

Railroad Study for Improvement Projects

Presented to:
City of Claremore, Oklahoma

September 2006



TranSystems

EXPERIENCE | Transportation



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October 3, 2006

Mr. Samuel P. Balsiger, PE
City of Claremore
104 S. Missouri
Claremore, OK 74017

Re: Railroad Study for Improvement Projects Report

Dear Mr. Balsiger:

In response to your request and authorization, TranSystems Corporation has completed the Railroad Study for Improvement Projects in Claremore, Oklahoma. The purpose of this study was to determine the feasibility of elevating the BNSF through Claremore and define other railroad improvements, like a Quiet Zone on the UPRR.

Included in this study is a discussion of existing conditions, rail elevation options, an update of the 2003 Blue Starr Overpass cost estimate and the UPRR corridor options. All public involvement activities are also summarized.

We trust that the enclosed information proves beneficial to the City of Claremore. We appreciate the opportunity to be of service to you and we will be available to review this study with you at your convenience.

Very truly yours,
TranSystems Corporation

A handwritten signature in black ink that reads "Steve Sturgeon".

Steve Sturgeon, PE
QA/QC Project Manager

A handwritten signature in black ink that reads "Sara Clark".

Sara Leitner Clark, PE
Project Operations Manager

Table of Contents

Table of Contents.....	i
List of Exhibits.....	ii
Section 1 – Introduction.....	3
Purpose and Objectives of Report.....	3
Section 2 – Baseline Conditions.....	4
Railroad Information.....	4
Highway-Railroad Grade Crossings.....	4
Local Traffic Conditions.....	5
Local Involvement.....	6
Section 3 – Blue Starr Drive Overpass Update.....	7
Blue Starr Overpass Review.....	7
Updated Cost Estimate.....	7
Section 4 – Railroad Elevation Study.....	9
Study Limits.....	9
Design Considerations.....	9
Downtown Limits.....	10
Expanded Limits.....	10
Roadway and Structures.....	11
Blue Starr Drive.....	11
Sixth Street.....	11
Will Rogers Drive.....	12
First Street.....	12
Claremore Street.....	12
Cat Creek.....	12
Reavis Road Extension.....	12
Country Club Road.....	13
Typical Sections.....	13
Utility Impacts.....	15
Business Impacts.....	17
Cost Estimate.....	18
Section 5 – Quiet Zone Study.....	19
Definitions.....	19
Crossing Safety Enhancements.....	20
Corridor Alternatives.....	21
Steps to Acquire a Quiet Zone.....	23
Section 6 – Additional Railroad Improvement Project Options.....	24
Transportation Network Plan.....	24
Combining Corridor Concept.....	26
UPRR Grade Separations.....	26
Section 7 – Funding Resources.....	28
Statewide Transportation Improvement Program – Fiscal Year 2007, 2008, 2009 & 2010.....	28
Capitol Grants for Rail Line Relocation.....	28
Safe Routes to School.....	28
Transportation Enhancement Fund.....	29
Tax Increment Financing.....	29

Railroad Funding.....	29
Federal Aid Funds.....	30
Cost Analysis	30
Section 8 – Study Summary and Conclusions	31
Summary of Options Developed	31
Study Conclusions	31
Appendix A – Concept Designs.....	32
Appendix B – Cost Estimates.....	34
Appendix C – Quiet Zone Corridor Plans	50

List of Exhibits

- Exhibit 1. At-Grade Highway-Railroad Crossing List
- Exhibit 2. Daily Traffic Volumes at Highway-Railroad Crossings
- Exhibit 3. Updated 2003 Blue Starr Drive Highway Grade Separation Cost Estimate
- Exhibit 4. Moretz Drive south of Archer Drive
- Exhibit 5. Downtown Limits Typical Section
- Exhibit 6. Double Track Typical Section
- Exhibit 7. Expanded Limits Typical Section
- Exhibit 8. Adams Dairy Parkway – Gateway Western Mainline Bridge Aesthetics in Blue Springs, Missouri
- Exhibit 9. Railroad Elevation Cost Estimate
- Exhibit 10. Quiet Zone Conditions
- Exhibit 11. Supplemental Safety Measures
- Exhibit 12. Evaluation of SSMs at Quiet Zone Crossings
- Exhibit 13. Quiet Zone Corridor SSM Alternatives
- Exhibit 14. Quiet Zone Cost Estimate
- Exhibit 15. Transportation Network Plan
- Exhibit 16. Combined Corridor Concept

Section 1 – Introduction

Purpose and Objectives of Report

Many times the safety, quality of life and congestion issues at highway-railroad grade crossings stem from railroad operational procedures and this is the case in the City of Claremore, Oklahoma. In Claremore, the Union Pacific Railroad (UPRR) and the BNSF Railway (BNSF) cross at-grade just south of Blue Starr Drive. This intersection, or the diamond crossing, is an automatic interlocker controlled by BNSF signals. This means that an approaching train must wait to receive a signal to proceed before crossing the diamond. Trains do not run on regular schedules and the length of time a train will wait is dependent on many factors including speed, train length, traffic ahead or if the train is slowing to enter the siding. The variability in wait time for the trains can mean that highway-railroad grade crossings are occupied for long periods of time creating congestion and safety issues for the citizens and visitors of Claremore.

Several railroad overpass studies have been completed in the City of Claremore to address the congestion and safety issues at grade crossings; however, no overpass plan has ever been constructed. A June 2003 Railroad Overpass Feasibility Study by C.H. Guernsey & Company recommended an overpass at Blue Starr Drive that would span over both the UPRR and the BNSF. This overpass succeeded in providing a grade separation in Claremore but it did not provide for a long-term solution to the growing delay and safety issues at the other grade crossings. This current study was initiated to find a long-term solution to these issues in Claremore.

The purpose of this report is to present the findings of the feasibility study to elevate the BNSF railroad to provide grade separated underpass locations for vehicular traffic and to remove the diamond crossing with the UPRR and the BNSF. The study provides an update to the 2003 Blue Starr Drive cost estimate, describes the design, impacts and costs of the elevated railroad design, and provides alternatives to the UPRR corridor. Study conclusions are presented in Section 8.

Section 2 – Baseline Conditions

Claremore sits at the crossroads of two Class I railroads and three major state highways. The convergence of these routes in the downtown district contributes to the traffic delay on city streets and prevents reliable access to certain areas for emergency response. To understand the existing transportation conditions in Claremore railroad information, highway-railroad grade crossing information, local traffic conditions, and community information was collected and is summarized below.

Railroad Information

The City of Claremore is located at the intersection of the UPRR and BNSF. The UPRR line extends from Wagoner, Oklahoma to Kansas City, Missouri. The BNSF line extends from Tulsa, Oklahoma to Springfield, Missouri. Both of these lines provide connection to the nationwide rail network for these Class I railroads.

The UPRR Wagoner subdivision is a single track line that operates between Wagoner and Kansas City. The tracks run from the southeast to the northwest in Claremore, dividing the city's east and west sides. There are approximately 15-18 trains that run on this line each day with tracks speeds of 40 mph. There is currently a slow order assigned at the diamond crossing with the BNSF so trains will slow to approximately 30 mph in advance of the crossing.

The BNSF Cherokee subdivision is a single track line that operates between Tulsa and Springfield. The tracks run parallel to Lynn Riggs Boulevard/SH 66 in a southwest to northeast direction in Claremore. There are approximately 35 trains that run on this line each day with a maximum authorized track speed of 60 mph. Due to the high volume of trains on this line and the slow order at the diamond very few trains can run at these speeds.

There is an existing industry track west of the BNSF main track from the diamond crossing to Will Rogers Boulevard. This track serves two industries that are located on property leased from the BNSF. These businesses are switched by the BNSF. From August 2005 to July 2006, Pixley Lumber was switched 151 times and Stillwater Milling was switched 93 times.

Highway-Railroad Grade Crossings

There are 15 highway-railroad grade crossings in and near Claremore that are under study. There are no existing grade separated crossings in Claremore. The main focus of the study is on the crossings on the BNSF corridor listed in Exhibit 1.

Each crossing on the UPRR corridor is protected with flashing light and gate warning devices. On the BNSF corridor the crossings at Archer Drive and Country Club Road are protected with flashing light warning devices. The remaining four crossings on the BNSF are protected with flashing lights and gates.

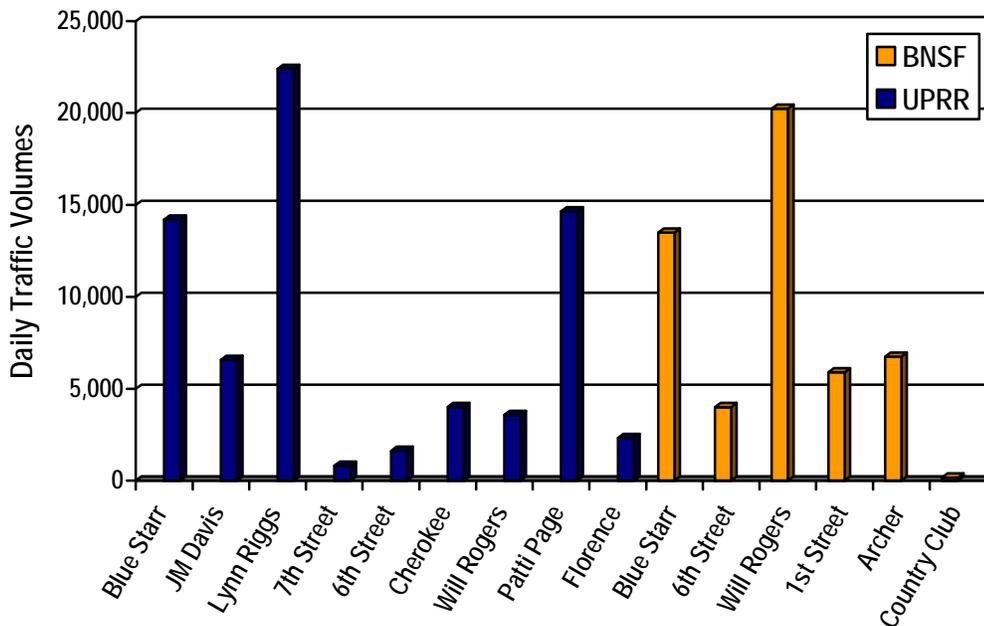
Exhibit 1
At-Grade Highway-Railroad Crossing List

BNSF	UPRR
Blue Starr Drive	Blue Starr Drive
6 th Street	J.M. Davis Boulevard
Will Rogers Boulevard/SH 20	Lynn Riggs Boulevard/SH 66
1 st Street	7 th Street
Archer Drive	6 th Street
Country Club Road	Cherokee Avenue
	Will Rogers Boulevard
	Patti Page Boulevard/SH 20
	Florence Avenue

Local Traffic Conditions

The major routes through Claremore include SH 66, SH 20 and SH 88. These state highways provide connections to the interstate and other nearby communities. SH 66 or Lynn Riggs Boulevard runs north/south at a diagonal through the center of the city. SH 88 enters Claremore on the northwest side of town and jogs through the central business district and exits to the southeast where it parallels the UPRR. SH 20 enters town on the west at the extension of Archer Drive and jogs through the central business district to the east of town where it interchanges with I-44. An extensive network of local streets provides circulation through the community. The majority of north/south traffic in Claremore travels on Lynn Riggs Boulevard/SH 66. Major east/west movements travel on Patti Page Boulevard or Will Rogers Boulevard which are designated as SH 20 through the center of the city. Exhibit 2 shows the daily traffic volumes on the highway-railroad grade crossings. The traffic volume counts were collected on typical weekdays in July 2006.

Exhibit 2. Daily Traffic Volumes at Highway-Railroad Grade Crossings



Local Involvement

Public participation and communication are integral to any successful study process. An informed public is an invested public. As such, the public involvement goals of this study were to involve stakeholders during the early stages of the project to provide input pertaining to their preferences, expectations, impressions, observations and expert knowledge. This study included contact with local and state representatives at two informational meetings.

Contact with local and state officials was made to share information and seek input on specific topics that impact the study findings. A Local Representatives meeting was held on August 3, 2006 and attended by city staff, ODOT, police, fire, and ambulance representatives as well as local economic development agencies, the school transportation provider and other interested parties. Over 30 local representatives were in attendance.

The goal of the meeting was to communicate with Local Representatives the scope of the Railroad Study for Improvement Projects and understand the needs of each organization represented while collecting valuable information on Claremore's transportation needs. During the meeting traffic volumes, preliminary information on the railroad elevation and a transportation network plan were explained. An open discussion was held to answer questions from the stakeholders and gather information from them on local transportation impacts to their businesses and services.

A meeting was held with the city's Traffic Committee on September 18, 2006. During this meeting an overview of the elevated design was presented and more details of the construction staging were shown. This meeting was held to provide more information to the community and to receive feedback on the project progress.

Section 3 – Blue Starr Drive Overpass Update

A study was completed in June 2003 by C.H. Guernsey & Company to determine the feasibility of constructing grade separated highway-railroad crossings at various locations along the BNSF corridor. The study showed that increased vehicular traffic and increased train traffic, on both the BNSF and UPRR railroad tracks, cause long delays and prevent emergency vehicles from reliable access to certain areas of the City. The original report presented findings of a feasibility study of grade separated vehicular crossings at various locations along the BNSF between Blue Starr Dr. and W. Country Club Road. The study reported in detail crossings at three locations: Blue Starr Drive, Archer Drive and Holiday Lane Extension. The overpass at Blue Starr Drive was selected by the City to advance into further study and possible design.

As part of this study for Railroad Improvements, the overpass study at Blue Starr Drive was reviewed and the engineer's cost estimate updated for current dollars.

Blue Starr Overpass Review

Based on the study, the concept for the Blue Starr Drive Overpass spanned both the UPRR and BNSF tracks along with J.M. Davis Drive with connections at both ends to Jay Street and SH 66. The functional classification of Blue Starr Drive is a minor arterial. A design exception to ODOT criteria was required due to 10% maximum grades and short vertical curves in order to make the overpass fit the site. The overpass also required major modification to the Jay Street intersection. The concept was to eliminate the at-grade highway-railroad crossings, but one at-grade highway-railroad crossing was replaced to maintain business access to Industrial Boulevard. Blue Starr Drive was also shown as a future bike trail route as part of the "Claremore Lake Trail and Bikeway Project" and was accommodated in the overpass structure.

The study review and site visit revealed several issues with the proposed overpass concept.

1. The design exceptions for the overpass severely reduced stopping sight distance for intersections at Jay Street and SH 66 due to steep grades.
2. The design exceptions for the overpass grades result in problems of inclusion as a bike trail (10% maximum grade).
3. Replacement of one at-grade highway-railroad crossing does not eliminate conflicts with railroad traffic and emergency vehicle traffic.
4. Access to businesses along Blue Starr Drive are severely affected or limited due to the new overpass, particularly the gas station on the Northeast corner and self storage business on the Northwest corner.

Updated Cost Estimate

To update the bridge and roadway cost estimate, bid tabs from 2005 and 2006 were used from the State of Texas and Oklahoma for similar bid items. To update the property acquisitions, the Rogers County Assessor's online information was used to determine current ownership, previous sale and current property tax. Based on the above information, the original engineer's cost estimate for the Blue Starr Drive Overpass was updated and results in an increase of about \$1.4M from the 2003 estimate as shown in Exhibit 3. A detailed breakdown of the revised engineer's cost estimate can be seen in Appendix B.

Exhibit 3
Updated 2003 Blue Starr Drive Highway Grade Separation Cost Estimate

	Description	2003 Estimate	Updated Estimate	Difference
1.	Bridge	\$1,595,809	\$2,276,586	\$680,777
2.	Roadway	\$1,599,000	\$1,896,000	\$296,100
3.	Property	\$342,621	\$524,025	\$184,404
4.	Contingency (20%)	\$707,666	\$939,322	\$231,656
	Total	\$4,245,996	\$5,635,933	\$1,389,937
Total Difference Between Estimates				\$1,389,937

Section 4 – Railroad Elevation Study

This section of the study explores the feasibility of elevating the BNSF railroad track over several local streets and state highways and the Union Pacific Railroad tracks near the northern limits of Claremore. A railroad elevation is accomplished by shifting the track adjacent to the existing track by 55 feet northeast and lifting it on an earth embankment or bridge structure to allow vehicles to travel under the tracks.

Study Limits

The limits of this study are separated into two segments, the “Downtown Limits” and the “Expanded Limits”. The Downtown Limits extend from 2,500 feet north of Blue Starr Drive to 1,400 feet south of Archer Drive. The Downtown Limits will elevate the railroad on embankment and bridges to the east side of the existing BNSF main line through downtown Claremore. The intersections that will be grade separated by this elevated railroad structure are Blue Starr Drive, 6th Street, Will Rogers Boulevard, 1st Street and Claremore Street. With this option Archer Drive will be closed. The elevated structure will also span the UPRR main line eliminating the diamond crossing.

The Expanded Limits extend 10,000 feet south from the Downtown Limits. The Expanded Limits will extend the elevated railroad structure south of Country Club Road. This segment will include additional grade separations at Country Club Road and a new roadway to align with Reavis Road. The railroad embankment will be located on the northwest side of the existing BNSF track for this segment.

Design Considerations

The BNSF main line can operate at a speed of 60 mph through Claremore. However, the diamond crossing with the UPRR and the high volume of trains rarely allows the BNSF to operate at these speeds. By eliminating the diamond crossing, the trains will be able to operate at higher speeds which will provide less delay at highway-railroad grade crossings and more efficient operation for the railroad. To increase operating efficiency and match speeds on other segments of this subdivision, a design speed of 60 mph was used. The design speed of 60 mph was used for the railroad horizontal and vertical curves. Superelevation and curve tables for the BNSF were used in the development of the horizontal curves. Vertical curves were designed using the American Railway Engineering and Maintenance of Way Association (AREMA) vertical curve formula, which has been adopted by the BNSF. Maximum grades of 1% were used throughout the design as these grades are less than the prevailing (maximum) grades on the same subdivision.

Within the Downtown Limits there is a 100-foot strip of right-of-way on the east side of the existing BNSF main line and a 300-foot strip of right-of-way on the west side. Within the right-of-way on the west side of the tracks there are several structures and well-established businesses leasing the property from the BNSF including a lumber store and mill that are served by a separate industry track. There are a few businesses within the 100-foot strip on the east side including a car dealership and a small retail business. The wide right-of-way in these limits allows for the elevation of the tracks immediately adjacent to the existing main line. For the Downtown Limits, elevating the tracks to the east of the existing mainline in the 100-foot right-of-way will impact the fewest properties and provide sufficient area to construct the necessary structures and embankment.

Similar consideration was given to the location of the elevated BNSF track for the “Expanded Limits”. The Expanded Limits extend to the southwest paralleling Lynn Riggs Boulevard/SH 66. Originally, the BNSF had a 100-foot strip of right-of-way on each side of the main line from south of 1st Street to the southern end of the Expanded Limits. After visiting the site and reviewing the data, it was discovered that SH 66 was located within the original BNSF right-of-way east of the main line – this right-of-way was likely purchased when SH 66 was widening. The right-of-way to the west of the main line is undeveloped and for this segment, the elevated alignment is located to the west of the

existing main line. Locating the Expanded Limits alignment along the west side allowed for less retaining wall construction and ease of access from potential borrow areas.

By separating the project into the Downtown Limits and the Expanded Limits, each project can be constructed separately when funding becomes available. The approach for the construction of the both segments was considered in the development of both alignments and profiles. Right-of-way should be investigated if the project is advanced into design.

The impact of this public driven project on the railroad will require the BNSF to make a higher investment in their track infrastructure if they decide to build a double track on this route in the future. If the railroad elevation option is advanced, mitigation of the additional cost of double tracking the mainline in the future should be considered. The mitigation would likely take the form of building the embankment and bridge structures with sufficient width to allow a second mainline to be constructed in the future by the BNSF.

Downtown Limits

The Downtown Limits segment begins shifting east of the main line approximately 2,500 feet north of Blue Starr Drive. This track shift will be performed initially with a ballast raise and then as the track 'breaks' away from the existing alignment, a typical track section would be constructed. The track will be shifted 55 feet east of the existing main line centerline. This would include placing the embankment, sub-ballast, ballast, ties, and rail. The track would continue to rise above the existing main line at a 1% grade. A retaining wall section would be required approximately 570 feet north of Blue Starr Drive. Blue Starr Drive will be grade separated with a bridge section. South of Blue Starr Drive, the section would transition back on embankment for approximately 430 feet to the bridge over the UPRR. This bridge would provided 23'-6" of vertical clearance and allow for enough horizontal clearance for a future second mainline for the UPRR. At the UPRR underpass, the grade along the BNSF changes from +1% to -0.81%. This grade continues to 6th Street, where a bridge will provide a grade separate crossing. At 6th Street the profile changes from a 0.81% down grade to a 1.0% down grade. The bridge section would then continue south of 6th Street for approximately 600 feet where the section would be elevated on embankment with retaining walls until Cat Creek. Three grade separations would be provided in this segment at Will Rogers Boulevard, 1st Street and Claremore Street.

South of Cat Creek Bridge, the proposed alignment transitions to embankment north of Archer and ties back into the existing BNSF main line at approximately 1,400 feet south of Archer Drive. The at-grade crossing at Archer Drive will be closed with this option. The proposed separated grade crossing at Claremore Street will accommodate the traffic volumes shifted from Archer Drive.

Expanded Limits

The Expanded Limits would introduce a new grade of +1.0% near Archer Drive. This grade would create a ballast raise on the new Cat Creek bridge along with a minimal track shift on the Downtown Limits alignment. This track shift would continue to the west side of the existing main line to a distance of 55 feet from the main line. The track would continue up to clear over Country Club Drive and proceed down at 0.58% to match the existing grade approximately 4,200 feet south of Country Club Drive. Due to the relatively undeveloped west side of the proposed alignment, purchasing property where required is recommended to avoid the use of retaining walls through the expanded limits.

This segment of the project also eliminates Moretz Drive. Moretz Drive was initially constructed on the original BNSF right-of-way, likely as an access road for the railroad. It has since been further improved for public access. As part of this project, and to minimize the use of large retaining walls, Moretz Drive would need to be closed. Alternative access for existing properties along this roadway would need to be developed (see Exhibit 4).

Exhibit 4. Moretz Drive south of Archer Drive



As designed, the Expanded Limits also creates the possibility for an additional grade separation along the BNSF to gain access to undeveloped land from SH 66 to the west of the BNSF main line. For purposes of this report, this road is called the Reavis Road Extension.

Roadway and Structures

The roadway profiles are developed for both the “Downtown Limits” and the “Expanded Limits”, included are the description of structures that are proposed for use in these areas. Permanent retaining wall construction would be one of three alternative, cast-in-place concrete, T-Wall, or Evergreen. The T-Wall and Evergreen retaining wall systems are both proprietary wall systems that have been approved by the BNSF on previous projects. The temporary retaining walls would be of Mechanically Stabilized Earth (MSE) wall. The MSE wall has not been approved by the BNSF for permanent use, thus for this project it is proposed for temporary use. The prepared cost estimates assume the use of T-Wall or Evergreen permanent retaining walls.

Blue Starr Drive

Blue Starr Drive is located within the Downtown Limits of the project. The roadway cross-section at Blue Starr Drive would consist of 10-foot sidewalks on each side to accommodate the bike route, 2'8" curb and gutter on each side, and five 12-foot lanes. The vertical profile on Blue Starr Drive will be modified to remove the hump of the old crossings and will provide over 16 feet of vertical clearance. The proposed structure consists of a concrete ballast deck and three prestressed I-girder spans at 60 feet, 80 feet, and 60 feet each. Permanent retaining walls would be located on the east side of the existing main line from Blue Starr Drive to the north. This wall would protect JM Davis Boulevard from being impacted by the proposed embankment. South of Blue Starr Drive, a permanent retaining wall on the east and a temporary retaining wall on the west would be required. The temporary retaining wall would be located 10' from the centerline of the existing BNSF main line. This would allow the proposed embankment to be constructed with limited impacts to the operations of the BNSF main line.

Sixth Street

Sixth Street is located within the Downtown Limits of the project. The existing roadway cross-section at 6th Street will remain with one lane in each direction. There would be no change in the profile at Sixth Street due to adequate clearance for the proposed structure. The structure at 6th Street is a continuation of the structure over the Union Pacific Railroad. This structure is a major part of the project and consists of a three steel plate girder spans over the Union Pacific for 60 feet, 115 feet, and 60 feet. The remainder of the structure (26 spans at 80 feet and 3 spans at 60 feet) is concrete ballast deck with prestressed I-girders. The proposed structure is nearly 2,500 feet long and would be elevated above the existing ground approximately 30 feet. This structure would permit line of sight through this area and the downtown area would not be ‘separated’ by a large retaining wall that would extend nearly 20 feet in height.

Will Rogers Drive

Will Rogers Drive is located within the Downtown Limits of the project. The roadway cross-section would consist of 6-foot sidewalks on the north side, 2'8" curb and gutter on each side, and four 12-foot lanes with a 16-foot center turn lane. There would be a cut of approximately 1'6" in the profile at Will Rogers Drive to design adequate clearance for the proposed structures. This would provide over 16 feet of vertical clearance. The proposed structure at Will Rogers Drive is a 3-span bridge consisting of a concrete ballast deck, a single prestressed I-girder span at 80 feet, and two prestressed double cell box girder spans at 50 feet each. Permanent retaining walls would be constructed north and south of Will Rogers on the east side of the new railroad embankment.

First Street

First Street is located within the Downtown Limits of the project. The roadway cross-section would consist of 6-foot sidewalks on each side, 2'8" curb and gutter on each side, and two 12-foot lanes and one 13-foot center turn lane. The profile at 1st Street would have to be reduced underneath the proposed structure by approximately 4 feet to accommodate the proposed vertical clearance of over 16 feet. The proposed structure at First Street is a 3-span bridge consisting of concrete ballast deck prestressed double cell box girders at 50 feet each. This would be accomplished by removing the existing at grade crossing hump and creating a smoother transition to JM Davis. It is proposed that the structure consist of a concrete ballast deck and three prestressed double cell box girder spans at 50 feet each. Permanent retaining walls would be constructed north and south of First Street on the east side of the new railroad embankment.

Claremore Street

Claremore Street is introduced as a new underpass location in the Downtown Limits project. The roadway cross-section would consist of 6-foot sidewalks on each side, 2'8" curb and gutter on each side, and two 12-foot lanes and one 13-foot center turn lane. The existing ground at Claremore Street would have to be reduced underneath the proposed structure by 4 feet to accommodate the proposed clearance of 14'-6". The proposed structure at Claremore Street is a 3-span bridge consisting of concrete ballast deck prestressed double cell box girders at 50 feet each. This would be accomplished by cutting out the existing at grade crossing and creating a transition to JM Davis. Since this is a new street west of JM Davis, additional work would have to be completed to connect in with the existing Claremore transportation network. This would include new paving, earthwork, and signals. Permanent retaining walls would be constructed north and south of Claremore Street on the east side of the new railroad embankment.

If the railroad elevation project develops beyond a conceptual phase, converting 1st Street and Claremore Street into a one-way pair should be considered. The Transportation Network Plan on Exhibit 15 in Section 6 illustrates an overall transportation network plan for the City of Claremore and includes a one-way pair option for these two roadways.

Cat Creek

A new Cat Creek bridge will replace the existing bridge over Cat Creek. The proposed structure at Cat Creek is a 5-span bridge consisting of concrete ballast deck prestressed double cell box girders at 28 feet each. The proposed bridge is approximately 13 feet above the existing top of rail and about 37' east of the existing bridge.

Reavis Road Extension

The Reavis Road Extension would be located within the Expanded Limits of the project. The roadway cross-section would consist of 6-foot sidewalks on each side, 2'8" curb and gutter on each side, and five 12-foot lanes with a 10-foot center median. This road extension would be a new road on the west side of SH 66. The profile at the Reavis Road Extension is proposed to be approximately 5 feet below grade at the existing centerline of the BNSF main line and provide sufficient vertical clearance. This would be a proposed underpass of the BNSF to provide access on the current Zoned C-4 development on the west. The proposed road would require additional work on both the east and west side of the SH 66, and would require property acquisition for the development of this proposed alignment. The

proposed structure at Reavis Road is a 4-span bridge consisting of concrete ballasted deck pre-stressed double cell box girders (2 at 50 feet, 1 at 44 feet and 1 at 35 feet).

The extension of Reavis Road is directly in line with the old RPC paint factory. To extend the roadway further to the west it would be necessary to remove the factory which may require environmental mitigation. If this location proves difficult to remediate, the roadway could be constructed at the median break just to the south on SH 66 near the Burger King. This location for an underpass appears to provide sufficient vertical clearance under the new railroad profile for a roadway cross section similar to the one presented for Reavis Road without site remediation constraints.

Country Club Road

Country Club Road is located within the Expanded Limits of the project. The roadway cross-section would consist of 6-foot sidewalks on each side, 2'8" curb and gutter on each side, and five 12-foot lanes with a 10-foot center median. The vertical profile at Country Club Road may need significant modifications due to the vertical slope west of SH 66. Sufficient vertical clearance will be provided at this underpass by removing the existing at grade crossing hump and creating a smoother transition to SH 66. The proposed structure at Country Club Road is a 4-span bridge consisting of steel plate girder spans (2 at 48 feet, 1 at 58 feet and 1 at 43 feet).

Typical Sections

Typical sections have been developed for the Downtown Limits and the Expanded Limits for this project. The Downtown Limits typical section is shown on Exhibit 5. This typical section utilizes the 100-foot strip of right-of-way on the east side of the existing BNSF main line. The proposed centerline of the new BNSF main line is 55' to the east of the existing main line track.

The section allows for the elevation of the track and construction of the embankment while allowing traffic to continue operating along the existing BNSF main line during construction. This was accomplished by increasing the slope along the railroad side of the embankment to 1.5 feet horizontal to 1 foot vertical (1.5:1) and installing a temporary retaining wall. This differs from the standard embankment of 2:1. To accomplish a 1.5:1 slope, the fill material would have to be monitored closely and certain types of material may not be allowed to be used in the construction of the embankment in this area. After rail traffic is moved to the elevated portion of the project, the west slope can be graded to the 2:1 embankment. The east portion of the embankment will have a retaining wall at the base of the fill. It is anticipated that this wall would either be of T-Wall or Evergreen, which are both proprietary wall designs which have previously been approved for use by the BNSF.

A typical section illustrating a double track is shown in Exhibit 6. This typical section will provide enough width on the bridges and embankments for a future second main line with 15-foot track centers. Since a double track does not exist today this project has only estimated the cost to provide a base for the second track to be constructed in the future. The construction of the additional embankment would start after rail traffic is shifted onto the elevated mainline. Retaining walls will be needed on the west side of the tracks north of Will Rogers near the industry track.

The Expanded Limits typical section is shown on Exhibit 7. This typical section utilizes the 100-foot strip of right-of-way on the west side of the existing BNSF main line. The proposed centerline of the new BNSF main line is 55' to the west of the existing main line track. The section allows for the elevation of the track and construction of the embankment while allowing traffic along the existing BNSF main line during construction. Due to the undeveloped area west of the existing main line there would be limited need for retaining walls or temporary slopes for this segment.

Exhibit 5. Downtown Limits Typical Section (facing north)

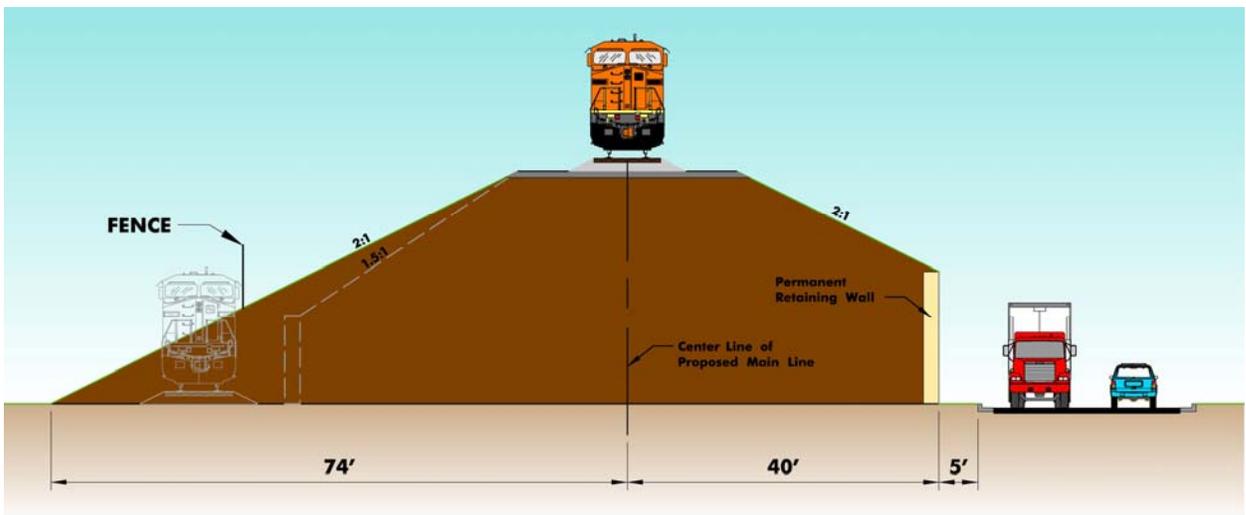
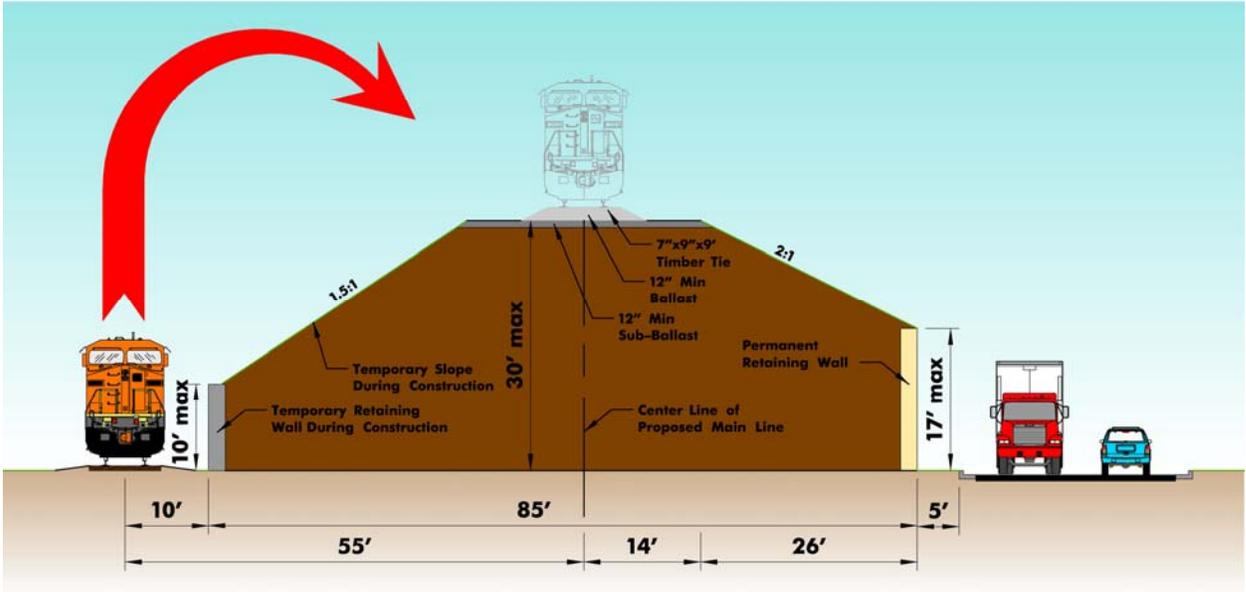
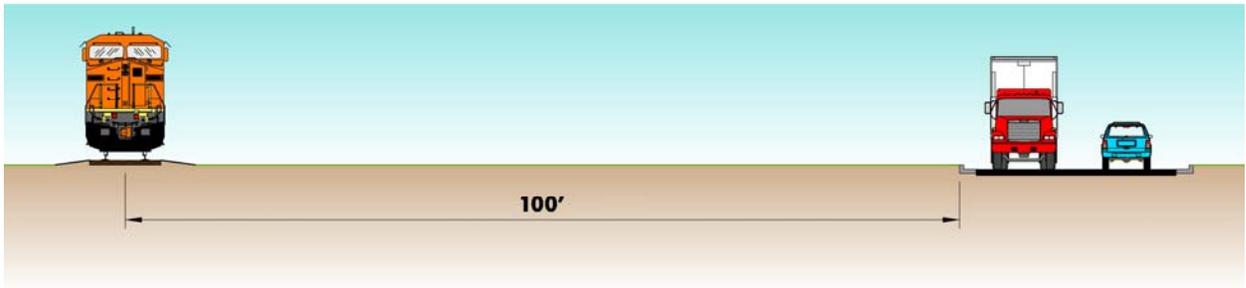


Exhibit 6. Double Track Typical Section (facing north)

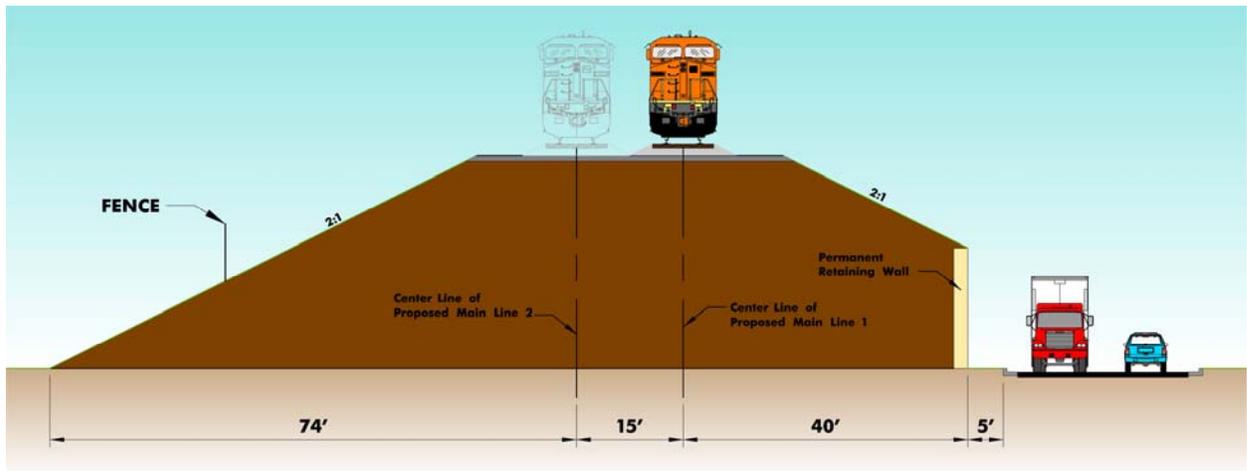
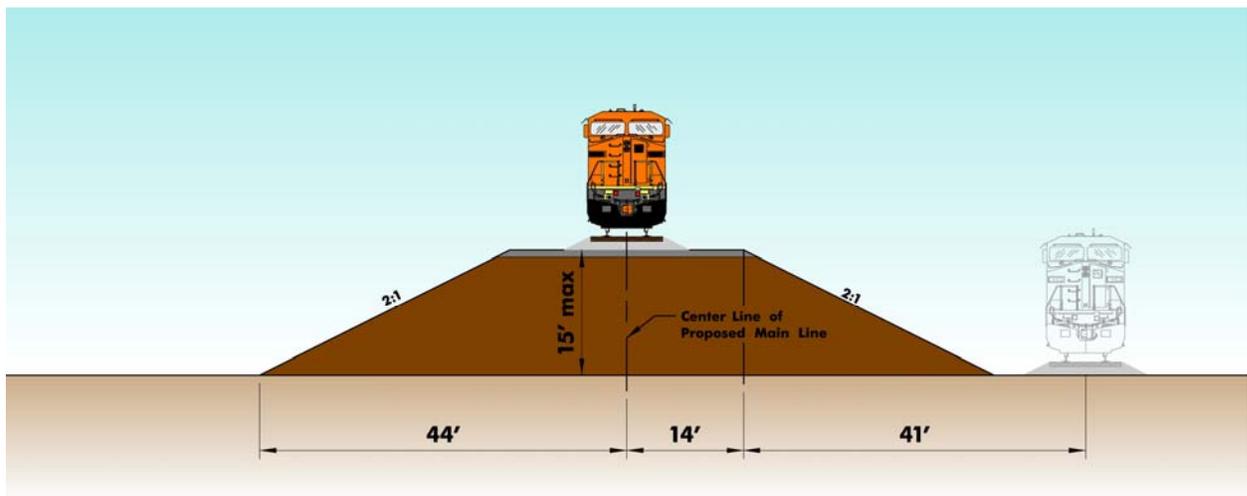


Exhibit 7. Expanded Limits Typical Section (facing north)



Utility Impacts

As with most cities with railroads, Claremore's utility infrastructure (water, sewer, phone, etc.) have limited crossings with the railroad due to permitting and the fees associated with crossing the railroad. In general, most public utilities cross the railroad within the public right-of-way. There is a fiber optic line within the BNSF right-of-way that nearly parallels the existing BNSF main line from the north end of the Downtown Limits to the south end of the Expanded Limits. This fiber optic line is predominantly 50 feet from the centerline on the east side of the track. It is anticipated that the fiber optic line would not have to be relocated for the entire project. However, there are locations where significant excavations would be required (e.g. bridge foundations and roadway excavations), where the fiber optic line would have to be relocated out of the area of impact. Existing City of Claremore utilities that would be included in the project are 12" waterlines north of Blue Starr Drive and north of Country Club Road, an 8" waterline at 1st Street, Will Rogers Road, and 7th Street, and a 30" interceptor sewer that appears to run underneath the BNSF near Cat Creek.

The impact to this interceptor sewer is significant, and would require the relocation of this line and casing protection underneath the future embankment. The waterline at 1st Street would have to be lowered due to the road profile being lowered at 1st Street. The waterline would be able to be upsized to a 12" main at this time to improve fire flows. The existing 8" water main underneath 7th Street would be required to have a casing pipe to be allowed underneath the railroad embankment. This can be accomplished by; 1.) Excavating around the existing 8" pipe and installing a split steel casing, or 2.) Boring a new casing pipe and replacing the existing 8" line with a 12" waterline.

There are also several private utilities within the public right of way for the project. These utilities include power, communication, and gas lines that utilize public right-of-way to cross the BNSF. At 1st Street, there is an overhead cable line that would have to be placed under ground or increase the height to clear the elevated BNSF tracks. At Country Club Road, there is an existing underground telephone line that may have to be relocated to due to the location of bridge piers and excavation for the roadway. There is a high voltage power line at the northern limits of the project that should not be impacted during the construction of the elevated portion of the BNSF. On the south side of the 1st Street at-grade crossing, there is an Oklahoma Natural Gas Line that would have to be relocated due to the amount of excavation at 1st Street. Located within the Expanded Limits, is a second Oklahoma Natural Gas line. This line is located between Archer Drive and Country Club Road, and it would have to be encased as part of the Expanded Limits. Included in the Expanded Limits of the project would be the relocation of an existing overhead power line south of Archer Street.

Aesthetic Treatments

Various aesthetic treatments are available to enhance the visual appearance of the elevated railroad design. The current design includes bridge structures and retaining walls that could be enhanced with various visual treatments. Landscaping and lighting are common aesthetic treatments that can be incorporated into a project like this to add visual appeal.

Various elements comprise the treatment of the retaining walls, including color, parapet and railings, as well as plantings. Typically, the base design for the walls is without color, yet color can be incorporated along the entire length or concentrated at specific points of interest. Parapet walls can be constructed around the bridges. A parapet wall is a solid element that replaces a railing on top of the wall. The landscaping elements can incorporate shrubs or other plantings along the embankment of the retaining walls.

The bridge treatments can reflect the character of the area at the crossings or include a distinctive element like a large column flanking the bridge structure. The bridge abutment, piers and substructure are all able to be modified to add visual elements. Abutment walls can be faced with false brick or stone treatments that can reflect other architectural or streetscape elements in the community. Decorative railings and metal formwork can be used on the bridge structure to visually link all of the proposed structures for the length of the project.

Typically, aesthetic treatments can represent 5-8% of a project cost depending on the treatments chosen. Exhibit 8 is a photograph of a railroad bridge in Blue Springs, Missouri that incorporated unusual aesthetic treatments. This three-span bridge design featured four 48-foot tapered columns with artistic overlapping copper plates, backlit with fiber-optic tube lighting. The cost of these treatments including the landscaping represented around 8% of the \$4 Million project cost. In this study, no aesthetic treatments have been included in the cost estimates or designs of the elevated railroad.

Exhibit 8. Adams Dairy Parkway – Gateway Western Mainline Bridge Aesthetics in Blue Springs, Missouri



Business Impacts

The BNSF routinely leases property to businesses within its right-of-way. In Claremore, the BNSF has over 400 feet of right-of-way in the downtown and has leased this property to several businesses. To the west of the track Pixley Lumber and Stillwater Milling are two of those businesses. On the east side of the track between 6th Street and Claremore Street, some of the right-of-way that will be used to relocate the railroad is occupied by businesses or used as parking areas. The lease status of these properties will need to be investigated to determine what type of relocation requirements are provided in the lease agreement or if property has been formally purchased.

The BNSF currently delivers rail cars to Pixley Lumber and Stillwater Milling using an industry track parallel to the mainline near Will Rogers Boulevard and 6th Street. With the elevated railroad design an alternative plan for servicing these two customers must be considered as the connection to the existing industry track cannot be made from the elevated structure.

Several alternatives to continue providing service to these rail customers should be considered:

- Through a reciprocal switching agreement the UPRR could deliver the rail cars to these two customers using the existing connection track near Blue Starr Drive.
- A transload facility could be constructed at the north end of the project near the existing industrial park where cars could be delivered, unloaded and product delivered by truck to the customers. This also may create an opportunity to provide rail service to more customers in Claremore.
- The existing mainline track could remain in place and a switch installed near Archer Drive where the elevated structure will start. Service would be provided as it is done today. This would require shifting the existing alignment west, constructing a new bridge over Cat Creek and permanent retaining walls on the west side of the elevated structure. It would likely require more expensive bridges to be constructed because the roadway profiles could not be modified. This would eliminate the diamond at the UPRR.
- The existing mainline track could remain in place and a switch installed north of Blue Starr for a BNSF train to provide service as it does today. This option would keep the diamond in place.

If this project is pursued, these alternatives should be considered in greater detail to find the best alternative to replacing the existing service to these two businesses. In this study, no cost or design was included for addressing the business impacts.

Cost Estimate

The cost breakdown for the BNSF Railroad Elevation is shown in two separate segments as described above, the Downtown Limits and the Expanded Limits. A detailed estimate for each segment can be found in Appendix B. As proposed, the two segments tie together, with the Expanded Limits being able to be constructed any time after the Downtown Limits were in place. These costs are compared in Exhibit 9.

<i>Exhibit 9</i> Railroad Elevation Cost Estimate (in Millions)		
Limits	Single Track	Additional Cost to Double Track
Downtown	\$35.8	\$15.3
Expanded	\$10.7	\$5.8
Total	\$46.5	\$21.1

Appendix A includes a plan and profile of the railroad elevation option for the Downtown Limits and Expanded Limits and the plan and profile sheets of roadway underpasses.

Section 5 – Quiet Zone Study

On April 27, 2005 the Federal Railroad Administration (FRA) issued its Train Horn Final Rule. This document sets the regulations for sounding the train horn at highway-railroad grade crossings. By federal law a locomotive engineer must sound the train horn with two short blasts, one long blast and one short blast in advance of each crossing. Where crossings are too closely spaced this sequence can be modified but the horn must be sounded in advance of the train occupying each crossing.

The Final Rule also created provisions for communities to establish Quiet Zones. A “Quiet Zone” is a segment of a rail line where the locomotive horn is not routinely sounded at public highway-rail grade crossings. A locomotive engineer may sound the locomotive horn to provide a warning in an emergency situation if the engineer judges it as an appropriate action. The City of Claremore has indicated an interest in obtaining a Quiet Zone. This study will focus on the UPRR corridor for Quiet Zone installation since the BNSF Elevated Corridor is a viable option.

Definitions

The initial requirements for a Quiet Zone focus on the corridor length and the warning devices installed at each crossing. A Quiet Zone must be one-half mile in length and each highway-rail grade crossing must be equipped with active grade crossing warning devices comprising of flashing lights and gates operated with constant warning time devices and power-out indicators. Also, if a public highway-rail crossing has pedestrian traffic and is equipped with automatic bells, the bells must remain in working condition. In Claremore the Quiet Zone study corridor is from Florence Avenue to Blue Starr Drive, this corridor is approximately one mile long exceeding the minimum distance required. Each crossing in this corridor on the UPRR is equipped with flashing lights and gates. The UPRR operates these crossing with constant warning time devices and power-out indicators are present on each signal house. This corridor meets these base requirements but to establish a Quiet Zone other conditions must be met.

To establish a Quiet Zone, one of the following four conditions must be met:

<i>Exhibit 10</i> Quiet Zone Conditions	
One or more Supplemental Safety Measures are installed at <i>each</i> public crossing in the Quiet Zone.	Additional safety measures are implemented at selected crossings resulting in the Quiet Zone Risk Index being reduced to a level equal to or less than the Nationwide Significant Risk Threshold.
The Quiet Zone Risk Index is equal to or less than the Nationwide Significant Risk Threshold without implementation of additional safety measures at any crossing in the Quiet Zone.	Additional Safety measures are taken at selected crossings resulting in the Quiet Zone Risk Index being reduced to at least the level of the Risk Index with Horns.

The Quiet Zone Risk Index (QZRI) is a measure of risk to the motoring public that accounts for the increased risk due to the lack of locomotive horn use at the Quiet Zone crossings and the reduced risk due to the implementation of Supplemental Safety Measures (SSMs) and Alternative Safety Measures (ASMs). The Nationwide Significant Risk Threshold (NSRT) is a measure of risk calculated on a nationwide basis, which reflects the average level of risk to the motoring public at public highway-rail grade crossings equipped with flashing lights and gates and at which locomotive horns are sounded. A risk level above the NSRT represents a significant risk with respect to loss of life or serious injury. The Risk Index with Horns (RIWH) is a measure of risk of to the motoring public when locomotive horns are routinely sounded at every public highway-rail grade crossing within a Quiet Zone. This represents the risk

index before the Quiet Zone is established. Each of the calculations can be made using the FRA's Quiet Zone calculator and information readily available for each crossing.

Several of the conditions necessary for establishing a Quiet Zone require additional safety measures at the crossings. A Supplemental Safety Measure (SSM) is a safety system or procedure established by the appropriate authority and determined by the Federal Railroad Administration to be an effective substitute for the locomotive horn in prevention of highway-rail casualties. An Alternative Safety Measures (ASM) are safety systems or procedures, other than SSMs, established by the appropriate authority and determined by the Federal Railroad Administration to be an effective substitute for the locomotive horn in prevention of highway-rail casualties at specific highway-rail grade crossings

Exhibit 11 Supplemental Safety Measures	
<p style="text-align: center;">Temporary Closure</p> <p>Temporary Closure of a public highway-rail grade crossing will close the crossing to highway traffic during a designated quiet period, for instance provide locked gates from 9:00 p.m. to 6:00 a.m..</p> <p style="text-align: center;">Permanent Closure</p> <p>This measure would permanently close the crossing to highway traffic.</p> <p style="text-align: center;">Gates with Medians or Channelization</p> <p>This measure would install medians or channelization devices on both highway approaches to a public highway-rail grade crossing denying to the highway user the option of circumventing the approach lane gates by switching to the opposing (oncoming) traffic lane and driving around the lowered gates to cross the tracks.</p>	<p style="text-align: center;">Four-Quadrant Gate System</p> <p>A Four-Quadrant Gate Systems will install gates at a crossing sufficient to fully block highway traffic from entering the crossing when the gates are lowered, including at least one gate for each direction of traffic on each approach.</p> <p style="text-align: center;">One-Way Streets with Gates</p> <p>For this option, gates must be installed such that all approaching highway lanes to the public highway-rail grade crossing are completely blocked.</p> <p style="text-align: center;">Wayside Horns</p> <p>A wayside horn is a stationary horn located at the highway-rail grade crossing designed to provide, upon the approach of a locomotive or train, audible warning to oncoming motorists of the approach of a train. This measure is not a true SSM but is looked at as a substitute for the locomotive horn and the crossing will not be included in risk calculations.</p>

Alternative Safety Measures include programmed enforcement, public education and awareness, and photo enforcement. A modified SSM may be needed if there are unique circumstances pertaining to a specific crossing which prevents SSMs from being fully compliant. A modified SSM is considered an Alternative Safety Measure and its effectiveness rating will be adjusted for any calculations. These are very beneficial safety measures but are typically not approved by the owning railroad.

The Union Pacific actively participate in Quiet Zone projects but asks that communities postpone taking any costly or irreversible action until it has been determined which safety measures are warranted.

Crossing Safety Enhancements

Before an area of track can become a quiet zone a scenario must be created which makes the Quiet Zone Risk Index (QZRI) lower than the Nationwide Significant Risk Threshold (NSRT) which is currently set at 17,030. It should be noted that the NSRT may change from year to year due to accidents and incidents that affect the nationwide calculation. In order to remain a quiet zone, the proposed area must have a QZRI below the NSRT. This can be insured by creating a QZRI significantly lower than the NSRT. The RIWH is 25,391.35. Currently the QZRI for this corridor is 42,352.77 which is far above the necessary 17,030. This calculation does not incorporate Florence Ave as it is too new to be included in the FRA database.

To reduce the risk supplemental safety measures can be installed at each crossing to substitute for the locomotive horn. The following exhibit outlines the SSMs that are most appropriate for the crossings on the UPRR corridor in Claremore. An initial evaluation of each of the crossing was completed during a field visit and using aerial photography, an official diagnostic evaluation with the FRA and UPRR has not been completed. .

Exhibit 12
Evaluation of SSMs at Quiet Zone Crossings

Highway-Rail Grade Crossing	Temporary Closure	Four-Quadrant Gate System	Permanent Closure	Medians with Gates	One-Way Streets with Gates	Wayside Horns
Blue Starr Drive	○	●	◐	◐	○	◐
JM Davis	○	◐	◐	●	○	◐
Lynn Riggs Boulevard	○	●	○	●	○	◐
7 th Street	○	◐	●	◐	◐	◐
6 th Street	○	◐	◐	●	◐	◐
Cherokee Street	○	◐	◐	●	○	◐
Will Rogers	○	●	◐	◐	○	◐
Patti Page	○	●	○	●	○	◐
Florence	○	◐	◐	●	○	◐

○ = Not a Viable Option ◐ = Possible Option ● = Most Probable Option

Temporary Closure was determined not to be a viable option at any of the crossings because of the labor intensive requirements of this SSM. Additionally it does not create a 24-hour quiet zone because the horn would be blown during the hours the crossing is open to vehicular traffic. Wayside horns are possible options at each crossing however they also do not create a completely quiet corridor as the stationary horn will blow directly at the crossing. One-way streets are an acceptable option however they only work well on parallel streets that do not require drivers to travel more than one or two blocks out of their original path. The only locations where one-way streets are possible are on 6th and 7th Streets. For the medians with gates SSM, the median should extend for 100 feet without and driveways or intersecting streets within that distance. Exceptions can be made when a median can be constructed for 60 feet without any driveways or intersecting streets.

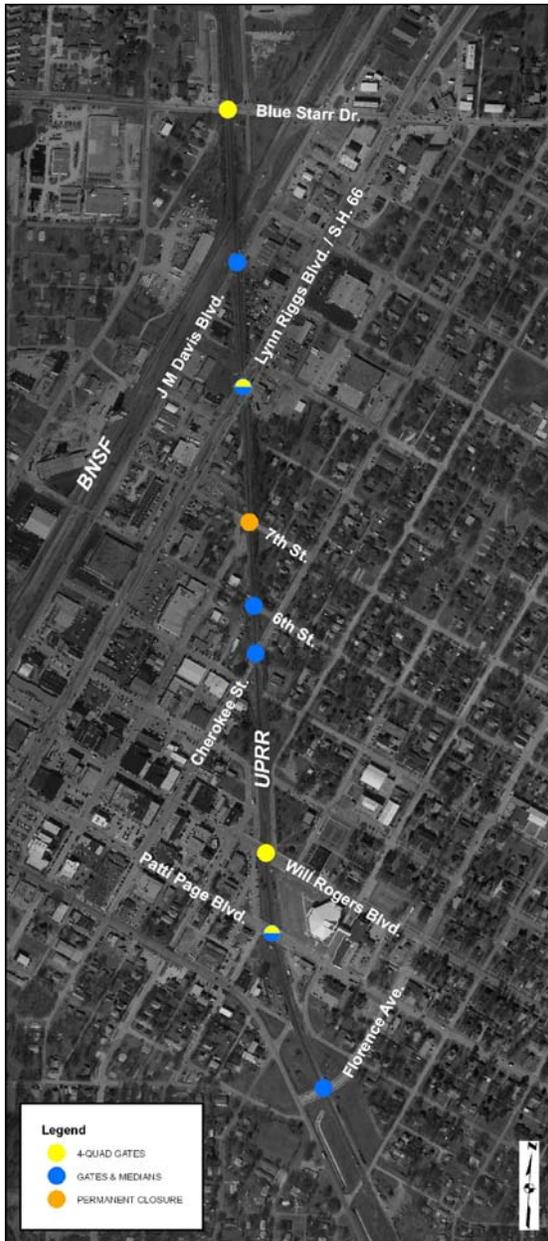
Corridor Alternatives

At each of the crossings the most probable option was used to help create two corridor solutions that could be pursued by the city to advance designation of a Quiet Zone on the UPRR corridor. Exhibit 13 illustrates the options that are most probable for creation of a Quiet Zone. Each crossing is individually illustrated with the most probable options in Appendix C.

The first Quiet Zone corridor alternative will install a four quadrant gate system at Blue Starr Drive and Will Rogers Boulevard. At J.M. Davis Boulevard, Lynn Riggs Boulevard/SH 66, 6th Street, Patti Page Boulevard and Florence Avenue medians will be installed. In this alternative 7th Street will be closed. This alternative will result in a QZRI of 6,237.86 which is significantly less than the NSRT. At some of these crossings there are driveways within the 60-foot minimum distance of the crossing gate arms that must be closed to meet the Quiet Zone requirements.

The second solution will install a four quadrant gate system at Blue Star Drive, Lynn Riggs Boulevard, Will Rogers Boulevard, and Patti Page Boulevard. Median with gates would be installed at J.M. Davis Boulevard, 6th Street, Cherokee Street, and Florence Avenue. The crossing at 7th Street will be closed. This alternative will bring the QZRI to 5516.86.

Exhibit 13. Quiet Zone Corridor SSM Alternatives



Estimated costs for the alternatives are presented in Exhibit 14. These costs are presented at a very preliminary planning level because costs for railroad signal installation can vary significantly depending on specific circumstances at each crossing. The costs at crossings with road or driveway closures may also vary depending on the treatments at the closures. More refined costs should be estimated as the Quiet Zone application is pursued beyond this level. It will likely be the sole responsibility of the city to pay for costs associated with the Quiet Zone; however, the railroad may choose to participate if crossings are closed along the corridor.

With the four quadrant gate system the railroad may require an annual payment of \$4,000 to \$10,000 from the city for maintenance of the third and fourth gates.

Exhibit 14
Quiet Zone Cost Estimate

Highway-Rail Grade Crossing	Alternative 1		Alternative 2	
	SSM	Estimated Cost	SSM	Estimate Cost
Blue Starr Drive	4-Quad Gates	\$500,000	4-Quad Gates	\$500,000
JM Davis	Medians	\$200,000	Medians	\$200,000
Lynn Riggs Boulevard	Medians	\$200,000	4-Quad Gates	\$500,000
7 th Street	Close	\$0	Close	\$0
6 th Street	Medians	\$200,000	Medians	\$200,000
Cherokee Street	Medians	\$200,000	Medians	\$200,000
Will Rogers	4-Quad Gates	\$500,000	4-Quad Gates	\$500,000
Patti Page	Medians	\$200,000	4-Quad Gates	\$500,000
Florence	Medians	\$200,000	Medians	\$200,000
Total Estimate Cost		\$2,200,000		\$2,800,000

Steps to Acquire a Quiet Zone

The FRA, through its Final Rule, has established a formal process for application for a Quiet Zone. This initial study was conducted following these guidelines but no formal application process has started nor any diagnostic reviews completed.

The basic steps to initiate a Quiet Zone application in Claremore are complete because the Quiet Zone will be more than ½ mile in length and gates and lights are currently installed at each of the crossings. To fully initiate the process the City will need to obtain cooperation from all jurisdictions affected including ODOT, UPRR, and FRA. This can be initiated by scheduling an initial diagnostic review of the crossings and reviewing the city's initial intent with the parties involved.

Once cooperation has been obtained, the process to create a New Quiet Zone can be initiated. The follow steps should be followed:

1. Update the national crossing inventory with ODOT and FRA assistance. The update should be sure to include Florence Avenue as it is not in the database today.
2. Submit a Notice of Intent to the FRA to create a New Quiet Zone. There is a 60-day comment period associated with this filing.
3. Calculate appropriate risk values.
4. Determine appropriate SSMs to install at each crossing. Since this study shows that the RIWH is significantly higher than the NSRT, it is assumed that SSMs will be installed at each crossing.
5. File a Public Authority Application to the FRA. The recommended SSMs should be reviewed by the FRA and UPRR to determine if they will meet Quiet Zone requirements before installation. There is a 60-day comment period associated with this filing.
6. Install SSMs and update the National Inventory with new crossing information.
7. Provide Notice of Quiet Zone Establishment and implement the Quiet Zone. This is the final step that will silence the train horns and install signage at crossings notifying drivers that the train horn will not sound.
8. Annual recalculations of the NSRT will require the city to periodically review the Quiet Zone status with the FRA.

Installation of a Quiet Zone is a process the could take 1-2 years considering application filing and comment periods, as well as, design, material acquisition and construction.

Section 6 – Additional Railroad Improvement Project Options

Transportation Network Plan

The intent of this study was to provide a long-term solution to congestion and safety concerns in Claremore. To help address this goal the overall transportation network was reviewed to determine if network enhancements were needed to provide a long-term solution. In this review of the transportation network other studies were referenced to understand existing long-range transportation plans in Claremore. The studies included the SH 88 Environmental Assessment, the SH 20 Corridor Study Conceptual Design, the Claremore-Rogers County Comprehensive Plan: 2025, and the Country Club Plaza Traffic Impact Study.

The existing conditions around the Archer Drive, JM Davis, and SH 66 intersection are congested and present safety concerns at the railroad crossing and the roadway intersections. In this study it is recommended that the existing at-grade intersection with Archer Drive and the BNSF be closed. However, to maintain traffic flow from west to east through this area a new grade separation at Claremore Street, north of Archer Drive and south of 1st Street, was designed. This extension of Claremore Street could act as a one-way pair with 1st Street and as illustrated on Exhibit 15, an extension of SH 88 through downtown Claremore.

Included as part of the Expanded Limits, was the extension of Reavis Road to the west side of SH 66. The area to the west of the BNSF Mainline is undeveloped but zoned C-4 Commercial and to access this development from SH 66 there would have to be either an additional at-grade crossing with the BNSF or a grade separation. It is unlikely that the BNSF would allow a new at-grade crossing therefore an underpass at this location was designed. To access the site if the Expanded Limits were constructed without underpass at Reavis Road, Country Club Road or connections to the new Claremore Street would be needed. With significant commercial development planned in this area, it is recommended that if the Expanded Limits are constructed then there should be provisions made for accessing the west side of the BNSF main line from SH 66 with an underpass.

Additional transportation network improvements are shown on Exhibit 15 including roundabouts on the east and west ends of the Claremore Street/1st Street one-way pair. While relatively new to the United States, roundabouts are becoming more prevalent and have proven to be effective in improving both intersection safety and efficiency. Roundabouts operate by gap acceptance, in that drivers approaching the roundabout must yield to traffic already circulating within the roundabout. This differs from traffic circles used previously in this country, and is beneficial since it maintains free-flow movement for circulating traffic. The design of a roundabout includes several islands. The islands are used to slow and deflect approaching traffic, thereby reinforcing the yield process. The slow travel speeds that result from the use of a roundabout are one of the primary safety aspects of this form of control. The slow speeds combined with one-way circular flow have been proven to reduce the frequency and severity of crashes, especially angle collisions, at roundabout intersections.

The intersection with SH 88 on the east side is an appropriate location for roundabout control since both of the intersecting roadways are collector type roadways and there five legs to the intersection when Florence Avenue is introduced. On the west side a similar situation occurs where a five leg intersection would be created when Claremore Avenue and 1st Street are extended to the west.

Exhibit 15. Transportation Network Plan



Combining Corridor Concept

As discussed previous, the Union Pacific maintains a main line through the center of Claremore. This line has several at-grade crossings, and combining this main line with the newly grade separated BNSF main track would eliminate nearly all at-grade crossings in Claremore. This concept is illustrated in Exhibit 16. The existing UPRR corridor south of Claremore is a single track main line with a siding track. To combine the corridor, the UPRR main line would have to connect with the BNSF main line, several miles to the west. This connection would cross a mainly rural area, with a small concentration of residential development. The Union Pacific connection would cross over Cat Creek, and Interstate 44, and SH 66 to tie into the BSNF corridor through the center of Claremore.

In the Downtown Limits of the grade separation project, the UPRR would require an additional mainline on the embankment due to the amount of traffic currently on the main line. This would entail widening the embankment for the length of the project for the additional track. With this additional track, the bridges would require widening. Due to constructability requirements, it has been our experience that the minimum track center that would allow bridges to be constructed while under traffic is 25 feet. This would account for the additional embankment widening as well.

Similar consideration would be made for the Expanded Limits for the track centers south of Archer Drive. The 25-foot track center, again, allows for construction of the bridges under rail traffic, but would require additional embankment outside of the bridge area. For the Expanded Limits the track could either be on the west side of the new main line, or on the west side of the existing main line. The connection between the BNSF and UPRR would require crossovers to be placed at both the north and south end of the combined corridor to make connections to the necessary tracks.

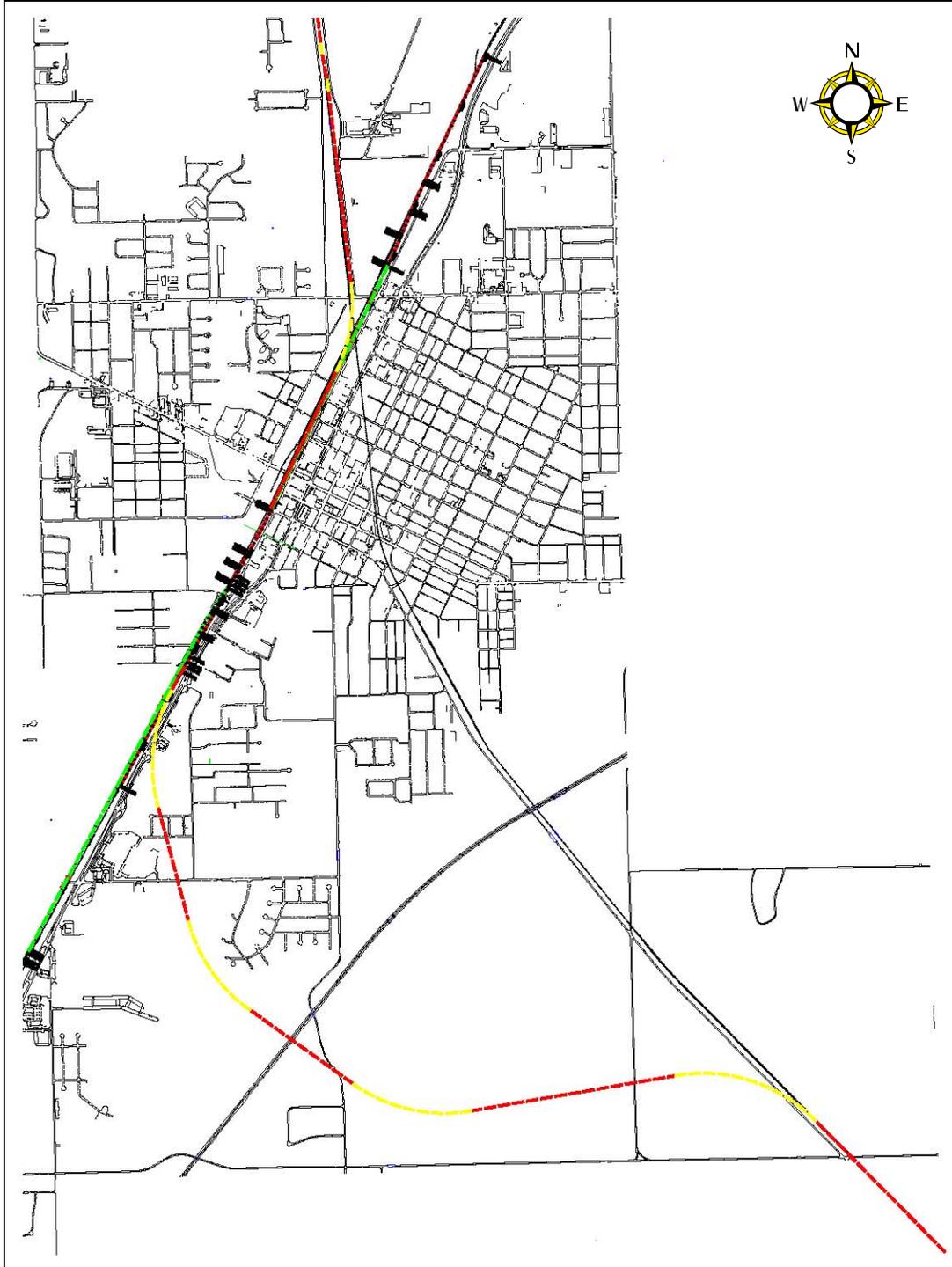
A preliminary cost estimate has been prepared for this concept however to account for the large property acquisition required and potential environmental constraints this cost estimate includes a higher contingency. The cost of this concept is estimated at \$60.6 Million.

UPRR Grade Separations

The cost of combining the UPRR and BNSF corridors and the environmental and social costs associated with that proposal suggest that other alternatives should be explored. Elevating the UPRR through Claremore will present similar cost and property acquisition issues; however, a grade separation appears to be viable at two locations on the corridor.

The UPRR track sits on a ridge at Cherokee Avenue and 6th Street. At these two streets the approach grade to the railroad crossing raises approximately 8-10 feet. Using this natural elevation advantage these roadways could be taken under the UPRR to provide a grade-separated underpass on this corridor. No specific design concepts have been created for these locations but as traffic grows on these streets a grade separation could be considered. An initial review of the area does indicate that there may be a drainage issue at these locations but further investigation would be required to determine if a sump condition would exist at the underpass.

Exhibit 16. Combined Corridor Concept



Section 7 – Funding Resources

Obtaining the resources necessary for to fund any of the options will require a variety of funding sources. Various sources of funds that could be pursued to make one of the options financially feasible are discussed here:

Statewide Transportation Improvement Program – Fiscal Year 2007, 2008, 2009 & 2010

The current Statewide Transportation Improvement Program for fiscal year 2007, 2008, 2009 & 2010 list the projects that have funds committed for the next 4 years in Oklahoma. In this document the following two projects are listed for Claremore under the SAFETEA-LU Special Projects section:

#1513 Construction of rail crossing in Claremore at Blue Star Drive & SH66, with \$320,000 for the years 2005 through 2009, totaling \$1,600,000.

#4675 Construction of rail crossing in Claremore at Blue Star Drive & SH66, with \$80,000 for the years 2005 through 2009, totaling \$400,000.

These funds are available to improve the rail crossings in Claremore. Two years, 2005 and 2006, of funds are currently available. After federal take down, 2005 and 2006 available funds from Line Item 1513 is \$549,519 and from Line Item 4675 is \$137,380. In October or November, the third year should also be available. The total for these three years is \$1,200,000 before federal take down. These funds require a 20% non-federal match.

In addition, there is \$500,000 available from Section 115 of the FFY 2004 Appropriations Act and \$2,000,000 available from Section 330 from the FFY 2002 Appropriations Act. These are 100% federal Funds and do not require any match.

Capitol Grants for Rail Line Relocation

On August 10, 2005, President George W. Bush signed the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). SAFETEA-LU authorizes the Federal surface transportation programs for highways, highway safety, and transit for the 5-year period 2005-2009. Title IX of this Act provides directive on rail transportation programs and Section 9002 describes the Capital Grants for Rail Line Relocation Projects. This section of the Act establishes a grant program to provide financial assistance for local rail line relocation and improvement projects that are "carried out for the purpose of mitigating the adverse effects of rail traffic safety, motor vehicle flow, community quality of life, or economic development." This grant program will fund projects that involve a lateral or vertical relocation of any portion of the rail line up to \$20 million with a shared cost of 10% by the state or other non-Federal entities.

Funding for this grant program has not been appropriated in FY 2005 or 2006, so in order to obtain these funds, the City will need to discuss and make an application for this program with the appropriate US Congressional staff. The grant application would then need to be a part of the yearly federal appropriations process.

Safe Routes to School

Another part of SAFETEA-LU, was the creation of the Safe Routes to School program that provides funds for sidewalks, trails and access to schools along public roads within a 2-mile radius of the school. At present, ODOT has approximately \$2,000,000 available for this program through federal fiscal year 2006. However, the State at this time, has not determined a process to make application for these funds and does not have a timeframe for the new process. Another program that provides similar funds is the Transportation Enhancement Program.

Transportation Enhancement Fund

The transportation enhancement program is another federal program that was originally established as a part of the federal transportation bill in 1991, continued in 1998 and in 2005 under SAFETEA-LU. The transportation enhancement program funds activities that are related to surface transportation in the following categories:

- (A) Provision of facilities for pedestrians and bicycles.
- (B) Provision of safety and educational activities for pedestrians and bicyclists.
- (C) Acquisition of scenic easements and scenic or historic sites (including historic battlefields).
- (D) Scenic or historic highway programs (including the provision of tourist and welcome center facilities).
- (E) Landscaping and other scenic beautification.
- (F) Historic preservation.
- (G) Rehabilitation and operation of historic transportation buildings, structures, or facilities (including historic railroad facilities and canals).
- (H) Preservation of abandoned railway corridors (including the conversion and use of the corridors for pedestrian or bicycle trails).
- (I) Inventory, control, and removal of outdoor advertising.
- (J) Archaeological planning and research.
- (K) Environmental mitigation--
 - (i) to address water pollution due to highway runoff; or
 - (ii) reduce vehicle-caused wildlife mortality while maintaining habitat connectivity.
- (L) Establishment of transportation museums.

ODOT receives approximately \$12,000,000 per year for this program. The State Department of Transportation has a Transportation Enhancement Program where 50% of the above funds are available to local governments through an application process for enhancement projects on a two year cycle. Projects under this program receive 80% federal funds with a 20% match. This fall \$12,000,000 will be available for the next two year project application cycle. Applications are due for this cycle on October 2, 2006.

Tax Increment Financing

Tax increment financing is used as a means to entice business decision makers to move into certain designated areas of a community to invest, make improvements and provide jobs. Tax increment financing will permit cities, towns and counties to pledge future tax increments to the repayment of debt such as bonds financing over several years. Bonds are pledged and paid off by the incremental rising of ad valorem property taxes that increase each year due to redevelopment and increased jobs generated. As a result, TIF funds are invested back into the district for public improvements, including roads, sewers, sidewalks and lighting. The 2004 Oklahoma State Legislature referred State Question 707 to state voters to decide if they wanted to allow multi-year pledging of TIF funds to amortize bonds over a period of time without raising taxes in order to make major public improvements to specific areas of a city, town or county for redevelopment and job creation. State Question 707 was approved by in the November 2004 general election.

More investigation into this funding mechanism needs to be completed but initial indications are that this type of financing could be applied to the undeveloped area near the defunct factory west of the BNSF between Archer Drive and Country Club Road.

Railroad Funding

The BNSF typically provides a 5% match for the cost of the structure to eliminate an at-grade railroad crossing. There have been no specific discussions regarding this project with the BNSF however they have participated in similar projects around the country.

Federal Aid Funds

Each year ODOT provides \$3,000,000 of Surface Transportation Program (STP) federal funds to local governments through an application process. This ODOT program provides 75% of the construction cost and requires that the local government provide a 25% match plus funds the engineering services. Applications are taken throughout the year for this program.

Cost Analysis

The city already has funds available through SAFETEA-LU and previous appropriations. These funds would total approximately \$3.75 Million in 2009 and would require a non-federal match of around \$340,000. This total would allow for completion of design and could cover other up front costs like utility relocations, environmental documentation, or property acquisitions for the chosen concept. While the existing funds are being used to advance the project other funding sources can be identified and pursued to fully fund the project through construction.

Section 8 – Study Summary and Conclusions

This Railroad Study for Improvement Projects has been prepared for the City of Claremore, Oklahoma to study the feasibility of elevating the BNSF railroad to provide grade separated underpass locations for vehicular traffic and to remove the diamond crossing with the UPRR and the BNSF. The study also provides an update to the 2003 Blue Starr Drive cost estimate, describes the design, impacts and costs of the elevated railroad design, and provides alternatives to the UPRR corridor.

Summary of Options Developed

The BNSF railroad elevation concept was presented in two segments, the Downtown Limits and the Expanded Limits. The Downtown Limits extends from north of Blue Starr Drive to approximately Archer Drive. This concept shifts the mainline 55 feet east and elevates the railroad on an embankment or bridges. Roadway underpasses are provided at Blue Starr Drive, 6th Street, Will Rogers Boulevard, 1st Street and Claremore Street. Archer Drive would be closed with this concept. The estimated cost for this segment is \$35.8 Million for a single track design.

The Expanded Limits extends the Downtown Limits south of Country Club Road. This segment will shift the existing mainline track 55 feet west and elevate it on an embankment. This concept provides two additional grade separations at Country Club Road and a new extension of Reavis Road. The estimated cost for this segment is \$10.7 Million for a single track design.

A review of the 2003 Blue Starr Drive Overpass cost estimate was completed. The current 2006 estimated cost for the overpass design is \$5.6 Million, a \$1.4 Million increase from the original study.

A Quiet Zone was developed for the UPRR corridor at the nine crossings from Blue Starr Drive to Florence Avenue. A "Quiet Zone" is a segment of a rail line where the locomotive horn is not routinely sounded at public highway-rail grade crossings. To become a Quiet Zone, Supplemental Safety Measures are installed at grade crossings as substitute for the train horn. Four Quadrant Gates, Medians, and crossing closure were Supplemental Safety Measures recommended at the crossings. There is a formal application process to follow and costs for the installation will range from \$2.2 to \$2.8 Million.

Discussion of other improvement projects included an overall Transportation Network Plan, a concept to combine the BNSF and UPRR corridors and target locations for a grade separation on the UPRR.

Study Conclusions

This Study was initiated to find a solution to overall community safety and congestion concerns related to the interaction between vehicle and train traffic. Each option presented for elevating the BNSF is technically feasible. It appears that all options are financially feasible using multiple funding sources. Emergency access and safety, school transportation route impacts, social impacts and traffic circulation will also be improved with the implementation of this concept.

Considering technical, financial and overall feasibility, the Railroad Elevation option appears to address the long-term transportation needs in Claremore. Overall, the Railroad Elevation option would provide a long-term solution to the congestion and safety needs because it eliminates all vehicle-train interaction on the BNSF Cherokee subdivision with five to seven roadway underpasses. Pursuing funding for this option is still unclear as Section 9002 has not been appropriated and other sources would need to be investigated. It would be important to discuss application for these funds with the appropriate US Congressional staff.

Appendix A – Concept Designs

Insert Rail Line Relocation Concept Design

Appendix B – Cost Estimates

Updated 2003 Blue Starr Drive – Bridge

	Description	Units	Quantity	Cost	Total	Revised Cost	Revised Total
1.	Approach Slab	SY	358	\$110	\$39,380	\$125	\$44,750
2.	PCB TY III	LF	5,438	\$65	\$353,470	\$115	\$625,370
3.	Concrete Slab	SF	39,762	\$12	\$477,144	\$13	\$516,906
4.	Sidewalk	SY	1,022	\$25	\$25,550	\$35	\$35,770
5.	Bridge Rail	LF	2,300	\$60	\$138,000	\$80	\$184,000
6.	Concrete Structures	CY	420	\$450	\$189,000	\$675	\$283,500
7.	Drilled Shafts (36")	LF	1,700	\$95	\$161,500	\$130	\$221,000
8.	Sealed Expansion Joint	LF	157	\$65	\$10,205	\$80	\$12,560
9.	Conc. Paved Rip Rap Header	CY	0	\$215	\$0	\$300	\$0
10.	MSE Retaining Wall	SF	10,078	\$20	\$201,560	\$35	\$352,730
11.	Subtotal				\$1,595,809		\$2,276,586
12.	Contingency	%	20		\$319,162		\$455,317
13.	Total for Blue Starr Drive - Bridge				\$1,941,971		\$2,731,903
Total Difference Blue Starr Drive - Bridge							\$816,932

Updated 2003 Blue Starr Drive – Roadway

	Description	Units	Quantity	Cost	Total	Revised Cost	Revised Total
1.	ROW Cleaning / Restoring, etc.	LF	670	\$750	\$502,500	\$900	\$603,000
2.	Extension of Industrial Blvd.	SY	2800	\$110	\$308,000	\$135	\$378,000
3.	Offsite Intersection Improvements	SY	1520	\$110	\$167,200	\$135	\$205,200
5.	Earthwork (Embankments, etc.)	CY	10900	\$10	\$109,000	\$12	\$130,800
6.	Pavement Demolition	SY	7900	\$8	\$63,200	\$10	\$79,000
7.	Mobilization	LS	1	\$100,000	\$100,000	\$100,000	\$100,000
8.	Traffic Signal	EA	1	\$100,000	\$100,000	\$150,000	\$150,000
9.	At-grade RR crossing and signal	EA	1	\$250,000	\$250,000	\$250,000	\$250,000
10.	Subtotal				\$1,599,900		\$1,896,000
11.	Contingency	%	20		\$319,980		\$379,200
12.	Total for Blue Starr Drive - Road				\$1,919,880		\$2,275,200
Total Difference Blue Starr Drive - Roadway							\$355,320

Updated 2003 Blue Starr Drive – Land & Building Acquisition

	Description	Acreage	Original Cost / Acre	Original Land and Building Cost	Revised Cost / Acre	Revised Land and Building Cost	NOTE
1.	Parcel No. 1 - Comm. - Quinn	0.047	\$175,000	\$8,225	\$350,000	\$16,450	1
2.	Parcel No. 2 - Res. - Hinds	0.223	\$65,340	\$58,071	\$75,000	\$76,725	2
3.	Parcel No. 3 - Comm. - BNSF	1.218	\$175,000	\$213,150	\$250,000	\$304,500	
5.	Parcel No. 4 - Comm. - Claremore Funeral Home	0.167	\$175,000	\$29,225	\$350,000	\$58,450	
6.	Parcel No. 5 - Comm. - Hinds	0.025	\$175,000	\$4,375	Use Min.	\$10,000	3
7.	Parcel No. 6 - Comm. - Warren	0.024	\$175,000	\$4,200	Use Min.	\$10,000	3
8.	Parcel No. 7 - Comm. - Gripado's	0.093	\$175,000	\$16,275	\$300,000	\$27,900	
9.	Parcel No. 8 - Comm. - BNSF	0.028	\$175,000	\$4,900	Use Min.	\$10,000	3
10.	Parcel No. 9 - Comm. - Patriot Fuels	0.024	\$175,000	\$4,200	Use Min.	\$10,000	3
11.	Subtotal			\$342,621		\$524,025	
12.	Contingency	%	20	\$68,524		\$104,805	
13.	Total for Blue Starr Drive Land & Building			\$411,145		\$628,830	
Total Difference Blue Starr Drive – Land & Building Acquisition						\$217,685	

1. Small quantity with a much higher property value.
2. \$60,000 assessed FMV of building.
3. Use Min. = A minimum estimated cost was assigned at \$10,000.

**Railroad Elevation
Downtown Limits**

	Description	Units	Single Track			Double Track		
			Quantity	Cost	Total	Quantity	Cost	Total
Site Preparation								
1.	Mobilization	LS	1	\$50,000	\$50,000	0	\$0	\$0
2.	Clearing and Grubbing	AC	20	\$2,500	\$50,000	23	\$2,500	\$57,500
3.	Seeding	AC	14	\$1,500	\$21,000	16	\$1,500	\$24,000
4.	Erosion Control	AC	20	\$2,000	\$40,000	23	\$2,000	\$46,000
5.	Embankment	CY	226,000	\$7.50	\$1,695,000	265,000	\$8	\$2,120,000
6.	Excavation	CY	1,200	\$4.00	\$4,800	0	\$0	\$0
7.	Subballast - 12" Depth	CY	6,100	\$35	\$241,500	8,850	\$35	\$309,800
8.	Access Road - (Crushed Rock 6")	CY	0	\$0	\$0	0	\$0	\$0
9.	Fencing - 5 strand barbed wire	LF	0	\$0	\$0	0	\$0	\$0
	Total Site Preparation				\$2,102,300			\$2,557,300
Structures								
1.	Prestressed I-Girders	LF	2,460	\$5,500	\$13,530,000	0	\$0	\$0
2.	P/S I-Girders – Sub. Only 2 nd Track	LF	0	\$0	\$0	2,460	\$2,500	\$6,150,000
3.	Prestressed Double Cell Box Girders	LF	540	\$5,000	\$2,700,000	0	\$0	\$0
4.	P/S Dbl. Cell Box Girders – Sub. Only 2 nd Track	LF	0	\$0	\$0	540	\$3,500	\$1,890,000
5.	Steel Plate Girder	LF	235	\$8,500	\$1,997,500	0	\$0	\$0
6.	Steel P/G – Sub. Only 2 nd Track	LF	0	\$0	\$0	235	\$3,300	\$775,500
7.	Permanent Retaining Walls	SF	33,840	\$45	\$1,522,800	800	\$45	\$36,000
8.	Temporary Retaining Walls	SF	16,500	\$30	\$495,000	0	\$0	\$0
9.	Culverts	LS	1	\$150,000	\$150,000	1	\$150,000	\$150,000
	Total Structures				\$20,395,300			\$9,001,500
Right of Way								
1.	Property Acquisition	AC	0	\$0	\$0	0	\$0	\$0
2.	Permitting	LS	1	\$10,000	\$10,000	0	\$0	\$0
	Total Right-of-Way				\$10,000			\$0
Track Work Labor								
1.	Construct Skeleton Track	TF	8,571	\$15	\$128,600	0	\$0	\$0
2.	Construct Track (Second Hand Mat'l)	TF	1,900	\$25	\$47,500	0	\$0	\$0
3.	Shift Track	TF	510	\$15	\$7,700	0	\$0	\$0
4.	Dump Ballast	TN	15,078	\$2	\$30,200	0	\$0	\$0
5.	Surface, Line, and Tamp	TF	10,981	\$3	\$32,900	0	\$0	\$0
6.	Install Temp. Turnout	LS	1	\$120,000	\$120,000	0	\$0	\$0
7.	Relocate No. 15 Turnout	LS	1	\$35,000	\$35,000	0	\$0	\$0
8.	Retire No. 11 Turnout	LS	1	\$10,000	\$10,000	0	\$0	\$0
	Total Track Work Labor				\$411,900			\$0
Track Material								
1.	Rail - CWR	LF	17,142	\$22.67	\$388,600	0	\$0	\$0
2.	Ties – Concrete	EA	5,274	\$85	\$448,300	0	\$0	\$0
3.	Ballast (12", supply Martin Marietta)	TN	15,078	\$20	\$301,600	0	\$0	\$0
4.	Rail Stop	EA	0	\$0	\$0	0	\$0	\$0
	Total Track Material				\$1,138,500			\$0
SUBTOTAL – Page 1					\$24,058,000	\$11,558,800		

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**Railroad Elevation – Continued
Downtown Limits**

	Description	Units	Single Track			Double Track		
			Quantity	Cost	Total	Quantity	Cost	Total
Road Crossings								
1.	Blue Starr Road	LS	1	\$391,000	\$391,000	0	\$0	\$0
2.	6 th Street	LS	1	\$112,300	\$112,300	0	\$0	\$0
3.	Will Rogers Drive	LS	1	\$308,000	\$308,000	0	\$0	\$0
4.	1 st Street	LS	1	\$257,900	\$257,900	0	\$0	\$0
5.	Claremore Street	LS	1	\$354,800	\$354,800	0	\$0	\$0
	Total Roadway				\$1,424,000			\$0
Utilities								
1.	Utility Relocation / Protection at Road Crossing	EA	6	\$100,000	\$600,000	0	\$0	\$0
2.	Utility Relocation (Interceptor Sewer)	LS	1	\$150,000	\$150,000	0	\$0	\$0
3.	Utility Relocation (Underground Pipeline)	LS	1	\$25,000	\$25,000	0	\$0	\$0
4.	Utility Relocation (Miscellaneous)	LS	1	\$100,000	\$100,000	0	\$0	\$0
	Total Utilities				\$875,000			\$0
Contingencies								
1.	Job Contingencies	%	20	\$26,357,000	\$5,271,400	20	\$11,558,800	\$2,311,800
	Total Contingencies				\$5,271,400			\$2,311,800
Engineering								
1.	Engineering	%	5.0	\$26,357,000	\$1,317,900	5.0	\$11,558,800	\$577,900
2.	Construction Management	%	7.0	\$26,357,000	\$1,845,000	7.0	\$11,558,800	\$809,100
	Total Engineering				\$3,162,900			\$1,387,000
Signal								
1.	Signal	LS	1	\$817,100	\$817,100	0	\$0	\$0
	Total Signal				\$817,100			\$0
Work Train Service								
1.	Work Train	DY	15	\$1,500	\$22,500	0	\$0	\$0
	Total Work Train				\$22,500			\$0
Flagging								
1.	Flagging	DY	225	\$800	\$180,000	0	\$0	\$0
	Total Flagging				\$180,000			\$0
	SUBTOTAL				\$11,752,900			\$11,558,800
	SUBTOTAL – Page 1				\$24,058,000			\$3,698,800
	TOTAL – Railroad Elevation Downtown Limits				\$35,810,900			\$15,257,600

**Railroad Elevation
Expanded Limits**

	Description	Units	Single Track			Double Track		
			Quantity	Cost	Total	Quantity	Cost	Total
Site Preparation								
1.	Mobilization	LS	1	\$50,000	\$50,000	0	\$0	\$0
2.	Clearing and Grubbing	AC	24	\$2,500	\$60,000	27	\$2,500	\$67,500
3.	Seeding	AC	18	\$1,500	\$27,000	20	\$1,500	\$30,000
4.	Erosion Control	AC	24	\$2,000	\$48,000	27	\$2,000	\$54,000
5.	Embankment	CY	260,000	\$6.00	\$1,560,000	366,000	\$6	\$2,196,000
6.	Excavation	CY	1,200	\$4.00	\$4,800	0	\$0	\$0
7.	Subballast - 12" Depth	CY	11,110	\$35	\$388,900	16,665	\$35	\$583,300
8.	Access Road - (Crushed Rock 6")	CY	0	\$0	\$0	0	\$0	\$0
Total Site Preparation					\$2,138,700			\$2,930,800
Structures								
1.	Prestressed Double Cell Box Girders	LF	182	\$5,000	\$910,000	0	\$0	\$0
2.	P/S Dbl. Cell Box Girders – Sub. Only 2 nd Track	LF	0	\$0	\$0	182	\$3,500	\$637,000
3.	Steel Plate Girder	LF	197	\$8,500	\$1,674,500	0	\$0	\$0
4.	Steel P/G – Sub. Only 2 nd Track	LF	0	\$0	\$0	197	\$3,300	\$650,100
5.	Temporary Retaining Walls	SF	8,000	\$30	\$240,000	0	\$0	\$0
6.	Culverts	LS	1	\$350,000	\$350,000	0	\$0	\$0
Total Structures					\$3,174,500			\$1,287,100
Right of Way								
1.	Property Acquisition	AC	10	\$15,000	\$150,000	13	\$15,000	\$195,000
2.	Permitting	LS	1	\$10,000	\$10,000	0	\$0	\$0
Total Right-of-Way					\$160,000			\$195,000
Track Work Labor								
1.	Construct Skeleton Track	TF	10,300	\$15	\$154,500	0	\$0	\$0
2.	Shift Track	TF	340	\$15	\$5,100	0	\$0	\$0
3.	Dump Ballast	TN	14,832	\$2.00	\$29,700	0	\$0	\$0
4.	Surface, Line, and Tamp	TF	10,640	\$3.00	\$31,900	0	\$0	\$0
5.	Relocate No. 11 Turnout	LS	1	\$35,000	\$35,000	0	\$0	\$0
6.	Retire No. 11 Turnout	LS	1	\$10,000	\$10,000	0	\$0	\$0
Total Track Work Labor					\$266,200			\$0
Track Material								
1.	Rail - CWR	LF	20,600	\$22.67	\$467,000	0	\$0	\$0
2.	Ties – Concrete	EA	6,338	\$85	\$538,700	0	\$0	\$0
3.	Ballast (12",supplied by Martin Marietta)	TN	14,832	\$20	\$296,600	0	\$0	\$0
Total Track Material					\$1,302,300			\$0
Utilities								
1.	Utility Relocation/Protection at Road Crossing	EA	1	\$100,000	\$100,000	0	\$0	\$0
2.	Utility Relocation (Underground Pipeline)	LS	1	\$25,000	\$25,000	0	\$0	\$0
3.	Utility Relocation (Miscellaneous)	LS	1	\$100,000	\$100,000	0	\$0	\$0
Total Utilities					\$225,000			\$0
SUBTOTAL – Page 1					\$7,266,700			\$4,412,900

CONTINUED ...

**Railroad Elevation – Continued
Expanded Limits**

	Description	Units	Single Track			Double Track		
			Quantity	Cost	Total	Quantity	Cost	Total
	Road Crossings							
1.	Reavis Road Extension	LS	1	\$430,500	\$430,500	0	\$0	\$0
2.	Country Club Road	LS	1	\$184,000	\$184,000	0	\$0	\$0
	Total Roadway				\$614,500			\$0
	Contingencies							
1.	Job Contingencies	%	20	\$7,881,200	\$1,576,200	20	\$4,412,900	\$882,600
	Total Contingencies				\$1,576,200			\$882,600
	Engineering							
1.	Engineering	%	5.0	\$7,881,200	\$394,100	5.0	\$4,412,900	\$220,600
2.	Construction Management	%	7.0	\$7,881,200	\$551,700	7.0	\$4,412,900	\$308,900
	Total Engineering				\$945,800			\$529,500
	Signal							
1.	Signal	LS	1	\$215,000	\$215,000	0	\$0	\$0
	Total Signal				\$215,000			\$0
	Work Train Service							
1.	Work Train	DY	10	\$1,500	\$15,000	0	\$0	\$0
	Total Work Train				\$15,000			\$0
	Flagging							
1.	Flagging	DY	125	\$800	\$100,000	0	\$0	\$0
	Total Flagging				\$100,000			\$0
	SUBTOTAL					\$3,466,500		\$1,412,100
	SUBTOTAL – Page 1					\$7,266,700		\$4,412,900
	TOTAL – Railroad Elevation Expanded Limits					\$10,733,200		\$5,825,000

Combined Corridor Concept

	Description	Units	Quantity	Cost	Total
Site Preparation					
1.	Mobilization	LS	1	\$50,000	\$50,000
1.	Clearing and Grubbing	AC	69	\$2,500	\$172,500
2.	Seeding	AC	55	\$1,500	\$82,500
3.	Erosion Control	AC	69	\$2,000	\$138,000
4.	Embankment	CY	480,000	\$6.00	\$2,880,000
5.	Excavation	CY	240,000	\$3.50	\$840,000
6.	Subballast - 12" Depth	CY	33,372	\$35	\$1,168,000
7.	Access Road - (Crushed Rock 6")	CY			
8.	Fencing - 5 strand barbed wire	LF	60,070	\$20	\$1,201,400
	Total Site Preparation				\$6,532,400
Structures					
1.	Prestressed I-Girders	LF	1,120	\$5,500	\$6,160,000
2.	Prestressed Double Cell Box Girders	LF	1,100	\$5,000	\$5,500,000
3.	Steel Plate Girder	LF	800	\$8,500	\$6,800,000
4.	Permanent Retaining Walls	SF	30,330	\$45	\$1,364,900
5.	Temporary Retaining Walls	SF	8,000	\$30	\$240,000
6.	Culverts	LS	1	\$750,000	\$750,000
	Total Structures				\$20,814,900
Right of Way					
1.	Rural Property Acquisition	AC	52	\$5,000	\$262,400
2.	Urban Property Acquisition (From Holiday Drive)	LS	1	\$3,967,006	\$3,967,006
3.	Urban Property Acquisition	AC	17	\$45,000	\$743,800
4.	Property Acquisition (Purchase/Relocate Residential)	EA	25	\$150,000	\$3,750,000
5.	Property Acquisition (Purchase/Relocate Commercial)	EA	4	\$350,000	\$1,400,000
6.	Permitting	LS	1	\$25,000	\$25,000
	Total Right-of-Way				\$10,148,200
Track Work Labor					
1.	Construct Skeleton Track	TF	30,035	\$15	\$450,500
2.	Shift Track	TF	340	\$15	\$5,100
3.	Retire Track	TF	20,385	\$15	\$305,800
4.	Dump Ballast	TN	43,250	\$2.00	\$86,500
5.	Surface, Line, and Tamp	TF	30,375	\$3.00	\$91,100
6.	No. 20 Crossovers (Purchase and Installed by RR)	EA	2	\$350,000	\$700,000
7.	No. 11 Temporary Turnout	EA	1	\$120,000	\$120,000
8.	Relocate No. 11 Turnout	EA	1	\$35,000	\$35,000
9.	Retire No. 11 Turnout	EA	1	\$10,000	\$10,000
	Total Track Work Labor				\$1,804,000
Track Material					
1.	Rail - CWR	LF	60,070	\$22.67	\$1,361,800
2.	Ties – Concrete	EA	18,483	\$85	\$1,571,100
3.	Ballast (12",supplied by Martin Marietta)	TN	43,250	\$20	\$865,000
	Total Track Material				\$3,797,900
SUBTOTAL – Page 1					\$43,097,400

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Combined Corridor Concept - Continued

	Description	Units	Quantity	Cost	Total
Road Crossings					
1.	At Grade Road Crossing - Public	TF	50	\$850	\$42,500
2.	At Grade Road Crossing - Private	TF	50	\$200	\$10,000
3.	Public Paved Road	SY	2,000	\$20	\$40,000
4.	Public Rock Road	SY	3,111	\$15	\$46,700
5.	Private Access Road	SY			
6.	Signal Work for Public Crossing	LS	1	\$200,000	\$200,000
	Total Roadway				\$339,200
Contingencies					
1.	Job Contingencies	%	20	\$46,470,600	\$9,294,100
	Total Contingencies				\$9,053,000
Engineering					
1.	Engineering	%	5.0	\$46,470,600	\$2,323,500
2.	Construction Management	%	7.0	\$46,470,600	\$3,252,900
	Total Engineering				\$5,576,400
Signal					
1.	Signal	LS	1	\$2,209,000	\$2,209,000
	Total Signal				\$2,209,000
Work Train Service					
1.	Work Train	DY	30	\$1,500	\$45,000
	Total Work Train				\$45,000
Flagging					
1.	Flagging	DY	330	\$800	\$264,000
	Total Flagging				\$264,000
				SUBTOTAL	\$17,486,600
				SUBTOTAL - Page 1	\$43,097,400
				TOTAL - Combined Corridor	\$60,584,000

Blue Starr Drive – Roadway Improvements

	Description	Units	Quantity	Cost	Total
Road Crossings					
1.	Clearing and Grubbing	LS	1	\$3,500.00	\$ 3,500.00
2.	Unclassified Excavation	CY	3000	\$7.00	\$ 21,000.00
3.	Type A-Salvaged Topsoil	LS	1	\$5,000.00	\$ 5,000.00
4.	Temporary Erosion Control	LS	1	\$2,500.00	\$ 2,500.00
5.	Solid Slab Sodding	SY	1000	\$2.00	\$ 2,000.00
6.	Aggregate Base, Type A	CY	750	\$25.00	\$ 18,750.00
7.	Asphalt Concrete, Type S2 (PG64-22OK)	Ton	120	\$50.00	\$ 6,000.00
8.	Asphalt Concrete, Type S3 (PG76-28OK)	Ton	60	\$53.00	\$ 3,180.00
9.	Asphalt Concrete, Type S4 (PG76-28OK)	Ton	40	\$55.00	\$ 2,200.00
10.	P.C. Concrete Paving (9-inch Dowel Jointed)	SY	3100	\$50.00	\$ 155,000.00
11.	6" Integral Barrier Curb	LF	1000	\$5.00	\$ 5,000.00
12.	4" Concrete Sidewalk	SY	1100	\$35.00	\$ 38,500.00
13.	6" Concrete Driveways (HES)	SY	0	\$35.00	\$ -
14.	6" Bituminous Driveway	SY	0	\$15.00	\$ -
15.	Manholes	EA	4	\$2,000.00	\$ 8,000.00
16.	Manhole Frame and Cover	EA	4	\$300.00	\$ 1,200.00
17.	Inlet CICI Design No. 2(2B)	EA	4	\$2,000.00	\$ 8,000.00
18.	Inlet (SMD-Type 2)	EA	2	\$1,500.00	\$ 3,000.00
19.	Inlet Frame & Grate	EA	8	\$250.00	\$ 2,000.00
20.	Cast Iron Curb Inlets	EA	28	\$200.00	\$ 5,600.00
21.	24" Reinforced Concrete Pipe, Round	LF	740	\$50.00	\$ 37,000.00
22.	Perforated Pipe Underdrain - 4" PVC Sch. 40	LF	1000	\$20.00	\$ 20,000.00
23.	Removal of Structures and Obstructions	LS	1	\$5,000.00	\$ 5,000.00
24.	Removal of Asphalt Paving	SY	200	\$2.00	\$ 400.00
25.	Removal of Concrete Paving	SY	2675	\$5.00	\$ 13,375.00
26.	Sawing Pavement	LF	250	\$2.00	\$ 500.00
27.	Mobilization	LS	1	\$21,750.00	\$ 21,750.00
28.	Staking	LS	1	\$2,500.00	\$ 2,500.00
	Total Roadway				\$390,955
Contingencies					
1.	Job Contingencies	%	20	\$390,955	\$78,191
	Total Contingencies				\$78,191
TOTAL – Blue Starr Drive					\$469,146

Sixth Street – Roadway Improvements

	Description	Units	Quantity	Cost	Total
Road Crossings					
1.	Clearing and Grubbing	LS	1	\$3,500.00	\$3,500.00
2.	Unclassified Excavation	CY	1000	\$7.00	\$7,000.00
3.	Type A-Salvaged Topsoil	LS	1	\$5,000.00	\$5,000.00
4.	Temporary Erosion Control	LS	1	\$2,500.00	\$2,500.00
5.	Solid Slab Sodding	SY	500	\$2.00	\$1,000.00
6.	Aggregate Base, Type A	CY	225	\$25.00	\$5,625.00
7.	Asphalt Concrete, Type S2 (PG64-22OK)	Ton	310	\$50.00	\$15,500.00
8.	Asphalt Concrete, Type S3 (PG76-28OK)	Ton	105	\$53.00	\$5,565.00
9.	Asphalt Concrete, Type S4 (PG76-28OK)	Ton	70	\$55.00	\$3,850.00
10.	P.C. Concrete Paving (9-inch Dowel Jointed)	SY	0	\$50.00	\$0.00
11.	6" Integral Barrier Curb	LF	500	\$15.00	\$7,500.00
12.	4" Concrete Sidewalk	SY	350	\$35.00	\$12,250.00
13.	6" Concrete Driveways (HES)	SY	0	\$35.00	\$0.00
14.	6" Bituminous Driveway	SY	0	\$15.00	\$0.00
15.	Manholes	EA	2	\$2,000.00	\$4,000.00
16.	Manhole Frame and Cover	EA	2	\$300.00	\$600.00
17.	Inlet CICI Design No. 2(2B)	EA	2	\$2,000.00	\$4,000.00
18.	Inlet (SMD-Type 2)	EA	2	\$1,500.00	\$3,000.00
19.	Inlet Frame & Grate	EA	4	\$250.00	\$1,000.00
20.	Cast Iron Curb Inlets	EA	8	\$200.00	\$1,600.00
21.	24" Reinforced Concrete Pipe, Round	LF	100	\$50.00	\$5,000.00
22.	Perforated Pipe Underdrain - 4" PVC Sch. 40	LF	450	\$15.00	\$6,750.00
23.	Removal of Structures and Obstructions	LS	1	\$2,500.00	\$2,500.00
24.	Removal of Asphalt Paving	SY	650	\$2.00	\$1,300.00
25.	Removal of Concrete Paving	SY	0	\$5.00	\$0.00
26.	Sawing Pavement	LF	140	\$2.00	\$280.00
27.	Mobilization	LS	1	\$10,500.00	\$10,500.00
28.	Staking	LS	1	\$2,500.00	\$2,500.00
	Total Roadway				\$112,320
Contingencies					
1.	Job Contingencies	%	20	\$112,320	\$22,464
	Total Contingencies				\$22,464
TOTAL – Sixth Street					\$134,784

Will Rogers Boulevard – Roadway Improvements

	Description	Units	Quantity	Cost	Total
Road Crossings					
1.	Clearing and Grubbing	LS	1	\$3,500.00	\$3,500.00
2.	Unclassified Excavation	CY	3900	\$7.00	\$27,300.00
3.	Type A-Salvaged Topsoil	LS	1	\$5,000.00	\$5,000.00
4.	Temporary Erosion Control	LS	1	\$2,500.00	\$2,500.00
5.	Solid Slab Sodding	SY	750	\$2.00	\$1,500.00
6.	Aggregate Base, Type A	CY	1000	\$25.00	\$25,000.00
7.	Asphalt Concrete, Type S2 (PG64-22OK)	Ton	360	\$50.00	\$18,000.00
8.	Asphalt Concrete, Type S3 (PG76-28OK)	Ton	180	\$53.00	\$9,540.00
9.	Asphalt Concrete, Type S4 (PG76-28OK)	Ton	120	\$55.00	\$6,600.00
10.	P.C. Concrete Paving (9-inch Dowel Jointed)	SY	2150	\$50.00	\$107,500.00
11.	6" Integral Barrier Curb	LF	660	\$5.00	\$3,300.00
12.	Combined Curb and Gutter - 6" Barrier	LF	500	\$15.00	\$7,500.00
13.	4" Concrete Sidewalk	SY	250	\$35.00	\$8,750.00
14.	6" Concrete Driveways (HES)	SY	100	\$35.00	\$3,500.00
15.	6" Bituminous Driveway	SY	0	\$15.00	\$0.00
16.	Manholes	EA	3	\$2,000.00	\$6,000.00
17.	Manhole Frame and Cover	EA	3	\$300.00	\$900.00
18.	Inlet CICI Design No. 2(2B)	EA	2	\$2,000.00	\$4,000.00
19.	Inlet (SMD-Type 2)	EA	2	\$1,500.00	\$3,000.00
20.	Inlet Frame & Grate	EA	6	\$250.00	\$1,500.00
21.	Cast Iron Curb Inlets	EA	12	\$200.00	\$2,400.00
22.	24" Reinforced Concrete Pipe, Round	LF	200	\$50.00	\$10,000.00
23.	Perforated Pipe Underdrain - 4" PVC Sch. 40	LF	660	\$20.00	\$13,200.00
24.	Removal of Structures and Obstructions	LS	1	\$5,000.00	\$5,000.00
25.	Removal of Asphalt Paving	SY	100	\$2.00	\$200.00
26.	Removal of Concrete Paving	SY	2150	\$5.00	\$10,750.00
27.	Sawing Pavement	LF	280	\$2.00	\$560.00
28.	Mobilization	LS	1	\$18,500.00	\$18,500.00
29.	Staking	LS	1	\$2,500.00	\$2,500.00
	Total Roadway				\$308,000
Contingencies					
1.	Job Contingencies	%	20	\$308,000	\$61,600
	Total Contingencies				\$61,600
TOTAL – Will Rogers Boulevard					\$369,600

First Street – Roadway Improvements

	Description	Units	Quantity	Cost	Total
Road Crossings					
1.	Clearing and Grubbing	LS	1	\$3,500.00	\$3,500.00
2.	Unclassified Excavation	CY	4125	\$7.00	\$28,875.00
3.	Type A-Salvaged Topsoil	LS	1	\$5,000.00	\$5,000.00
4.	Temporary Erosion Control	LS	1	\$2,500.00	\$2,500.00
5.	Solid Slab Sodding	SY	1500	\$2.00	\$3,000.00
6.	Aggregate Base, Type A	CY	600	\$25.00	\$15,000.00
7.	Asphalt Concrete, Type S2 (PG64-22OK)	Ton	660	\$50.00	\$33,000.00
8.	Asphalt Concrete, Type S3 (PG76-28OK)	Ton	330	\$53.00	\$17,490.00
9.	Asphalt Concrete, Type S4 (PG76-28OK)	Ton	220	\$55.00	\$12,100.00
10.	P.C. Concrete Paving (9-inch Dowel Jointed)	SY	0	\$50.00	\$0.00
11.	Combined Curb & Gutter - 6" Barrier	LF	860	\$15.00	\$12,900.00
12.	4" Concrete Sidewalk	SY	600	\$35.00	\$21,000.00
13.	6" Concrete Driveways (HES)	SY	120	\$35.00	\$4,200.00
14.	6" Bituminous Driveway	SY	120	\$15.00	\$1,800.00
15.	Manholes	EA	3	\$2,000.00	\$6,000.00
16.	Manhole Frame and Cover	EA	3	\$300.00	\$900.00
17.	Inlet CICI Design No. 2(2B)	EA	4	\$2,000.00	\$8,000.00
18.	Inlet (SMD-Type 2)	EA	2	\$1,500.00	\$3,000.00
19.	Inlet Frame & Grate	EA	8	\$250.00	\$2,000.00
20.	Cast Iron Curb Inlets	EA	20	\$200.00	\$4,000.00
21.	24" Reinforced Concrete Pipe, Round	LF	600	\$50.00	\$30,000.00
22.	Perforated Pipe Underdrain - 4" PVC Sch. 40	LF	860	\$20.00	\$17,200.00
23.	Removal of Structures and Obstructions	LS	1	\$2,500.00	\$2,500.00
24.	Removal of Asphalt Paving	SY	1720	\$2.00	\$3,440.00
25.	Removal of Concrete Paving	SY	200	\$5.00	\$1,000.00
26.	Sawing Pavement	LF	240	\$2.00	\$480.00
27.	Mobilization	LS	1	\$16,500.00	\$16,500.00
28.	Staking	LS	1	\$2,500.00	\$2,500.00
	Total Roadway				\$257,885
Contingencies					
1.	Job Contingencies	%	20	\$257,885	\$51,577
	Total Contingencies				\$51,577
TOTAL – First Street					\$309,462

Claremore Street – Roadway Improvements

	Description	Units	Quantity	Cost	Total
Road Crossings					
1.	Clearing and Grubbing	LS	1	\$3,500.00	\$3,500.00
2.	Unclassified Excavation	CY	5850	\$7.00	\$40,950.00
3.	Type A-Salvaged Topsoil	LS	1	\$5,000.00	\$5,000.00
4.	Temporary Erosion Control	LS	1	\$2,500.00	\$2,500.00
5.	Solid Slab Sodding	SY	2250	\$2.00	\$4,500.00
6.	Aggregate Base, Type A	CY	1100	\$25.00	\$27,500.00
7.	Asphalt Concrete, Type S2 (PG64-22OK)	Ton	1110	\$50.00	\$55,500.00
8.	Asphalt Concrete, Type S3 (PG76-28OK)	Ton	555	\$53.00	\$29,415.00
9.	Asphalt Concrete, Type S4 (PG76-28OK)	Ton	370	\$55.00	\$20,350.00
10.	P.C. Concrete Paving (9-inch Dowel Jointed)	SY	0	\$50.00	\$0.00
11.	Combined Curb & Gutter - 6" Barrier	LF	1500	\$15.00	\$22,500.00
12.	4" Concrete Sidewalk	SY	700	\$35.00	\$24,500.00
13.	6" Concrete Driveways (HES)	SY	0	\$35.00	\$0.00
14.	6" Bituminous Driveway	SY	0	\$15.00	\$0.00
15.	Manholes	EA	4	\$2,000.00	\$8,000.00
16.	Manhole Frame and Cover	EA	4	\$300.00	\$1,200.00
17.	Inlet CICI Design No. 2(2B)	EA	4	\$2,000.00	\$8,000.00
18.	Inlet (SMD-Type 2)	EA	2	\$1,500.00	\$3,000.00
19.	Inlet Frame & Grate	EA	6	\$250.00	\$1,500.00
20.	Cast Iron Curb Inlets	EA	24	\$200.00	\$4,800.00
21.	24" Reinforced Concrete Pipe, Round	LF	650	\$50.00	\$32,500.00
22.	Perforated Pipe Underdrain - 4" PVC Sch. 40	LF	1500	\$20.00	\$30,000.00
23.	Removal of Structures and Obstructions	LS	1	\$3,500.00	\$3,500.00
24.	Removal of Asphalt Paving	SY	1150	\$2.00	\$2,300.00
25.	Removal of Concrete Paving	SY	100	\$5.00	\$500.00
26.	Sawing Pavement	LF	120	\$2.00	\$240.00
27.	Mobilization	LS	1	\$20,500.00	\$20,500.00
28.	Staking	LS	1	\$2,500.00	\$2,500.00
	Total Roadway				\$354,755
Contingencies					
1.	Job Contingencies	%	20	\$354,755	\$70,951
	Total Contingencies				\$70,951
TOTAL – Claremore Street					\$425,706

Reavis Road – Roadway Improvements

	Description	Units	Quantity	Cost	Total
Road Crossings					
1.	Clearing and Grubbing	LS	1	\$3,500.00	\$3,500.00
2.	Unclassified Excavation	CY	2150	\$7.00	\$15,050.00
3.	Type A-Salvaged Topsoil	LS	1	\$5,000.00	\$5,000.00
4.	Temporary Erosion Control	LS	1	\$2,500.00	\$2,500.00
5.	Solid Slab Sodding	SY	600	\$2.00	\$1,200.00
6.	Aggregate Base, Type A	CY	460	\$25.00	\$11,500.00
7.	Asphalt Concrete, Type S2 (PG64-22OK)	Ton	540	\$50.00	\$27,000.00
8.	Asphalt Concrete, Type S3 (PG64-22OK)	Ton	270	\$53.00	\$14,310.00
9.	Asphalt Concrete, Type S4 (PG76-28OK)	Ton	180	\$55.00	\$9,900.00
10.	P.C. Concrete Paving (9-inch Dowel Jointed)	SY	0	\$50.00	\$0.00
11.	Class C Concrete	CY	30	\$250.00	\$7,500.00
12.	Combined Curb & Gutter - 6" Barrier	LF	700	\$15.00	\$10,500.00
13.	4" Concrete Sidewalk	SY	260	\$35.00	\$9,100.00
14.	6" Concrete Driveways (HES)	SY	0	\$35.00	\$0.00
15.	6" Bituminous Driveway	SY	0	\$15.00	\$0.00
16.	Manholes	EA	3	\$2,000.00	\$6,000.00
17.	Manhole Frame and Cover	EA	3	\$300.00	\$900.00
18.	Inlet CICI Design No. 2(2B)	EA	2	\$2,000.00	\$4,000.00
19.	Inlet (SMD-Type 2)	EA	1	\$1,500.00	\$1,500.00
20.	Inlet Frame & Grate	EA	5	\$250.00	\$1,250.00
21.	Cast Iron Curb Inlets	EA	12	\$200.00	\$2,400.00
22.	24" Reinforced Concrete Pipe, Round	LF	360	\$50.00	\$18,000.00
23.	Perforated Pipe Underdrain - 4" PVC Sch. 40	LF	690	\$20.00	\$13,800.00
24.	Removal of Structures and Obstructions	LS	1	\$2,500.00	\$2,500.00
25.	Removal of Asphalt Paving	SY	100	\$2.00	\$200.00
26.	Removal of Concrete Paving	SY	0	\$5.00	\$0.00
27.	Sawing Pavement	LF	160	\$2.00	\$320.00
28.	Mobilization	LS	1	\$13,500.00	\$13,500.00
29.	Staking	LS	1	\$2,500.00	\$2,500.00
	Total Roadway				\$183,930
Contingencies					
1.	Job Contingencies	%	20	\$183,930	\$36,786
	Total Contingencies				\$36,786
TOTAL – Reavis Road					\$220,716

Country Club Road – Roadway Improvements

	Description	Units	Quantity	Cost	Total
Road Crossings					
1.	Clearing and Grubbing	LS	1	\$3,500.00	\$3,500.00
2.	Unclassified Excavation	CY	6000	\$7.00	\$42,000.00
3.	Type A-Salvaged Topsoil	LS	1	\$5,000.00	\$5,000.00
4.	Temporary Erosion Control	LS	1	\$2,500.00	\$2,500.00
5.	Solid Slab Sodding	SY	2000	\$2.00	\$4,000.00
6.	Aggregate Base, Type A	CY	1220	\$25.00	\$30,500.00
7.	Asphalt Concrete, Type S2 (PG64-22OK)	Ton	1380	\$50.00	\$69,000.00
8.	Asphalt Concrete, Type S3 (PG76-28OK)	Ton	690	\$53.00	\$36,570.00
9.	Asphalt Concrete, Type S4 (PG76-28OK)	Ton	460	\$55.00	\$25,300.00
10.	P.C. Concrete Paving (9-inch Dowel Jointed)	SY	0	\$50.00	\$0.00
11.	Class C Concrete	CY	45	\$250.00	\$11,250.00
12.	Combined Curb & Gutter - 6" Barrier	LF	1410	\$15.00	\$21,150.00
13.	4" Concrete Sidewalk	SY	650	\$35.00	\$22,750.00
14.	6" Concrete Driveways (HES)	SY	300	\$35.00	\$10,500.00
15.	6" Bituminous Driveway	SY	300	\$15.00	\$4,500.00
16.	Manholes	EA	5	\$2,000.00	\$10,000.00
17.	Manhole Frame and Cover	EA	5	\$300.00	\$1,500.00
18.	Inlet CICI Design No. 2(2B)	EA	8	\$2,000.00	\$16,000.00
19.	Inlet (SMD-Type 2)	EA	2	\$1,500.00	\$3,000.00
20.	Inlet Frame & Grate	EA	10	\$250.00	\$2,500.00
21.	Cast Iron Curb Inlets	EA	32	\$200.00	\$6,400.00
22.	24" Reinforced Concrete Pipe, Round	LF	850	\$50.00	\$42,500.00
23.	Perforated Pipe Underdrain - 4" PVC Sch. 40	LF	1400	\$20.00	\$28,000.00
24.	Removal of Structures and Obstructions	LS	1	\$2,500.00	\$2,500.00
25.	Removal of Asphalt Paving	SY	1100	\$2.00	\$2,200.00
26.	Removal of Concrete Paving	SY	200	\$5.00	\$1,000.00
27.	Sawing Pavement	LF	200	\$2.00	\$400.00
28.	Mobilization	LS	1	\$23,500.00	\$23,500.00
29.	Staking	LS	1	\$2,500.00	\$2,500.00
	Total Roadway				\$430,520
Contingencies					
1.	Job Contingencies	%	20	\$430,520	\$86,104
	Total Contingencies				\$86,104
TOTAL – Country Club Road					\$516,624

Appendix C – Quiet Zone Corridor Plans