option 3A - IH 30 Corridor Adjusted



 North Central Texas Council of Governments

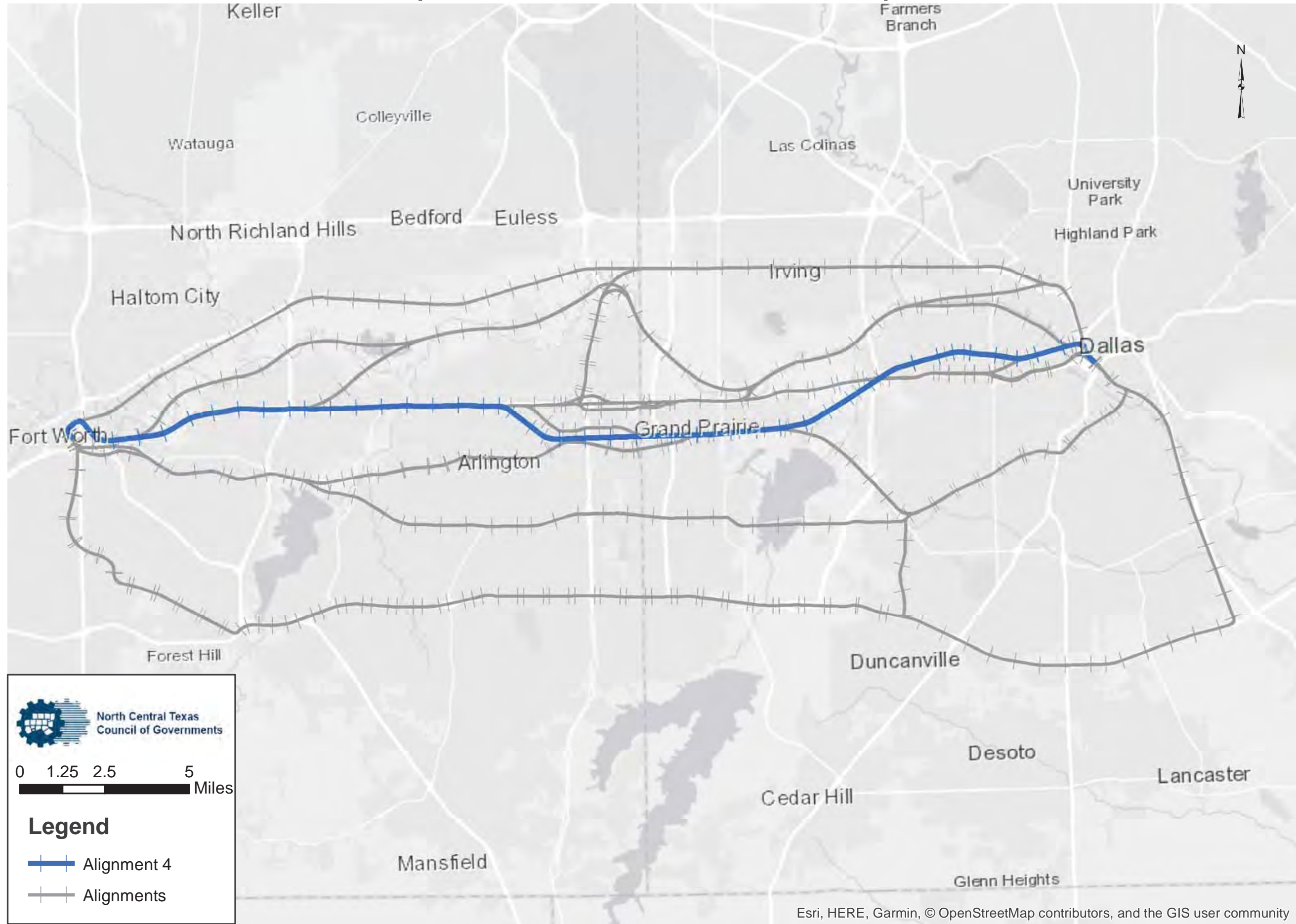
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**Legend**

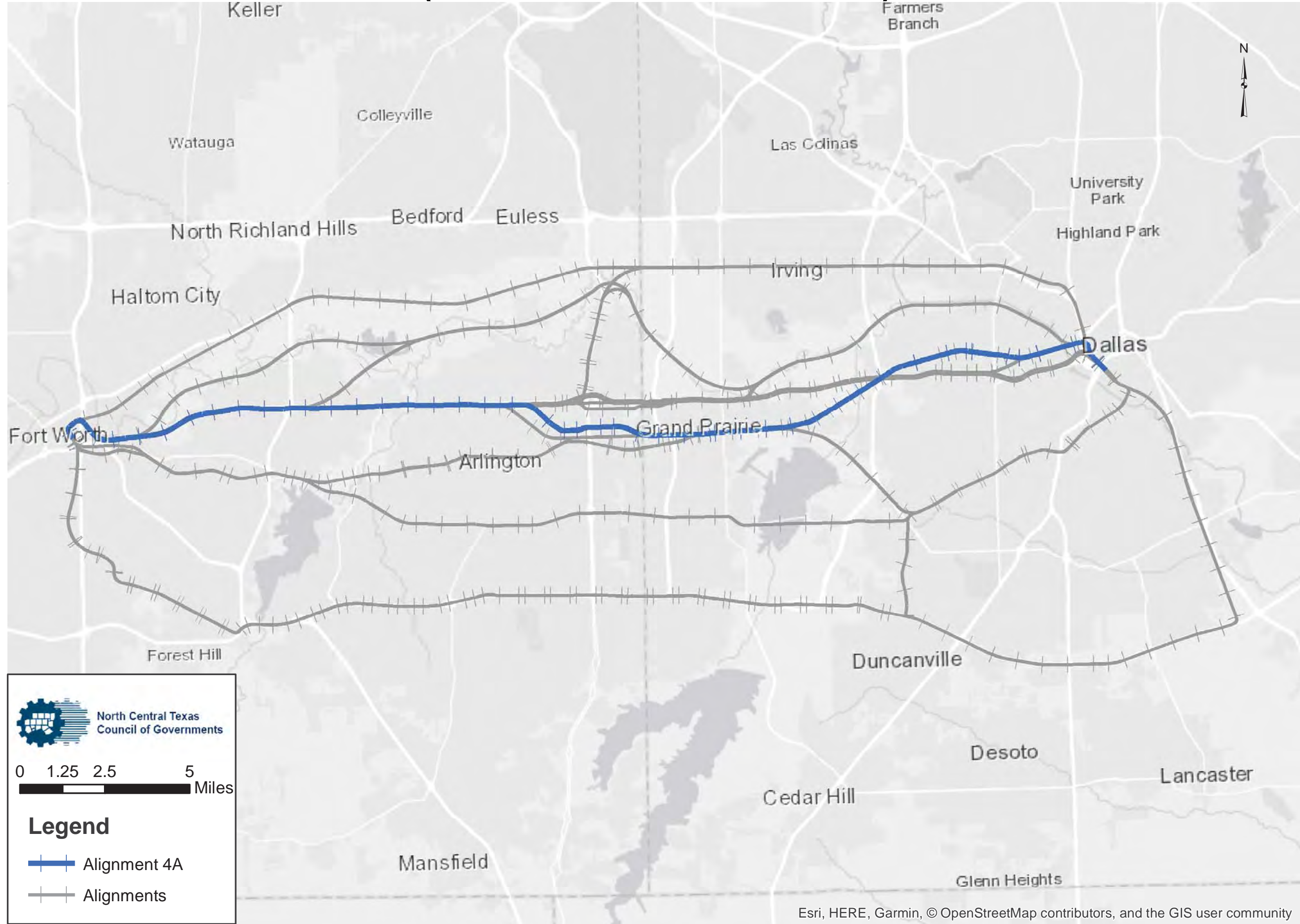
- +— Alignment 3A
- +— Alignments



# Alignment Option 4 - IH 30/Entertainment District/UPRR Corridor (Station between Stadiums)

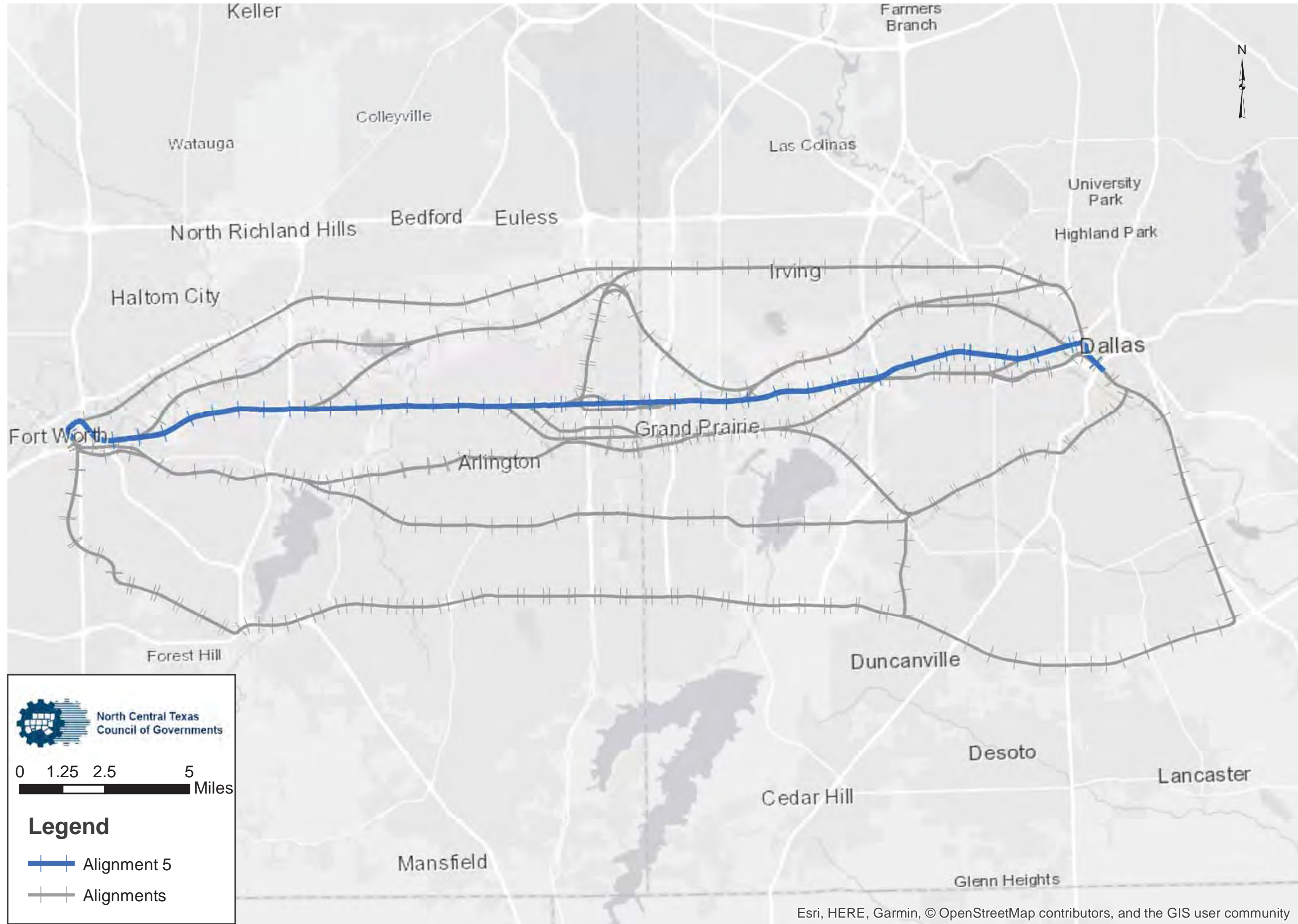


# Alignment Option 4A - IH 30/Entertainment District/UPRR Corridor (Station at Globe Life Park)

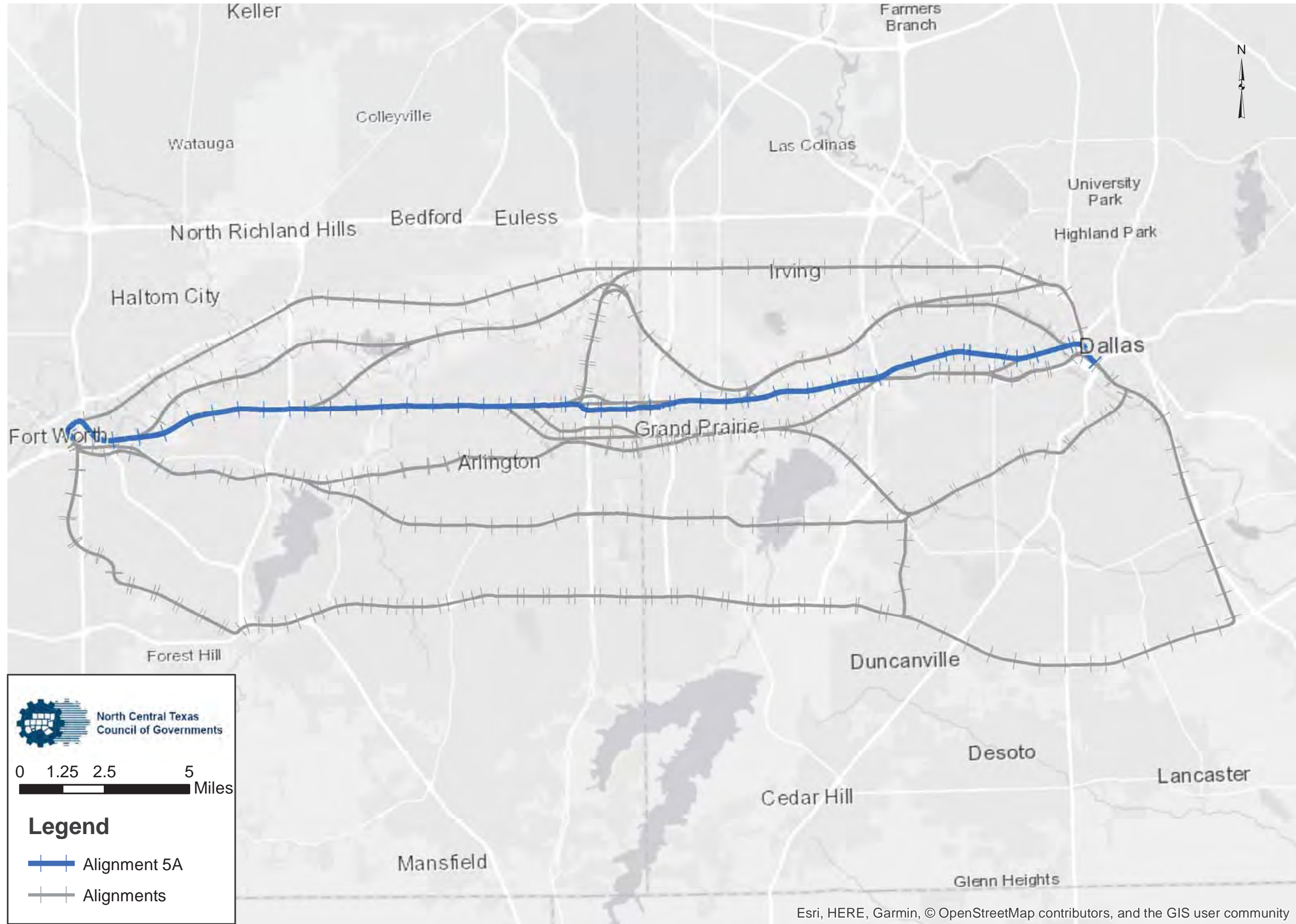




# Alignment Option 5 - IH 30/UPRR Corridor

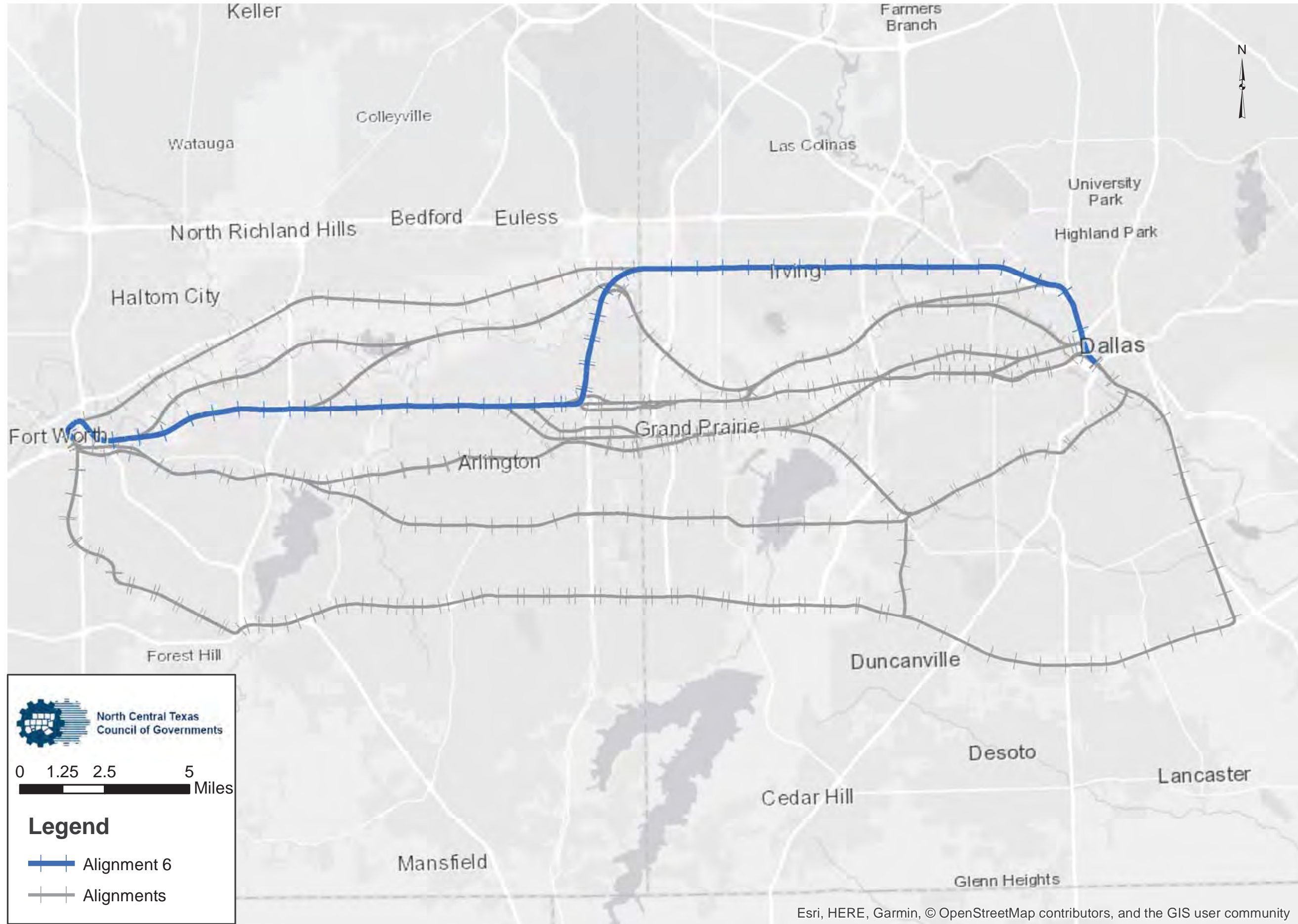


# Alignment Option 5A - IH 30/UPRR Corridor Adjusted

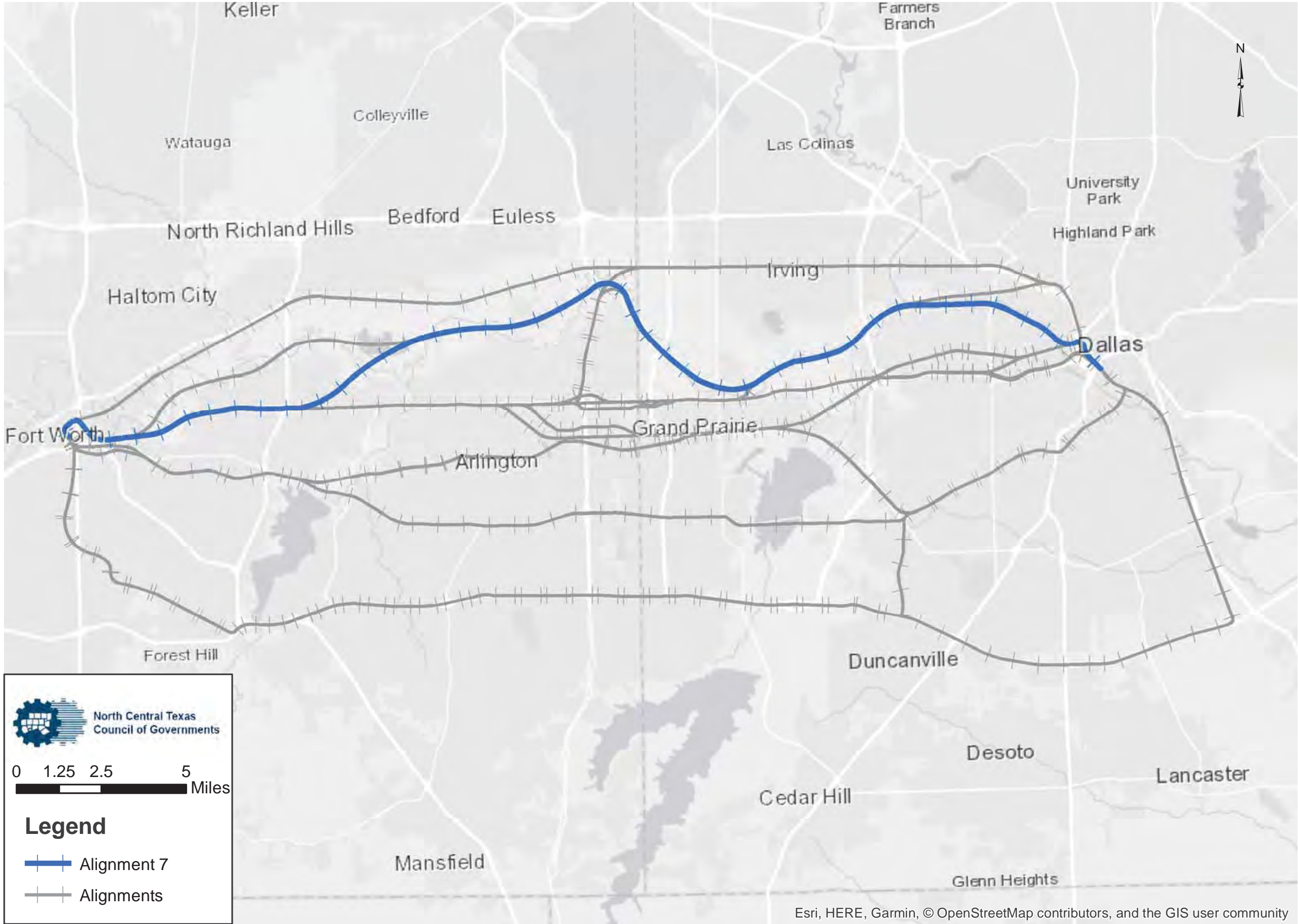




# Alignment Option 6 - IH 30/SH 360/TRE Corridor

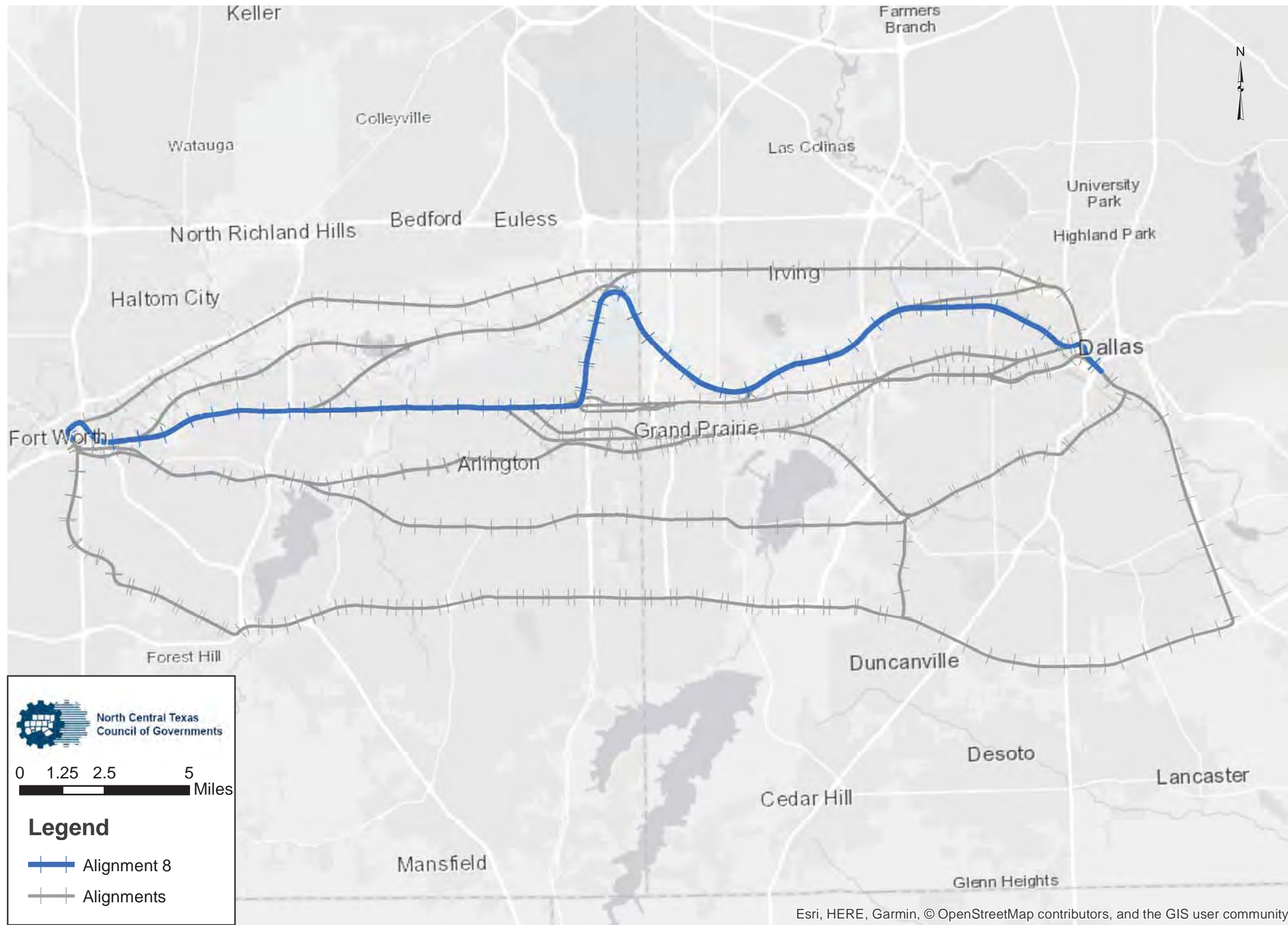


# Alignment Option 7 - IH 30/West Fork Trinity River Corridor (near IH 820)

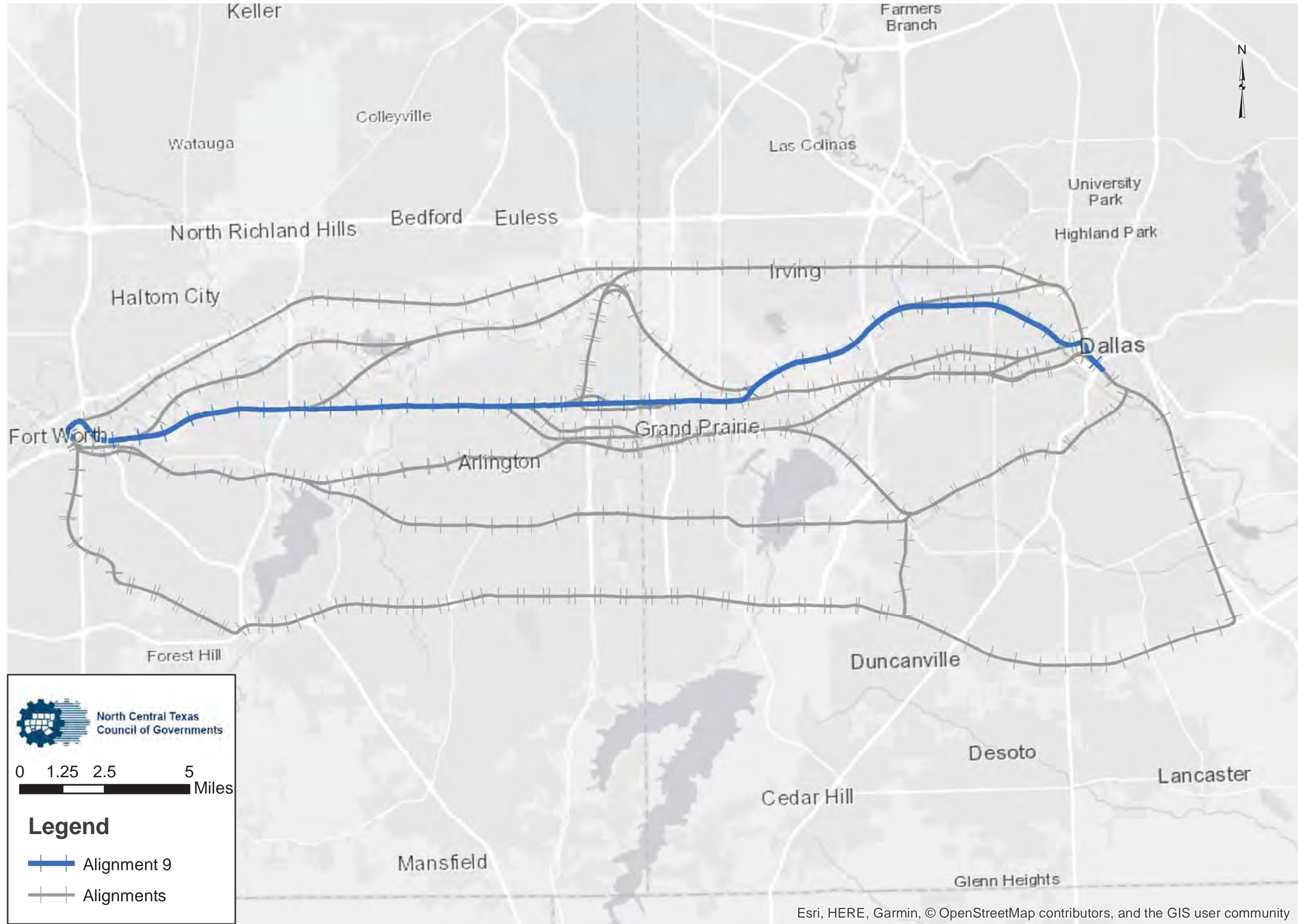




# Alignment Option 8 - IH 30/SH 360/West Fork Trinity River Corridor (near TRE)

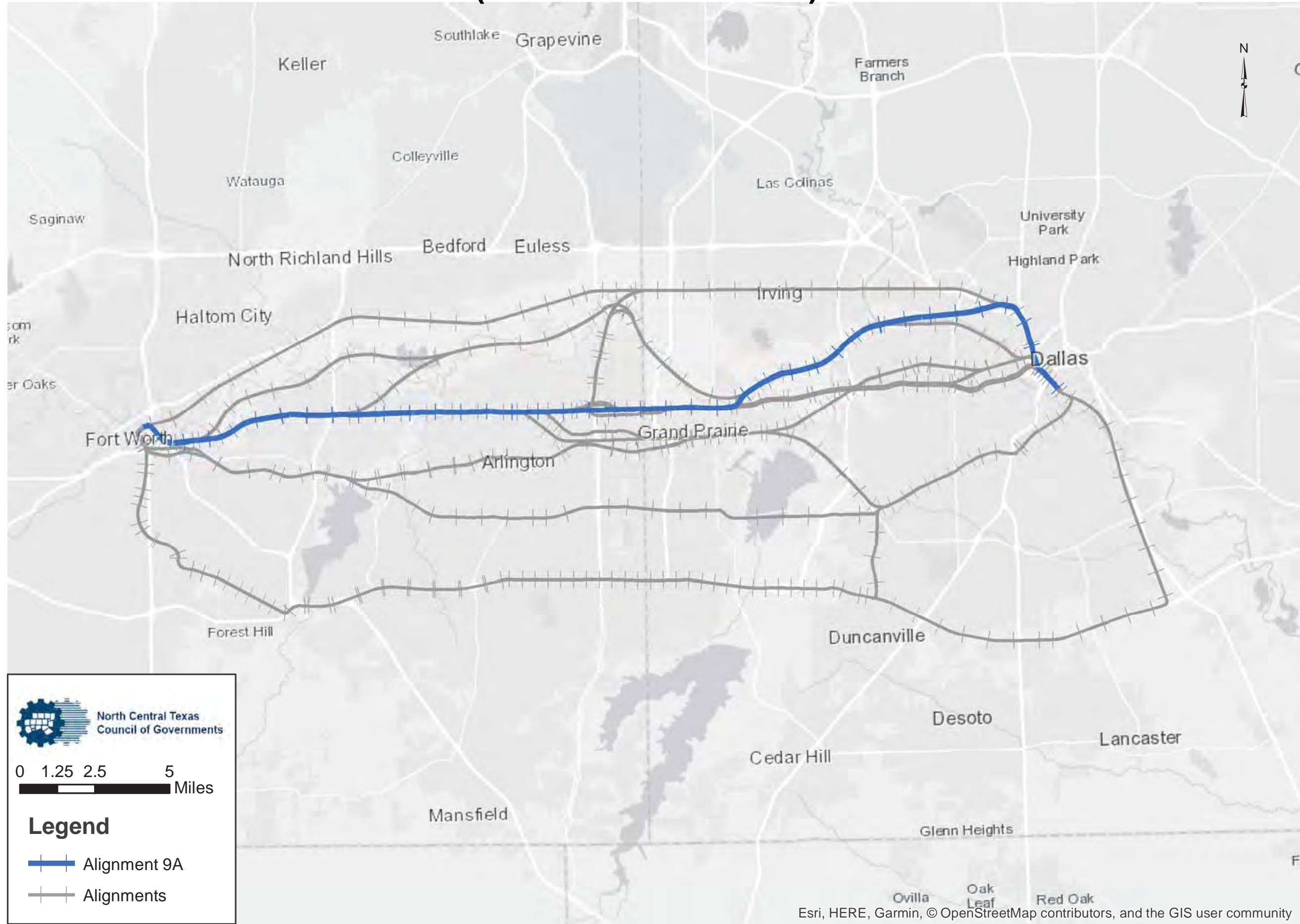


# Alignment Option 9 - IH 30/West Fork Trinity River Corridor (near Grand Prairie)



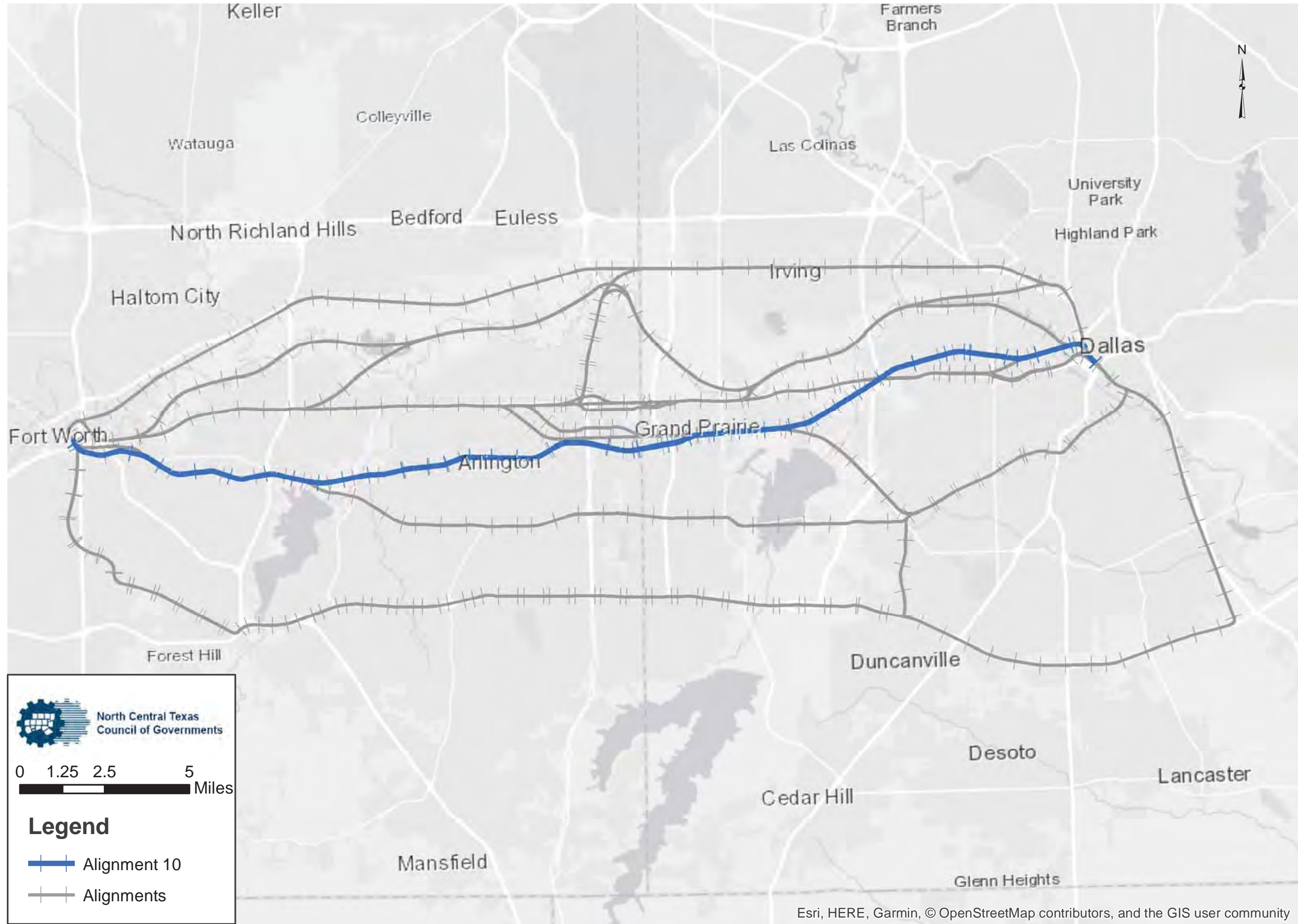



# Alignment Option 9A - IH 30 adjusted/West Fork Trinity River Corridor (near Grand Prairie)





# Alignment Option 10 - UPRR Corridor



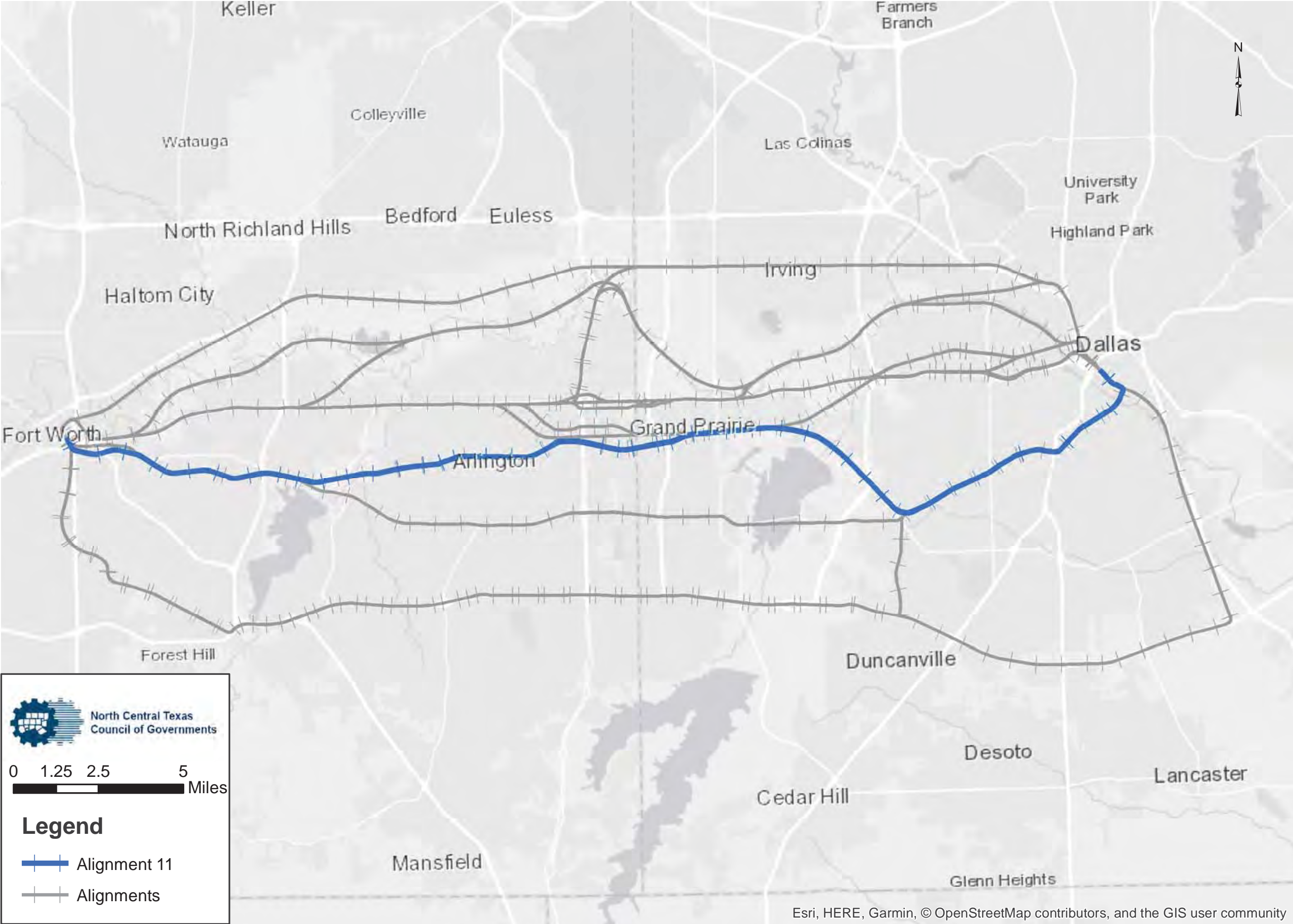
 North Central Texas Council of Governments

0 1.25 2.5 5 Miles

**Legend**

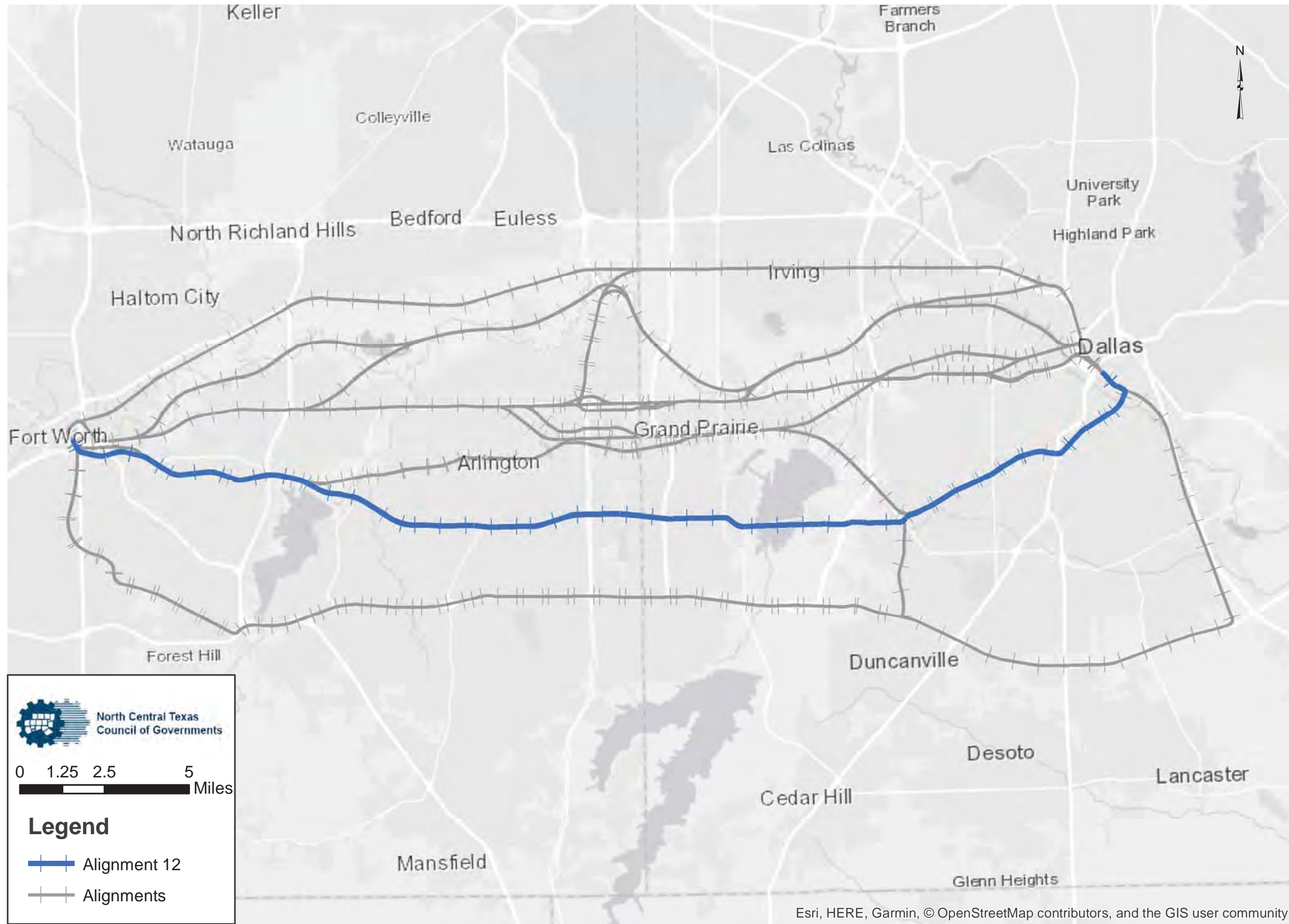
- +— Alignment 10
- +— Alignments

# Alignment Option 11 - UPRR/DART Red Line/TCR Corridor

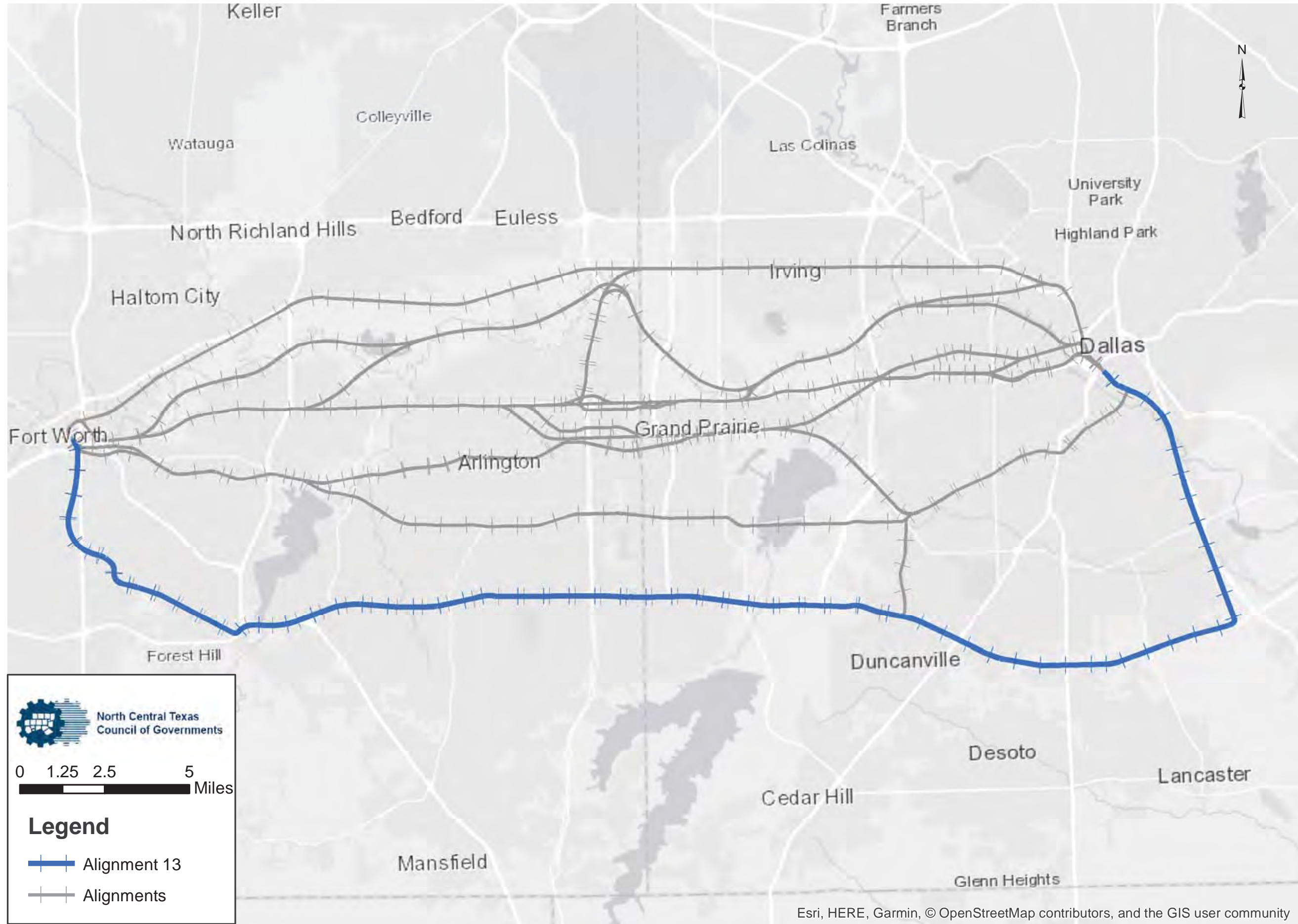




# Alignment Option 12 - UPRR/SH 303/DART Red Line/TCR Corridor

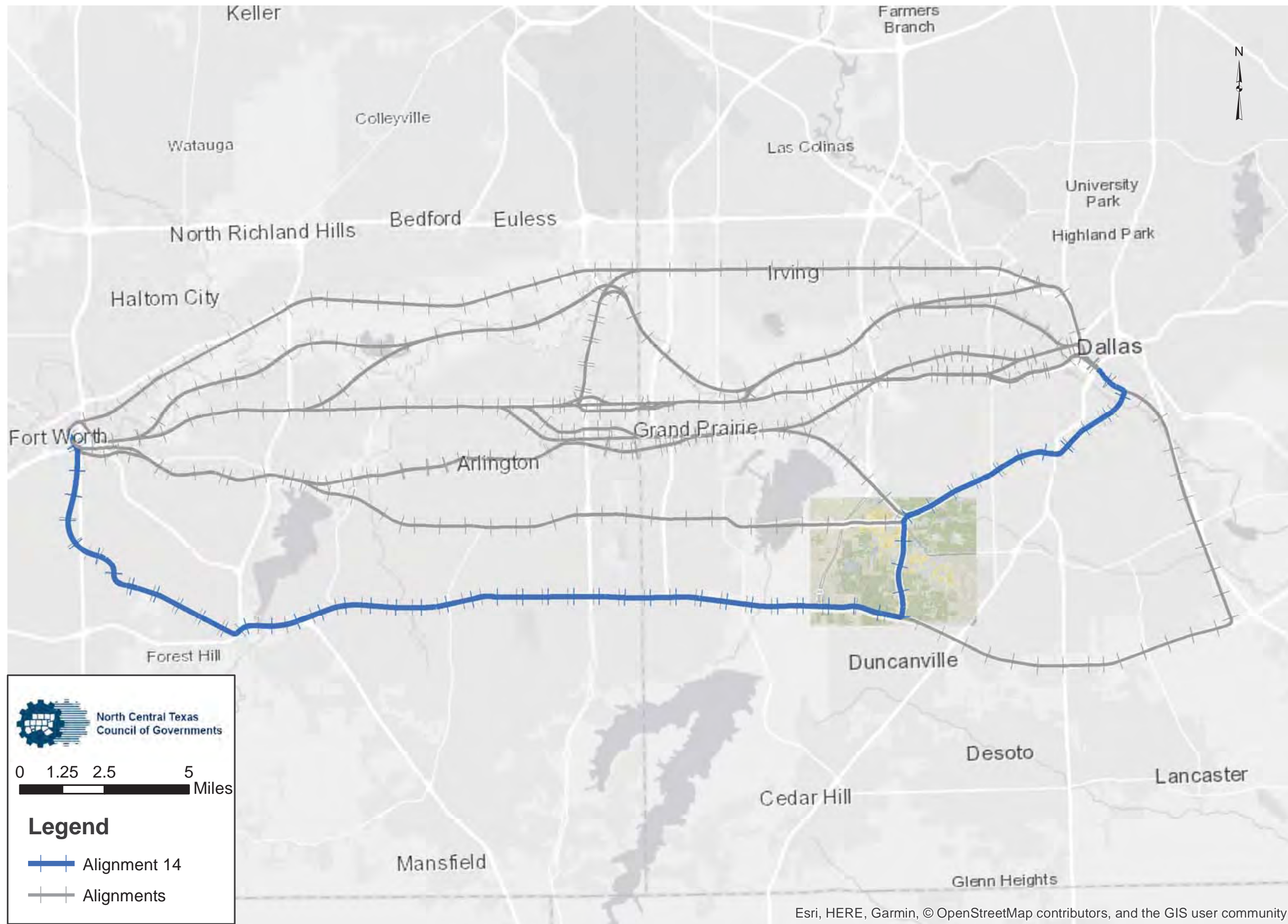


# Alignment Option 13 - UPRR Waxahachie Line /US 287 BUS/IH 20/TCR Corridor





# Alignment Option 14 - UPRR Waxahachie Line/US 287 BUS/IH 20/BNSF/ DART Red Line/TCR Corridor





## **Appendix B – Peer Review Comment Spreadsheet**

**DALLAS - FORT WORTH CORE EXPRESS SERVICE HIGH SPEED RAIL**  
**October 2016 Peer Review Comments**

Map Reference	Alignment Option	Pros	Cons	Ranked Most Favorite to Least Favorite
1	TRE Corridor (TRE corridor entire length)	<ul style="list-style-type: none"> <li>• Direct and established corridor/transit expected</li> <li>• Straight alignment, minimum curves</li> <li>• Parallel TRE tracks</li> <li>• Straight alignment will allow for higher speed</li> </ul>	<ul style="list-style-type: none"> <li>• To far north with no connection to Arlington Entertainment District</li> <li>• Right-of-way constraints at Victory Station, Southwestern Medical District, Centreport Station, Arlington landfill</li> <li>• Unfavorable to Irving City Hall</li> <li>• Lack of ridership on existing TRE indicative of unfavorable route</li> <li>• No new development potential outside of existing TRE stations</li> <li>• Impact to existing TRE stations</li> <li>• Potential opposition from some cities not in proximity to a station</li> <li>• <del>No access to Dallas Naval Air Station</del></li> </ul>	11,8,8,4,3,7
2	West Fork Trinity River Corridor (West Fork Trinity River entire length)	<ul style="list-style-type: none"> <li>• Easier acquisition of right-of-way along Trinity River</li> <li>• Less expensive right-of-way</li> <li>• Direct route will allow for higher speed</li> <li>• Less impact to existing development</li> <li>• Smooth transition into Fort Worth</li> <li>• Scenic route along Trinity River</li> </ul>	<ul style="list-style-type: none"> <li>• Natural environment impact/Trinity River</li> <li>• Potential ecology concerns</li> <li>• No access to Arlington Entertainment District</li> <li>• No access to Dallas Naval Air Station</li> <li>• Right-of-way acquisition within levees may be difficult</li> <li>• Potential destruction of parkland in Arlington or Veridian neighborhood</li> <li>• Political opposition</li> <li>• Impact to multiple landfills in various cities</li> <li>• Significant curvature south of TRE</li> </ul>	10,10,7,11,10,12
3	IH 30 Corridor (IH 30 Corridor entire length)	<ul style="list-style-type: none"> <li>• Direct route between downtown Fort Worth and downtown Dallas, faster speed</li> <li>• Close accessibility to downtown Arlington and stadiums</li> <li>• Station along IH 30 with direct access to the Arlington Entertainment District</li> <li>• Mostly within public right-of-way/minimal right-of-way impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Connection to the Dallas Station may difficult</li> <li>• IH 30 east of SH 360 has already been reconstructed (including HOV lane)</li> <li>• No access across SH 360/IH 30 interchange</li> <li>• Impact to Hampton Road historic bridge</li> <li>• No access across SH 161/IH 30 interchange</li> <li>• Difficult connection to ITC in Fort Worth</li> <li>• Steep and curvy east of Loop 12</li> <li>• Impacts to commercial development</li> <li>• Size limitations of Arlington station</li> </ul>	3,3,6,1,1,1
4	IH 30/Entertainment District/UPRR Corridor (Transfer from IH 30 to UPRR Corridor in Arlington Entertainment District)	<ul style="list-style-type: none"> <li>• No impact to IH 30/SH 360 interchange</li> <li>• No impact to IH 30/SH 161 interchange</li> <li>• Access between signature bridges in Dallas</li> <li>• Access to Dallas Naval Air Station</li> <li>• Access to Arlington Entertainment District</li> <li>• Access to UTA</li> <li>• Visibility for stadiums and Arlington Live</li> <li>• Opportunity for reconstruction of IH 30 west of SH 360</li> <li>• Minimal impact along existing UPRR corridor</li> <li>• Minimal impact along IH 30 west of SH 360</li> </ul>	<ul style="list-style-type: none"> <li>• Constraints at Lincoln square shopping center (Central Street @ IH 30)</li> <li>• Constraints near Division Street development</li> <li>• Impact to existing ballpark</li> <li>• Difficult station connections/safety issues</li> <li>• Opposition to parking impacts at stadiums</li> <li>• Impact to existing development</li> <li>• Limited space between stadiums</li> </ul>	1,1,1,3,4,3

**DALLAS - FORT WORTH CORE EXPRESS SERVICE HIGH SPEED RAIL**  
**October 2016 Peer Review Comments**

Map Reference	Alignment Option	Pros	Cons	Ranked Most Favorite to Least Favorite
5	IH 30/UPRR Corridor (Transfer from IH 30 to UPRR corridor at Loop 12)	<ul style="list-style-type: none"> <li>• Direct route</li> <li>• Minimum curvature will allow for high speed</li> <li>• Development potential for Arlington</li> <li>• Minimal impact on future Dallas Trinity Park</li> <li>• No impacts to Irving</li> <li>• Direct access to Arlington stadiums/Entertainment District</li> <li>• No parkland impacts</li> <li>• Route within existing right-of-way</li> <li>• Access to Dallas Naval Air Station</li> <li>• Potential use of Six Flags Mall area for station</li> </ul>	<ul style="list-style-type: none"> <li>• Conflict with IH 30/SH 360 interchange</li> <li>• Conflict with IH 30/SH 161 interchange</li> <li>• Environmental justice issues in west Dallas</li> <li>• Right-of-way concerns within Trinity Levee near Dallas</li> <li>• Commercial/residential impacts</li> <li>• Difficult connection to Dallas station/safety issues</li> <li>• Avoids Hampton Road historic bridge</li> </ul>	2,2,2,1,2,2
6	IH 30/SH 360/TRE Corridor [Transfer from IH 30 to TRE corridor at SH 360 (Hybrid)]	<ul style="list-style-type: none"> <li>• Opportunity for IH 30 upgrade west of SH 360</li> <li>• Potential station at IH 30</li> <li>• Minimal right-of-way acquisition along IH 30 and TRE</li> <li>• Access to Arlington Entertainment District</li> <li>• Development potential for Arlington</li> <li>• Minimal intrusion to future Dallas Trinity Park</li> <li>• Avoids IH 30/SH 360 interchange</li> <li>• Avoids IH 30/SH 161 interchange</li> </ul>	<ul style="list-style-type: none"> <li>• Right-of-way constraints along SH 360</li> <li>• Right-of-way constraints at Centreport Station</li> <li>• Significant curvature will require slow speed</li> <li>• Opposition from Irving City Hall</li> <li>• Impacts to Hurricane Harbor and Six Flags</li> <li>• Limited development opportunities and access to TRE stations</li> <li>• Complexity of the route will result in slow speed</li> <li>• No access to Dallas Naval Air Station</li> </ul>	8,5,5,7,12,5
7	IH 30/West Fork Trinity River (A) Corridor (Start off on IH 30 and transfer to the West Fork Trinity River corridor around just east of Fort Worth)	<ul style="list-style-type: none"> <li>• Less costly right-of-way</li> <li>• Opportunity for IH 30 upgrade</li> </ul>	<ul style="list-style-type: none"> <li>• No access to Arlington Entertainment District</li> <li>• No access to Dallas Naval Air Station</li> <li>• Large natural environment concerns within Trinity River</li> <li>• Impacts to multiple parks/nature preserves</li> <li>• Impacts to landfills</li> <li>• Possible terrain issues between IH 820 and downtown Fort Worth</li> <li>• Natural environment impact/Trinity River</li> <li>• Potential ecology concerns</li> <li>• Impact to Veridian development</li> </ul>	9,9,9,10,9,13
8	IH 30/SH 360/West Fork Trinity River Corridor (Start off on IH 30 and transfer to West Fork Trinity River corridor at SH 360)	<ul style="list-style-type: none"> <li>• Opportunity for IH 30 upgrade</li> <li>• Access to Arlington Entertainment District</li> <li>• Development potential for Arlington</li> <li>• No impact to Irving</li> <li>• Avoids IH 30/SH 360 interchange</li> <li>• Avoids IH 30/SH 161 interchange</li> </ul>	<ul style="list-style-type: none"> <li>• Impacts to existing park space</li> <li>• Right-of-way constraints along SH 360</li> <li>• Curvature south of TRE will require right-of-way and reduce speed</li> <li>• Natural environment impact/Trinity River</li> <li>• Potential ecology concerns</li> <li>• Curvature unfeasible</li> <li>• <b>No access to Dallas Naval Air Station</b></li> </ul>	7,2,12,12,11,14
9	IH 30/West Fork Trinity River (B) Corridor (Start off on IH 30 and transfer to the West Fork Trinity River corridor around Grand Prairie)	<ul style="list-style-type: none"> <li>• Gentle curvature</li> <li>• No impacts to Irving</li> <li>• Opportunity for IH 30 upgrade</li> <li>• Right-of-way available along IH 30</li> <li>• Opportunity for IH 30 upgrade</li> <li>• Access to Arlington Entertainment District</li> <li>• <b>Development potential for Arlington</b></li> </ul>	<ul style="list-style-type: none"> <li>• No access to Arlington station</li> <li>• Impacts to existing park space</li> <li>• Confined space around Union Station</li> <li>• Conflict with ITC in Fort Worth</li> <li>• Natural environment impact/Trinity River</li> <li>• Potential ecology concerns</li> <li>• <b>No access to Dallas Naval Air Station</b></li> </ul>	4,4,4,7,6,4
10	UPRR Corridor (UPRR corridor entire length)	<ul style="list-style-type: none"> <li>• Existing train corridor</li> <li>• Minimal residential or commercial impacts</li> <li>• Access to Arlington Entertainment District</li> <li>• Potential station east of IH 35W</li> <li>• Avoids IH 30/SH 360 interchange</li> <li>• Avoids IH 30/SH 161 interchange</li> <li>• Access to Dallas Naval Air Station</li> <li>• No impacts to parkland</li> </ul>	<ul style="list-style-type: none"> <li>• Right-of-way required parallel to UPRR</li> <li>• TxDOT jurisdiction of SH 180</li> <li>• Proximity to Tower 55 in Fort Worth</li> <li>• Environmental justice concerns</li> </ul>	5,5,10,3,5,6

DALLAS - FORT WORTH CORE EXPRESS SERVICE HIGH SPEED RAIL  
October 2016 Peer Review Comments

Map Reference	Alignment Option	Pros	Cons	Ranked Most Favorite to Least Favorite
11	UPRR/DART Red Line Corridor (UPRR corridor until Dallas Naval Air Station, then greenfield until BNSF/DART Red line corridor)	<ul style="list-style-type: none"> <li>• Access to Arlington Entertainment District</li> <li>• Access to Dallas Naval Air Station</li> <li>• Minimal impacts to parkland</li> <li>• Avoids IH 30/SH 360 interchange</li> <li>• Avoids IH 30/SH 161 interchange</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental justice concerns near Dallas</li> <li>• Proximity to the zoo</li> <li>• Curves will affect speed</li> <li>• Requires a portion to be new greenfield alignment</li> </ul>	6,6, 6,11,7,8
12	UPRR/SH 303/DART Red Line Corridor (UPRR corridor until just east of IH 820, then SH 303 until BNSF/DART Red Line corridor)	<ul style="list-style-type: none"> <li>• Access to Arlington Entertainment District</li> <li>• Avoids IH 30/SH 360 interchange</li> <li>• Avoids IH 30/SH 161 interchange</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental justice concerns for established neighborhoods</li> <li>• Right-of-way constraints along SH 303 and Oak Cliff</li> <li>• Proximity to Grand Prairie Airport</li> <li>• Costly bridge over Mountain Creek Lake</li> <li>• Curves will affect speed</li> <li>• Requires a portion to be new greenfield alignment</li> <li>• No access to Dallas Naval Air Station</li> </ul>	12,14,14,9,8,9
13	UPRR/US 287/IH 20/TCP Corridor (UPRR going south until US 287 business, then IH 20 to TCP HSR corridor)	<ul style="list-style-type: none"> <li>• Direct route will allow for higher speed</li> <li>• Access to public right-of-way along IH 20 corridor</li> <li>• Smooth connections to TCP/Dallas station and Fort Worth station</li> <li>• Minimal impacts</li> <li>• Avoids IH 30/SH 360 interchange</li> <li>• Avoids IH 30/SH 161 interchange</li> </ul>	<ul style="list-style-type: none"> <li>• Far south and away from Arlington Entertainment District</li> <li>• People mover would be required</li> <li>• Terrain concerns</li> <li>• Environmental justice concerns near established neighborhoods</li> <li>• IH 20/SH 360 interchange concerns</li> <li>• IH 20/SH 161 interchange concerns</li> <li>• IH 20/US 67 interchange concerns</li> <li>• IH 20/IH 35E interchange concerns</li> <li>• Curves will affect speed</li> <li>• <u>No access to Dallas Naval Air Station</u></li> </ul>	14,13,13,8,13,10
14	UPRR (NS)/US 287/IH 20/BNSF/DART Red Line Corridor (UPRR going south until US 287 business, then IH 20 to BNSF/DART Red Line corridor)	<ul style="list-style-type: none"> <li>• Direct route will allow for higher speed</li> <li>• Access to public right-of-way along IH 20 corridor</li> <li>• Avoids IH 30/SH 360 interchange</li> <li>• Avoids IH 30/SH 161 interchange</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental justice concerns for established neighborhoods</li> <li>• Far south and away from Arlington Entertainment District right-of-way constraints along DART Red Line</li> <li>• Vertical grade concerns</li> <li>• IH 20/SH 360 interchange concerns</li> <li>• IH 20/SH 161 interchange concerns</li> <li>• IH 20/US 67 interchange concerns</li> <li>• IH 20/IH 35E interchange concerns</li> <li>• Curves will affect speed</li> <li>• No access to Dallas Naval Air Station</li> </ul>	13,13,12,14,14,11



## **Appendix C – Alignment Evaluation Matrix**

APPENDIX C

DFWCES Alignment Evaluation Matrix

Map Reference Number	Alignment Option	Alignment Description (West to East)	Length (Miles)	% Length On or Adjacent to Existing Transportation Corridor	% Length Adjacent to Residential Areas	Number of Public Facilities Within 100 Feet	% Length Above 125 mph <sup>1</sup>	Secondary Criteria			Issues and Fatal Flaws (FF)	Recommended for Further Evaluation (Yes, No)
								Meets One-Seat Ride Policy <sup>2</sup>	Meets Three-Station Policy	Adjacent to Former Dallas Naval Air Station		
1	TRE Corridor	Alignment shares part the TRE right-of-way from Fort Worth to the proposed Dallas TCR station	33.7	100.0%	0.4%	11	93.9%	YES	NO	NO	No Arlington Entertainment District Station; Irving opposition; Residential neighborhood impacts	NO
2	IH 30/West Fork Trinity River Corridor (near Fort Worth)	Alignment is within the IH 30 right-of-way until just east of Fort Worth where it curves north to follow the West Fork Trinity River basin until it crosses the Trinity River and then it parallels the UPRR right-of-way to the proposed Dallas TCR station	35.2	13.0%	2.1%	3	65.0%	YES	NO	NO	Trinity River environmental impacts; Circuitous route resulting in slower speed; No Arlington Entertainment District Station	NO
3	IH 30 Corridor	Alignment is within the IH 30 right-of-way from Fort Worth to the proposed Dallas TCR station	32.1	93.8%	0.2%	4	93.0%	YES	YES	NO	Conflict with SH 360, PGBT, Loop 12, Hampton and IH 30/IH 35E Interchanges (FF)	NO
3A	IH 30 Corridor Adjusted	Alignment is within the IH 30 right-of-way except for adjustments to avoid SH 360, PGBT and Loop 12 interchanges. Alignment then shifts at Hampton Road to be adjacent to the UPRR right-of-way all the way to the proposed Dallas TCR station	32.2	87.3%	0.2%	3	88.6%	YES	YES	NO	Added cost of right-of-way to avoid interchanges; Curves result in slower speeds	YES
4	IH 30/Entertainment District/UPRR Corridor (Station between Stadiums)	Alignment is within IH 30 right-of-way until Arlington entertainment district where it traverses between AT&T and Globe Life Stadiums then parallels UPRR right-of-way all the way to the proposed Dallas TCR station	32.7	88.1%	1.8%	8	89.9%	YES	YES	YES	Added cost for right-of-way to parallel UPRR right-of-way	YES
4A	IH 30/Entertainment District/UPRR Corridor (Station at Globe Life Park)	Alignment is within IH 30 right-of-way until Arlington entertainment district where it traverses through site of old Globe Life Stadiums then parallels UPRR right-of-way all the way to the proposed Dallas TCR station	32.7	91.0%	1.6%	10	89.9%	YES	YES	YES	Added cost for right-of-way to parallel UPRR right-of-way	YES
5	IH 30/UPRR Corridor	Alignment is within right-of-way of IH 30 until Loop 12 where it shifts to be adjacent to the UPRR right-of-way all the way to the proposed Dallas TCR station	32.1	93.8%	0.5%	4	78.2%	YES	YES	NO	Conflict w/SH 360, PGBT and Loop 12 Interchanges (FF); Added cost for right-of-way to parallel UPRR right-of-way	NO

APPENDIX C

DFWCES Alignment Evaluation Matrix

Map Reference Number	Alignment Option	Alignment Description (West to East)	Length (Miles)	% Length On or Adjacent to Existing Transportation Corridor	% Length Adjacent to Residential Areas	Number of Public Facilities Within 100 Feet	% Length Above 125 mph <sup>1</sup>	Secondary Criteria			Issues and Fatal Flaws (FF)	Recommended for Further Evaluation (Yes, No)
								Meets One-Seat Ride Policy <sup>2</sup>	Meets Three-Station Policy	Adjacent to Former Dallas Naval Air Station		
5A	IH 30/UPRR Corridor Adjusted	Alignment is within IH 30 right-of-way except for adjustments to avoid SH 360, PGBT and Loop 12 interchanges. Alignment then shifts at Loop 12 to be adjacent to the UPRR right-of-way all the way to the proposed Dallas TCR station	32.2	87.3%	0.7%	4	89.4%	YES	YES	NO	Added cost of right-of-way to avoid interchanges and to parallel UPRR right-of-way; Additional curves results in slower speed	YES
6	IH 30/SH 360/TRE Corridor	Alignment is within the IH 30 right-of-way until Arlington where it curves north to be within the SH 360 right-of-way. It then curves east to share part of the TRE right-of-way all the way to the proposed Dallas TCR station	35.9	91.0%	0.1%	10	91.8%	YES	YES	NO	Greater Length; Added right-of-way cost to accommodate curves at SH 360; Curves result in slower speeds; Irving Opposition; Residential neighborhood impacts	YES
7	IH 30/West Fork Trinity River Corridor (near IH 820)	Alignment is within the IH 30 right-of-way until just east of IH 820 where it curves north to follow the West Fork Trinity River basin until it crosses the Trinity River and then it parallels the UPRR right-of-way to the proposed Dallas TCR station	35.1	27.5%	2.3%	3	63.7%	YES	NO	NO	Trinity River environmental impacts; No Arlington Entertainment District Station; Circuitous route resulting in slower speed	NO
8	IH 30/SH 360/West Fork Trinity River Corridor (near TRE)	Alignment is within the IH 30 right-of-way until Arlington where it curves north to be within the SH 360 right-of-way. It then curves east before it gets to the TRE corridor to be within the West Fork Trinity River basin until it crosses the Trinity River and then it parallels the UPRR right-of-way to the proposed Dallas TCR station	36.6	55.7%	0.4%	4	69.7%	YES	YES	NO	Trinity River Environmental impacts ; Circuitous route resulting in slower speed; Added right-of-way cost to accommodate curves at SH 360	NO
9	IH 30/West Fork Trinity River Corridor (near Grand Prairie)	Alignment is within the IH 30 right-of-way until Grand Prairie where it curves north to follow the West Fork Trinity River basin until it crosses the Trinity River and then it parallels the UPRR right-of-way to the proposed Dallas TCR station	33.0	67.5%	0.4%	3	90.9%	YES	YES	NO	Conflict with SH 360 and PGBT Interchanges (FF); Trinity River Environmental impacts; Circuitous route resulting in slower speed	NO

APPENDIX C

DFWCES Alignment Evaluation Matrix

Map Reference Number	Alignment Option	Alignment Description (West to East)	Length (Miles)	% Length On or Adjacent to Existing Transportation Corridor	% Length Adjacent to Residential Areas	Number of Public Facilities Within 100 Feet	% Length Above 125 mph <sup>1</sup>	Secondary Criteria			Issues and Fatal Flaws (FF)	Recommended for Further Evaluation (Yes, No)
								Meets One-Seat Ride Policy <sup>2</sup>	Meets Three-Station Policy	Adjacent to Former Dallas Naval Air Station		
9A	IH 30 corridor adjusted/West Fork Trinity River Corridor (near Grande Prairie)	Alignment is within the IH 30 right-of-way except for adjustments to avoid SH 360 and PGBT interchanges until Grand Prairie where it curves north to follow the West Fork Trinity River basin until it crosses the Trinity River and then it parallels the UPRR right-of-way to the proposed Dallas TCR station	33.0	67.5%	0.6%	3	88.4%	YES	YES	NO	Added cost to avoid interchanges; Trinity River Environmental impacts; Circuitous route resulting in slower speed	NO
10	UPRR Corridor	Alignment parallels and is adjacent to the UPRR right-of-way from Fort Worth to the proposed Dallas TCR station	32.2	99.5%	0.8%	6	88.6%	YES	YES	YES	Added cost to avoid Tower 55 and IH 35W interchange; Added cost for right-of-way to parallel UPRR right-of-way	YES
11	UPRR/DART Red Line/TCR Corridor	Alignment parallels the UPRR right-of-way until just east of the former Joint Naval Air Station, then curves southeast on new alignment until the BNSF/DART Red Line corridor where it parallels the right-of-way until the TCR Houston to Dallas HSR right-of-way. It then turns north and follows the TCR right-of-way to the proposed Dallas TCR station	34.9	89.5%	1.2%	7	75.9%	YES	YES	YES	Added cost to avoid Tower 55 and IH 35W interchange; Additional cost for right-of-way to parallel UPRR and DART Red Line right-of-way; Residential neighborhood impacts; right-of-way cost for new alignment from UPRR to BNSF near SH 408	NO
12	UPRR/SH 303/DART Red Line/TCR Corridor	Alignment parallels the UPRR right-of-way until just east of IH 820, then it parallels SH 303 right-of-way until the BNSF/DART Red Line corridor where it parallels the right-of-way until the TCR Houston to Dallas HSR right-of-way. It then turns north and follows the TRC right-of-way to the proposed Dallas TCR station	34.2	91.6%	0.1%	7	72.6%	YES	NO	NO	Added cost to avoid Tower 55 and IH 35W interchange; No Arlington Entertainment District Station; Additional cost for right-of-way paralleling UPRR and DART Red Line right-of-way; Residential neighborhood impacts	NO



APPENDIX C

DFWCES Alignment Evaluation Matrix

Map Reference Number	Alignment Option	Alignment Description (West to East)	Length (Miles)	% Length On or Adjacent to Existing Transportation Corridor	% Length Adjacent to Residential Areas	Number of Public Facilities Within 100 Feet	% Length Above 125 mph <sup>1</sup>	Secondary Criteria			Issues and Fatal Flaws (FF)	Recommended for Further Evaluation (Yes, No)
								Meets One-Seat Ride Policy <sup>2</sup>	Meets Three-Station Policy	Adjacent to Former Dallas Naval Air Station		
13	UPRR Waxahachie Line/US 287 BUS/IH 20/TCR Corridor	Alignment parallels the UPRR Waxahachie line going south until US 287 Business, then curves southeast to be within US 287 Business right-of-way until IH 20. It then curves east to be within IH 20 right-of-way until the Texas Central Partners HSR right-of-way. It then parallels the TCR right-of-way until the proposed Dallas TCR station	47.7	94.3%	4.8%	1	80.6%	YES	NO	NO	Added cost to avoid Tower 55 and IH 35W interchange; Steep IH 20 vertical curves (FF) ; No Arlington Entertainment District Station; greater length; Additional cost for right-of-way to parallel UPRR and TCR right-of-way	NO
14	UPRR Waxahachie Line/US 287 BUS/IH 20/BNSF/DART Red Line/TCR Corridor	Alignment parallels the UPRR Waxahachie line going south until US 287 Business, then curves southeast to be within US 287 Business right-of-way until IH 20. It then curves east to be within IH 20 right-of-way until the BNSF railroad right-of-way in Duncanville where it curves north and parallels the BNSF/DART Red Line right-of-way until the TCR Houston to Dallas HSR right-of-way. It then turns north and follows the TCR right-of-way to the proposed Dallas TCR station	40.3	99.5%	1.6%	6	75.2%	YES	NO	NO	Added cost to avoid Tower 55 and IH 35W interchange; Steep IH 20 vertical curves (FF) ; No Arlington Entertainment District Station; greater length; Additional cost for right-of-way paralleling UPRR, BNSF and DART Red Line right-of-way	NO

Note 1: Percent Length above 125 mph does not consider acceleration or deceleration distances

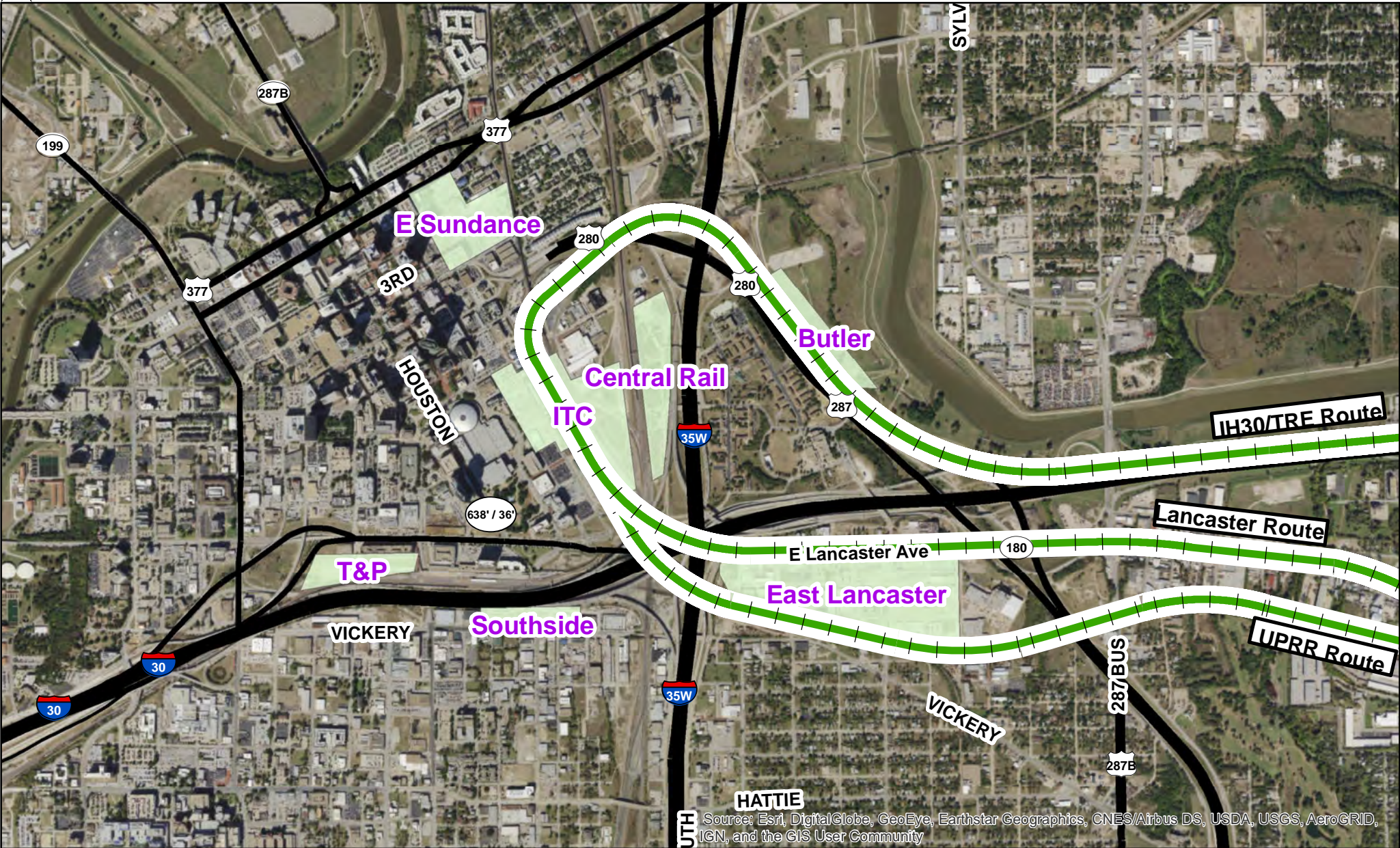
Note 2: Alignments shown as one-seat ride; however, this is dependent on ultimate Fort Worth station location

COLOR LEGEND	Length (Miles)	% Length On or Adjacent to Existing Transportation Corridor	% Length Adjacent to Residential Areas	Number of Public Facilities Within 100 Feet	% Length Above 125 mph <sup>1</sup>	Meets One-Seat Ride Policy <sup>2</sup>	Meets Three-Station Policy	Adjacent to NAS	Issues and Fatal Flaws (FF)	Recommended for Further Evaluation (Yes, No)
Minimal Impact Range	32	100%	0.0%	1	100%	YES	YES	YES	Minimal	YES
	37	81%	2.0%	5	81%					
Moderate Impact Range	38	80%	2.1%	6	80%	POSSIBLE	POSSIBLE	POSSIBLE	Moderate	
	43	51%	3.2%	10	71%					
Significant Impact Range	44	50%	3.7%	11	70%	NO	NO	NO	Significant	NO
	48	0%	4.8%	15	60%					
Fatal Flawed									FATAL FLAWED	

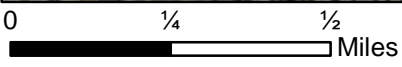
## **Appendix D – Fort Worth Area Map**



# HSR Alignment Options - Fort Worth



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



1 inch = 1,585 feet

## Legend

- |                   |                    |
|-------------------|--------------------|
| High Speed Rail   | Interstate Highway |
| Station_Platforms | US Highway         |
|                   | State Highway      |
|                   | Tollway            |

## **Appendix E – HSR Station Location Evaluation Matrices**



**DFWCES Alignment Options Analysis - Fort Worth Station Locations**

Map Reference Number		3A	4	4A	5A	6	10
Alignment Option		IH 30 Corridor Adjusted	IH 30/Entertainment District/UPRR Corridor (Station between Stadiums)	IH 30/Entertainment District/UPRR Corridor (Station at Globe Life Park)	IH 30 Adjusted/UPRR Corridor	IH 30/SH 360/TRE Corridor	UPRR Corridor
Alignment Description (West to East)		Alignment is within the IH 30 right-of-way except for adjustments to avoid SH 360, PGBT and Loop 12 interchanges. Alignment then shifts at Hampton Rd to be adjacent to the UPRR right-of-way all the way to proposed TCR Dallas	Alignment is within IH 30 right-of-way until Arlington entertainment district where it traverses between AT&T and Globe Life Stadiums then parallels UPRR right-of-way all the way to the proposed TCR Dallas Station	Alignment is within IH 30 right-of-way until Arlington entertainment district where it traverses through site of old Globe Life Stadiums then parallels UPRR right-of-way all the way to proposed TCR Dallas Station	Alignment is within IH 30 right-of-way except for adjustments to avoid SH 360, PGBT and Loop 12 interchanges. Alignment then shifts at Loop 12 to be adjacent to the UPRR right-of-way all the way to the proposed TCR Dallas station.	Alignment is within the IH 30 right-of-way until Arlington where it curves north to be within the SH 360 right-of-way. It then curves east to share part of the TRE right-of-way all the way to the proposed TCR Dallas station	Alignment parallels and is adjacent to the UPRR right-of-way from Fort Worth to the proposed TCR Dallas station
Station Location #1 Butler	HSR Operational Impacts (Horiz and Vert Curves)	Yellow	Yellow	Yellow	Yellow	Yellow	Green
	Alignment Proximity to Station	Green	Green	Green	Green	Green	Red
	Compatibility with North/South HSR	Green	Green	Green	Green	Green	Red
Station Location #2 East Lancaster	HSR Operational Impacts (Horiz and Vert Curves)	Yellow	Yellow	Yellow	Yellow	Yellow	Green
	Alignment Proximity to Station	Red	Red	Red	Red	Red	Green
	Compatibility with North/South HSR	Green	Green	Green	Green	Green	Red
Station Location #3 Southside	HSR Operational Impacts (Horiz and Vert Curves)	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
	Alignment Proximity to Station	Red	Red	Red	Red	Red	Red
	Compatibility with North/South HSR	Green	Green	Green	Green	Green	Red
Station Location #4 T & P	HSR Operational Impacts (Horiz and Vert Curves)	Yellow	Yellow	Yellow	Yellow	Yellow	Green
	Alignment Proximity to Station	Red	Red	Red	Red	Red	Yellow
	Compatibility with North/South HSR	Green	Green	Green	Green	Green	Red

APPENDIX E

Map Reference Number		3A	4	4A	5A	6	10
Alignment Option		IH 30 Corridor Adjusted	IH 30/Entertainment District/UPRR Corridor (Station between Stadiums)	IH 30/Entertainment District/UPRR Corridor (Station at Globe Life Park)	IH 30 Adjusted/UPRR Corridor	IH 30/SH 360/TRE Corridor	UPRR Corridor
Alignment Description (West to East)		Alignment is within the IH 30 right-of-way except for adjustments to avoid SH 360, PGBT and Loop 12 interchanges. Alignment then shifts at Hampton Rd to be adjacent to the UPRR right-of-way all the way to proposed TCR Dallas	Alignment is within IH 30 right-of-way until Arlington entertainment district where it traverses between AT&T and Globe Life Stadiums then parallels UPRR right-of-way all the way to the proposed TCR Dallas Station	Alignment is within IH 30 right-of-way until Arlington entertainment district where it traverses through site of old Globe Life Stadiums then parallels UPRR right-of-way all the way to proposed TCR Dallas Station	Alignment is within IH 30 right-of-way except for adjustments to avoid SH 360, PGBT and Loop 12 interchanges. Alignment then shifts at Loop 12 to be adjacent to the UPRR right-of-way all the way to the proposed TCR Dallas station.	Alignment is within the IH 30 right-of-way until Arlington where it curves north to be within the SH 360 right-of-way. It then curves east to share part of the TRE right-of-way all the way to the proposed TCR Dallas station	Alignment parallels and is adjacent to the UPRR right-of-way from Fort Worth to the proposed TCR Dallas station
Station Location #5 ITC	HSR Operational Impacts (Horiz and Vert Curves)	Yellow	Yellow	Yellow	Yellow	Yellow	Green
	Alignment Proximity to Station	Green	Green	Green	Green	Green	Red
	Compatibility with North/South HSR	Green	Green	Green	Green	Green	Red
Station Location #6 East Sundance	HSR Operational Impacts (Horiz and Vert Curves)	Yellow	Yellow	Yellow	Yellow	Yellow	Green
	Alignment Proximity to Station	Yellow	Yellow	Yellow	Yellow	Yellow	Red
	Compatibility with North/South HSR	Green	Green	Green	Green	Green	Red
Station Location #7 Central Rail Station	HSR Operational Impacts (Horiz and Vert Curves)	Yellow	Yellow	Yellow	Yellow	Yellow	Green
	Alignment Proximity to Station	Green	Green	Green	Green	Green	Red
	Compatibility with North/South HSR	Green	Green	Green	Green	Green	Red

COLOR LEGEND	Favorable	Neutral	Negative
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APPENDIX E

DFWCES Alignment Options Analysis - Arlington Station Locations

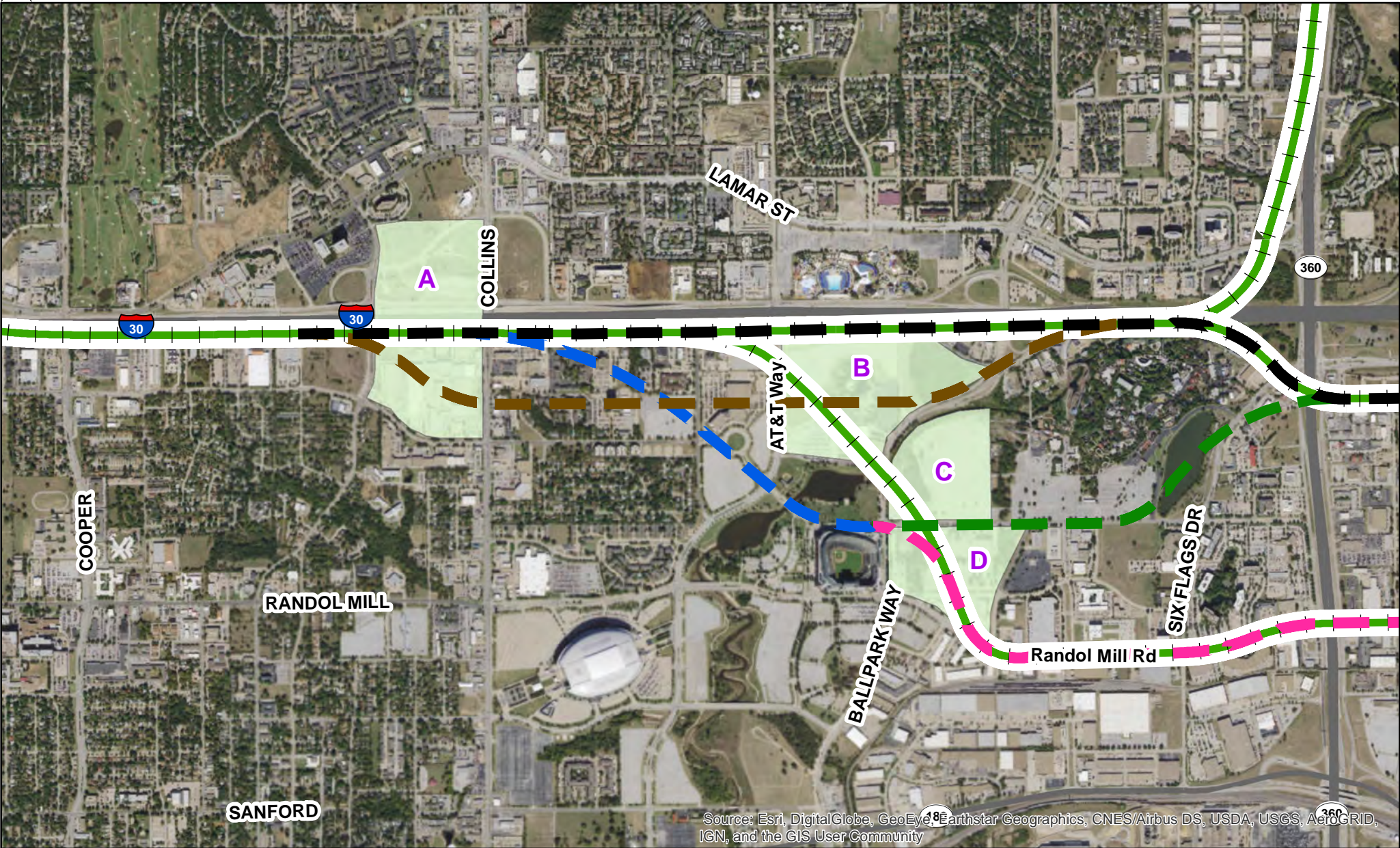
Map Reference Number		3A	3A.1	3A.2	4	4A	4A.1	5A	6	10
Alignment Option		IH 30 Corridor Adjusted	Arlington Brown	Arlington Blue/Green	IH 30/Entertainment District/UPRR Corridor (Station between Stadiums)	IH 30/Entertainment District/UPRR Corridor (Station at Globe Life Park)	Arlington Blue/Pink	IH 30 adjusted/UPRR Corridor	IH 30/SH 360/TRE Corridor	UPRR Corridor
Alignment Description (West to East)		Alignment is within the IH 30 right-of-way except for adjustments to avoid SH 360, PGBT, and Loop 12 interchanges. Alignment then shifts at Hampton Road to be adjacent to the UPRR right-of-way all the way to proposed TCR Dallas Station	Alignment is the same as 3A and 5A through Arlington except that it dips south just west of Collins and then rejoins IH 30 at Six Flags.	Alignment is the same as 4A except that it passes north of Globe Life Park then parallels Road to the BallPark Drive and then rejoins alignments 3A and 5A at SH 360 and Avenue E.	Alignment is within IH 30 right-of-way until Arlington entertainment district where it traverses between AT&T and Globe Life Stadiums then parallels UPRR right-of-way all the way to the proposed TCR Dallas Station	Alignment is within IH 30 right-of-way until Arlington entertainment district where it traverses through site of old Globe Life Stadiums then parallels UPRR right-of-way all the way to the proposed TCR Dallas Station	Alignment is the same as 4A except that it misses Globe Life Park to the north	Alignment is within IH 30 right-of-way except for adjustments to avoid SH 360, PGBT and Loop 12 interchanges. Alignment then shifts at Loop 12 to be adjacent to the UPRR right-of-way all the way to the proposed Dallas station	Alignment is within the IH 30 right-of-way until Arlington where it curves north to be within the SH 360 right-of-way. It then curves east to share part of the TRE right-of-way all the way to the proposed TCR Dallas station	Alignment parallels and is adjacent to the UPRR right-of-way from Fort Worth to the proposed TCR Dallas station
Station Location # 1 West of Collins	HSR Operational Impacts (Horiz and Vert Curves)									
	Alignment Proximity to Station									
	Alignment Mostly on Existing Public Right-of-Way									
Station Location # 2 South IH 30	HSR Operational Impacts (Horiz and Vert Curves)									
	Alignment Proximity to Station									
	Alignment Mostly on Existing Public Right-of-Way									
Station Location # 3 Six Flags	HSR Operational Impacts (Horiz and Vert Curves)									
	Alignment Proximity to Station									
	Alignment Mostly on Existing Public Right-of-Way									
Station Location # 4 East Ballpark	HSR Operational Impacts (Horiz and Vert Curves)									
	Alignment Proximity to Station									
	Alignment Mostly on Existing Public Right-of-Way									

COLOR LEGEND	Favorable	Neutral	Negative
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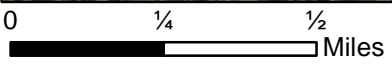


## **Appendix F – Arlington Area Map**

# HSR Alignment Options - Arlington



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



## Legend

- |                          |                                     |                    |
|--------------------------|-------------------------------------|--------------------|
| High Speed Rail          | <b>HSR Arlington Concept Routes</b> | Interstate Highway |
| Station_Platforms        | IH-30 Option                        | US Highway         |
| Ball Park Option         | Convention Center Option            | State Highway      |
| Road to Six Flags Option | Randol Mill Option                  | Tollway            |

## **Appendix G – Alignment Option Recommendations Map**



# Supplemental Study of DFWCES Alignment Option Recommendations

