Oklahoma High-Speed Rail Initiative

Oklahoma City to Tulsa High-Speed Rail Corridor Cost Study

Prepared for:

The Oklahoma Department of Transportation

Rail Programs Division

200 N.E. 21st
Oklahoma City, OK 73105

Prepared by:

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C&B Project No. 020874.010

February 2002

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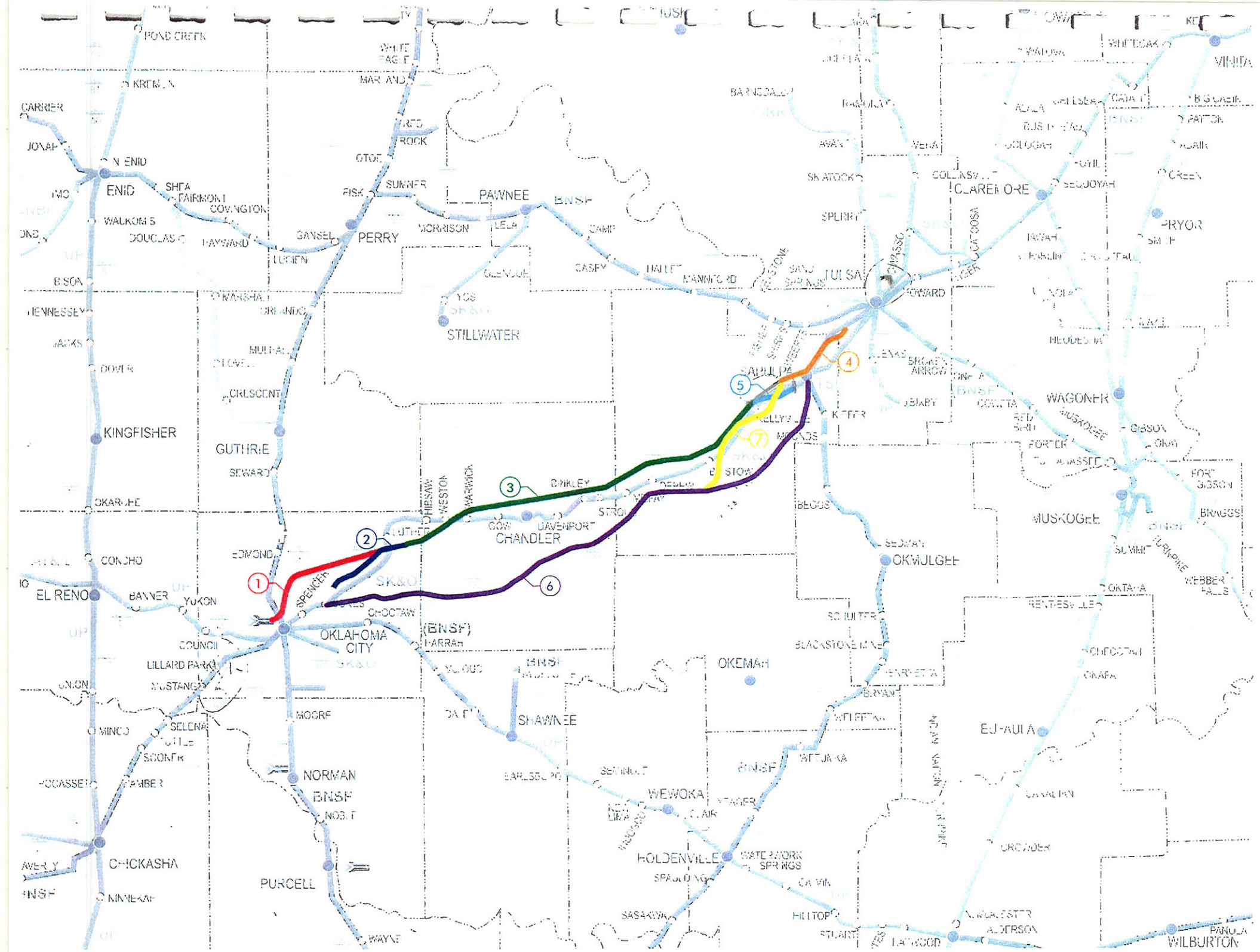
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KINGFISHER
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TULSA
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PRYOR
HOLDENVILLE
WEWOKA
OKEMAH
EUFAULA
WILBURTON
BNSF
SK&O

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CHAPTER 1 - INTRODUCTION

A growing interest in intercity rail passenger service, increasing roadway congestion, and increasing interest in High Speed Rail transportation as well as proposed funding mechanisms throughout the United States led to the development of the original High Speed Passenger Rail Feasibility Study for the State of Oklahoma (1). Included in the High Speed Passenger Rail Feasibility Study (1) was an evaluation of the existing routes between "Oklahoma City and Tulsa". The original study underscored the importance of a solid passenger rail connection between two largest economic centers to facilitate the ridership and connectivity necessary to develop a feasible passenger rail system in the State of Oklahoma and throughout the remainder of the region. A significant accomplishment of the original Oklahoma High Speed Passenger Rail Feasibility Study (1) was the completion of a successful application for designation by the Federal Railroad Administration (FRA) and the Department of Transportation (DOT) as a High Speed Rail Corridor from Ft. Worth to Tulsa.

The primary route selected for the Fort Worth to Oklahoma City segment follows the existing Heartland Flyer route on the Burlington Northern Santa Fe (BNSF) Red Rock and Fort Worth Subdivisions. The Red Rock Subdivision is presently being modified to increase operating speeds up to 79 MPH from Oklahoma City to the Red River. Ongoing efforts are under way with the BNSF to incrementally reduce the present travel time on the Heartland Flyer from Oklahoma City to Ft. Worth primarily focusing on the enhancement of the present grade crossing and train control signals. Preliminary travel time projections indicate that the present total travel time of Four hours and 30 Minutes can be reduced by approximately 35 minutes with the improvements presently programmed in the State of Oklahoma. Similar improvements in the State of Texas would be anticipated to reduce the travel time by an additional 25 minutes resulting in a total travel time of Three hours and 30 minutes, which would be extremely competitive with present automobile travel times under favorable conditions.

The Oklahoma City to Tulsa segment would be an extremely important component of passenger rail service throughout the designated Southwest High Speed Rail Corridors because of the potential for through service on to Kansas City linking the Midwest Regional Rail System to the designated Southwest corridors. A recent study conducted by the Kansas Department of Transportation (2) indicates that the Tulsa to Kansas City route has the second highest potential for successful high-speed rail operations in the State of Kansas just behind a proposed high-

speed connection between Wichita and Kansas City. The establishment of competitive rail service between Oklahoma City and Tulsa would significantly impact the development of High Speed Passenger and Passenger Rail service in the State of Oklahoma and the surrounding region. One significant challenge for the development of the Oklahoma City to Tulsa corridor is to develop a service that would be faster or highly competitive with existing automobile travel times on the Turner Turnpike. In order to be competitive with existing travel time via automobile on the segment between Oklahoma City and Tulsa will require passenger rail operations in excess of 90 MPH which has prompted the present High Speed route evaluation. The existing ODOT route was evaluated for the feasibility of passenger rail operations by Amtrak in 1996 (3) and 1999 (4) as well as re-evaluated in the original High Speed Passenger Rail Study (1). The existing track infrastructure would require a significant amount of realignment and upgrade in order to be competitive with present automobile travel times on the Turner Turnpike. The existing ODOT route is also utilized for freight operations by the Stillwater Central Railroad Company and preliminary investigations have been conducted to establish overnight intermodal transport operations between Tulsa and Oklahoma City. Passenger rail operations on the existing track infrastructure under mixed track utilization operating scenarios would be greatly inhibited and inhibited freight operations. Extensive track infrastructure upgrades would be required to be competitive with existing automobile travel times and co-exist with present and future freight operations.

The present automobile travel time from Oklahoma City to Tulsa via the Turner Turnpike is approximately 1 hour and 45 minutes from city center to city center under favorable conditions. Preliminary travel time forecasts for High Speed Rail indicate that High Speed Rail service could be established that would facilitate a travel time of just over an hour between the two largest central business districts in the State of Oklahoma. This type of service would provide the connectivity needed to establish feasible through rail service from Tulsa to the north or east as well as provide more opportunity for daily employment or other travel commuting between Oklahoma City and Tulsa.

Another accomplishment of the ongoing passenger and High-Speed Rail studies in the State of Oklahoma has been the development of a High-Speed Rail development plan worthy of receiving Federal funding for present aerial mapping activities being conducted by the Federal Railroad Administration (FRA) on designated High Speed Corridors for select segments

throughout the nation. The "fly mapping" funding presently available for the incremental development of High-Speed Rail service on designated corridors is one of the only sources of funding presently available for High-Speed Rail development. The fly mapping information presently being programmed for collection will be crucial in order to further enhance the existing service between Fort Worth and Oklahoma City as well as establish additional service to Tulsa as proposed in the original High Speed Rail corridor application. The completion of this report has facilitated the development of the information necessary to facilitate the collection of the mapping data necessary to further the proposed High Speed Rail development efforts between Oklahoma City and Tulsa.

1.1 PROJECT STUDY CORRIDOR

1.1.1 Overview

The proposed rail connection between Oklahoma City and Tulsa was developed using two primary corridors with various alternative options on either end of the core corridors for the final connections to the Santa Fe train Station located in the Bricktown Area of downtown Oklahoma City and to Union Station in downtown Tulsa. The average length of the corridors range between 105 and 111 miles depending on the core route and the end connection alternatives selected. All of the corridors proposed would facilitate an overall travel time of less than 75 minutes when operated at 125 MPH and just over an hour when operated at 150 MPH.

The corridors evaluated were defined based on existing land development, previous rail studies, U.S.G.S. topographic maps, Department of Interior Wetland Maps, site visits, and the criteria previously established in the ODOT High Speed Passenger Rail Feasibility Study. Plan and profile sheets were generated using computer software which utilizes U.S.G.S. Public Land Survey System (PLSS) electronic data files, U.S.G.S. Geographic Names Information System (GNIS) electronic data files, and U.S.G.S Digital Elevation Model (DEM) data. The DEM files were digitized to establish a stated accuracy of approximately +/- 10 feet. Surface contours and vertical elevations were generated from the U.S.G.S. 10-feet DEM data generated during the digitizing process which consists of a grid of elevation values posted at 10 foot intervals.

1.1.2 Existing Conditions

The ODOT/ Union Pacific route through Harter Yard providing the proposed connection between Bricktown and the proposed new Southern Corridor south of Jones is a combination of existing ODOT and Union Pacific rail alignments which begins at a connection with the BNSF/Amtrak Heartland Flyer route just north of the Santa Fe Station in downtown Oklahoma City. The existing connection would require a reverse turning movement, consequently the direct connection proposed in the original High Speed Passenger Rail Study (1) has been included in the cost estimates for the High Speed Rail corridors in this study. The track from downtown to the proposed new corridor south of Jones is presently restricted to operations of speeds less than 40 MPH, consequently the existing infrastructure has been proposed for upgrade to operating speeds between 60 and 90 MPH. This route has also been proposed as one of the potential connections to the proposed Turnpike Corridor following existing ODOT/Union Pacific alignments to just North of Jones to connect with a proposed new corridor that would ultimately connect this route with the core turnpike corridor developed as an alternative for this study.

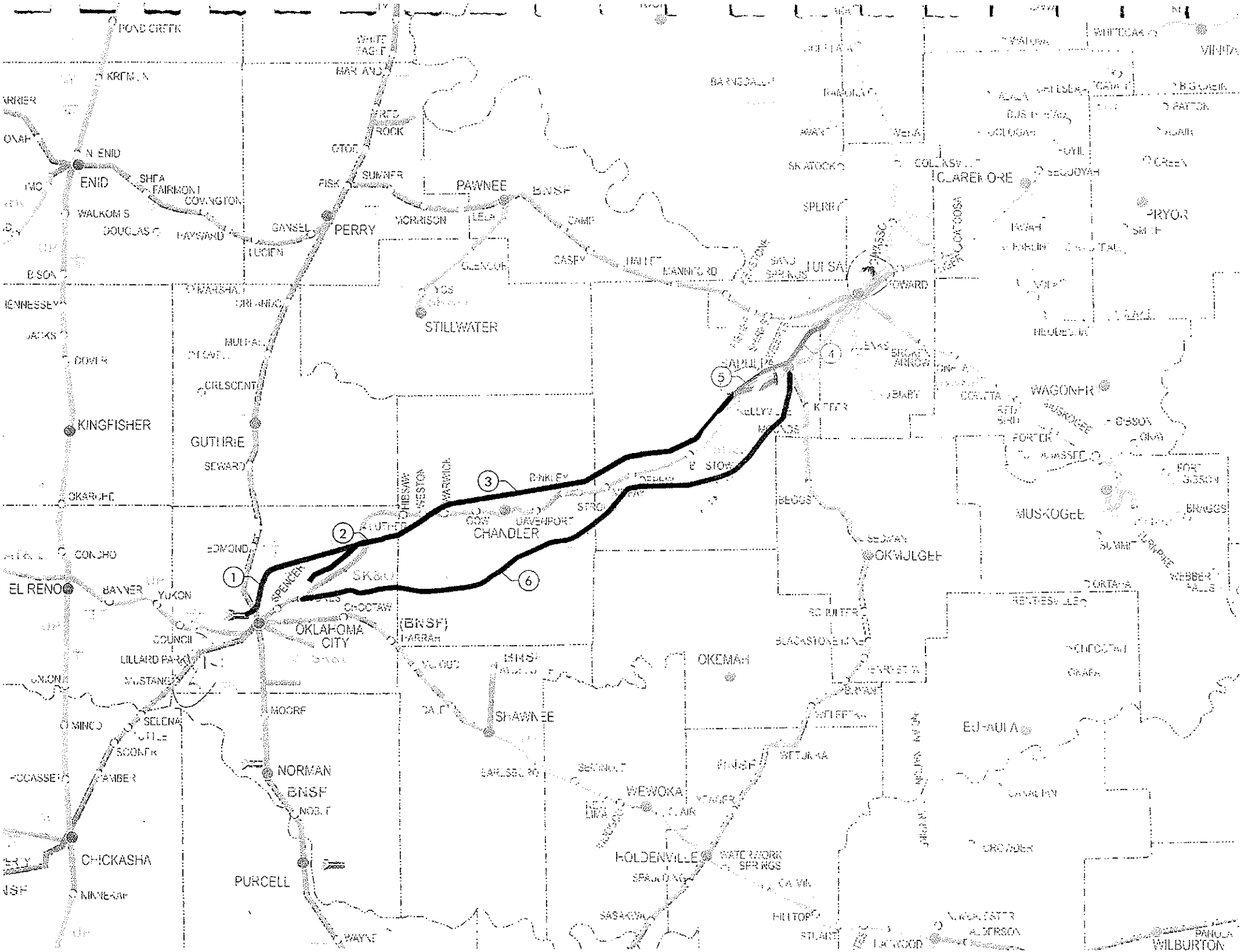
An abandoned Missouri, Kansas and Texas Railroad right-of-way extending from the western edge of Harter Yard up to near the western terminus of the Turner Turnpike was also evaluated as a potential alternative for connecting downtown Oklahoma City to the proposed turnpike corridor. The majority of this alignment remains in place, however development in the Lincoln Park and Remington Park areas may inhibit the utilization of the existing alignment. The abandoned track remains in place from around 50th Street south, indicating that the roadbed remains primarily in tact. The utilization of this alignment would require the complete replacement of the existing track infrastructure including ties, to facilitate the proposed operating speeds of between 60 and 90 MPH.

The existing segment of BNSF track south of Sapulpa proposed for the eastern connection of the Southern Corridor in one alternative is presently a high volume coal route. Passenger train movements on this route would most likely raise capacity issues on the existing trackage, consequently the cost estimate for improvements associated with this proposed alternative connection include provisions for the construction of an additional parallel track to the BNSF connection in Sapulpa. One alternative associated with each core corridor would connect to an

existing ODOT line west of Sapulpa. The cost estimates for the alternatives utilizing segments of the ODOT line include provisions to upgrade the existing track to the desired operating speeds as well as upgrade existing at-grade crossing locations.

The proposed routing from Sapulpa to downtown Tulsa would utilize the same segment of BNSF track for all of the alternatives from either the core Southern or Turnpike corridors with the exception of one Turnpike corridor alternative where the connection would be routed through northeast Sapulpa and connect with the existing BNSF route north of Sapulpa. All of these connections would require the installation of a bypass track around the BNSF Cherokee Yard to avoid capacity issues and maintain good operating speeds through the yard.

Figure 1.1: Proposed High Speed Rail Corridors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EL RENO
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CHAPTER 2 - CONCEPTUAL CORRIDOR AND ALTERNATIVE DEFINITION

The corridor evaluation includes two primary core corridors: the Turnpike Corridor and the Southern Corridor.

2.1 TURNPIKE CORRIDOR ALTERNATIVES

The Turnpike Corridor core route primarily follows the north edge of the Turner Turnpike from turnpike milepost 151.8 to turnpike milepost 211.5. Variations in grade and existing locations of development and roadway interchanges require the proposed corridor to deviate slightly from the existing turnpike at a few locations along the core route. The limited access available to the turnpike reduces the number of roadway overpasses and underpasses necessary to provide a controlled access rail corridor required for operations above 110MPH. An additional option for the Turnpike Corridor was developed on the Tulsa end of the corridor to connect the proposed new segment with the existing ODOT line just west of Sapulpa. Both proposed connections on the Tulsa end would follow the BNSF from Sapulpa through the BNSF Cherokee Yard in Tulsa on to Union Station in downtown Tulsa. Additional track infrastructure allowing passenger operations to bypass existing freight operations in the Cherokee Yard as denoted in the original High Speed Passenger Rail Study have been included in the corresponding High-Speed Corridor cost estimates for both alternatives on the Tulsa end of the proposed corridors.

2.1.1 Corridor Analysis

2.1.1.1 Horizontal Alignment

The proposed alignments for the Turnpike Corridor start at the Santa Fe Station in downtown Oklahoma City and would utilize existing ODOT roadbed to the existing Union Pacific Harter Yard approximately 3 miles east of downtown. Segment 1 proceeds north along an abandoned MKT right-of-way passing through Lincoln Park and near Remington Park prior to crossing under I-35 and heading north to intersect the existing Turner Turnpike alignment near turnpike milepost 136. Segment 2 begins near Jones connecting to the Santa Fe Station utilizing existing ODOT and Union Pacific alignments and new alignment north of Jones until intersecting the existing Turner Turnpike alignment near turnpike milepost 151.8. Segment 3 follows the Turner Turnpike alignment closely from turnpike milepost 151.8 to 211.5. Segment 4 follows a new alignment northwest of Sapulpa passing over and following an existing BNSF route on the east side of the tracks north of Sapulpa, and connecting into the BNSF after traversing the proposed Cherokee Yard bypass just prior to the Arkansas River bridge. Segment 5 begins near turnpike milepost 210 and immediately crosses over the turnpike to connect into an

existing ODOT line approximately 5 miles west of the BNSF Creek Subdivision connection in downtown Sapulpa.

All of the Turnpike corridor alternatives will require the construction of a direct connection to the BNSF line in downtown Oklahoma City and a bypass route around the BNSF Cherokee Yard near downtown Tulsa as denoted in the original High Speed Passenger Rail Study (1). Existing segments of track will require varying levels of horizontal alignment upgrade depending on present utilization, track condition, and desired operating speeds. The horizontal alignment for new construction will maintain the minimum curvature allowed for 150 mph operations.

2.1.1.2 Vertical Alignment

The elevation at the eastern end of the proposed corridors in Tulsa is approximately 750 feet and approximately 1200 feet in Oklahoma City. Consequently, the overall gradient will be negative when traveling east and positive when traveling west. The maximum vertical sustained grades for the track design profiles were held to less than a two percent grade in an effort to maintain feasible high-speed operations. The existing turnpike roadway alignment contains grades in excess of 4 % in some areas resulting in the need for more excavation and fill for the turnpike rail corridor than the southern corridor. The maximum rate of change for the vertical curves was limited to 0.015% pending further direction from the FRA who is presently reviewing vertical alignment design standards for high-speed rail operations in the United States.

2.1.1.3 Grade Crossings

There were no grade crossings proposed on the segments of new construction associated with the Turnpike Corridor. Individual grade crossings improvements on existing rail segments utilized near Tulsa and Oklahoma City were included in the cost estimate for each segment based on desired operating speeds at the individual locations. Minimum improvements included upgrade of existing crossing signal systems for 79 mph operations. Operations up to 90 mph included provisions for total closure grade crossing systems, and operations above 90 mph included provisions for grade separation.

2.1.1.4 Bridges and Drainage Structures

The culverts proposed for placement under railroad facilities will be galvanized asphalt coated corrugated metal pipe having a minimum diameter of 24 inches. All of the proposed railroad bridges with short spans (less than 30 feet) are recommended to be AREA standard precast concrete box beam (E 80 Loading) placed on steel H piles with precast bents. Bridge decks

shall be ballasted and include handrails on one side. For longer spans (greater than 30 feet), the bridges will be cast in place concrete, ballasted deck structures designed for Cooper E 80 Loadings, with escape areas spaced at 200 feet intervals. For public road crossings, roadway bridges shall be designed per Oklahoma Department of Transportation design standards to accommodate double track configuration for future expansion of railroad operations with a minimum vertical clearance design of 23 feet minimum (26 feet preferred), and a horizontal clearance of 25 feet minimum) under highway overpass structures. Highway underpass structures will maintain a minimum of 17 feet vertical clearance (18 feet preferred) under the tracks.

2.1.1.5 Grading

The overall terrain of the Turnpike alignment from Oklahoma City to Tulsa is hilly or partially mountainous terrain, which will result in anticipated excavation (cut) and embankment (fill) quantities that will be presumably high. The design standard for minimum slope stability in a cut shall be 2:1 and 2 ¼:1 in fill areas.

2.1.1.6 Drainage

At a minimum, the drainage structures and facilities within the proposed corridor should be designed to convey the capacity of storm with a 100-year frequency. Federal Emergency Management Agency (FEMA) maps have been obtained for each of the proposed corridors to establish the 100-year flood plains and assist in the development of the environmental procedures estimating process. Existing culverts that require replacement with a bridge structure should incorporate proper measures for scour protection, as well as pier and abutment undermining. Appropriate facilities should also be designed to minimize the problems of excessive silt and debris potentially plugging culverts and resulting in embankment washout. Such measures should include desilting fences and/or sediment basins, rip rap slope protection, and any other treatments deemed appropriate.

2.1.1.7 Trackwork

The rail for recommended for mainline track segments is 32-136lb rail with premium head hardened rail utilized on curve segments. Ties for the proposed new segments of the corridors shall be 8'-6" monoblock or two-block concrete spaced at 24 inches on center connected with direct fixation rail anchors. The minimum ballast depth shall be 12" below the ties, with 12' of select material placed for subgrade and 6 inches of lime treatment on existing materials below the subgrade. The stabilization of the subgrade will be one of the greatest challenges for

maintaining Class VII or Class VIII track standards for 125 or 150 mph operations, especially on bridge approaches. Right-of-way widths will typically be 100 feet, but will vary between 40 and 250 feet to accommodate proper slope stabilization. Grade crossings shall be installed with new timber ties and proper subballast preparation with the crossing surface lengths designed to provide an additional 3 foot of roadway surface perpendicular to the roadway surface at each end of the crossing (32 feet minimum). Rail constructed on ballasted deck bridges shall be installed using concrete ties.

2.1.1.8 Environmental Constraints

Segment 1 utilizes an abandoned MKT alignment that passes through Lincoln Park and Remington Park north of downtown Oklahoma City. Depending on how or if the property was redistributed after the line was abandoned will determine whether or not the right-of-way through those areas are considered park areas and how difficult it would be to reinitiate rail service along the alignment. No direct impact to any jurisdictional waters is anticipated within the proposed corridor. The Turnpike Corridor is not expected to substantially impact any potential designated wetlands located within the proposed corridor. The potential for visual, noise, and aesthetic impacts from the construction of this alignment would be minimal because the proposed alignment will be primarily following the Turner Turnpike. Segments 2, 4, and 5 would potentially impact the areas those segment are proposed to traverse. No impacts to any potentially sensitive plant and animal species are expected to result from this alternative based on current information obtained from USGS Topographic maps (1" to 2000' scale) and the 100 year flood plain maps obtained from the FEMA.

2.1.1.9 Investment-Grade Cost Estimate

The preliminary cost estimate for each corridor utilizing the various combinations of respective segments is listed in Table 2.1 including total cost and cost per mile. The items incorporated into these estimates, include all of the materials associated with constructing the track, earthwork, bridges, culverts, grade crossing surfaces, tunnel placement, subgrade preparation, safety barriers, train control signaling warning devices, and land acquisition. Additional costs included in the total estimates for each corridor include equipment and facility costs as well anticipated costs for environmental clearance. The preliminary quantities for earthwork on all of the segments involving new construction include common excavation, embankment, and waste. The earthwork quantities were calculated from topography with surface contours and vertical elevations generated from U.S.G.S. 10 Foot digitized DEM data. The estimate cost for reestablishing the track infrastructure have been included in the estimated cost for segment 1

from Harter Yard to the existing Turner Turnpike alignment. The estimates for all of the segments on existing trackage presently in operation include provisions for roadbed, track, train control signaling, and grade crossing signal upgrades to standards associated with desired operating speeds. The anticipated costs for a direct connect to the existing BNSF/Amtrak route in Oklahoma City have been included in the estimates for Segments 1,2 and 6. The anticipated cost for the BNSF Cherokee Yard bypass track have been included in the estimates for Segments 4,5,6 and 7. All quantities and unit costs are provided in Table 2-1 on page 2-6.

Table 2.1: Turnpike Corridor Investment-Grade Cost Estimates

150 MPH Operations Corridor 134	Unit	Quantity	Unit Price	
TOTAL w/ 15% contingency				**$949,975,394**
Environmental Processes	ea	1	$2,505,000	$2,505,000
Right of Way (Inc. est. damages)	ea	1	$48,976,573	$48,976,573
Utility reloocation costs	ea	1	$59,005,800	$59,005,800
Mobilization	lump sum	1	$2,000,000	$2,000,000
New Track Construction				
Earthwork, clear & grub	acres	1038	$3,000	$3,113,148
Earthwork, cut	yd3	38107117	$3.06	$116,607,778
Earthwork, fill	yd3	16725633	$6.23	$104,200,697
Borrow	yd3	0	$9.06	$0
Subgrade lime treatment	yd2	1917227	$1.04	$1,993,916
Lime	Ton	65360	$67.33	$4,400,689
Ditching	ft	862752	$1	$862,752
Drainage culverts	each	469	$10,000	$4,689,743
Subdrains	ft	397460	$5	$1,987,300
Select subgrade, placed	yd3	471125	$11.79	$5,554,566
Subballast, placed	yd3	235563	$8	$1,884,501
Ballast	ton	471125	$8	$3,533,439
Ties, new track	each	235563	$65	$15,311,568
Structures	Track ft.	17868	$5,000	$89,339,599
Tunnels	Track ft.	1530	$10,000	$15,300,000
#46 turnouts	each	2	$3,000,000	$6,000,000
#20 turnouts	each	14	$500,000	$7,000,000
Rail	tons	21833	$600	$13,099,578
Rail welding	each	11970	$100	$1,196,964
Place track	ft	21833	$50	$1,091,632
Chain link fence, 6 ft.	ft	11970	$20	$239,393
Material Transportation	lump sum	1	$2,000,000	$2,000,000
Grade Separations (Highway Under)*	avg cost	43	$649,585	$27,932,136
Grade Separations (Highway Over)*	avg cost	61	$486,460	$29,674,085
Safety Barrier	ft	215688	$210	$45,294,480
Retaining Wall	yd2	17833	$225	$4,012,425
BNSF Yard Track Improvements	mile	4	$1,200,000	$4,320,000
OKC Station Connection	each	1	$6,000,000	$6,000,000
Track Rehabilitation				
Rehabiliate turnouts	each	7	$75,000	$525,000
Update existing signal sys	miles	12.1	$150,000	$1,815,000
Update grade xing protection	each	9	$150,000	$4,150,000
Replace rail	miles	12.1	$390,000	$4,719,000
Replace 50% of Wood Ties	miles	12.1	$128,000	$1,548,800
Stations	each	2	$2,000,000	$4,000,000
Main Maintenance Facility	each	1	$45,000,000	$45,000,000
Layover Facilities	each	2	$3,000,000	$6,000,000
New track signalization	track mile	82	$400,000	$32,680,000
Dispatching/office facility	each	1	$5,000,000	$5,000,000
Trains, 150 mph turbine				
Locomotives	each	6	$4,000,000	$24,000,000
Coaches	each	21	$2,500,000	$52,500,000
Track Maintenance Equip	lump sum	1	$15,000,000	$15,000,000
OPTION				
150 mph Electrified, additional costs				**$289,060,000**
Train equipment, additional	lump sum	1	$13,500,000	$13,500,000
Catenary	mile	125.28	$1,000,000	$125,280,000
Substations	mile	125.28	$500,000	$62,640,000
Signal system	mile	125.28	$500,000	$62,640,000
Increased clearance	lump sum	1	$20,000,000	$20,000,000
Electrical maintenance equip	lump sum	1	$5,000,000	$5,000,000

150 MPH Operations Corridor 135	Unit	Quantity	Unit Price	
TOTAL w/ 15% contingency				**$893,476,748**
Environmental Processes	ea	1	$2,505,000	$2,505,000
Right of Way (Inc. est. damages)	ea	1	$40,174,288	$40,174,288
Utility reloocation costs	ea	1	$53,655,000	$53,655,000
Mobilization	lump sum	1	$2,000,000	$2,000,000
New Track Construction				
Earthwork, clear & grub	acres	998	$3,000	$2,993,148
Earthwork, cut	yd3	34670113	$3.06	$106,090,545
Earthwork, fill	yd3	15785912	$6.23	$98,346,233
Borrow	yd3	0	$9.06	$0
Subgrade lime treatment	yd2	1793323	$1.04	$1,865,056
Lime	Ton	61136	$67.33	$4,116,287
Ditching	ft	806995	$1	$806,995
Drainage culverts	each	445	$10,000	$4,450,490
Subdrains	ft	395780	$5	$1,978,900
Select subgrade, placed	yd3	440678	$11.79	$5,195,593
Subballast, placed	yd3	220339	$8	$1,762,712
Ballast	ton	440678	$8	$3,305,084
Ties, new track	each	220339	$65	$14,322,032
Structures	Track ft.	16956	$5,000	$84,781,834
Tunnels	Track ft.	1080	$10,000	$10,800,000
#46 turnouts	each	2	$3,000,000	$6,000,000
#20 turnouts	each	14	$500,000	$7,000,000
Rail	tons	20422	$600	$12,252,996
Rail welding	each	11196	$100	$1,119,609
Place track	ft	20422	$50	$1,021,083
Chain link fence, 6 ft.	ft	11196	$20	$223,922
Material Transportation	lump sum	1	$2,000,000	$2,000,000
Grade Separations (Highway Under)*	avg cost	38	$683,706	$25,980,816
Grade Separations (Highway Over)*	avg cost	53	$477,776	$25,322,128
Safety Barrier	ft	201749	$210	$42,367,248
Retaining Wall	yd2	17833	$225	$4,012,425
BNSF Yard Track Improvements	mile	4	$1,200,000	$4,320,000
OKC Station Connection	each	1	$6,000,000	$6,000,000
Track Rehabilitation				
Rehabiliate turnouts	each	23	$75,000	$1,725,000
Update existing signal sys	miles	12.9	$150,000	$1,936,500
Update grade xing protection	each	33	$150,000	$7,750,000
Replace rail	miles	12.9	$390,000	$5,034,900
Replace 50% of Wood Ties	miles	12.9	$128,000	$1,652,480
Stations	each	2	$2,000,000	$4,000,000
Main Maintenance Facility	each	1	$45,000,000	$45,000,000
Layover Facilities	each	2	$3,000,000	$6,000,000
New track signalization	track mile	76	$400,000	$30,568,000
Dispatching/office facility	each	1	$5,000,000	$5,000,000
Trains, 150 mph turbine				
Locomotives	each	6	$4,000,000	$24,000,000
Coaches	each	21	$2,500,000	$52,500,000
Track Maintenance Equip	lump sum	1	$15,000,000	$15,000,000
OPTION				
150 mph Electrified, additional costs				**$287,960,000**
Train equipment, additional	lump sum	1	$13,500,000	$13,500,000
Catenary	mile	124.73	$1,000,000	$124,730,000
Substations	mile	124.73	$500,000	$62,365,000
Signal system	mile	124.73	$500,000	$62,365,000
Increased clearance	lump sum	1	$20,000,000	$20,000,000
Electrical maintenance equip	lump sum	1	$5,000,000	$5,000,000

150 MPH Operations Corridor 234	Unit	Quantity	Unit Price	
TOTAL w/ 15% contingency				**$853,989,589**
Environmental Processes	ea	1	$2,505,000	$2,505,000
Right of Way (Inc. est. damages)	ea	1	$40,322,689	$40,322,689
Utility reloocation costs	ea	1	$58,560,200	$58,560,200
Mobilization	lump sum	1	$2,000,000	$2,000,000
New Track Construction				
Earthwork, clear & grub	acres	881	$3,000	$2,643,900
Earthwork, cut	yd3	29066033	$3.06	$88,942,061
Earthwork, fill	yd3	13169293	$6.23	$82,044,692
Borrow	yd3	2104631	$9.06	$19,067,956
Subgrade lime treatment	yd2	1827115	$1.04	$1,900,199
Lime	Ton	62288	$67.33	$4,193,851
Ditching	ft	822202	$1	$822,202
Drainage culverts	each	389	$10,000	$3,892,580
Subdrains	ft	290140	$5	$1,450,700
Select subgrade, placed	yd3	448982	$11.79	$5,293,494
Subballast, placed	yd3	224491	$8	$1,795,927
Ballast	ton	448982	$8	$3,367,363
Ties, new track	each	224491	$65	$14,591,906
Structures	Track ft.	14831	$5,000	$74,153,646
Tunnels	Track ft.	1100	$10,000	$11,000,000
#46 turnouts	each	2	$3,000,000	$6,000,000
#20 turnouts	each	14	$500,000	$7,000,000
Rail	tons	20806	$600	$12,483,882
Rail welding	each	11407	$100	$1,140,706
Place track	ft	20806	$50	$1,040,323
Chain link fence, 6 ft.	ft	11407	$20	$228,141
Material Transportation	lump sum	1	$2,000,000	$2,000,000
Grade Separations (Highway Under)*	avg cost	45	$649,522	$29,228,496
Grade Separations (Highway Over)*	avg cost	49	$486,294	$23,828,413
Safety Barrier	ft	151378	$210	$31,789,296
Retaining Wall	yd2	14500	$225	$3,262,500
BNSF Yard Track Improvements	mile	4	$1,200,000	$4,320,000
OKC Station Connection	each	1	$6,000,000	$6,000,000
Track Rehabilitation				
Rehabiliate turnouts	each	13	$75,000	$975,000
Update existing signal sys	miles	12.9	$150,000	$1,933,500
Update grade xing protection	each	22	$150,000	$3,500,000
Replace rail	miles	12.9	$390,000	$5,027,100
Replace 50% of Wood Ties	miles	12.9	$128,000	$1,649,920
Stations	each	2	$2,000,000	$4,000,000
Main Maintenance Facility	each	1	$45,000,000	$45,000,000
Layover Facilities	each	2	$3,000,000	$6,000,000
New track signalization	track mile	78	$400,000	$31,144,000
Dispatching/office facility	each	1	$5,000,000	$5,000,000
Trains, 150 mph turbine				
Locomotives	each	6	$4,000,000	$24,000,000
Coaches	each	21	$2,500,000	$52,500,000
Track Maintenance Equip	lump sum	1	$15,000,000	$15,000,000
OPTION				
150 mph Electrified, additional costs				**$282,960,000**
Train equipment, additional	lump sum	1	$13,500,000	$13,500,000
Catenary	mile	122.23	$1,000,000	$122,230,000
Substations	mile	122.23	$500,000	$61,115,000
Signal system	mile	122.23	$500,000	$61,115,000
Increased clearance	lump sum	1	$20,000,000	$20,000,000
Electrical maintenance equip	lump sum	1	$5,000,000	$5,000,000

150 MPH Operations Corridor 235	Unit	Quantity	Unit Price	
TOTAL w/ 15% contingency				**$800,857,260**
Environmental Processes	ea	1	$2,505,000	$2,505,000
Right of Way (Inc. est. damages)	ea	1	$31,520,404	$31,520,404
Utility reloocation costs	ea	1	$53,209,400	$53,209,400
Mobilization	lump sum	1	$2,000,000	$2,000,000
New Track Construction				
Earthwork, clear & grub	acres	841	$3,000	$2,523,900
Earthwork, cut	yd3	25629029	$3.06	$78,424,829
Earthwork, fill	yd3	12229571	$6.23	$76,190,229
Borrow	yd3	2104631	$9.06	$19,067,956
Subgrade lime treatment	yd2	1703211	$1.04	$1,771,339
Lime	Ton	58064	$67.33	$3,909,449
Ditching	ft	766445	$1	$766,445
Drainage culverts	each	365	$10,000	$3,653,327
Subdrains	ft	288460	$5	$1,442,300
Select subgrade, placed	yd3	418534	$11.79	$4,934,521
Subballast, placed	yd3	209267	$8	$1,674,138
Ballast	ton	418534	$8	$3,139,008
Ties, new track	each	209267	$65	$13,602,370
Structures	Track ft.	13919	$5,000	$69,595,881
Tunnels	Track ft.	650	$10,000	$6,500,000
#46 turnouts	each	2	$3,000,000	$6,000,000
#20 turnouts	each	14	$500,000	$7,000,000
Rail	tons	19395	$600	$11,637,300
Rail welding	each	10633	$100	$1,063,350
Place track	ft	19395	$50	$969,775
Chain link fence, 6 ft.	ft	10633	$20	$212,670
Material Transportation	lump sum	1	$2,000,000	$2,000,000
Grade Separations (Highway Under)*	avg cost	40	$681,929	$27,277,176
Grade Separations (Highway Over)*	avg cost	41	$475,035	$19,476,455
Safety Barrier	ft	151378	$210	$31,789,296
Retaining Wall	yd2	14500	$225	$3,262,500
BNSF Yard Track Improvements	mile	4	$1,200,000	$4,320,000
OKC Station Connection	each	1	$6,000,000	$6,000,000
Track Rehabilitation				
Rehabiliate turnouts	each	29	$75,000	$2,175,000
Update existing signal sys	miles	13.7	$150,000	$2,055,000
Update grade xing protection	each	46	$150,000	$7,100,000
Replace rail	miles	13.7	$390,000	$5,343,000
Replace 50% of Wood Ties	miles	13.7	$128,000	$1,753,600
Stations	each	2	$2,000,000	$4,000,000
Main Maintenance Facility	each	1	$45,000,000	$45,000,000
Layover Facilities	each	2	$3,000,000	$6,000,000
New track signalization	track mile	73	$400,000	$29,032,000
Dispatching/office facility	each	1	$5,000,000	$5,000,000
Trains, 150 mph turbine				
Locomotives	each	6	$4,000,000	$24,000,000
Coaches	each	21	$2,500,000	$52,500,000
Track Maintenance Equip	lump sum	1	$15,000,000	$15,000,000
OPTION				
150 mph Electrified, additional costs				**$281,860,000**
Train equipment, additional	lump sum	1	$13,500,000	$13,500,000
Catenary	mile	121.68	$1,000,000	$121,680,000
Substations	mile	121.68	$500,000	$60,840,000
Signal system	mile	121.68	$500,000	$60,840,000
Increased clearance	lump sum	1	$20,000,000	$20,000,000
Electrical maintenance equip	lump sum	1	$5,000,000	$5,000,000

2.2 SOUTHERN CORRIDOR ALIGNMENT ALTERNATIVES

The southern corridor primarily follows a relatively even gradient on a new corridor through the Dry Fork Drainage Basin. This corridor is located south of the existing turnpike roadway alignment and utilizes existing Union Pacific and ODOT rail lines to connect downtown Oklahoma City with the new section of the corridor just south of Jones. The core segment of the Southern Corridor extends from south of Jones to connect with an existing BNSF line on the southern edge of Sapulpa. One additional route option for the Southern Corridor was developed to connect the proposed new segment with the existing ODOT line just west of Sapulpa. Both proposed connections on the Tulsa end would follow an existing BNSF line from Sapulpa through the BNSF Cherokee Yard in Tulsa on to Union Station in downtown Tulsa. Additional track infrastructure allowing passenger operations to bypass existing freight operations in the Cherokee Yard as denoted in the original High Speed Passenger Rail Study (1) have been included in the corresponding High-Speed Corridor cost estimates for both alternatives on the Tulsa end of the proposed corridors

2.2.1 Alignment Analysis

2.2.1.1 Horizontal Alignment

The proposed alignments for the Southern Corridor start at the Santa Fe Station in downtown Oklahoma City and would utilize existing ODOT and Union Pacific trackage to the proposed connection with Segment 6 just south of Jones near Post Road. Segment 6 extends from south of Jones across western Oklahoma, Lincoln, and Eastern Creek Counties to a proposed connection with the BNSF Creek Subdivision on the southern edge of Sapulpa. Segment 7 provides an alternative for the eastern end of the Southern Corridor separating from Segment 6 just east of S.H. 48 approximately eight miles south of Bristow and extending northeastward to a proposed connection with an existing ODOT line just west of Kellyville.

Both of the Southern corridor alternatives will require the construction of a direct connection to the BNSF line in downtown Oklahoma City and a bypass route around the BNSF Cherokee Yard near downtown Tulsa as denoted in the original High Speed Passenger Rail Study (1). Existing segments of track will require varying levels of horizontal alignment upgrade depending on present utilization, track condition, and desired operating speeds. The horizontal alignment for new construction will maintain the minimum curvature allowed for 150 mph operations.

2.2.1.2 Vertical Alignment

The elevation at the eastern end of the proposed corridors in Tulsa is approximately 750 feet and approximately 1200 feet in Oklahoma City. Consequently, the overall gradient will be negative when traveling east and positive when traveling west. The maximum vertical sustained grades for the track design profiles were held to less than a two percent grade in an effort to maintain feasible high-speed operations. The proposed Southern corridor would have fewer gradient challenges that the Turnpike corridor because most of the proposed Southern corridor follows lower areas of the Dry Fork Drainage Basin. The maximum rate of change for the vertical curves was limited to 0.015% pending further direction from the FRA who is presently reviewing vertical alignment design standards for high-speed rail operations in the United States.

2.2.1.3 Grade Crossings

There were no grade crossings proposed on the segments of new construction associated with the proposed 150 mph operations on the Southern Corridor. Separate cost estimates were developed for 125 mph operations on the Southern Corridor in an effort to establish the variance in costs associated with 125 versus 150 mph operations. The proposed 125 mph operating scenario for the Southern Corridor allowed some roadways to cross at-grade and included provisions for total closure systems. Over 25 percent of the cost saving associated with 125 mph operations can be attributed to grade crossing installations versus grade separation construction and fencing both of which raise significant operational safety issues. Similar to the Turnpike Corridor cost estimates the primary cost differences for Individual grade crossings improvements on existing rail segments utilized near Tulsa and Oklahoma City were included in the cost estimate for each segment based on desired operating speeds at the individual locations. Minimum improvements included upgrade of existing crossing signal systems for 79 mph operations. Operations up to 90 mph included provisions for total closure grade crossing systems, and operations above 90 mph included provisions for grade separation in the cost estimate prepared for 150 mph operations.

2.2.1.4 Bridges and Drainage Structures

The culverts proposed for placement under railroad facilities will be galvanized asphalt coated corrugated metal pipe having a minimum diameter of 24 inches. All of the proposed railroad bridges with short spans (less than 30 feet) are recommended to be AREA standard precast concrete box beam (E 80 Loading) placed on steel H piles with precast bents. Bridge decks

shall be ballasted and include handrails on one side. For longer spans (greater than 30 feet), the bridges will be cast in place concrete, ballasted deck structures designed for Cooper E 80 Loadings, with escape areas spaced at 200 feet intervals. For public road crossings, roadway bridges shall be designed per Oklahoma Department of Transportation design standards to accommodate double track configuration for future expansion of railroad operations with a minimum vertical clearance design of 23 feet minimum (26 feet preferred), and a horizontal clearance of 25 feet minimum) under highway overpass structures. Highway underpass structures will maintain a minimum of 17 feet vertical clearance (18 feet preferred) under the tracks.

2.2.1.5 Grading

The overall terrain of the Southern Corridor is relatively flat with some hilly terrain between Oklahoma City and Tulsa, which resulted in lower amounts of necessary excavation (cut) and embankment (fill) per mile than experienced on the Turnpike Corridor. However, the overall length of the Southern Corridor is expected to be longer than the Turnpike Corridor, which will negate some of the earthwork savings associated with the Southern Corridor. The design standard for minimum slope stability in a cut shall be 2:1 and 2 ¼:1 in fill areas. The less restrictive areas being traversed by the proposed Southern Corridor will most likely eliminate the need for any tunneling or traffic safety barriers.

2.2.1.6 Drainage

At a minimum, the drainage structures and facilities within the proposed corridor should be designed to convey the capacity of storm with a 100-year frequency. Federal Emergency Management Agency (FEMA) maps have been obtained for each of the proposed corridors to establish the 100-year flood plains and assist in the development of the environmental procedures estimating process. Existing culverts that require replacement with a bridge structure should incorporate proper measures for scour protection, as well as pier and abutment undermining. Appropriate facilities should also be designed to minimize the problems of excessive silt and debris potentially plugging culverts and resulting in embankment washout. Such measures should include desilting fences and/or sediment basins, rip rap slope protection, and any other treatments deemed appropriate.

2.2.1.7 Trackwork

The rail for recommended for mainline track segments is 132-136lb rail with premium head hardened rail utilized on curve segments. Ties for the proposed new segments of the corridors

shall be 8'-6" monoblock or two-block concrete spaced at 24 inches on center connected with direct fixation rail anchors. The minimum ballast depth shall be 12" below the ties, with 12' of select material placed for subgrade and 6 inches of lime treatment on existing materials below the subgrade. The stabilization of the subgrade will be one of the greatest challenges for maintaining Class VII or Class VIII track standards for 125 or 150 mph operations, especially on bridge approaches. Right-of-way widths will typically be 100 feet, but will vary between 40 and 250 feet to accommodate proper slope stabilization. Grade crossings shall be installed with new timber ties and proper subballast preparation with the crossing surface lengths designed to provide an additional 3 foot of roadway surface perpendicular to the roadway surface at each end of the crossing (32 feet minimum). Rail constructed on ballasted deck bridges shall be installed using concrete ties.

2.2.1.8 Environmental Constraints

Segment 6 utilizes an entirely new alignment corridor that passes through the eastern edge of Oklahoma, all of Lincoln, and most of Creek Counties. The Southern Corridor is expected to have some measurable impact on some designated wetlands located within the proposed corridor. The potential for visual, noise, and aesthetic impacts from the construction of this alignment would be expected to be minimal but nonetheless measurable because the proposed alignment will be traversing largely uninhabited regions. Only minor impacts to any potentially sensitive plant and animal species are expected to result from this alternative based on current information obtained from USGS Topographic maps (1" to 2000' scale) and the 100 year flood plain maps obtained from the FEMA.

2.2.1.9 Investment-Grade Cost Estimate

The preliminary cost estimate for each corridor utilizing the various combinations of respective segments is listed in Table 2.2 including total cost and cost per mile. The items incorporated into these estimates, include all of the materials associated with constructing the track, earthwork, bridges, culverts, grade crossing surfaces, subgrade preparation, train control signaling warning devices, and land acquisition. Additional costs included in the total estimates for each corridor include equipment and facility costs as well anticipated costs for environmental clearance. The preliminary quantities for earthwork on all of the segments involving new construction include common excavation, embankment, and waste. The earthwork quantities were calculated from topography with surface contours and vertical elevations generated from U.S.G.S. 10 Foot digitized DEM data. The estimates for all of the segments on existing trackage presently in operation include provisions for roadbed, track, train control signaling, and

grade crossing signal upgrades to standards associated with desired operating speeds. The anticipated costs for a direct connect to the existing BNSF/Amtrak route in Oklahoma City have been included in the estimates for Segment 6. The anticipated costs for the BNSF Cherokee Yard bypass track have been included in the estimates for Segments 6 and 7. All quantities and unit costs are provided in Table 2-2 on page 2-12.

Table 2.2: Southern Corridor Investment-Grade Cost Estimates

125 MPH Operations Corridor 6	Unit	Quantity	Unit Price	
TOTAL w/ 15% contingency				**$863,477,787**
Environmental Processes				$2,505,000
Right of Way (Inc. est. damages)				$67,339,956
Utility relocation costs				$67,596,000
Mobilization	lump sum	1	$2,000,000	$2,000,000
New Track Construction				
Earthwork, clear & grub	acres	1,020	$3,000	$3,060,000
Earthwork, cut	yd3	13835456	$3.06	$42,336,495
Earthwork, fill	yd3	16510561	$6.23	$102,860,795
Borrow	yd3	2675105	$9.06	$24,236,451
Subgrade lime treatment	yd2	2002176	$1.04	$2,082,263
Lime	Ton	68256	$67.33	$4,595,676
Ditching	ft	899899	$1	$899,899
Drainage culverts	each	426	$10,000	$4,260,886
Subdrains	ft	193800	$5	$969,000
Select subgrade, placed	yd3	492000	$11.79	$5,800,680
Subballast, placed	yd3	246000	$8	$1,968,000
Ballast	ton	492000	$8	$3,690,000
Ties, new track	each	246,000	$65	$15,990,000
Structures	Track ft.	16750	$5,000	$81,169,887
#46 turnouts	each	2	$3,000,000	$6,000,000
#20 turnouts	each	14	$500,000	$7,000,000
Rail	tons	22800	$600	$13,680,000
Rail welding	each	12500	$100	$1,250,000
Place track	ft	492000	$50	$24,600,000
Fencing	ft	802560	$2	$1,605,120
Material Transportation	lump sum	1	$2,000,000	$2,000,000
Grade Separations (Highway Under)*	avg cost	50	$711,901	$35,595,050
Grade Separations (Highway Over)*	avg cost	23	$370,086	$8,511,978
BNSF Yard Track Improvements	mile	3.6	$1,200,000	$4,320,000
OKC Station Connection	each	1	$6,000,000	$6,000,000
Grade Crossings	each	96	$210,527	$20,210,592
Track Rehabilitation				
Rehabiliate turnouts	each	25	$75,000	$1,875,000
Update existing signal sys	miles	11.14	$150,000	$1,671,000
Update grade xing protection	each	32	$150,000	$4,800,000
Replace rail	miles	11.14	$390,000	$4,344,600
Replace 50% of Wood Ties	miles	11.14	$128,000	$1,425,920
Stations	each	2	$2,000,000	$4,000,000
Main Maintenance Facility	each	1	$45,000,000	$45,000,000
Layover Facilities	each	2	$3,000,000	$6,000,000
New track signalization	track mile	94	$400,000	$37,600,000
Dispatching/office facility	each	1	$5,000,000	$5,000,000
Trains, 150 mph turbine				
Locomotives	each	6	$3,000,000	$18,000,000
Coaches	each	21	$2,000,000	$42,000,000
Track Maintenance Equip	lump sum	1	$15,000,000	$15,000,000
OPTION				
125 mph Electrified, additional costs				**$299,860,000**
Train equipment, additional	lump sum	1	$13,500,000	$13,500,000
Catenary	mile	130.68	$1,000,000	$130,680,000
Substations	mile	130.68	$500,000	$65,340,000
Signal system	mile	130.68	$500,000	$65,340,000
Increased clearance	lump sum	1	$20,000,000	$20,000,000
Electrical maintenance equip	lump sum	1	$5,000,000	$5,000,000

150 MPH Operations Corridor 6	Unit	Quantity	Unit Price	
TOTAL w/ 15% contingency				**$931,842,240**
Environmental Processes				$2,505,000
Right of Way (Inc. est. damages)				$67,339,956
Utility reloocation costs				$67,956,000
Mobilization	lump sum	1	$2,000,000	$2,000,000
New Track Construction				
Earthwork, clear & grub	acres	1,020	$3,000	$3,060,000
Earthwork, cut	yd3	13835456	$3.06	$42,336,495
Earthwork, fill	yd3	16510561	$6.23	$102,860,795
Borrow	yd3	2675105	$9.06	$24,236,451
Subgrade lime treatment	yd2	2002176	$1.04	$2,082,263
Lime	Ton	68256	$67.33	$4,595,676
Ditching	ft	899899	$1	$899,899
Drainage culverts	each	426	$10,000	$4,260,886
Subdrains	ft	193800	$5	$969,000
Select subgrade, placed	yd3	492000	$11.79	$5,800,680
Subballast, placed	yd3	246000	$8	$1,968,000
Ballast	ton	492000	$8	$3,690,000
Ties, new track	each	246,000	$65	$15,990,000
Structures	Track ft.	15900	$5,000	$81,169,887
#46 turnouts	each	2	$3,000,000	$6,000,000
#20 turnouts	each	14	$500,000	$7,000,000
Rail	tons	22800	$600	$13,680,000
Rail welding	each	12500	$100	$1,250,000
Place track	ft	492000	$50	$24,600,000
Chain link fence, 6 ft.	ft	802560	$20	$16,051,200
Material Transportation	lump sum	1	$2,000,000	$2,000,000
Grade Separations (Highway Under)*	avg cost	99	$611,592	$60,547,608
Grade Separations (Highway Over)*	avg cost	71	$451,982	$32,090,722
BNSF Yard Track Improvements	mile	3.6	$1,200,000	$4,320,000
OKC Station Connection	each	1	$6,000,000	$6,000,000
Existing Track Rehabilitation				
Rehabiliate turnouts	each	28	$75,000	$2,100,000
Update existing signal sys	miles	10.31	$150,000	$1,546,500
Update grade xing protection	each	33	$150,000	$4,950,000
Replace rail	miles	10.31	$390,000	$4,020,900
Replace 50% of Wood Ties	miles	10.31	$128,000	$1,319,680
Stations	each	2	$2,000,000	$4,000,000
Main Maintenance Facility	each	1	$45,000,000	$45,000,000
Layover Facilities	each	2	$3,000,000	$6,000,000
New track signalization	track mile	94	$400,000	$37,600,000
Dispatching/office facility	each	1	$5,000,000	$5,000,000
Trains, 150 mph turbine				
Locomotives	each	6	$4,000,000	$24,000,000
Coaches	each	21	$2,500,000	$52,500,000
Track Maintenance Equip	lump sum	1	$15,000,000	$15,000,000
OPTION				
150 mph Electrified, additional costs				**$299,860,000**
Train equipment, additional	lump sum	1	$13,500,000	$13,500,000
Catenary	mile	130.68	$1,000,000	$130,680,000
Substations	mile	130.68	$500,000	$65,340,000
Signal system	mile	130.68	$500,000	$65,340,000
Increased clearance	lump sum	1	$20,000,000	$20,000,000
Electrical maintenance equip	lump sum	1	$5,000,000	$5,000,000

150 MPH Operations Corridor 67	Unit	Quantity	Unit Price	
TOTAL w/ 15% contingency				**$929,839,933**
Environmental Processes				$2,505,000
Right of Way (Inc. est. damages)				**$67,339,956**
Utility relocation costs				**$67,956,000**
Mobilization	lump sum	1	$2,000,000	$2,000,000
New Track Construction				
Earthwork, clear & grub	acres	989	$3,000	$2,968,200
Earthwork, cut	yd3	12024077	$3.06	$36,793,674
Earthwork, fill	yd3	15859926	$6.23	$98,807,336
Borrow	yd3	3835849	$9.06	$34,752,792
Subgrade lime treatment	yd2	1957589	$1.04	$2,035,893
Lime	Ton	66736	$67.33	$4,493,335
Ditching	ft	899899	$1	$899,899
Drainage culverts	each	417	$10,000	$4,171,232
Subdrains	ft	187986	$5	$939,930
Select subgrade, placed	yd3	480480	$11.79	$5,664,865
Subballast, placed	yd3	240240	$8	$1,921,922
Ballast	ton	480480	$8	$3,603,603
Ties, new track	each	240240	$65	$15,615,615
Structures	Track ft.	16750	$5,000	$79,461,964
#46 turnouts	each	2	$3,000,000	$6,000,000
#20 turnouts	each	14	$500,000	$7,000,000
Rail	tons	22266	$600	$13,359,700
Rail welding	each	12207	$100	$1,220,733
Place track	ft	480480	$50	$24,024,022
Chain link fence, 6 ft.	ft	783769	$20	$15,675,382
Material Transportation	lump sum	1	$2,000,000	$2,000,000
Grade Separations (Highway Under)*	avg cost	99	$611,592	$60,547,608
Grade Separations (Highway Over)*	avg cost	71	$451,982	$32,090,722
BNSF Yard Track Improvements	mile	3.6	$1,200,000	$4,320,000
OKC Station Connection	each	1	$6,000,000	$6,000,000
Track Rehabilitation				
Rehabiliate turnouts	each	30	$75,000	$2,250,000
Update existing signal sys	miles	10.31	$150,000	$1,546,500
Update grade xing protection	each	41	$150,000	$6,150,000
Replace rail	miles	10.31	$390,000	$4,020,900
Replace 50% of Wood Ties	miles	10.31	$128,000	$1,319,680
Stations	each	2	$2,000,000	$4,000,000
Main Maintenance Facility	each	1	$45,000,000	$45,000,000
Layover Facilities	each	2	$3,000,000	$6,000,000
New track signalization	track mile	94	$400,000	$37,600,000
Dispatching/office facility	each	1	$5,000,000	$5,000,000
Trains, 150 mph turbine				
Locomotives	each	6	$4,000,000	$24,000,000
Coaches	each	21	$2,500,000	$52,500,000
Track Maintenance Equip	lump sum	1	$15,000,000	$15,000,000
OPTION				
150 mph Electrified, additional costs				**$296,760,000**
Train equipment, additional	lump sum	1	$13,500,000	$13,500,000
Catenary	mile	129.13	$1,000,000	$129,130,000
Substations	mile	129.13	$500,000	$64,565,000
Signal system	mile	129.13	$500,000	$64,565,000
Increased clearance	lump sum	1	$20,000,000	$20,000,000
Electrical maintenance equip	lump sum	1	$5,000,000	$5,000,000

2.3 OPERATING CONCEPTS/VISIONS

Since World War II, public investment in transportation in the United States has primarily revolved around highway and air transportation modes. Massive public investment supported aviation and highways modes, and to a lesser extent, waterways. Intercity railroads are one of the only totally privatized transportation systems and have been left to operate without public investment but under extensive financial and business regulation by the Interstate Commerce Commission (ICC).

Included in the requirements imposed by the ICC was the provision of intercity passenger service. While the premier mode of long distance travel during the first half of the 20th Century, the passenger train was hard pressed to compete with the airplane and publicly supported infrastructure that has developed for air transportation in later years. By 1970, losses on passenger service threatened the financial viability of the rail network and the federal government formed the National Railroad Passenger Corporation, better known as AMTRAK, to assume the passenger service responsibilities. The quid pro quo was that the railroads would provide track access for AMTRAK at cost.

While of great relief to the rail industry, AMTRAK embarked on a long and painful history of under-capitalization and over-extended assets, leading to poor service and never ceasing criticism of its need of cash subsidy. To date, the hard choices needed to reform AMTRAK's situation have been avoided.

The American system of railroading, while not totally unique, is an extremely rare practice in the industrialized world. In most countries, the rail infrastructure has remained part of the public infrastructure, which also includes highways, airports, and waterways similar to the present practices in the United States. In these countries, passenger rail service has evolved into a modern high-speed train system that effectively competes with air service for distances between 100 and 500 miles. France, Germany and Japan are the most heralded examples where this application of rail technology has been successful. However, a plethora of other countries, many of which are not economic power players, have adopted and are installing high speed rail as part of their economic agendas including China, Greece, Italy, Spain and Korea. The United States has made some strides with the recent upgrading of the Washington, New York, Boston corridor to higher operating speeds that include a 50 mile section with operations up to 150 mph.

Oklahoma may not immediately be thought of as a candidate for high-speed rail to some planners or administrators. However, a closer examination of population patterns and land use reveals that much of the state's population is concentrated in Oklahoma City and Tulsa. The distance between Oklahoma City and Tulsa lies within the 100 to 500 mile range, there is significant interrelated economic activity, and the prevailing land use in the countryside between these cities that would allow for a relatively economical construction of new rail line suitable for high-speed operations.

Beyond these two main cities, additional markets are worthy of examination. Possibilities include directly serving Oklahoma centers such as Will Rogers International Airport or the University of Oklahoma in Norman, or extensions beyond the state boundaries to population centers such as Kansas City, St. Louis, Springfield, or Dallas.

The installation of a high-speed rail system in Oklahoma, thoughtfully integrated with the institutional and industrial assets of the state, would have economic effects well beyond those of the immediate provision of cost-effective transportation. The train could potentially become a symbol of a progressive state interested in broad-based economic expansion and not afraid to invest in its infrastructure to facilitate that expansion.

2.3.1 Planning/Engineering Activities

2.3.1.1 Actions Necessary to Implement the Vision

Three areas of understanding are critical to the success of a high-speed rail system. These are:

1. A thorough appreciation for the transportation market to be served and the application of that knowledge to the system design.
2. Knowledge of the financial mechanisms available for long-range transportation investments.
3. An appropriate and economic application of technology that fits the realities of the financial and transportation markets.

These three components tie together to produce a transportation product that meets the expectations of the passengers, the public, and the financiers.

2.3.1.2 The Market

It is unlikely that construction of a high-speed rail system would be financed strictly on a cash basis, consequently some method of finance will ultimately be required to assemble the necessary capital. The financial backers will require evidence that their investment is safe and the project proposed in sound in concept. One tool used in developing this evidence is the investment-grade ridership study.

An accepted approach to these studies has two components. The first is an estimate of the total travel market covered by the proposed system. The second component is the mode split analysis that determines the ability of the proposed rail service to capture a share of the total market. Investment-grade studies frequently make this estimate using data on value of time perceptions. Both analyses require extensive data collection efforts, which account for the significant investment required to develop and complete a detailed investment-grade ridership study.

Besides satisfying the needs of financial backers, the ridership study also guides system designers in locating stations where market share can be maximized by providing convenient service to the largest possible number of passengers.

2.3.1.3 Financing

Financing mechanisms for high-speed rail systems in the United States have not been reduced to practice as with highway or aviation financing. Established mechanisms available, such as general obligation or revenue bonds, if used alone for finance would require extensive security commitments from the State of Oklahoma and for that reason, may not be fully desirable.

Newer financing mechanisms are now or may soon be available to assist in financing. These instruments are developed with high-speed rail in mind and many are restricted to the high-speed corridors identified under 23 USC 104(d)(2)[1]. Among these are:

1. The High Speed Rail Assistance Program under the Swift Rail Development Act of 1994 can provide a 50% federal match for high-speed rail planning activities.
2. The High-Speed Rail Grade Crossing Improvement Program can provide federal funding to reduce or eliminate grade crossing hazards on designated high-speed lines.
3. TIFIA is a federal credit assistance program geared for large infrastructure projects (greater than $100 million) but limited to covering 1/3 of the project costs.

[1] Tulsa-Oklahoma City-Dallas/Ft.Worth is a designated high-speed rail corridor.

4. Two bills introduced in Congress would provide substantial finance for high-speed rail. Presently provisions of the bills (one providing $13 Billion and the other $71 Billion is assistance) are being blended into a new legislative package that is currently pending the approval process awaiting the release of the Bush administration's program for Amtrak and high-speed rail anticipated to be revealed in February 2002.

The State of Oklahoma needs to be prepared to commit substantial financial funds or guarantees for High Speed Rail projects as even a percentage of the funding for these types of projects would represent a substantial financial obligation.

2.3.1.4 Application of Technology and Infrastructure

The evolution of high-speed rail systems in the world has led to a range of choices in equipping a high-speed rail system. While rail safety rules and regulations in the United States differ from those in the rest of the world substantially, many of the rail vehicles utilized in other countries have been or could be modified to meet American requirements. This expansion of choices gives American rail system designers greater flexibility in developing systems that closely match the requirements of a particular market being served. It also provides for a degree of competitive procurement that helps in moderating and stabilizing costs.

High-speed rail technologies are often categorized according to the required Federal Railroad Administration track safety classification standards. While this method of classification is not necessarily an appropriate use of the track classification system, it will be utilized for this report because of the overall use of the system for the purpose of interpreting track related standards.[2]

Conventional passenger rail is considered operations below 90 mph (FRA Class 5 and below). High-speed rail operations are 90 mph or higher (FRA track classes 6 through 9). Of immediate interest to Oklahoma are those trains that operate in the 125 mph category (Class 7) or the 150 mph category (Class 8).

Trains operating under Class 7 are usually diesel or turbine powered. Class 8 trains are most likely to be turbine or electrically powered. Any preparation of NEPA documents for high-speed

[2] FRA Track Safety classes are minimum safety related tolerances, not construction or maintenance specifications. The FRA does not impose a class designation on a railroad. Railroads set their own classification by setting maximum permissible speeds in their timetable, and then must meet the safety requirements for that track class.

rail should seek environmental clearance for a wide range of power options to allow more flexibility in the selection of equipment.

Each type of power option possesses certain advantages. Diesel is economical to operate and the development of computer control has increased power to weight ratios and made significant improvement in diesel emissions. Turbines offer very high power to weight ratios but do not offer the fuel economy of diesel. The addition power available with turbine facilitates the practical development of 150 mph fossil-fueled trains. However, because of limited torque, high gradient capability at higher speeds might be limited. Electric trains provide very high power and torque because their energy is provided from the electric power grid and not limited to the energy supply that can be carried on-board the prime movers (locomotives with turbine or diesel engines). Electric trains have higher capital expense in their power distribution systems and greater clearance envelopes are required electrically powered equipment.

Tilt train technology is an often-touted train feature that provides for the passenger compartments to lean while a train is traversing horizontal curves. Tilt is primarily a passenger comfort feature only and Tilt trains cannot actually travel faster than a non-tilt train because of any ability to negotiate curves more efficiently. Any operation that requires tilt technology to provide reasonable passenger comfort for increased operating speeds are going to require certain waivers from present FRA safety regulations. This situation normally occurs in mountainous territory or when freight and passenger equipment share the same track, commonly referred to as "mixed track utilization". Tilt trains are designed using one of two types of technology, "active" where tilting is achieved through mechanical means controlled by sensors, and "passive" where tilting is achieved through gravity and centrifugal force.

Decisions regarding the final selection of train technology should be held in abeyance until after market studies have defined system requirements and sensitivities. Consequently, any associated NEPA documents should not be developed in a manner that would limit technological choices.

Track infrastructure for high-speed operations is similar to standard railroad track with some variations in detail and an overall approach that calls for premium components and greater attention to detail during installation. One of the most critical components is the preparation of the subgrade, which must assure that the vertical stiffness of the foundation is uniform and any changes in stiffness are gradual. For example, approaches to bridges require treatment that

gradually increases subgrade stiffness to that presented by the bridge structure. Ballast should be igneous rock such as granite, broadly graded such as AREMA Grade 24 or 25. Ties should be of prestressed or two-block concrete. Rail should be high Brinell steel in the 6" base and long head radius class. Turnouts should have moveable point frogs. For the mid-route passing siding, #46 turnouts are recommended to provide high-speed diverging moves (100 mph). Turnouts for other sidetracks could be placed using more moderate design criteria. In the passing track area, track centers will be spaced at 20 feet to reduce aerodynamic interaction of passing trains although 15-foot track centers are utilized for high-speed operations on other routes.

Drainage will also be a key component for maintaining sound subgrade during high- speed operations. Anticipated problems associated with higher water tables or other natural drainage issues will be addressed utilizing drainage systems on the edge of the right-of-way similar to French drain systems. This methodology has been utilized on other mainline routes in the United States to help stabilize the subgrade and ballast section of the track. The elimination of groundwater from the subgrade will inhibit changes in soil characteristics that could complicate the stabilization of the roadbed. The utilization of select material and in some cases lime treatment, will be required to maintain subgrade adequate for 125 or up to 150 MPH operations.

The dedicated high-speed line would be required to be totally grade-separated and fenced to prevent the intrusion of trespassers, domestic animals, and wildlife for 150 MPH operations. The access requirements would not be as stringent for 125 MPH operations but should be considered as a component of the overall design in areas where significant wildlife or other intrusions are anticipated.

Two separate signal systems can be utilized on the segments of track with mixed utilization; standard wayside signals can provide for operations up to 79 mph, and operations over 79 mph will require in-cab signals for every train operating on the territory. The equipment requirements associated with mixed track utilization mandating that every freight train using the track be equipped with cab signals is often extremely cost prohibitive, especially where the freight operator has equipment utilized throughout a large railroad network commonly referred to as "free-roaming" equipment. In most cases, the capital necessary to facilitate 90 MPH operations is better utilized eliminating slow orders and pockets of speed restrictions. For dedicated high-speed operations there are a number of advanced communications-based signal/control systems available, that employ the latest technologies to assure train separation when mixed

track utilization and free-roaming equipment are not a component of standard operating practices.

In making decisions regarding capital allocation, the most widely accepted formula is $ per minutes saved. In early stages of development, large time savings can be realized for relatively small investments. As the design matures, the formula advances into $millions per second. A slower train that can attain and maintain a steady cruise speed will generally have a shorter time in route than a faster train that has to slow for speed restrictions.

2.3.1.5 Conceptual Operating Plan and Estimate

Without market data, a passenger rail system can only be properly conceived using a set of "reasonable" assumptions. These initial concepts can be analyzed to formulate financial "ballpark" estimates for the proposed Oklahoma high-speed rail service.

The following was assumed:

1. The system will connect the two largest cities, Oklahoma City and Tulsa.
2. Terminal stations will be located in the Central Business Districts
3. Largely new alignment will be used but existing tracks will be used on the final approaches to the city centers.
4. Fossil-fueled trains with a top operating speed of up to 150 mph will be used although data on other choices will be obtained.
5. A schedule of four trains per day in each direction will be used to evaluate initial "start-up" service. A single track railroad with a long (20 mile) passing siding half way between Tulsa and Oklahoma City will be assumed for operational calculations. This provides for simultaneous departures from both ends at the most popular travel times. Two train-sets are required to cover this proposed schedule, plus one additional spare train-set to cover maintenance rotations and breakdowns.
6. A single major maintenance facility will be located at one end of the route. Because most high-speed train consists have two locomotives (one at each end), a train would rarely be totally stranded in the event of a breakdown. A 150 mph train-set should be able to operate in excess of 100 mph with a single power unit operative. Routine coach cleaning, fueling, and washing will be conducted at both terminal facilities.

Example schedule:

		#1	#3	#5	#7
Oklahoma City	Lv	7:30 am	12:30 am	5:30 pm	8:30 pm
Tulsa	Ar	8:36 am	12:36 pm	6:21 pm	9:36 pm
		#2	#4	#6	#8
Tulsa	Lv	7:30 am	12:30 am	5:30 pm	8:30 pm
Oklahoma City	Ar	8:36 am	12:36 pm	6:21 pm	9:36 pm

The total route length is approximately 111 miles with 25 miles operated on existing track, and 86 miles on the new alignment. The new right of way will be 100 feet wide except where earthwork will require additional space for excavation or fill. An initial alignment, curved for non-wavered 150 mph operations has been developed in order to estimate the necessary earthwork and structure quantities. A 20-mile long passing siding will be located at the center of the route and shorter sidings will be located at 10-mile intervals. Single-track will be installed offset from the property centerline to accommodate eventual addition of a second track.

2.3.1.6 General Equipment Technology Configurations

High-speed passenger rail equipment is divided into two distinct categories based on specific means of propulsion, which is primarily limited to fossil-fueled or electric power sources.

Fossil-fueled trains carry some form of liquid petroleum fuel, usually diesel fuel, and convert chemical energy into tractive force. Mechanical energy is produced through some type of engine, either diesel or gas-turbine through the combustion of the liquid fuel. The energy necessary to actually drive the locomotive wheels is transferred from the engine through some type of transmission. The transmissions most generally used are either hydraulic similar to an automatic automotive transmission, or electric where the engine turns a generator which in turn powers the motors providing power to the driving wheels. Several combinations of engines and transmissions have been used for railroad locomotive power including diesel-electric, diesel-hydraulic, turbine-electric, and turbine-hydraulic. Electric fueled equipment is more often used for high-speed operation; however, Fossil-fueled equipment is presently available for speeds up to 150 m.p.h.

Electric traction offers several environmental advantages primarily because emissions from fixed power sources can be more effectively controlled than emissions from mobile power sources. Advantages in overall energy efficiency are not as great as might be expected due to the losses during power transmission, which tend to diminish the benefits associated with the efficiency of fixed power generation.

Historical research regarding the installation of catenary power sources indicate that the capital costs are approximately $1 million per track-mile for the catenary structures and an additional $1 million per route-mile for the necessary substation equipment. The OKC-Tulsa route will most likely require three substations. The Track-based train control signal system costs would be double the normal cost for cab-signal train control if employed in conjunction with an electric power system. However, the communication-based components of the control signal system would not be significantly impacted by electrification.

Variations in equipment layout are primarily categorized into two distinct categories including locomotive-hauled trains and multiple-unit trains. Locomotive-hauled trains have power units at one or both ends of the train and the individual train cars are not powered. Multiple-unit trains have power distributed throughout the trainset, with each or most cars carrying a means of propulsion, either electric or fossil-fueled. While multiple units are common in most of the world, U.S. regulations virtually preclude their utilization in any situation where mixed passenger and freight operations are allowed. However, train equipment manufacturers have indicated that multiple unit trains meeting U.S. regulations can and would be built if a market developed in the United States for that type of equipment. Multiple-unit train equipment has been developed in European countries capable of operating up to 125 mph utilizing diesel power.

Some high-speed passenger cars are equipped with special suspension features commonly referred to as "tilt" suspension technology. Tilt suspension technology is a mechanism designed to provide greater passenger comfort while the train is traversing through a curve in the track. Tilt technology is most useful in situations where the track has numerous tight curves that restrict the overall operating speed of the existing alignment. Tilt technology systems can be categorized primarily into two specific classifications including active and passive tilt systems. Active tilt systems utilize sensors to detect curve conditions and provide information to powered activators, which actually tilt the passenger cars through a modified suspension system. Passive tilt systems use gravity and centrifugal forces to tilt the cars through a modified suspension system.

All of the above mentioned technology options form a continuum of choices for the development of a system that will specifically meet the needs of the State of Oklahoma. The requirements of the travel market will be the single most important factor in the final selection of equipment and infrastructure of technologies. The expansion of high-speed rail systems throughout the world has made a variety of basic train equipment packages available with each specific application having its own features or specific modifications developed for a specific use. The actual number of seats, seat pitch and width, food service provisions (cart, bistro car or dining car), baggage provisions (checked baggage, end of car or overhead racks, etc.), as well as many other aspects of passenger service will need to be specified by the operator, not the train manufacturer.

2.3.1.7 Equipment related Regulatory Issues

During the process of selecting the most appropriate technology, in addition to the primary questions of market suitability, a major issue to be considered is compliance with the United States regulatory environment. Railroad safety is regulated by the Federal Railroad Administration, which is a unit of the U.S. Department of Transportation. The U.S. has taken a distinctively different approach to high-speed rail safety regulation as compared to other countries presently operating high-speed rail service. Domestic regulations emphasize crashworthiness in addition to crash avoidance. The implications of this type of regulatory approach require that trainsets be constructed considerably heavier than the requirements adopted by other countries, which presently limits the technology choices or equipment available that have been specifically designed or modified for the American market.

Passenger train equipment is subject to regulation under Title 49 Part 238 of the Code of Federal Regulations (49 CFR 238). For trains operating up to 125 mph, the equipment must comply with the Tier 1 requirements (subparts C and D). For operations up to 150 mph, a stricter guideline known as Tier II is in effect (subparts E, F and G). For speeds greater than 150 mph, each case is evaluated individually and a "Rule of Specific Applicability" is developed under current FRA rule making processes.

Because many manufacturers are eager to enter the American high-speed rail market but few have actually made equipment compliant with these requirements, guarantees beyond claims of compliance should be obtained from suppliers before entering any agreement for equipment procurement.

Although federal regulations presently allow highway at-grade crossings for operating speeds up to 125 mph, great lengths have been taken to avoid such crossings on the proposed Oklahoma City to Tulsa route. Grade crossings are the single greatest generator of safety hazards that are out of the control of the service operator.

The safety of the track is regulated under 49 CFR 213. For high-speed track (greater than 90 mph maximum authorized speed (M.A.S.)), subpart G applies. Although track is often referred to by its FRA class number (i.e. Class 7, Class 8, etc.), this is a misnomer and often leads to a misinterpretation of the intent of track classification regulations. FRA track classifications refer to minimum safety standards. These standards are not, and should not be considered standards that should be adopted for either maintenance or construction standards. These safety standards set the requirements for track inspection, the requirements for personnel to be qualified to conduct the required inspections, the maximum extent to which certain discrete defects may exist in the track, and the requirements for remedial action. The track safety classification is determined by the railroad, not by the Federal Railroad Administration. The declaration of the maximum operating speed (M.A.S.) over a territory by the operating timetable (a document required by the FRA and developed by the operator) establishes the track classification and the requirements for safety regulation.

Passenger trains operating in excess of 79 mph must be equipped with a signal system that displays operational information at the engineers operating position often referred to as cab signals. All locomotives operating in a territory where cab signals are used for any operations must be so equipped with cab signals. Many freight railroads operate using a "free running" locomotive system, whereby their locomotives are allowed to travel anywhere on their system. The undefined operational limits of "free running" locomotives coupled with the fact that many railroads rent or lease locomotives from outside sources both on long-term and short-term basis increases the probability that the overall cost of equipping of freight locomotives with cab signals may be extremely prohibitive. The cost for updating any freight locomotives is normally the responsibility of the passenger operator generating this requirement. On the Oklahoma City to Tulsa route we would be dealing with a relatively captive fleet of locomotives on the Oklahoma City end of the alignment, however the Tulsa end of the proposed alignment would be part of a free running system operated by the BNSF. We do not anticipate that the BNSF would be operating on the proposed new alignment and locomotives equipped with cab signal equipment

are allowed to operate on territories not requiring cab signals as long as the operating speeds do not exceed the specified maximum speed of 79 mph for wayside control signal operations.

2.3.1.8 Anticipated Equipment Application for the OKC to Tulsa Route

For Oklahoma, fossil-fueled equipment will likely be the best choice for several reasons including the following:

(1) While the distance between Oklahoma City and Tulsa (110 miles) will benefit from high speed, a more important component will be flexibility for the expansion of service from Oklahoma City north or Tulsa to the east. Fossil-fueled equipment would have the flexibility to be operated at lower speed on existing routes providing extended service to other destinations if necessary.

(2) Presently there are minimal intermediate stations planned, negating the need for the higher acceleration capabilities of an electrified system.

(3) Fossil-fueled equipment, while providing adequate performance for the OKC-Tulsa line, will represent a substantial savings in capital expenditure, which could be directed toward additional service. Frequency of service will be as important as the actual trip time in expanding and sustaining ridership.

(4) The reduction of initial capital expenditures associated with the utilization of fossil-fueled equipment would allow for the promotion of expanded service to destinations beyond the limits of the OKC-Tulsa corridor.

Initial indications are that a locomotive-hauled train would be the most suitable equipment for the OKC-Tulsa route, however one manufacturer has expressed the willingness to manufacture a version of their very successful high-speed diesel multiple unit train compliant with FRA Tier One requirements. Equipment options should be thoroughly investigated during the procurement process after the infrastructure design has been further developed.

The preferred development of the infrastructure would be to construct the route between OKC and Tulsa without grade crossings and with a modern communications based signal/control system. 125 MPH operations would allow some grade crossings to be utilized in an effort to reduce the initial capital expenditures, however, several safety issues would be prevalent under this scenario. Freight train traffic could potentially be operated on the dedicated line but only under a strict time-segregated arrangement. Under the proposed operating schedule, freight traffic would need to be restricted to night hours between 10:00 PM and 7:00 AM. The use of existing mixed traffic rail lines at the terminal ends (i.e. the approaches to OKC and Tulsa) or to

destinations beyond the termini (i.e. Norman, Dallas/Ft. Worth, Kansas City, Springfield, St. Louis, etc.) is a common and accepted practice.

The preferred roadbed for the OKC-Tulsa high-speed line would be sufficient to facilitate two tracks throughout the entire new alignment for future expansion to a full double track infrastructure. The initial capital costs associated with the development of a double track roadbed would be minimal compared to the anticipated costs of future expansion. The actual track infrastructure could initially be constructed as single track with a long passing siding near the midway point that would facilitate dynamic train meets. The midway siding would allow operations where trains operating on time could pass each other without either train stopping. The exact location of the midway passing track would be determined by the schedule adopted for initial operations. Shorter passing sidings that would facilitate stopped train meets would need to be provided at other points along the route to provide for static passing of off-schedule trains. Once a train falls off-schedule, it is difficult to recover on-time operations for the remainder of the day. Successful passenger operations throughout the world have adopted, and adhere to fanatical philosophies regarding safety and on-time operations. These two factors are closely linked primarily because predictable operations are generally safer operations. On-time performance is critical for the development of the necessary levels of confidence that lead to frequent and repeated passenger business.

In addition to the minimum number of trainsets required to perform the scheduled service, at least one extra trainset should be in ready-reserve. As the trainsets begin to age and require more extensive maintenance procedures, an additional trainset should be acquired to cover maintenance cycles, and to facilitate the continuous need for one ready-reserve trainset. A single heavy maintenance facility located near one of the terminals should be adequate for the proposed Oklahoma system. Each terminal should be equipped for lighter maintenance activities including train cleaning and light repairs. The interior should be cleared of debris after every run with a more thorough cleaning performed at least once on a daily basis. The exterior of the train should also be washed on a daily basis in an effort to maintain desired consumer confidence levels with regard to safety and operations. Depending on layover times during the day, the exterior cleaning may be accomplished at a single wash rack.

Fossil-fueled trains will require provisions for fueling and the trains fuel capacity should be specified to carry enough fuel for a round trip with adequate reserve. Adequate capacity for round trip operations would allow fueling to be accomplished at a single terminal. The fuel pit

would be required to meet certain environmental regulations in addition to numerous safety requirements designed to prevent or contain spillage.

2.3.1.9 Other Issues and Potential Solutions

The proposed Oklahoma City – Tulsa high-speed rail line directly parallel to the Turner Turnpike will require higher volumes of fill than the proposed new alignment through the Deep Fork drainage basin and may result in steeper gradient conditions. The original turnpike alignment was designed utilizing essentially a straight line with little regard for the local topography. Consequently, the final roadway design resulted in gradients within the operating limitations of highway vehicles, however the existing grades along the highway route would significantly tax the ability of a rail vehicle during normal operations and especially during high-speed operations. The reduction of the existing gradients for rail operations will require extensive improvements including excavation, embankment, bridging, and tunneling. A safety barrier system constructed to National Technical Information Service (NTIS) design standards (5) will most likely be required on segments of the Turnpike Corridor where common right-of-way lines are shared between the proposed rail and existing roadway systems.

Similar to the proposed turnpike alignment for the OKC-Tulsa line, the original TGV high-speed line in France was built on the principle of traversing hills rather than routing the track around them. To achieve performance on the steep grades associated with these design criteria, the French National Railways (SNCF) made certain provisions in the design of the equipment used for TGV operations. The principal feature is a very high horsepower locomotive that approaches 10,000 hp in the original consist designed for 170 mph operations in which electric traction was chosen to obtain this power while keeping locomotive weights reasonable.

While electric traction is the foremost technology to power high-speed trains, the infrastructure necessary for electric powered operations requires higher initial capital expenditures which would be an estimated additional $300 million for the OKC-Tulsa line. In the event that electric power operations were utilized in the OKC to Tulsa line, the prime movers (electric locomotives) could not be operated to destinations beyond OKC or Tulsa unless additional electric power infrastructure is installed.

The alternative power source to electric traction in prime movers is the use of fossil-fueled locomotive power whereby the power source for the locomotive is carried on-board. Fossil-fueled power can be generated using either diesel or gas-turbine engines. Prime Movers

carrying the capacity for peak horsepower on-board when high horse power is required accumulate a considerable amount of weight attributed primarily to the engines, generators, and the transport of fuel. For turbine-powered equipment the large differences between peak and cruise horsepower requirements result in subsequent loss of fuel efficiency and the need for high fuel loads resulting in additional fuel costs. Turbine powered locomotives are normally only fuel-efficient at high throttle settings and lose efficiency at lower power settings.

Several power transfer methods have been developed to couple the engines to the drive train of a locomotive. The most efficient and flexible method of coupling the diesel or turbine engines to the drive wheels is an electric transmission. This transmission consists of an engine-driven generator that powers electric traction motors on the drive wheels. This type of system may incorporate direct-current (DC) or alternating-current (AC) during the transfer of power.

When determining the required amount of locomotive horsepower necessary for adequate operations, several factors need to be evaluated. These include; the weight of the locomotives and other train equipment, the maximum desired speed, the desired rate of acceleration, the maximum grade on the route, and the maximum non-momentum grade on the route. For the route being proposed along the existing turnpike alignment, the horsepower requirement could be very high due to the desired operating speeds and the anticipated grades associated with the proposed alignment.

Innovative technology may be available to overcome the short duration high-horsepower requirements without over sizing any proposed fossil-fueled locomotive power sources. One potential technology is the gyroscopic battery, which is still in developmental stages. The gyroscopic battery spools excess energy during operations requiring low levels of power. The excess stored energy is utilized to supplement the power available to sustain desired speeds for operations requiring power levels above the maximum amount available from the on-board engines.

Another potential method of facilitating better operations through higher gradients along the route is true dual-mode locomotive deriving traction power from both on-board and external sources. Dual-mode locomotive operations employ known technologies, however, the utilization of these methodologies for high-speed operations would require significant development prior to final implementation. The anticipated dual-mode application on the proposed Oklahoma

turnpike alignment would incorporate additional power from either a catenary wire or a third-rail on segments where grades exceed the maximum capability of the on-board fossil-fuel engines.

Either of the proposed supplemental power source technologies would require the blending of electrical power from two different sources into a single load (the traction motor array). While these types of dual mode operation have been attempted in the past, the engineering necessary to facilitate successful operations using this configuration has not presently been reduced to practice. In both cases, the utilization of AC power is virtually ruled out because both sources of AC power must be fully synchronized before power can be blended. Such precise synchronization of AC power would be extremely difficult. Dual mode power operations would most likely be more feasible using DC power, primarily because frequency synchronization would not be required, however, there are other engineering challenges involved when utilizing DC power sources.

DC traction motors been utilized for high-speed operation though not as capable as AC motors, but are potentially capable of providing the power necessary to facilitate dual mode operations. The original TGV high-speed locomotives have DC motors. DC motors, have very high starting torque capabilities, however those torque characteristics quickly diminish as rotational speeds increase. For high-speed dual power operations, the DC motors would need to be sized large enough to provide the torque required to maintain high speeds on steep gradients. The locomotives required for the proposed operations would require larger DC motors as well as a greater number of motors within each locomotive unit. The original TGV DC powered locomotives carried 12 motors as opposed to 8 motors on the later AC models. DC motors have historically had a greater mass for unit of output as opposed to AC models.

Other engineering challenges would involve circuit breaker protection for on-board equipment in case of a ground fault or the reversal of polarity during operations. Provisions for braking power would be necessary in the event the prime mover fails. The consist should not be allowed to continue its journey on external power in the event that an on-board power failure occurs if the prime mover is the only source of braking power. With dual-mode power, both sources of power would also need to be regulated to voltage levels less than the minimum amount of voltage that may be available from either system at any given time. Any voltage supplied via third rail or catenary line will vary significantly based on immediate load, the distance from substation, and the level of voltage supplied from the commercial power source. Consequently, the power

sources utilized for single or dual mode locomotive power would require substantial rectifier protection against back currents.

One of the primary issues regarding the overall design of the High-Speed rail infrastructure will be the stabilization of the subgrade to facilitate the construction of trackage that will sustain the higher than normal forces associated with High-Speed rail operations. With the high elastic soils properties frequently found in soils throughout the State of Oklahoma, extra precautions for soil stabilization and water table management have been included in the associated cost estimates. These precautions include the utilization of select material, lime stabilization, and French drain systems to mitigate potential problems associated with water table infiltration. Ambient temperature is expected to be an important factor while attempting to maintain maximum design speed operations. Higher temperatures in the summer months are expected to limit the operating speeds because of the rail deformation associated with high temperatures. Wind resistance will also be a factor during High-Speed operations with strong head winds hindering the efficient operation and the capability of the equipment to maintain desired operating speeds. It is anticipated that high head winds will commonly be experienced when traveling westward toward Oklahoma City. This factor coupled with the fact that the ground elevation in Oklahoma City is over 400 feet higher than in Tulsa indicates that the equipment will be more taxed when traveling westward on either of the proposed corridors. With this in mind, it would appear as though the most reasonable location for refueling efforts would be in Oklahoma City to facilitate lighter gross operating weights during westbound operations.

CHAPTER 3 - EVALUATION RESULTS

3.1 EVALUATION SUMMARY

The two core corridors evaluated each have individual benefits and obstacles that will need to be considered during the final selection process, which will require public involvement. All of the estimates formulated for the various options associated with each of the two core corridors were based on the best FRA and USDOT design information presently available. Many of the present design criteria for High-Speed rail operations in the United States are presently under review including infrastructure design standards. The construction of High-Speed rail infrastructure on entirely new right-of-way is presently a rather unique undertaking in the United States. Foreign design standards for High-Speed rail have matured immensely over the past decade and are generally less stringent that United States design standards. However, the design assumptions set forth in these cost estimates adhere to the latest interpretation of United States design standards.

The Turnpike Corridor provides the primary benefit of not disturbing an entirely new corridor for the construction of High-Speed rail infrastructure between Oklahoma City and Tulsa. The concept of utilizing right-of-way adjacent to the present Turner Turnpike alignment provides an opportunity to minimize the amount of visual, noise, and aesthetic impacts associated with the construction of the proposed infrastructure. The proposed Turnpike Corridor would be slightly shorter than the proposed Southern Corridor resulting in travel times anticipated to be one hour or less. The acquisition of right-of-way is anticipated to be less troublesome and less expensive overall for the Turnpike Corridor primarily because less resistance is anticipated from landowners whom already have a significant infrastructure disruption near their property.

Tunneling, and additional slope stabilization including some retaining walls will be required in order to stay within the right-of-way restrictions adjacent to the turnpike. Additional safety measures including the erection of safety barriers and more elaborate fencing to advert trespassing and other right-of-way access concerns will also be necessary for the shared right-of-way areas along the Turnpike Corridor. The overall cost of construction for the Turnpike Corridor was originally anticipated to be higher primarily because of the substantial amount of earthwork that would be necessary to maintain vertical grades that would facilitate High-Speed rail operations. However, the estimated costs indicate that the lower right-of-way costs and

overall shorter length of the turnpike alignments resulted in some combinations of the proposed Turnpike Corridor alternatives being less expensive.

Segment 4 of the Turnpike alignment includes provisions for infrastructure that would allow for most of the proposed operations on the Tulsa end to be on dedicated right-of-way. The infrastructure proposed in this alternative would eliminate any potential capacity issues with the BNSF with the exception of the Arkansas River crossing just west of Union Station in Tulsa.

The proposed Turnpike Corridor 235 resulted in the lowest overall cost, anticipated to be $800,857,260. The right-of-way acquisition is also anticipated to be easier for this proposed corridor primarily because it requires the least amount of new right-of-way and traverses the least of amount of undisturbed property.

The Southern Corridor provides the primary benefit of easing the complexity of construction primarily due to the flexibility to select gradients requiring smaller quantities of earthwork to facilitate High-Speed rail operations. This route could also be developed for Class 7 operations at 125 mph with fewer restrictions on the overall design of the infrastructure to further reduce construction costs.

The public acceptance of the Southern Corridor is anticipated not to be as welcoming as it might be for the Turnpike Corridor. The right-of-way acquisition and associated damages are estimated to be higher for the Southern Corridor. The proposed Southern Corridor was selected to avoid as many grade issues as possible, and consequently would traverse several prime wildlife areas and potential residential or hobby farm development areas. The overall length and associated travel time of the Southern Corridor would be expected to be slightly longer. An overall summary of the estimated costs for non-electrified and electrified operations as well as specific comparisons of the estimated costs associated with the proposed corridor combinations for service between Oklahoma City and Tulsa are provided in Table 3.1.

Table 3.1: Corridor Cost Comparisons

›posed Corridor Summaries

›rridor	Length of Track			Estimated	Estimated	Estimated	Estimated
Route	New	Existing	Total	Travel Time	Avg. Speed	Cost	Cost (Elec.)
134	81.70	23.58	105.28	54.36	116	$949,975,394	$1,239,035,394
135	76.42	28.31	104.73	58.71	107	$893,476,748	$1,181,436,748
234	81.70	20.53	102.23	55.05	111	$853,989,589	$1,136,949,589
235	76.42	25.26	101.68	59.40	103	$800,857,260	$1,082,717,260
›(125)	85.42	25.26	110.68	68.82	96	$863,477,787	$1,163,337,787
6	85.42	25.26	110.68	63.35	105	$931,842,240	$1,231,702,240
67	83.42	25.71	109.13	63.26	103	$929,839,933	$1,226,599,933

Comparison of Corridors by Total Cost

Corridor	Length (mi)	Time (mins)	Avg. Speed	Total Cost	Cost / Min	Cost / Mile
235	101.68	59.40	105.79	**$800,857,260**	$13,482,303	$7,876,252
234	102.23	55.05	114.74	**$853,989,589**	$15,512,691	$8,353,610
6(125)	110.68	68.82	106.25	**$863,477,787**	$12,546,736	$7,801,570
135	104.73	58.71	107.03	**$893,476,748**	$15,218,176	$8,531,240
67	109.13	63.26	113.32	**$929,839,933**	$14,697,755	$8,520,480
6	110.68	63.35	115.43	**$931,842,240**	$14,710,569	$8,419,247
134	105.28	54.36	116.20	**$949,975,394**	$17,475,130	$9,023,323

Comparison of Corridors by Cost/Min

Corridor	Length (mi)	Time (mins)	Avg. Speed	Total Cost	Cost / Min	Cost / Mile
6(125)	110.68	68.82	106.25	$863,477,787	**$12,546,736**	$7,801,570
235	101.68	59.40	105.79	$800,857,260	**$13,482,303**	$7,876,252
67	109.13	63.26	113.32	$929,839,933	**$14,697,755**	$8,520,480
6	110.68	63.35	115.43	$931,842,240	**$14,710,569**	$8,419,247
135	104.73	58.71	107.03	$893,476,748	**$15,218,176**	$8,531,240
234	102.23	55.05	114.74	$853,989,589	**$15,512,691**	$8,353,610
134	105.28	54.36	116.20	$949,975,394	**$17,475,130**	$9,023,323

Comparison of Corridors by Cost/Mile

Corridor	Length (mi)	Time (mins)	Avg. Speed	Total Cost	Cost / Min	Cost / Mile
6(125)	110.68	68.82	106.25	$863,477,787	$12,546,736	**$7,801,570**
235	101.68	59.40	105.79	$800,857,260	$13,482,303	**$7,876,252**
234	102.23	55.05	114.74	$853,989,589	$15,512,691	**$8,353,610**
6	110.68	63.35	115.43	$931,842,240	$14,710,569	**$8,419,247**
67	109.13	63.26	113.32	$929,839,933	$14,697,755	**$8,520,480**
135	104.73	58.71	107.03	$893,476,748	$15,218,176	**$8,531,240**
134	105.28	54.36	116.20	$949,975,394	$17,475,130	**$9,023,323**

Disclaimer

The purpose of this estimate is to provide the engineering firm of Carter Burgess with a preliminary estimate of right of way acquisition cost for the proposed new high speed rail line between Oklahoma and Tulsa. At the time that this estimate was performed Carter Burgess had not completed the typical section, final design, nor established a definite corridor for this project. Without these factors being determined, and lacking completed plans, ownerships, and other pertinent data necessary to arrive at a more realistic value estimate, this estimate can only serve as a basic guideline to illustrate some of the factors that will be encountered in the right of way phase of this project, as well as providing a very basic right of way cost that can be expected in association with this project. This estimate is not intended to be used to program monies for the acquisition of rights of way along this corridor, nor is it intended to be used as a basis for the acquisition of properties along this corridor. This estimate is provided as a courtesy for use by Carter Burgess ***only*** and is not to be used as part of the public hearing process. ***The only purpose of this estimate is to aid Carter Burgess in the decision making process as to any possible future routes for this proposed new high speed rail corridor.***

Any changes in the alignment of this corridor can and likely will greatly effect the proposed right of way costs. The appraiser reserves the right to preform a new estimate when additional information is provided, plans are finalized, alignment changes are made, or any other factor which could effect value.

The values provided in this estimate are not property specific and only represent a reasonable average acquisition cost along the proposed corridor. ***This document is not a appraisal and is only intended to be used as part of Carter Burgess feasibility study regarding this proposed project.***

Oklahoma County

The areas highlighted on the map in green represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $2,500 to $3,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $3,000 to $5,000 per acre with some tracts having sold as high as $10,000 per acre.

Note: The wide diversity in the range of values for these tracts can be attributed to numerous factors. Examples that are common in this area but not limited to are: Location, Desirability of home site, Proximity to population or employment centers, Quality of Access, Road surface type, Available utilities, as well as Uninformed buyers.

The area highlighted in blue represents an area that is typically flood prone and not well suited for home site development, these properties due to their location and the desirability of good productive bottom land tend to command a premium for agricultural tracts. Typical land values range from $1,500 to $2,500 per acre.

The areas highlighted on the map in orange represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $3,500 to $4,500 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $5,000 to $7,500 per acre with some tracts having sold much higher.

Oklahoma County Estimated R/W Costs

Land to be Acquired

60 acres located in the orange value zone, of which 30% appears to be smaller acreage home sites

42 acres @ $4,000 per acre =	$168,000
18 acres @ $6,500 per acre =	$117,000

14 acres located in the green value zone, of which 20% appears to be smaller acreage home sites

11.20 acres @ $2,500 per acre =	$ 28,000
2.8 acres @ $4,500 per acre =	$ 12,600

79 acres located in the blue value zone

79 acres @ $2,250 per acre =	$177,750

Improvements to be Acquired

Estimated[1]	$750,000

Proximity Damages to Remainders

Estimated[2]	$656,250

Severance Damages to Remainders

Estimated[3]	$1,125,000

Land Locked Properties and Uneconomic Remnants

Estimated[4]	$675,000

Damages Due to Loss of Development Potential

Estimated[5]	$2,400,000

Estimated R/W acquisition Oklahoma County	$6,109,600
Plus 25% to cover contingencies	$1,527,400
Estimated Acquisition Cost for Oklahoma County	***$7,637,000***

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[1] Based on a projected acquisition of 10 improvements at a average of $75,000 each

[2]Based on projected damages to 35 improvements at a average of 25% damages to each structure, with each structure having a average price of $75,000 each

[3]Based on a estimated severance of 2500 acres of agricultural land. Average land value $2,250 per acre average damage amount 20% of total land value

[4]Based on a estimated 150 acres of landlocked land and 75 acres of uneconomic remnants. Average land value $3,000 per acre

[5]Based on the belief that the larger properties located within the development corridors will not be developed due to the close proximity of the rail line. 960 acres effected at the average price of $3,500 per acre, reduced down to $1,000 per acre

Lincoln County

The areas highlighted on the map in green represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $1,000 to $1,500 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,500 to $5,000 per acre with some tracts having sold as high as $10,000 per acre.

Note: The wide diversity in the range of values for these tracts can be attributed to numerous factors. Examples that are common in this area but not limited to are: Location, Desirability of home site, Proximity to population or employment centers, Quality of Access, Road surface type, Available utilities, as well as Uninformed buyers.

The non-highlighted areas typically represent areas where the highest and best use of the tract is agricultural. Agricultural land values typically range from $500 to $1,000 per acre.

Lincoln County Estimated R/W Costs

Land to be Acquired

Western Lincoln County

58 acres located in the green value zone, of which 30% appears to be smaller acreage home sites

40.60 acres @ $1,500 per acre =	$ 60,900
17.40 acres @ $5,000 per acre =	$ 87,000

Highway 177 Corridor

25 acres located in the green value zone, of which 20% appears to be smaller acreage home sites

20.00 acres @ $1,500 per acre =	$ 30,000
5.0 acres @ $4,500 per acre =	$ 22,500

Highway 18 & 99 corridors

75 acres located in the green value zone, of which 10% appears to be smaller acreage home sites

67.50 acres @ $1,500 per acre =	$101,250
7.50 acres @ $4,000 per acre =	$ 30,000

Agricultural Lands

243 acres @ $1,000 per acre =	$243,000

Improvements to be Acquired

Estimated[6]	$1,875,000

Proximity Damages to Remainders

Estimated[7]	$843,750

Severance Damages to Remainders

Estimated[8]	$1,960,000

[6] Based on a projected acquisition of 25 improvements at a average of $75,000 each

[7] Based on projected damages to 45 improvements at a average of 25% damages to each structure, with each structure having a average price of $75,000 each

[8] Based on a estimated severance of 9,800 acres of agricultural land. Average land value $1,000 per acre average damage amount 20% of total land value

Lincoln County Estimated R/W Costs.....Cont.

Land Locked Properties and Uneconomic Remnants	
Estimated[9]	$1,002,975
Damages Due to Loss of Development Potential	
Estimated[10]	$1,360,000
Estimated R/W acquisition Lincoln County	$7,616,375
Plus 25% to cover contingencies	$1,904,094
Estimated Acquisition Cost for Lincoln County	***$9,520,469***

[9]Based on a estimated 520 acres of landlocked land and 125 acres of uneconomic remnants. Average land value $1,555 per acre

[10]Based on the belief that the larger properties located within the development corridors will not be developed due to the close proximity of the rail line. 2,720 acres effected at the average price of $1,500 per acre, reduced down to $1,000 per acre

Creek County

The areas highlighted on the map in represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage. One of the principle value influences in this area is the close proximity of these lands to Sapulpa as well as ease of access to the Tulsa employment centers.

Land values in this area typically range from $2,500 to $3,500 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $3,000 to $8,000 per acre with some tracts having sold for more.

Note: The wide diversity in the range of values for acreage home sites and hobby farm values can be attributed to numerous factors. Examples that are common in this area but not limited to are: Location, Desirability of home site, Proximity to population or employment centers, Quality of Access, Road surface type, Available utilities, as well as Uninformed buyers.

The areas highlighted on the map in represent properties which likely have some acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage. One of the principle value influences in this area is the close proximity of these lands to Sapulpa as well as ease of access to the Tulsa employment centers. However access to these tracts is typically not of the quality for the areas highlighted in pink or green. *These lands area presently not in the preferred corridor. However they are very close and any realignment of the corridor leading into Sapulpa could involve these lands.*

Land values in this area typically range from $1,000 to $2,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,000 to $3,500 per acre with some tracts having sold for more.

The areas highlighted on the map in represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $1,500 to $3,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,500 to $3,500 per acre with some tracts having sold much higher.

The areas highlighted on the map in represent properties which are located within the corporate city limits of Sapulpa as such these properties have greatly increased values over the outlying lands(values should average around $30,000 per acre)

The non-highlighted areas typically represent areas where the highest and best use of the tract is agricultural. Agricultural land values typically range from $500 to $1,000 per acre.

Creek County Estimated R/W Costs

Land to be Acquired

67acres located in the pink value zone, of which 25% appears to be smaller acreage home sites

50.25 acres @ $3,500 per acre =	$175,875
16.75 acres @ $6,500 per acre =	$108,875

Depew Area

49 acres located in the green value zone, of which 25% appears to be smaller acreage home sites

36.75 acres @ $1,500 per acre =	$ 55,125
12.25 acres @ $3,000 per acre =	$ 36,750

Bristow Area

37 acres located in the green value zone, of which 25% appears to be smaller acreage home sites

7.40 acres @ $1,500 per acre =	$ 11,100
29.60 acres @ $3,500 per acre =	$103,600

Slick Area

43 acres located in the green value zone, of which 10% appears to be smaller acreage home sites

38.70 acres @ $1,500 per acre =	$ 58,050
4.30 acres @ $3,000 per acre =	$ 12,900

Sapulpa Area

21 acres located in the orange value zone

21 acres @ $30,000 per acre =	$630,000

Agricultural Lands

237 acres @ $1,000 per acre =	$237,000

Improvements to be Acquired

Estimated[11]	$2,625,000

Proximity Damages to Remainders

Estimated[12]	$1,125,000

Severance Damages to Remainders

Estimated[13]	$1,840,000

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[11] Based on a projected acquisition of 35 improvements at a average of $75,000 each

[12] Based on projected damages to 60 improvements at a average of 25% damages to each structure, with each structure having a average price of $75,000 each

[13] Based on a estimated severance of 9200 acres of agricultural land. Average land value $1,000 per acre average damage amount 20% of total land value

Creek County Estimated R/W Costs.....Cont.

Land Locked Properties and Uneconomic Remnants	
Estimated[14]	$1,305,000
Damages Due to Loss of Development Potential	
Estimated[15]	$3,500,000
Estimated R/W acquisition Creek County	$11,824,275
Plus 25% to cover contingencies	$ 2,956,069
Estimated Acquisition Cost for Creek County	***$14,780,344***

[14]Based on a estimated 725 acres of landlocked land and 145 acres of uneconomic remnants. Average land value $1,500 per acre

[15]Based on the belief that the larger properties located within the development corridors will not be developed due to the close proximity of the rail line. 3,500 acres effected at the average price of $2,000 per acre, reduced down to $1,000 per acre

Okmulgee County Estimated R/W Costs

A small portion of the purposed Right of way Acquisition is shown to go thru a small corner of Okmulgee county. The area within Okmulgee county the proposed corridor traverses is a rural agricultural area with little in the way of improvements. The basic land value at this location is $500 to $1,00 per acre. Due to the short portion of the project located within Okmulgee county as well as other reasons listed above a county map for this area is not provided. Estimated R/W Costs is as follows:

Land to be Acquired	
12.0 acres @ $500 per acre =	$ 6,000
Improvements to be Acquired	
Estimated	$ 0
Severance Damages to Remainders	
Estimated[16]	$ 16,000
Estimated R/W acquisition Okmulgee County	$ 22,000
Plus 25% to cover contingencies	$ 5,500
Estimated Acquisition Cost for Okmulgee County	***$ 27,500***

[16]Based on a estimated severance of 160 acres of agricultural land. Average land value $500 per acre average damage amount 20% of total land value

Additional Costs

Wetland Mitigation

The proposed project corridor travels along a area that covers the Canadian River bottom, the Deep Fork River bottom, as well as numerous feeder creeks. Due to the length of the corridor though these area and the historically high percentage chance of wetland potential in these areas it is necessary to address the possibility that wetland mitigation may be involved within the scope of the R/W acquisition. Sources within ODOT estimate that possibly as much as 50 to 100 acres of wetlands may need to be effected along the length of the proposed corridor. Historically a rule of thumb for determining the amount of wetlands replacement is 5 acres of new wetlands will need to be acquired for every acre of wetlands effected. Assuming that 75 acres of wetlands will be effected the estimated mitigation cost is $750,000

Relocation Costs

The proposed project will involve the acquisition of approximately 70 improvements. The estimated relocation costs to acquire these improvements is $25,000 per residence bringing the relocation costs for this project to $1,750,000

Utility Relocation

As part of the proposed project it will be necessary to relocate any utility lines located within the proposed corridor. The estimated cost of this utility relocation is $650,000 per mile or $56,550,000.

Administrative Settlements & Condemnation Costs

Traditionally ODOT administrative settlements and condemnation costs have run approximately 30% of the total R/W costs,.. however these figures are based on highway improvements not high speed rail routes. Highway projects inherently provide certain benefits such as increased access, better quality roadways, improved transportation routes, etc. all of which often improve the development potential for the adjoining ownerships. High speed rail provides none of these things to the adjoining land owners. Instead high speed rail deters the development potential and often times damages to use of properties and provides no benefits to the adjoining owners. Given the increased potential for damages associated with this project it is my belief that this aspect of the estimate should be increased to 50% of the total R/W costs.

Service Providers Fees

Engineering	$375,000
Appraisal	$750,000
Appraisal Review	$125,000
Relocation	$262,500
Acquisition	$450,000
Utilities	$ 80,000

Additional fees

Staking	$ 75,000
Demolition	$500,000

Administrative and Contingency Costs

It is common for ODOT to include a percentage adjustment to cover administrative and contingency costs this cost has typically been 20% of the total cost

Miscellaneous Expenses

Right of Way fencing $1,837,440

(Based on a double sided 87 mile corridor, average price per linear foot of fencing $2.00)

Estimated Land and Improvement Costs

Oklahoma County	$ 7,637,000
Lincoln County	$ 9,520,469
Creek County	$14,780,344
Okmulgee County	$ 27,500
Wetland Mitigation	$ 750,000
Misc Expenses	$ 1,837,440
	$34,552,753

Total Right of Way Costs

Right-of-Way Costs

R/W Engineering Service Provider Fee (Plans, Title, Etc.)	$375,000.00
R/W Costs (Land, Improvements, Damages)	$34,552,753.00
Appraisal Service Provider Fee (Includes Master Addenda, Appraisals, Determination of Appraisal Waiver Parcels)	$750,000.00
Appraisal Review Service Provider Fee	$125,000.00
Admin. Settlement/Condemnation Costs (Estimated @ 50% of R/W Costs)	$17,276,377.00
Acquisition Service Provider Fee	$450,000.00
Relocation Costs (Residential, Commercial)	$1,750,000.00
Relocation Service Provider Fee	$262,500.00
Demolition Costs	$500,000.00
Staking Costs	$75,000.00
Subtotal	$56,116,630.00
Administrative & Contingency Costs (20% of Subtotal)	$11,223,326.00
Total Right-of-Way Costs	$67,339,956.00

Utilities

Utility Relocation Costs	$56,550,000.00
Utility Service Provider Fee	$80,000.00
Subtotal	$56,630,000.00
Administrative & Contingency Costs (20% of Subtotal)	11,326,000.00
Total Utilities Costs	67,956,000.00

OKLAHOMA DEPARTMENT OF TRANSPORTATION

DATE: **February 13, 2002**

TO: **Kurt Harms, Chief Right of Way Division**

THRU: **Chris Bohannon, Manger Engineering Branch - Acting Manager**
Appraisal Branch

FROM: **Gregg Lynn, Staff Review Appraiser**

SUBJECT: **Estimated Right of Way Cost for Proposed New Alignment for High Speed Rail Route Between Oklahoma City and Tulsa Option 2 - Existing Burlington Northern Line Near Jones Extending Northeast on New Alignment Approximately 12 Miles to Lincoln County Line**

As per your request I have inspected the proposed alignment and have established some of the criteria for the proposed acquisition. There are a number of things which should be considered before a final dollar amount for the proposed right of way acquisition can be determined. Lacking completed plans and without establishing ownerships for the project I can only identify value corridors and try to provide some insight as to what can be expected if the proposed rights of way for this corridor are to be acquired. Outlined below are the results of my findings as well as the conclusions which I have reached regarding the acquisition. The conclusions reached and the results drawn from them, are based upon the proposed right of way route and are explained throughout the report.

Scope of Search:

The primary scope of search was focused in and immediately around the proposed route. Note: Only if the proposed route passed though any corporate city limits were any aspect of the property values within those city limits considered as part of this search.

Value Corridors:

Attached for each of the counties which the proposed route travels through is a county map, outlined on each of these maps are what the appraiser has identified as value corridors. These corridors represent anticipated breaks in value for the properties located within the corridor. However it should be noted that due to the sheer size of the assignment these areas are delineated in broad and general terms and are not property specific, for various reasons some of the tracts located within the more intensive use value corridors may never develop to any higher usage than agricultural. The same holds true in that some of the areas designated as having an agricultural highest and best usage may in fact currently be or in the near future be developed as home sites or hobby farms. In the case of this option the only county which the proposed route passes through is Oklahoma county. Within Oklahoma county the values remain reasonably consistent throughout the project corridor. This is due to the close proximity of the Oklahoma City Metroplex and the over riding desire of many residents to have homes located near the employment centers and yet still remain within the country.

Assumptions

Largely the assumptions made in the preparation of this estimate will be stated at the point where a value conclusion is reached. However there are some assumptions which will hold consistent throughout the project. These assumptions are detailed out below:

1) The corridor width is assumed to be 100' **total**
2) It is assumed that there will be sufficient grade separation crossings so that all properties located on either side of the rail line will be provided adequate access.
3) It is assumed that this is a limits of no access facility with the only crossings at designated locations.
4) It is assumed that no damages will occur due to circuitry of access
5) It is assumed that all vehicular crossings will be built to ODOT specifications

Damages

1) Damages will occur to any properties which have residences on them. These damages are the direct result of the market places perception in regards to the close proximity of rail lines to residences and the associated loss of value which occurs as a due to proximity.
2) Damages will occur to any tracts that have development potential along the proposed corridor. This is due to the realization that any properties within close proximity to the proposed rail line will be less desirable and therefore not be developed within a reasonable time frame to have effected the market value of the tract.

Disclaimer

The purpose of this estimate is to provide the engineering firm of Carter Burgess with a preliminary estimate of right of way acquisition cost for the proposed new high speed rail line between Oklahoma and Tulsa. At the time that this estimate was performed Carter Burgess had not completed the typical section, final design, nor established a definite corridor for this project. Without these factors being determined, and lacking completed plans, ownerships, and other pertinent data necessary to arrive at a more realistic value estimate, this estimate can only serve as a basic guideline to illustrate some of the factors that will be encountered in the right of way phase of this project, as well as providing a very basic right of way cost that can be expected in association with this project. This estimate is not intended to be used to program monies for the acquisition of rights of way along this corridor, nor is it intended to be used as a basis for the acquisition of properties along this corridor. This estimate is provided as a courtesy for use by Carter Burgess ***only*** and is not to be used as part of the public hearing process. ***The only purpose of this estimate is to aid Carter Burgess in the decision making process as to any possible future routes for this proposed new high speed rail corridor.***

Any changes in the alignment of this corridor can and likely will greatly effect the proposed right of way costs. The appraiser reserves the right to preform a new estimate when additional information is provided, plans are finalized, alignment changes are made, or any other factor which could effect value.

The values provided in this estimate are not property specific and only represent a reasonable average acquisition cost along the proposed corridor. ***This document is not a appraisal and is only intended to be used as part of Carter Burgess feasibility study regarding this proposed project.***

Oklahoma County

The areas highlighted on the map in green represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $2,500 to $3,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $3,000 to $5,000 per acre with some tracts having sold as high as $10,000 per acre.

The area highlighted in blue represents an area that is typically flood prone and not well suited for home site development, these properties due to their location and the desirability of good productive bottom land tend to command a premium for agricultural tracts. Typical land values range from $1,500 to $2,500 per acre.
Other agricultural lands in the project area are commanding prices from $900 per acre to $1,500 per acre.

The areas highlighted on the map in orange represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $3,500 to $4,500 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $5,000 to $7,500 per acre with some tracts having sold much higher.

The areas highlighted on the map in represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $1,200 to $2,300 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,000 to $5,000 per acre with some tracts having sold much higher.

Note: The wide diversity in the range of values for these tracts can be attributed to numerous factors. Examples that are common in this area but not limited to are: Location, Desirability of home site, Proximity to population or employment centers, Quality of Access, Road surface type, Available utilities, as well as Uninformed buyers.

Oklahoma County Estimated R/W Costs

Land to be Acquired	
145 acres located in the [illegible] value zone, of which 60% appears to be smaller acreage home sites	
87 acres @ $5,000 per acre =	$435,000
58 acres @ $2,300 per acre =	$133,400
Improvements to be Acquired	
Estimated[1]	$750,000
Proximity Damages to Remainders	
Estimated[2]	$468,750
Severance Damages to Remainders	
Estimated[3]	$450,000
Land Locked Properties and Uneconomic Remnants	
Estimated[4]	$1,180,000
Damages Due to Loss of Development Potential	
Estimated[5]	$1,100,000
Estimated R/W acquisition Oklahoma County	$4,517,150
Plus 25% to cover contingencies	$1,129,288
Estimated Acquisition Cost for Oklahoma County	***$5,646,438***

[1] Based on a projected acquisition of 10 improvements at a average of $75,000 each

[2]Based on projected damages to 25 improvements at a average of 25% damages to each structure, with each structure having a average price of $75,000 each

[3]Based on a estimated severance of 1000 acres of agricultural/development land. Average land value $2,250 per acre average damage amount 20% of total land value

[4]Based on a estimated 220 acres of landlocked land and 75 acres of uneconomic remnants. Average land value $4,000 per acre

[5]Based on the belief that the larger properties located within the development corridors will not be developed due to the close proximity of the rail line. 1000 acres effected at the average price of $2,300 per acre, reduced down to $1,200 per acre

Additional Costs

Wetland Mitigation

The proposed project corridor travels along an area that covers the Canadian River bottom, as well as numerous feeder creeks. Due to the length of the corridor through these areas and the historically high percentage chance of wetland potential in these areas it is necessary to address the possibility that wetland mitigation may be involved within the scope of the R/W acquisition. Sources within ODOT estimate that possibly as much as 2 to 10 acres of wetlands may need to be effected along the length of the proposed corridor. Historically a rule of thumb for determining the amount of wetlands replacement is 5 acres of new wetlands will need to be acquired for every acre of wetlands effected. Assuming that 5 acres of wetlands will be effected the estimated mitigation cost is $6,000

Outdoor Advertizing

The proposed R/W taking will either physically acquire or will land lock. approximately 3 outdoor advertising signs at a estimated value of $15,000 per sign or $45,000

Relocation Costs

The proposed project will involve the acquisition of approximately 10 improvements. The estimated relocation costs to acquire these improvements is $25,000 per residence bringing the relocation costs for this project to $250,000

Utility Relocation

As part of the proposed project it will be necessary to relocate any utility lines located within the proposed corridor. The estimated cost of this utility relocation is $650,000 per mile or $7,800,000. Additionally it will likely be necessary to relocate a communication tower at a estimated cost of $150,000. Bringing the total Utility cost to $7,950,000

Administrative Settlements & Condemnation Costs

Traditionally ODOT administrative settlements and condemnation costs have run approximately 30% of the total R/W costs,. however these figures are based on highway improvements not high speed rail routes. Highway projects inherently provide certain benefits such as increased access, better quality roadways, improved transportation routes, etc. all of which often improve the development potential for the adjoining ownerships. High speed rail provides none of these things to the adjoining land owners. Instead high speed rail deters the development potential and often times damages the use of properties and provides no benefits to the adjoining owners. Given the increased potential for damages associated with this project it is my belief that this aspect of the estimate should be increased to 50% of the total R/W costs.

Service Providers Fees

Engineering	$78,000
Appraisal	$130,000
Appraisal Review	$32,500
Relocation	$30,000
Acquisition	$97,500
Utilities	$12,000

Additional fees

Staking	$13,000
Demolition	$50,000

Administrative and Contingency Costs

It is common for ODOT to include a percentage adjustment to cover administrative and contingency costs this cost has typically been 20% of the total cost

Miscellaneous Expenses

Right of Way fencing $253,440

(Based on a double sided 12 mile corridor, average price per linear foot of fencing $2.00)

Total Right of Way Costs

Right-of-Way Costs

R/W Engineering Service Provider Fee (Plans, Title, Etc.)	$78,000
R/W Costs (Land, Improvements, Damages)	$5,697,438
Appraisal Service Provider Fee (Includes Master Addenda, Appraisals, Determination of Appraisal Waiver Parcels)	$130,000
Appraisal Review Service Provider Fee	$32,500
Admin. Settlement/Condemnation Costs (Estimated @ 50% of R/W Costs)	$2,823,219
Acquisition Service Provider Fee	$97,500
Relocation Costs (Residential, Commercial)	$250,000
Relocation Service Provider Fee	$30,000
Demolition Costs	$50,000
Staking Costs	$13,000
Misc. Expenses	$253,440
Subtotal	$9,455,097
Administrative & Contingency Costs (20% of Subtotal)	$1,891,019
Total Right-of-Way Costs	$11,346,116

Utilities

Utility Relocation Costs	$7,950,000
Utility Service Provider Fee	$12,000
Subtotal	$7,962,000
Administrative & Contingency Costs (20% of Subtotal)	$1,592,400
Total Utilities Costs	$9,554,400

OKLAHOMA DEPARTMENT OF TRANSPORTATION

DATE:February 12, 2002

TO: **Kurt Harms, Chief Right of Way Division**

THRU: **Chris Bohannon, Manger Engineering Branch - Acting Manager Appraisal Branch**

FROM: **Gregg Lynn, Staff Review Appraiser**

SUBJECT: **Estimated Right of Way Cost for Proposed New Alignment for High Speed Rail Route Between Oklahoma City and Tulsa Option 3, From Mile Marker 151.9 Northeast Approximately 58.1 miles to Mile Marker 210**

As per your request I have inspected the proposed alignment and have established some of the criteria for the proposed acquisition. There are a number of things which should be considered before a final dollar amount for the proposed right of way acquisition can be determined. Lacking a definite route as well as completed plans and without establishing ownerships for the project I can only identify value corridors and try to provide some insight as to what can be expected if the proposed rights of way for this corridor are to be acquired. Outlined below are the results of my findings as well as the conclusions which I have reached regarding the acquisition. The conclusions reached and the results drawn from them, are based upon the proposed right of way route and are explained throughout the report.

Scope of Search:

The primary scope of search was focused in and immediately around the proposed route, however most everything which was located along the Turner Turnpike and south to highway 62 in Oklahoma and Lincoln Counties was considered as part of the search. (As far west as Jones city limits from there the value corridor spans the area of the proposed route). Creek County from Sapulpa west along the Turner Turnpike.
Note: Only if the proposed route passed though any corporate city limits were any aspect of the property values within those city limits considered as part of this search.

Value Corridors:

Attached for each of the counties which the proposed route travels through is a county map, outlined on each of these maps are what the appraiser has identified as value corridors. These corridors represent anticipated breaks in value for the properties located within the corridor. However it should be noted that due to the sheer size of the assignment these areas are delineated in broad and general terms and are not property specific, for various reasons some of the tracts located within the more intensive use value corridors may never develop to any higher usage than agricultural. The same holds true in that some of the areas designated as having an agricultural highest and best usage may in fact currently be or in the near future be developed as home sites or hobby farms. The appraiser has given his primary focus to the areas along the proposed rail corridor, other areas were given consideration in previous estimates.

Assumptions

Largely the assumptions made in the preparation of this estimate will be stated at the point where a value conclusion is reached. However there are some assumptions which will hold consistent throughout the project. These assumptions are detailed out below:

1) The corridor width is assumed to be 100' **total**
2) It is assumed that there will be sufficient grade separation crossings so that all properties located on either side of the rail line will be provided adequate access.
3) It is assumed that this is a limits of no access facility with the only crossings at designated locations.
4) It is assumed that no damages will occur due to circuitry of access
5) It is assumed that al vehicular crossing will be built to ODOT specifications

Damages

1) Damages will occur to any properties which have residences on them. These damages are the direct result of the market places perception in regards to the close proximity of rail lines to residences and the associated loss of value which occurs as a direct result of that proximity.
2) Damages will occur to any tracts that have development potential along the proposed corridor. This is due to the realization that any properties within close proximity to the proposed rail line will be less desirable and therefore not be developed.

Disclaimer

The purpose of this estimate is to provide the engineering firm of Carter Burgess with a preliminary estimate of right of way acquisition cost for the proposed new high speed rail line between Oklahoma and Tulsa. At the time that this estimate was performed Carter Burgess had not completed the typical section, final design, nor established a definite corridor for this project. Without these factors being determined, and lacking completed plans, ownerships, and other pertinent data necessary to arrive at a more realistic value estimate, this estimate can only serve as a basic guideline to illustrate some of the factors that will be encountered in the right of way phase of this project, as well as providing a very basic right of way cost that can be expected in association with this project. This estimate is not intended to be used to program monies for the acquisition of rights of way along this corridor, nor is it intended to be used as a basis for the acquisition of properties along this corridor. This estimate is provided as a courtesy for use by Carter Burgess ***only*** and is not to be used as part of the public hearing process. ***The only purpose of this estimate is to aid Carter Burgess in the decision making process as to any possible future routes for this proposed new high speed rail corridor.***

Any changes in the alignment of this corridor can and likely will greatly effect the proposed right of way costs. The appraiser reserves the right to preform a new estimate when additional information is provided, plans are finalized, alignment changes are made, or any other factor which could effect value.

The values provided in this estimate are not property specific and only represent a reasonable average acquisition cost along the proposed corridor. ***This document is not a appraisal and is only intended to be used as part of Carter Burgess feasibility study regarding this proposed project.***

Lincoln County

The areas highlighted on the map in green represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $1,000 to $1,500 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,500 to $5,000 per acre with some tracts having sold as high as $10,000 per acre.

The areas highlighted in represent properties which are located along commercial corridors where the intensity of usage is anticipated to be greater than that of the surrounding outlying areas.

Land values in these areas typically range from $0.75 per sq. ft. to $2.50 per sq. ft.

The non-highlighted areas typically represent areas where the highest and best use of the tract is agricultural. Agricultural land values typically range from $500 to $1,000 per acre.

Note: The wide diversity in the range of values for these tracts can be attributed to numerous factors. Examples that are common in this area but not limited to are: Location, Desirability of home site, Proximity to population or employment centers, Quality of Access, Road surface type, Available utilities, as well as Uninformed buyers.

Creek County

The areas highlighted on the map in blue & pink represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage. One of the principle value influences in this area is the close proximity of these lands to Sapulpa as well as ease of access to the Tulsa employment centers.

In the areas shaded in blue land values in this area typically range from $3,500 to $5,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $3,500 to $10,000 per acre with some tracts having sold for more.

In the areas shaded in pink land values in this area typically range from $2,500 to $3,500 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $3,000 to $8,000 per acre with some tracts having sold for more.

The areas highlighted on the map in represent properties which likely have some acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage. One of the principle value influences in this area is the close proximity of these lands to Sapulpa as well as ease of access to the Tulsa employment centers. However access to these tracts is typically not of the quality for the areas highlighted in pink or green.

Land values in this area typically range from $1,000 to $2,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,000 to $3,500 per acre with some tracts having sold for more.

The areas highlighted on the map in green represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $1,500 to $3,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,500 to $3,500 per acre with some tracts having sold much higher.

The highway 97 corridor (shaded in purple) represents a area which will likely have the benefit of commercial property value influences, as such the values along this corridor are much greater that throughout the outlying areas. The estimated land value for this corridor at the point near or where the proposed rail line crosses is expected to be $3.50 per sq. ft.

The non-highlighted areas typically represent areas where the highest and best use of the tract is agricultural. Agricultural land values typically range from $500 to $1,000 per acre.

Some of these land areas are presently not in the preferred corridor. However they are very close and any realignment of the corridor leading into Sapulpa could involve these lands.

Note: The wide diversity in the range of values for acreage home sites and hobby farm values can be attributed to numerous factors. Examples that are common in this area but not limited to are: Location, Desirability of home site, Proximity to population or employment centers, Quality of Access, Road surface type, Available utilities, as well as Uninformed buyers.

Estimated R/W Costs

Lincoln County

Land to be Acquired

Areas highlighted in .

624,000 sq. ft. @ $2.00 per sq. ft.= $1,248,000

Western Lincoln County

55 acres located in the green value zone, of which 30% appears to be smaller acreage home sites

38.50 acres @ $1,500 per acre = $57,750

16.50 acres @ $5,000 per acre = $82,500

Highway 177 Corridor

37 acres located in the green value zone, of which 20% appears to be smaller acreage home sites

29.60 acres @ $1,500 per acre = $44,400

7.40 acres @ $4,500 per acre = $33,300

Highway 18 & 99 corridors

128 acres located in the green value zone, of which 30% appears to be smaller acreage home sites

89.60 acres @ $1,500 per acre = $134,400

38.40 acres @ $4,000 per acre = $153,600

Agricultural Lands

134 acres @ $1,000 per acre = $134,000

Creek County

25 acres located in the pink value zone, of which 65% appears to be smaller acreage home sites

8.75 acres @ $3,500 per acre = $30,625

16.25 acres @ $6,500 per acre = $105,650

146 acres located in the green value zone, of which 65% appears to be smaller acreage home sites

51.10 acres @ $1,500 per acre = $76,650

94.90 acres @ $3,000 per acre = $284,700

13 acres located in the value zone, of which 65% appears to be smaller acreage home sites

4.55 acres @ $1,500 per acre = $6,825

8.45 acres @ $2,000 per acre = $16,900

Agricultural Lands

122 acres @ $1,000 per acre = $122,000

Continued.....

Improvements to be Acquired	
Estimated[1]	$1,575,000
Proximity Damages to Remainders	
Estimated[2]	$506,250
Land Locked Properties and Uneconomic Remnants	
Estimated[3]	$400,000
Estimated R/W acquisition Lincoln County	$5,012,525
Plus 25% to cover contingencies	$1,253,131
Estimated Acquisition Cost for Lincoln County	***$6,265,656***

[1] Based on a projected acquisition of 21 improvements at a average of $75,000 each. (17 residences and 4 commercial properties)

[2]Based on projected damages to 45 improvements at a average of 15% damages to each structure, with each structure having a average price of $75,000 each

[3]Based on a estimated 100 acres of landlocked land and uneconomic remnants. Average land value $4,000 per acre

Additional Costs

Wetland Mitigation

The proposed project corridor travels along an area that covers the drainage basin for Canadian River, and the Deep Fork River. Due to the length of the corridor through these areas and the historically high percentage chance of wetland potential in these areas it is necessary to address the possibility that wetland mitigation may be involved within the scope of the R/W acquisition. Sources within ODOT estimate that possibly as much as 35 acres of wetlands may need to be effected along the length of the proposed corridor. Historically a rule of thumb for determining the amount of wetlands replacement is 5 acres of new wetlands will need to be acquired for every acre of wetlands effected. Assuming that 175 acres of wetlands will be effected the estimated mitigation cost is $175,000

Outdoor Advertising

The proposed R/W taking will either physically acquire or will land lock. approximately 19 outdoor advertizing signs at a estimated value of $15,000 per sign or $285,000. Additionally it will be necessary to compensate the land owners for the loss of income attributable to the outdoor advertizing signs. Loss of income based on $1,200 per year income, capitalized at 10%, for 10 years, which comes to $7,373 per land owner per sign . Or $140,087. Total outdoor advertising sign cost $425,087

Relocation Costs

The proposed project will involve the acquisition of approximately 21 improvements. The estimated relocation costs to acquire these improvements is $25,000 per residence bringing the relocation costs for this project to $525,000

Utility Relocation

As part of the proposed project it will be necessary to relocate any utility lines located within the proposed corridor. The estimated cost of this utility relocation is $650,000 per mile or $5,590,000. Additionally it will likely be necessary to relocate 5 communication towers at a estimated cost of $150,000 each. Bringing the total Utility cost to $38,515,000

Administrative Settlements & Condemnation Costs

Traditionally ODOT administrative settlements and condemnation costs have run approximately 30% of the total R/W costs, however these figures are based on highway improvements not high speed rail routes. Highway projects inherently provide certain benefits such as increased access, better quality roadways, improved transportation routes, etc. all of which often improve the development potential for the adjoining ownerships. High speed rail provides none of these things to the adjoining land owners. Instead high speed rail deters the development potential and often times damages the use of these properties and provides no benefits to the adjoining owners. Given the increased potential for damages associated with this project it is my belief that this aspect of the estimate should be increased to 50% of the total R/W costs.

Service Providers Fees

Engineering	$120,000
Appraisal	$200,000
Appraisal Review	$50,000
Relocation	$63,000
Acquisition	$150,000
Utilities	$58,000

Additional fees

Staking	$20,000
Demolition	$105,000

Administrative and Contingency Costs

It is common for ODOT to include a percentage adjustment to cover administrative and contingency costs this cost has typically been 20% of the total cost

Miscellaneous Expenses

Right of Way fencing $1,227,072

(Based on a double sided 58.1 mile corridor, average price per linear foot of fencing $2.00)

Total Right of Way Costs

Right-of-Way Costs

R/W Engineering Service Provider Fee (Plans, Title, Etc.)	$120,000.00
R/W Costs (Land, Improvements, Damages)	$6,859,650.00
Appraisal Service Provider Fee (Includes Master Addenda, Appraisals, Determination of Appraisal Waiver Parcels)	$200,000.00
Appraisal Review Service Provider Fee	$50,000.00
Admin. Settlement/Condemnation Costs (Estimated @ 50% of R/W Costs)	$3,429,825.00
Acquisition Service Provider Fee	$150,000.00
Relocation Costs (Residential, Commercial)	$525,000.00
Relocation Service Provider Fee	$63,000.00
Demolition Costs	$105,000.00
Staking Costs	$20,000.00
Misc. Expenses	$1,227,072.00
Subtotal	$12,749,547.00
Administrative & Contingency Costs (20% of Subtotal)	$2,549,909.00
Total Right-of-Way Costs	$15,299,456.00

Utilities

Utility Relocation Costs	$38,515,000.00
Utility Service Provider Fee	$58,000.00
Subtotal	$38,573,000.00
Administrative & Contingency Costs (20% of Subtotal)	$7,714,600.00
Total Utilities Costs	$46,287,600.00

OKLAHOMA DEPARTMENT OF TRANSPORTATION

DATE:February 12, 2002

TO: **Kurt Harms, Chief Right of Way Division**

THRU: **Chris Bohannon, Manger Engineering Branch - Acting Manager Appraisal Branch**

FROM: **Gregg Lynn, Staff Review Appraiser**

SUBJECT: **Estimated Right of Way Cost for Proposed New Alignment for High Speed Rail Route Between Oklahoma City and Tulsa Option 4 From Mile Marker 210 Northeast Approximately 8.6 miles**

As per your request I have inspected the proposed alignment and have established some of the criteria for the proposed acquisition. There are a number of things which should be considered before a final dollar amount for the proposed right of way acquisition can be determined. Lacking a definite route as well as completed plans for the project I can only identify value corridors and try to provide some insight as to what can be expected if the proposed rights of way for this corridor are to be acquired. Outlined below are the results of my findings as well as the conclusions which I have reached regarding the acquisition. The conclusions reached and the results drawn from them, are based upon the proposed right of way route and are explained throughout the report.

Scope of Search:

The primary scope of search was focused in and immediately around the proposed route, however most everything which was located from the Turner Turnpike south to highway 62 in Oklahoma and Lincoln Counties was considered as part of the search. (As far west as Jones city limits from there the value corridor spans the area of the proposed route). Creek County from Sapulpa west along the Turner Turnpike.
Note: Only if the proposed route passed though any corporate city limits were any aspect of the property values within those city limits considered as part of this search.

Value Corridors:

Attached for each of the counties which the proposed route travels through is a county map, outlined on each of these maps are what the appraiser has identified as value corridors. These corridors represent anticipated breaks in value for the properties located within the corridor. However it should be noted that due to the sheer size of the assignment these areas are delineated in broad and general terms and are not property specific, for various reasons some of the tracts located within the more intensive use value corridors may never develop to any higher usage than agricultural. The same holds true in that some of the areas designated as having an agricultural highest and best usage may in fact currently be or in the near future be developed as home sites or hobby farms. The appraiser has given his primary focus to the areas along the proposed rail corridor, other areas were given consideration in previous estimates.

Assumptions

Largely the assumptions made in the preparation of this estimate will be stated at the point where a value conclusion is reached. However there are some assumptions which will hold consistent throughout the project. These assumptions are detailed out below:

1) The corridor width is assumed to be 100' **total**
2) It is assumed that there will be sufficient grade separation crossings so that all properties located on either side of the rail line will be provided adequate access.
3) It is assumed that this is a limits of no access facility with the only crossings at designated locations.
4) It is assumed that no damages will occur due to circuitry of access
5) It is assumed that al vehicular crossing will be built to ODOT specifications

Damages

1) Damages will occur to any properties which have residences on them. These damages are the direct result of the market places perception in regards to the close proximity of rail lines to residences and the associated loss of value which occurs as a direct result of that proximity.
2) Damages will occur to any tracts that have development potential along the proposed corridor. This is due to the realization that any properties within close proximity to the proposed rail line will be less desirable and therefore not be developed.

Disclaimer

The purpose of this estimate is to provide the engineering firm of Carter Burgess with a preliminary estimate of right of way acquisition cost for the proposed new high speed rail line between Oklahoma and Tulsa. At the time that this estimate was performed Carter Burgess had not completed the typical section, final design, nor established a definite corridor for this project. Without these factors being determined, and lacking completed plans, ownerships, and other pertinent data necessary to arrive at a more realistic value estimate, this estimate can only serve as a basic guideline to illustrate some of the factors that will be encountered in the right of way phase of this project, as well as providing a very basic right of way cost that can be expected in association with this project. This estimate is not intended to be used to program monies for the acquisition of rights of way along this corridor, nor is it intended to be used as a basis for the acquisition of properties along this corridor. This estimate is provided as a courtesy for use by Carter Burgess ***only*** and is not to be used as part of the public hearing process. ***The only purpose of this estimate is to aid Carter Burgess in the decision making process as to any possible future routes for this proposed new high speed rail corridor.***

Any changes in the alignment of this corridor can and likely will greatly effect the proposed right of way costs. The appraiser reserves the right to preform a new estimate when additional information is provided, plans are finalized, alignment changes are made, or any other factor which could effect value.

The values provided in this estimate are not property specific and only represent a reasonable average acquisition cost along the proposed corridor. ***This document is not a appraisal and is only intended to be used as part of Carter Burgess feasibility study regarding this proposed project.***

Creek County

The areas highlighted on the map in blue & pink represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage. One of the principle value influences in this area is the close proximity of these lands to Sapulpa as well as ease of access to the Tulsa employment centers.

In the areas shaded in blue land values in this area typically range from $3,500 to $5,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $3,500 to $10,000 per acre with some tracts having sold for more.

In the areas shaded in pink land values in this area typically range from $2,500 to $3,500 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $3,000 to $8,000 per acre with some tracts having sold for more.

The areas highlighted on the map in represent properties which likely have some acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage. One of the principle value influences in this area is the close proximity of these lands to Sapulpa as well as ease of access to the Tulsa employment centers. However access to these tracts is typically not of the quality for the areas highlighted in pink or green. *These land areas presently are not in the preferred corridor. However they are very close and any realignment of the corridor leading into Sapulpa could involve these lands.*

Land values in this area typically range from $1,000 to $2,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,000 to $3,500 per acre with some tracts having sold for more.

The areas highlighted on the map in green represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $1,500 to $3,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,500 to $3,500 per acre with some tracts having sold much higher.

The highway 97 corridor (shaded in purple) represents a area which will likely have the benefit of commercial property value influences, as such the values along this corridor are much greater that throughout the outlying areas. The estimated land value for this corridor at the point near or where the proposed rail line crosses is expected to be $3.50 per sq. ft.

The non-highlighted areas typically represent areas where the highest and best use of the tract is agricultural. Agricultural land values typically range from $500 to $1,000 per acre.

Note: The wide diversity in the range of values for acreage home sites and hobby farm values can be attributed to numerous factors. Examples that are common in this area but not limited to are: Location, Desirability of home site, Proximity to population or employment centers, Quality of Access, Road surface type, Available utilities, as well as Uninformed buyers.

Creek County Estimated R/W Costs

Land to be Acquired

Highway 97 corridor (purple)	
120,000 sq. ft. @ $3.50 per sq. ft.=	$420,000
28 acres located in the Blue value zone, of which 35% appears to be smaller acreage home sites	
18.20 acres @ $5,000 per acre =	$91,000
9.80 acres @ $10,000 per acre =	$98,000
31 acres located in the pink value zone, of which 65% appears to be smaller acreage home sites	
10.85 acres @ $3,500 per acre =	$37,975
20.15 acres @ $6,500 per acre =	$130,975
Improvements to be Acquired	
Estimated[1]	$1,125,000
Proximity Damages to Remainders	
Estimated[2]	$675,000
Land Locked Properties and Uneconomic Remnants	
Estimated[3]	$750,000
Damages Due to Loss of Development Potential	
Estimated[4]	$2,160,000
Estimated R/W Acquisition Creek County	$5,487,950
Plus 25% to cover contingencies	$1,371,988
Estimated Acquisition Cost for Creek County	**$6,859,938**

[1] Based on a projected acquisition of 15 residences at $75,000 per residence.

[2] Based on projected damages to 36 improvements at a average of 25% damages to each structure, with each structure having a average price of $75,000 each

[3] Based on a estimated 80 acres of landlocked land and 20 acres of uneconomic remnants. Average land value $7,500 per acre

[4] Based on the belief that the larger properties located within the development corridors will not be developed due to the close proximity of the rail line. 720 acres effected at the average price of $5,000 per acre, reduced down to $2,000 per acre

Additional Costs

Wetland Mitigation

The proposed project corridor travels along an area that covers numerous feeder creeks which provide drainage waters for established wetlands . Due to the length of the corridor though these areas and the historically high percentage chance of wetland potential along this corridor it is necessary to address the possibility that wetland mitigation may be involved within the scope of the R/W acquisition. Sources within ODOT estimate that possibly as much as 5 acres of wetlands may need to be effected along the length of the proposed corridor. Historically a rule of thumb for determining the amount of wetlands replacement is 5 acres of new wetlands will need to be acquired for every acre of wetlands effected. Assuming that 5 acres of wetlands will be effected the estimated mitigation cost is $10,000

Outdoor Advertizing

The proposed R/W taking will either physically acquire or will land lock. approximately 1 outdoor advertizing signs at a estimated value of $15,000 per sign or $15,000. Additionally it will be necessary to compensate the land owner for the loss of income attributable to the outdoor advertizing sign loss of income based on $1,200 per year income, capitalized at 10%, for 10 years. Or $7,373

Relocation Costs

The proposed project will involve the acquisition of approximately 15 improvements. The estimated relocation costs to acquire these improvements is $25,000 per residence bringing the relocation costs for this project to $375,000

Utility Relocation

As part of the proposed project it will be necessary to relocate any utility lines located within the proposed corridor. The estimated cost of this utility relocation is $650,000 per mile or $5,590,000.

Administrative Settlements & Condemnation Costs

Traditionally ODOT administrative settlements and condemnation costs have run approximately 30% of the total R/W costs,.. however these figures are based on highway improvements not high speed rail routes. Highway projects inherently provide certain benefits such as increased access, better quality roadways, improved transportation routes, etc. all of which often improve the development potential for the adjoining ownerships. High speed rail provides none of these things to the adjoining land owners. Instead high speed rail deters the development potential and often times damages to use of properties and provides no benefits to the adjoining owners. Given the increased potential for damages associated with this project it is my belief that this aspect of the estimate should be increased to 50% of the total R/W costs.

Service Providers Fees

Engineering	$90,000
Appraisal	$150,000
Appraisal Review	$37,500
Relocation	$45,000
Acquisition	$112,500
Utilities	$8,500

Additional fees

Staking	$15,000
Demolition	$75,000

Administrative and Contingency Costs

It is common for ODOT to include a percentage adjustment to cover administrative and contingency costs this cost has typically been 20% of the total cost

Miscellaneous Expenses

Right of Way fencing $181,632

(Based on a double sided 8.6 mile corridor, average price per linear foot of fencing $2.00)

Total Right of Way Costs

Right-of-Way Costs

R/W Engineering Service Provider Fee (Plans, Title, Etc.)	$90,000.00
R/W Costs (Land, Improvements, Damages)	$6,877,311.00
Appraisal Service Provider Fee (Includes Master Addenda, Appraisals, Determination of Appraisal Waiver Parcels)	$150,000.00
Appraisal Review Service Provider Fee	$37,500.00
Admin. Settlement/Condemnation Costs (Estimated @ 50% of R/W Costs)	$3,438,655.00
Acquisition Service Provider Fee	$112,500.00
Relocation Costs (Residential, Commercial)	$375,000.00
Relocation Service Provider Fee	$45,000.00
Demolition Costs	$75,000.00
Staking Costs	$15,000.00
Misc. Expenses	$181,632.00
Subtotal	$11,397,598.00
Administrative & Contingency Costs (20% of Subtotal)	$2,279,519.00
Total Right-of-Way Costs	$13,677,117.00

Utilities

Utility Relocation Costs	$5,590,000.00
Utility Service Provider Fee	$8,500.00
Subtotal	$5,598,500.00
Administrative & Contingency Costs (20% of Subtotal)	$1,119,700.00
Total Utilities Costs	$6,718,200.00

OKLAHOMA DEPARTMENT OF TRANSPORTATION

DATE:February 12, 2002

TO: **Kurt Harms, Chief Right of Way Division**

THRU: **Chris Bohannon, Manger Engineering Branch - Acting Manager**
Appraisal Branch

FROM: **Gregg Lynn, Staff Review Appraiser**

SUBJECT: **Estimated Right of Way Cost for Proposed New Alignment for High Speed Rail Route Between Oklahoma City and Tulsa Option 5 From Mile Marker 210 Northeast Approximately 1.75 miles**

As per your request I have inspected the proposed alignment and have established some of the criteria for the proposed acquisition. There are a number of things which should be considered before a final dollar amount for the proposed right of way acquisition can be determined. Lacking a definite route as well as completed plans and established ownerships for the project I can only identify value corridors and try to provide some insight as to what can be expected if the proposed rights of way for this corridor are to be acquired. Outlined below are the results of my findings as well as the conclusions which I have reached regarding the acquisition. The conclusions reached and the results drawn from them, are based upon the proposed right of way route and are explained throughout the report.

Scope of Search:

The primary scope of search was focused in and immediately around the proposed route, however most everything which was located along the Turner Turnpike and south to highway 62 in Oklahoma and Lincoln Counties was considered as part of the search. (As far west as Jones city limits from there the value corridor spans the area of the proposed route). Creek County from Sapulpa west and from along the Turner Turnpike and south was also given consideration. Note: Only if the proposed route passed though any corporate city limits were any aspect of the property values within those city limits considered as part of this search.

Value Corridors:

Attached for each of the counties which the proposed route travels through is a county map, outlined on each of these maps are what the appraiser has identified as value corridors. These corridors represent anticipated breaks in value for the properties located within the corridor. However it should be noted that due to the sheer size of the assignment these areas are delineated in broad and general terms and are not property specific, for various reasons some of the tracts located within the more intensive use value corridors may never develop to any higher usage than agricultural. The same holds true in that some of the areas designated as having an agricultural highest and best usage may in fact currently be or in the near future be developed as home sites or hobby farms. The primary focus is along the proposed rail corridor. In previous estimates other areas have been considered for that information refer to those afore mentioned estimates

Assumptions

Largely the assumptions made in the preparation of this estimate will be stated at the point where a value conclusion is reached. However there are some assumptions which will hold consistent throughout the project. These assumptions are detailed out below:

1) The corridor width is assumed to be 100' **total**
2) It is assumed that there will be sufficient grade separation crossings so that all properties located on either side of the rail line will be provided adequate access.
3) It is assumed that this is a limits of no access facility with the only crossings at designated locations.
4) It is assumed that no damages will occur due to circuitry of access
5) It is assumed that al vehicular crossing will be built to ODOT specifications

Damages

1) Damages will occur to any properties which have residences on them. These damages are the direct result of the market places perception in regards to the close proximity of rail lines to residences and the associated loss of value which occurs as a direct result of that proximity.
2) Damages will occur to any tracts that have development potential along the proposed corridor. This is due to the realization that any properties within close proximity to the proposed rail line will be less desirable and therefore not be developed.

Disclaimer

The purpose of this estimate is to provide the engineering firm of Carter Burgess with a preliminary estimate of right of way acquisition cost for the proposed new high speed rail line between Oklahoma and Tulsa. At the time that this estimate was performed Carter Burgess had not completed the typical section, final design, nor established a definite corridor for this project. Without these factors being determined, and lacking completed plans, ownerships, and other pertinent data necessary to arrive at a more realistic value estimate, this estimate can only serve as a basic guideline to illustrate some of the factors that will be encountered in the right of way phase of this project, as well as providing a very basic right of way cost that can be expected in association with this project. This estimate is not intended to be used to program monies for the acquisition of rights of way along this corridor, nor is it intended to be used as a basis for the acquisition of properties along this corridor. This estimate is provided as a courtesy for use by Carter Burgess ***only*** and is not to be used as part of the public hearing process. ***The only purpose of this estimate is to aid Carter Burgess in the decision making process as to any possible future routes for this proposed new high speed rail corridor.***

Any changes in the alignment of this corridor can and likely will greatly effect the proposed right of way costs. The appraiser reserves the right to preform a new estimate when additional information is provided, plans are finalized, alignment changes are made, or any other factor which could effect value.

The values provided in this estimate are not property specific and only represent a reasonable average acquisition cost along the proposed corridor. ***This document is not a appraisal and is only intended to be used as part of Carter Burgess feasibility study regarding this proposed project.***

Creek County

The areas highlighted on the map in blue & pink represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage. One of the principle value influences in this area is the close proximity of these lands to Sapulpa as well as ease of access to the Tulsa employment centers.

In the areas shaded in blue land values in this area typically range from $2,500 to $5,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $3,500 to $10,000 per acre with some tracts having sold for more.

In the areas shaded in pink land values in this area typically range from $2,500 to $3,500 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $3,000 to $8,000 per acre with some tracts having sold for more.

The areas highlighted on the map in represent properties which likely have some acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage. One of the principle value influences in this area is the close proximity of these lands to Sapulpa as well as ease of access to the Tulsa employment centers. However access to these tracts is typically not of the quality for the areas highlighted in pink or green.

Land values in this area typically range from $1,000 to $2,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,000 to $3,500 per acre with some tracts having sold for more.

The areas highlighted on the map in green represent properties which likely have acreage home site or hobby farm potential. As such the highest and best use typically for these properties is more intensive than an agricultural usage.

Land values in this area typically range from $1,500 to $3,000 per acre for the larger tracts while smaller tracts (Acreage home sites and Hobby farms) can typically range from $2,500 to $3,500 per acre with some tracts having sold much higher.

The areas highlighted on the map in orange represent properties which are located within the corporate city limits of Sapulpa as such these properties have greatly increased values over the outlying lands(values should average around $30,000 per acre)

The non-highlighted areas typically represent areas where the highest and best use of the tract is agricultural. Agricultural land values typically range from $500 to $1,000 per acre.

Some of these lands area presently not in the preferred corridor. However they are very close and any realignment of the corridor leading into Sapulpa could involve these lands.

Note: The wide diversity in the range of values for acreage home sites and hobby farm values can be attributed to numerous factors. Examples that are common in this area but not limited to are: Location, Desirability of home site, Proximity to population or employment centers, Quality of Access, Road surface type, Available utilities, as well as Uninformed buyers.

Creek County Estimated R/W Costs

Land to be Acquired

22acres located in the pink value zone, of which 15% appears to be smaller acreage home sites

18.70 acres @ $3,500 per acre =	$65,450
3.30 acres @ $6,500 per acre =	$21,450

Improvements to be Acquired

Estimated[1]	$695,000

Proximity Damages to Remainders

Estimated[2]	$37,500

Land Locked Properties and Uneconomic Remnants

Estimated[3]	$315,000

Damages Due to Loss of Development Potential

Estimated[4]	$960,000

Estimated R/W acquisition Creek County	$2,094,400
Plus 25% to cover contingencies	$ 523,600
Estimated Acquisition Cost for Creek County	***$2,618,000***

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[1] Based on a projected acquisition of 1 residence at $45,000 and the acquisition of the Creek County Fairgrounds buildings at a estimated cost of $650,000

[2] Based on projected damages to 2 improvements at a average of 25% damages to each structure, with each structure having a average price of $75,000 each

[3] Based on a estimated 80 acres of landlocked land and 10 acres of uneconomic remnants. Average land value $3,500 per acre

[4] Based on the belief that the larger properties located within the development corridors will not be developed due to the close proximity of the rail line.640 acres effected at the average price of $3,500 per acre, reduced down to $2,000 per acre

Additional Costs

Wetland Mitigation

The proposed project corridor travels along an area that covers part of the drainage area of established wetlands. Due to the length of the corridor through these areas and the historically high percentage chance of wetland potential in these areas it is necessary to address the possibility that wetland mitigation may be involved within the scope of the R/W acquisition. Sources within ODOT estimate that possibly as much as 5 acres of wetlands may need to be effected along the length of the proposed corridor. Historically a rule of thumb for determining the amount of wetlands replacement is 5 acres of new wetlands will need to be acquired for every acre of wetlands effected. Assuming that 5 acres of wetlands will be effected the estimated mitigation cost is $5,000

Relocation Costs

The proposed project will involve the acquisition of approximately 2 improvements. The estimated relocation costs to acquire these improvements is $25,000 per residence bringing the relocation costs for this project to $50,000

Utility Relocation

As part of the proposed project it will be necessary to relocate any utility lines located within the proposed corridor. The estimated cost of this utility relocation is $650,000 per mile or $1,137,500.

Administrative Settlements & Condemnation Costs

Traditionally ODOT administrative settlements and condemnation costs have run approximately 30% of the total R/W costs,.. however these figures are based on highway improvements not high speed rail routes. Highway projects inherently provide certain benefits such as increased access, better quality roadways, improved transportation routes, etc. all of which often improve the development potential for the adjoining ownerships. High speed rail provides none of these things to the adjoining land owners. Instead high speed rail deters the development potential and often times damages to use of properties and provides no benefits to the adjoining owners. Given the increased potential for damages associated with this project it is my belief that this aspect of the estimate should be increased to 50% of the total R/W costs.

Service Providers Fees

Engineering	$7,200
Appraisal	$12,000
Appraisal Review	$3,000
Relocation	$6,000
Acquisition	$9,000
Utilities	$2,000

Additional fees

Staking	$1,200
Demolition	$10,000

Administrative and Contingency Costs

It is common for ODOT to include a percentage adjustment to cover administrative and contingency costs this cost has typically been 20% of the total cost

Miscellaneous Expenses

Right of Way fencing $36,960

(Based on a double sided 1.75 mile corridor, average price per linear foot of fencing $2.00)

Total Right of Way Costs

Right-of-Way Costs

R/W Engineering Service Provider Fee (Plans, Title, Etc.)	$7,200.00
R/W Costs (Land, Improvements, Damages)	$2,618,000.00
Appraisal Service Provider Fee (Includes Master Addenda, Appraisals, Determination of Appraisal Waiver Parcels)	$12,000.00
Appraisal Review Service Provider Fee	$3,000.00
Admin. Settlement/Condemnation Costs (Estimated @ 50% of R/W Costs)	$1,309,000.00
Acquisition Service Provider Fee	$9,000.00
Relocation Costs (Residential, Commercial)	$50,000.00
Relocation Service Provider Fee	$6,000.00
Demolition Costs	$10,000.00
Staking Costs	$1,200.00
Misc. Expenses	$36,960.00
Subtotal	$4,062,360.00
Administrative & Contingency Costs (20% of Subtotal)	$812,472.00
Total Right-of-Way Costs	$4,874,832.00

Utilities

Utility Relocation Costs	$1,137,500.00
Utility Service Provider Fee	$2,000.00
Subtotal	$1,139,500.00
Administrative & Contingency Costs (20% of Subtotal)	$227,900.00
Total Utilities Costs	$1,367,400.00

APPENDIX B – ESTIMATED ENVIRONMENTAL CLEARANCE COSTS

Cost to Obtain Environmental Clearance

The following table shows a preliminary cost estimate for the preparation and approval of an Environmental Impact Statement (EIS) for the Oklahoma High-Speed Rail Initiative. A final cost proposal and scope would need to be negociated with ODOT and the sponsoring federal agency.

This cost estimate was developed assuming:
- A 30-month schedule;
- Costs and salaries in 2002 dollars;
- Public and agency involvement includes two series of public involvement for five public scoping meetings and five public hearings; and
- Developing an EIS for two corridors (i.e., Turnpike and Southern Corridor) and a No-Build Alternative to FHWA/FTA and NEPA requirements including field studies, Section 4(f) statement, pedestrian archeological survey, and Section 7 Coordination.

Task		Costs
1.0	PROJECT MANAGEMENT & COORDINATION	$85,000
2.0	PUBLIC & AGENCY INVOLVEMENT • Meetings and Briefings • Scoping Meetings • Public Hearings • Coordination with Agencies • Mailing List	$375,000
3.0	EIS ALTERNATIVE DEVELOPMENT • Review and Development of Alternatives • Design Criteria • Utility Design & Relocations • Bridge and Structural Design • Drainage Design • Traffic Analysis • Cost Estimates	$310,000
4.0	SOCIAL, ECONOMIC, & ENVIRONMENTAL STUDIES • Social & Economic Analysis • Physical Environment Analysis & Impacts o Noise and Vibration Studies o Air Quality o Regulated Material Investigation o Parkland/4(f) Properties o Archaeological & Cultural Resources Investigations • Natural Environment Analysis & Field Investigations o Wetland Investigations o Threatened & Endangered Species Studies o Wildlife Habitat & Vegetation Studies • Mitigation & Permitting	$835,000
5.0	PREPARE DEIS	$315,000
6.0	CIRCULATION/COORDINATION OF DEIS	$175,000
7.0	PREPARATION OF FINAL ENVIRONMENTAL DOCUMENT	$235,000
	EXPENSES	$175,000
	TOTAL	$2,505,000