

TRANSPORTATION INVESTMENT GENERATING ECONOMIC
RECOVERY (TIGER) DISCRETIONARY GRANT APPLICATION

OKLAHOMA

Oklahoma Rural Tribal Railroad Crossing
Safety Improvement Project



PROJECT TYPE:
Freight Rail

CFDA # 20.933
FY2016 National Infrastructure
Investments

LOCATION:
27 railroad crossings in rural areas
of Oklahoma

AREA: Rural

REQUESTED AMOUNT:
\$6,705,000

TOTAL PROJECT COST:
\$8,940,000

DUNS NUMBER:
824700074

PROJECT WEB ADDRESS:
[http://www.okladot.state.ok.us/
tiger/index.htm](http://www.okladot.state.ok.us/tiger/index.htm)



TIGER



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Executive Summary

The Sooner State is proud to be one of the nation’s essential rail crossroads. However, the welcomed rail traffic comes with costs as well. Remote rural crossings that just a few years ago saw little rail traffic are today experiencing volumes that require more than yesterday’s safety measures. In Oklahoma, railroad crossing safety is a high priority. This is demonstrated by the Oklahoma Department of Transportation’s (ODOT) efforts since 2014 to improve railroad/highway grade crossing safety. Since 2014, 54 crossings have been improved. In support of Federal Railroad Administrator Feinberg’s efforts to improve railroad/highway grade crossing safety, ODOT is applying for \$6,705,000 in 2016 TIGER Grant funding to improve 27 rural railroad crossings to increase safety for its citizens and to promote continued efficient movements of freight along the railroads. The majority of these 27 rural crossings impact tribal citizens in Oklahoma and are located in socio-economically disadvantaged communities. The requested 2016 TIGER funds will be matched by ODOT and private railroad funds to result in a benefit cost ratio of nearly \$4 in public benefits for every \$1 spent.

As ODOT’s tribal partners exercise their economic growth through commercial, industrial, infrastructure and community resource development, ODOT is working with them to make sure the railroad/highway grade crossings in their tribal jurisdictions having improved or enhanced safety features. The 27 rural crossing upgrades described in our 2016 TIGER Grant application specifically will enhance safety and improve access along key routes to tribal medical centers, community centers, schools, and business activities. The crossing improvements proposed in this application include upgrades of crossbucks to signal flashers or upgrades of signal flashers, addition of gates, improved advanced warning signs and pavement markings, and improved crossing surfaces. These projects are a positive step forward for Oklahoma and a positive step forward for the nation.

ODOT is submitting this Oklahoma Rural Tribal Railroad Crossing Safety Improvement Project application for 2016 TIGER Grant funding to achieve three key benefits: to reduce accidents, to achieve a state of good repair of these crossings, and to enhance the quality of life of the traveling public through improved community connectivity. These needed improvements will assist the railroads in operating more efficiently and safely as well as allow Oklahoma’s citizens, including tribal community members, to move safely across these crossings in pursuit of personal and business activities.

Figure ES-1: Benefit Cost Analysis Summary (in 2015 \$)

Category	Present Value at 7%
Capital costs	\$8,355,140
Total Evaluated Benefits	\$31,657,362
Net Present Value	\$23,302,222
BENEFIT/COST RATIO	3.79

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1.0 Project Description

The State of Oklahoma, through the Oklahoma Department of Transportation (ODOT), plans to address the increased potential hazards associated with increased train/motor vehicle interaction and improve community connectivity through improvements at 27 rural railroad crossings in Oklahoma. On a crossing by crossing basis, these upgrades will include:

Upgrading crossing warning devices

such as signals, pavement markings, and signage

Improving crossing surfaces

Improving roadway crossing geometry

within existing right-of-way, as warranted

Addressing sight distance issues

where feasible

The crossings included in this project have either experienced growing volumes of freight traffic, or intersect with key street and highway routes that serve tribal facilities such as medical centers, community centers, schools, and business activities.

Oklahoma's freight traffic on the railroads has increased over the years transporting crude oil, agricultural products, and intermodal freight throughout the country. A majority of the increased oil production in recent years is shipped by rail, originating from North Dakota shale oil fields to refineries in Texas, often through Oklahoma. Unit car lengths are increasing as well in order to help the railroads optimize operating efficiencies. The railroads have taken numerous steps to improve operations while the federal government is currently in the process of increasing safety requirements. These rural crossing improvements will further improve safety in Oklahoma by assisting with keeping the traveling public away from trains.

Many of Oklahoma's tribal citizens have taken advantage of changing federal policy to assert their sovereignty. Constitutions have been written and tribal governments established to provide social services for the people including health, housing and jobs. Culture and language preservation continue to be a priority amongst the nations. Many of these endeavors are funded through tribal enterprises. One example of a tribal-federal partnership is the Choctaw Promise Zone, established by President Obama in 2014 to build and strengthen partnerships at all levels to promote and advocate investment in the people, land, and economy of the Choctaw Nation. Improving public safety and creating economic opportunity are goals of the Promise Zone initiative that will be facilitated with these crossing improvements.

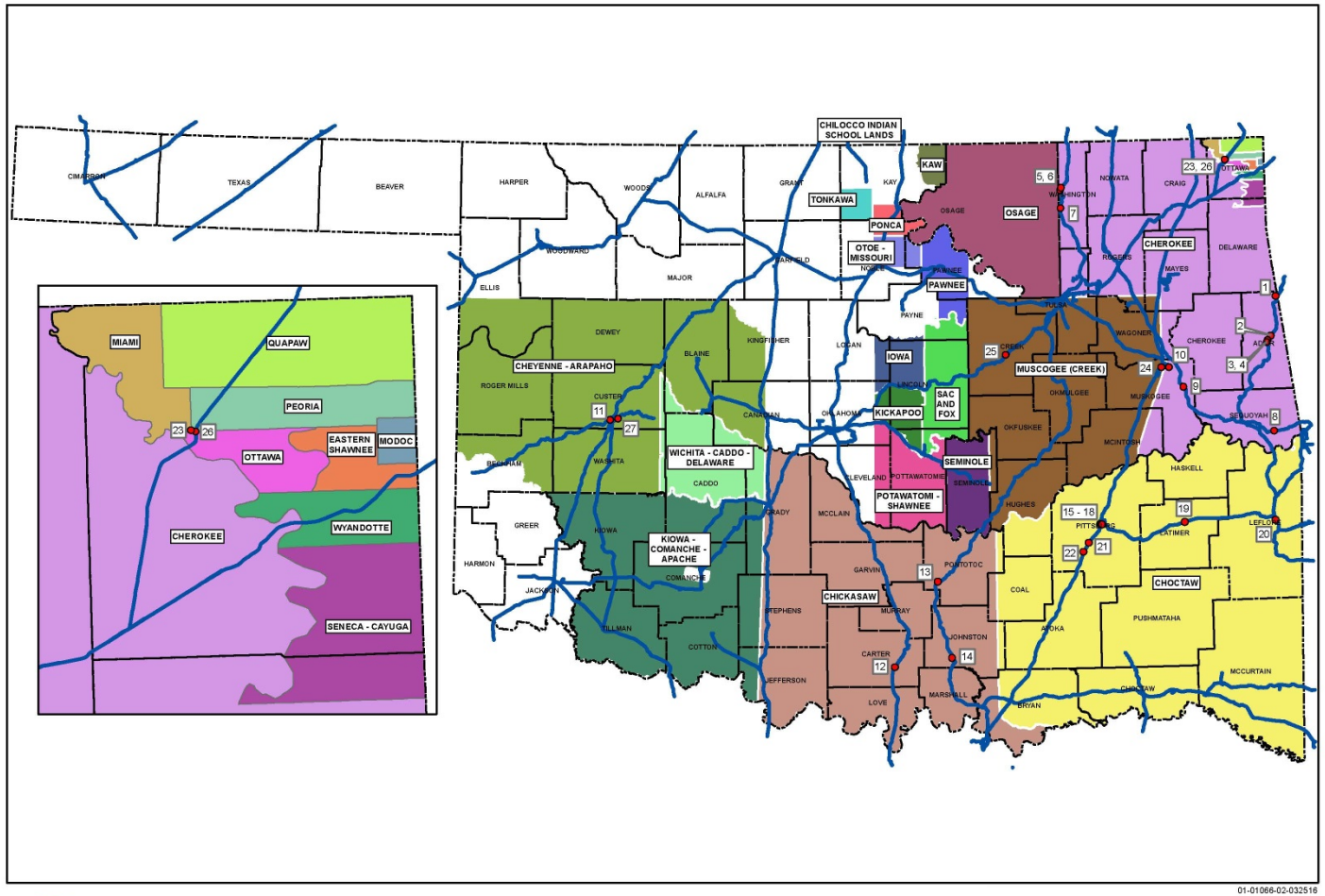
Currently, there are 39 tribal governments of which 38 are federally recognized tribes and tribal towns in Oklahoma. Oklahoma's 38 federally recognized Indian tribes produce an estimated \$10.8 billion impact on Oklahoma's economic output. As Oklahoma's tribal partners exercise their economic growth through commercial, industrial, infrastructure and community resource development, ODOT is collaborating with them to make sure the railroad/highway grade crossings in their respective jurisdictions have enhanced safety features. These proposed rural crossing improvements will ensure safer travel and connectivity of the tribal citizens within the community.

The 27 rural crossing upgrades described in our 2016 TIGER Grant application will help railroads operate safer as well as allow Oklahoma's citizens to move safely across these crossings in pursuit of personal and business activities.

2.0 Project Location

This proposed multi-location, multi-jurisdictional project will upgrade 27 rural railroad crossings across the state of Oklahoma. These locations are shown in **Figure 1**, which also indicates the tribal jurisdictions related to these crossings, and are listed in **Figure 2** with existing conditions information. Eight of the crossings are located within the Choctaw Promise Zone.

Figure 1: Map of Crossing Locations and Tribal Jurisdictions



RAIL PASSAGE THROUGH TRIBAL JURISDICTIONS

Legend

- Railroad Crossing
- Railroad

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Figure 2: Crossing Improvement Locations and Existing Details

Crossing	County	City	DOT	Railroad	Location	Tribal Jurisdiction	AADT	Number of Trains	Needed Improvements
1	Adair	Near Watts	330389F	KCS	Twin Falls Road	Cherokee	160	22	Safety, Quality of Life
2		Near Westville	330616J	KCS	E0755	Cherokee	150	22	Safety, Quality of Life
3		Near Stilwell	330619E	KCS	E0772	Cherokee	250	22	Safety, Quality of Life
4		Near Stilwell	330620Y	KCS	E0778	Cherokee	200	22	Safety, Quality of Life
5	Washington	Bartlesville	008485A	SKOL	Frank Phillips Avenue	Cherokee and Delaware Tribe	12000	7	Safety, Quality of Life
6		Bartlesville	008495F	SKOL	W 14th Street	Cherokee and Delaware Tribe	3404	3	Safety, Quality of Life
7		Near Ochelata	008509L	SKOL	E2600	Cherokee	131	3	Safety
8	Sequoyah	Muldrow	434122E	UP	Fargo Street	Cherokee	150	23	Safety, Quality of Life
9	Muskogee	Braggs	434179F	UP	Craig Avenue	Cherokee	150	23	Safety, Quality of Life
10		Fort Gibson	845767Y	UP	Three Forks Road	Cherokee	11400	5	Safety, Quality of Life
11	Custer	Clinton	018116F	FMRC	Modelle Avenue	Cheyenne-Arapaho	6750	1	Safety, Quality of Life
12	Carter	Ardmore	020710S	BNSF	NE 3rd Avenue	Chickasaw Nation	1000	32	Safety, Quality of Life
13	Pontotoc	Roff	672020R	BNSF	E0016 6th Street	Chickasaw Nation	420	11	Safety
14	Johnston	Near Ravia	673060S	BNSF	Cobb Road	Chickasaw Nation	54	11	Safety
15	Pittsburg	McAlester	600221J	AOK	2nd Street	Choctaw Nation	4500	5	Safety, Quality of Life
16		McAlester	600223X	AOK	3rd Street	Choctaw Nation	4000	5	Safety, Quality of Life
17		McAlester	600224E	AOK	5th Street	Choctaw Nation	5000	5	Safety, Quality of Life
18		McAlester	600227A	AOK	Strong Avenue	Choctaw Nation	4800	5	Safety, Quality of Life
19	Latimer	Near Wilburton	600287J	AOK	Panola Road	Choctaw Nation	250	1	Safety, Quality of Life
20	Le Flore	Howe	330744S	KCS	E1440 Forest Hill Road	Choctaw Nation	150	34	Safety, Quality of Life
21	Pittsburg	Savanna	413699G	UP	Choctaw Avenue	Choctaw Nation	364	22	Safety, Quality of Life
22		Near Kiowa	413702M	UP	E1540	Choctaw Nation	87	17	Safety, Quality of Life
23	Ottawa	Miami	670441V	BNSF	US-69B Main Street	Miami	16100	4	Safety, Quality of Life
24	Muskogee	Muskogee	674008R	BNSF	York Street	Muscogee (Creek) Nation	14000	1	Safety, Quality of Life
25	Creek	Near Slick	668761V	SLWC	N3730	Muscogee (Creek) Nation	250	6	Safety, Quality of Life
26	Ottawa	Miami	670401X	BNSF	3rd NE Avenue	Ottawa Tribe	2700	8	Safety, Quality of Life
27	Custer	Clinton	597430K	FMRC	N2274 Road	Cheyenne-Arapaho	1100	4	Safety, Quality of Life

Key:
AOK = Arkansas-Oklahoma Railroad Co. **KCS** = Kansas City Southern Railway Company **SLWC** = Stillwater Central Railroad
BNSF = Burlington Northern Santa Fe Railway **SKOL** = South Kansas and Oklahoma Railroad **UP** = Union Pacific Railroad
FMRC = Farmrail Corporation

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The proposed crossing improvements are located in 13 counties. The majority of these crossings are located in socio-economically disadvantaged communities and also have a high percentage of Native American residents. **Figure 3** shows these counties' socio-economic status in relation to poverty.

Figure 3: County Population and Median Income

County	Population 2014	Median Household Income 2014	Percent of Persons in Poverty
Adair	22,004	\$ 33,325.00	27.2%
Carter	48,821	\$ 43,280.00	16.5%
Creek	70,892	\$ 44,003.00	15.8%
Custer	29,500	\$ 45,056.00	15.9%
Johnston	11,103	\$ 37,845.00	20.1%
Latimer	10,693	\$ 39,563.00	20.7%
Le Flore	49,761	\$ 35,970.00	24.0%
Muskogee	69,699	\$ 40,133.00	22.2%
Ottawa	32,105	\$ 36,616.00	22.1%
Pittsburg	44,626	\$ 41,339.00	21.7%
Pontotoc	38,005	\$ 42,566.00	17.3%
Sequoyah	41,358	\$ 37,483.00	27.9%
Washington	51,937	\$ 48,870.00	13.9%
Oklahoma	3,878,051	\$ 46,235.00	16.6%

Source: United States Census Bureau

In developing the criteria to objectively and equitably determine which crossings were most in need of improvement, ODOT utilized the U.S. DOT Accident Prediction Model, and considered characteristics of the existing crossing geometry and additional sight distance criteria recently collected for the national initiative to place Stop and/or Yield signs at passive grade crossing locations. The resulting list of rural crossings most in need of safety upgrades was then further prioritized based on which crossings were along key access roads to tribal facilities such as Indian Health Service Facilities.

Figure 4 lists the 27 rural crossings selected and indicates proposed improvements and cost. None of these crossings are currently equipped with gates, and 14 of the crossings rely only on passive warning devices (crossbucks). Each of these crossings will be provided with safety improvements that include the installation of gates to physically separate rail and road traffic in addition to other warning devices, surface, and roadway improvements as warranted.

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Figure 4: Crossing Improvement Locations and Proposed Improvements

Crossing	DOT	Railroad	DTI Date	Location	Signal Improvements	Surface Improvements	Pavement Markings Installation	Advanced Warning Signs Installation	Cost
1	330389F	KCS		Twin Falls Road	●	●	●	●	\$300,000
2	330616J	KCS		E0755	●	●	●	●	\$300,000
3	330619E	KCS		E0772	●	●	●	●	\$300,000
4	330620Y	KCS		E0778	●	●	●	●	\$300,000
5	008485A	SKOL		Frank Phillips Avenue	●		●	●	\$325,000
6	008495F	SKOL		W 14th Street	●		●	●	\$225,000
7	008509L	SKOL		E2600	●		●	●	\$300,000
8	434122E	UP		Fargo Street	●	●	●	●	\$355,000
9	434179F	UP		Craig Avenue	●	●	●	●	\$375,000
10	845767Y	UP		Three Forks Road	●	●	●	●	\$400,000
11	018116F	FMRC	5/27/10	Modelle Avenue	●	●	●	●	\$390,000
12	020710S	BNSF	6/18/09	NE 3rd Avenue	●	●	●	●	\$580,000
13	672020R	BNSF	6/27/07	E0016 6th Street	●	●	●	●	\$300,000
14	673060S	BNSF		Cobb Road	●				\$300,000
15	600221J	AOK		2nd Street	●	●	●	●	\$350,000
16	600223X	AOK		3rd Street	●	●	●	●	\$350,000
17	600224E	AOK		5th Street	●	●	●	●	\$350,000
18	600227A	AOK		Strong Avenue	●	●	●	●	\$305,000
19	600287J	AOK		Panola Road	●	●	●	●	\$350,000
20	330744S	KCS		E1440 Forest Hill Road	●		●	●	\$300,000
21	413699G	UP		Choctaw Avenue	●		●	●	\$355,000
22	413702M	UP	6/13/13	E1540	●			●	\$275,000
23	670441V	BNSF	6/29/10	US-69B Main Street	●	●	●	●	\$305,000
24	674008R	BNSF	6/26/07	York Street	●	●	●	●	\$325,000
25	668761V	SLWC		N3730	●	●		●	\$300,000
26	670401X	BNSF	10/11/12	3rd NE Avenue	●		●	●	\$275,000
27	597430K	FMRC		N2274 Road	●	●	●	●	\$350,000
									\$8,940,000

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The following is a brief description of the proposed work at each crossing. Additional details about the existing conditions and proposed improvements are available in a one-page summary of each crossing in

APPENDIX A.

- **Crossing #1** (DOT 330389F) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Surface Improvements will include replacing with new timber crossing and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Parallel Railroad Crossing (crossroad)” signs on adjacent roadway intersection approaches.
- **Crossing #2** (DOT 330616J) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Surface Improvements will include replacing with new timber crossing and resurfacing track approaches. Roadway improvements include removing the abandoned crossing through the limits of the roadway. Proposed work includes installation of crossing advanced warning signs and pavement markings, including any updates required due to proximity to adjacent intersection and driveways and “Number of Tracks” signs.
- **Crossing #3** (DOT 330619E) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Surface Improvements will include replacing with new timber crossing and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Parallel Railroad Crossing (crossroad)” sign on adjacent roadway intersection approaches.
- **Crossing #4** (DOT 330620Y) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Surface Improvements will include replacing with new timber crossing and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Skewed Railroad Crossing” signs.
- **Crossing #5** (DOT 008485A) – Signal Improvements will include replacing pedestal mounted flashing lights with cantilever flashing lights and half roadway gates. Proposed work includes installation of crossing advanced warning signs and pavement markings for roadway and sidewalk.
- **Crossing #6** (DOT 008495F) – Signal Improvements will include adding half roadway gates to the existing cantilevered flashing lights. Proposed work includes installation of crossing advanced warning signs and pavement markings for roadway and sidewalk.
- **Crossing #7** (DOT 008509L) – Signal Improvements will include replacing railroad crossbucks with flashing lights and half roadway gates. Proposed work includes installation of crossing advanced warning signs and pavement markings.
- **Crossing #8** (DOT 434122E) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Surface Improvements will include replacing existing concrete crossing with new concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Parallel Railroad Crossing (crossroad)” sign on adjacent roadway intersection approaches.
- **Crossing #9** (DOT 434179F) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Surface Improvements will include replacing existing concrete crossings with new concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Parallel Railroad Crossing (crossroad)” sign on adjacent roadway intersection approaches and “Number of Tracks” signs.

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- **Crossing #10** (DOT 845767Y) – Signal Improvements will include replacing pedestal mounted flashing lights with flashing lights and half roadway gates. Surface Improvements will include replacing timber crossing with concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Skewed Railroad Crossing” signs and “Number of Tracks” signs.
- **Crossing #11** (DOT 018116F) – Signal Improvements will include replacing flashing lights with cantilever flashing lights and half roadway gates. Surface Improvements will include replacing existing concrete crossing panels with new concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Parallel Railroad Crossing (crossroad)” sign on adjacent roadway intersection approaches.
- **Crossing #12** (DOT 020710S) – Signal Improvements will include replacing pedestal mounted flashing lights with flashing lights and half roadway gates. Surface Improvements will include replacing existing concrete crossing panels with new concrete crossing panels for all tracks and resurfacing track approaches. Roadway improvements include updating the roadway surface between all the crossings and to the extents of the existing railroad right-of-way. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Number of Tracks” signs.
- **Crossing #13** (DOT 672020R) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Surface Improvements will include replacing timber crossing with concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings.
- **Crossing #14** (DOT 673060S) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates.
- **Crossing #15** (DOT 600221J) – Signal Improvements will include replacing pedestal mounted flashing lights with flashing lights and half roadway gates. Surface Improvements will include replacing asphalt crossing with concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings for roadway and sidewalk, including any updates required based on nearby intersections and driveways.
- **Crossing #16** (DOT 600223X) – Signal Improvements will include replacing pedestal mounted flashing lights with flashing lights and half roadway gates. Surface Improvements will include replacing concrete crossing with new concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings for roadway and sidewalk, including any updates required based on nearby intersections and driveways.
- **Crossing #17** (DOT 600224E) – Signal Improvements will include replacing cantilever flashing lights with flashing lights and half roadway gates. Surface Improvements will include replacing asphalt crossing with concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings, including any updates required based on nearby intersections and driveways and “Number of Tracks” signs.
- **Crossing #18** (DOT 600227A) – Signal Improvements will include replacing cantilever flashing lights with cantilever flashing lights and half roadway gates. Surface Improvements will include replacing asphalt crossing with concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings for roadway and sidewalk, including any updates required based on nearby intersections and driveways.

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- **Crossing #19** (DOT 600287J) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Surface Improvements will include replacing asphalt crossing with concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Parallel Railroad Crossing (crossroad)” sign on adjacent roadway intersection approaches.
- **Crossing #20** (DOT 330744S) – Signal Improvements will include replacing pedestal mounted flashing lights with flashing lights and half roadway gates. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Parallel Railroad Crossing (crossroad)” sign on adjacent roadway intersection approaches, “Number of Tracks” signs, and “Skewed Railroad Crossing” signs.
- **Crossing #21** (DOT 413699G) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Proposed work includes installation of crossing advanced warning signs and pavement markings.
- **Crossing #22** (DOT 413702M) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Proposed work includes installation of crossing advanced warning signs including installation of “Parallel Railroad Crossing (crossroad)” sign on adjacent roadway intersection approaches.
- **Crossing #23** (DOT 670441V) – Signal Improvements will include replacing pedestal mounted flashing lights with cantilever flashing lights and half roadway gates. Surface Improvements will include replacing asphalt crossing with concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings.
- **Crossing #24** (DOT 674008R) – Signal Improvements will include replacing crossbucks with cantilever flashing lights and half roadway gates and additional flashing lights. Surface Improvements will include replacing existing concrete crossing panels with new concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings, including installation of “Skewed Railroad Crossing” signs.
- **Crossing #25** (DOT 668761V) – Signal Improvements will include replacing crossbucks with flashing lights and half roadway gates. Surface Improvements will include replacing timber/asphalt crossing with concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs.
- **Crossing #26** (DOT 670401X) – Signal Improvements will include replacing pedestal mounted flashing lights with flashing lights and half roadway gates. Proposed work includes installation of crossing advanced warning signs and pavement markings.
- **Crossing #27** (DOT 597430K) - Signal Improvements will include replacing flashing lights with flashing lights and half roadway gates. Surface Improvements will include replacing asphalt crossing with concrete crossing panels and resurfacing track approaches. Proposed work includes installation of crossing advanced warning signs and pavement markings.

In addition to the above, each crossing will be evaluated at the Diagnostic Team Inspection (DTI) for possible additional related improvements to supplement the reliability and functionality of each crossing, such as drainage, sight distance, and geometric improvements, to be included in the proposed work. Drainage improvements could include existing culvert clean-out, ditch shaping either side of culvert, new culvert installation, and culvert extension or replacement. Several of the crossings have vegetation related sight distance constraints. To the extent possible within existing right-of-way and with coordination with adjacent

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property owners, vegetation will be reduced to improve sight distances at these crossings. Geometric improvements could be horizontal alignment and/or vertical alignment updates to provide better sight distance or address other safety concerns identified at the crossing.

3.0 Project Parties

ODOT is the designated and authorized state executive agency for administration and implementation of federal and state transportation spending. ODOT is an eligible grant applicant under TIGER, and will provide the required 20% matching funds and administer the federal funding.

The railroad owners of the various crossings considered in this application are:



Burlington Northern Santa Fe Railway (BNSF)



Union Pacific Railroad (UP)



Kansas City Southern Railway Company (KCS)



South Kansas and Oklahoma Railroad (SKOL)



Arkansas-Oklahoma Railroad Co. (AOK)



Farmrail Corporation (FMRC)



Stillwater Central Railroad (SLWC)

These railroads support the improvements discussed in this application and are planning to provide a 5% match of the project costs, as well as administering the construction contracts.

The tribal jurisdictions of the various crossings include:

- Cherokee
- Cherokee and Delaware Tribe
- Cheyenne-Arapaho
- Chickasaw Nation
- Choctaw Nation
- Miami
- Muscogee (Creek) Nation
- Ottawa Tribe

These jurisdictions support these improvements for the benefits that the improved crossings will bring to their communities.



4.0 Grant Funds and Sources/Uses of Project Funds

The project match will be provided predominantly by ODOT, using state funding as shown in **Figure 5** below.

Figure 5: Funding Sources

Source	Amount	Share of Project Total
ODOT	\$1,788,000	20%
Private Railroads	\$447,000	5%
TIGER Request	\$6,705,000	75%
Total Project Cost	\$8,940,000	100%

5.0 Selection Criteria

5.1 Primary Selection Criteria

The project benefits for the five primary benefit areas identified in the TIGER guidelines are described below. The main anticipated long-term outcome from this project is the safer rail operations in Oklahoma’s rural areas, achieved specifically from the reduction in potential collisions at railroad crossings, in particular within the tribal areas.

5.1.1 State of Good Repair

Improving the crossings identified in this project will improve the state of repair for existing infrastructure that is handling growing volumes of freight shipments via rail. The surface improvements at the crossings will increase the overall quality of the existing infrastructure, which is expected to result in fewer critical repairs in the future. It is assumed that the increase in maintenance costs for the proposed improvements to the warning devices will be offset by the need for fewer critical repairs.

5.1.2 Economic Competitiveness

The increased mobility represented by the crossing improvements described in this application will result in an increased economic competitiveness for local businesses. With the crossing improvements implemented, local consumers will also have better access to vital services and goods, and safe infrastructure will provide a stronger foundation for local businesses to grow. In addition, safer infrastructure will reduce accidents, which saves money and has the potential to increase economic productivity.

5.1.3 Quality of Life

The traveling public and individuals living near the crossings will notice benefits to their quality of life from these crossing improvements through increased safety and connectivity. These qualitative benefits are achieved as opportunities for potential increases in use of the crossings due to improved safety.

In rural areas, travelers rely heavily on highway access. There are 13 crossings with proposed improvements, such as Crossing #23 that provide direct highway access to vehicular traffic. These improvements will increase connectivity of the traveling public in addition to safety.

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One crossing in particular, Crossing #27 in Clinton, highlights the connectivity benefits for the tribal jurisdictions. This high traffic crossing is used to access the Clinton Indian Hospital, Cheyenne & Arapaho Nutrition Program, Cheyenne & Arapaho Ambulance Service, and Lucky Star Casino. See **Figure 6**.

Figure 6: Clinton, Oklahoma – Crossing #27, N2274 Road on FRMC (DOT 597430K)



Of the proposed crossings being improved, five have sidewalks that connect people to residences or commercial areas of towns. The improvements to the crossing surface and addition of gates will improve the conditions of the pedestrian crossing, making the crossing more desirable for pedestrians to use. **Figure 7** shows the city of Bartlesville, where two crossings with proposed improvements have sidewalks. One of these crossings is located in the commercial area of town while the other is located in the residential area of town. Both, with their proposed improvements, will be safer for the community to be connected on either side of the crossings whether by foot, bike, or motor vehicle.

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Figure 7: Bartlesville, Oklahoma – Crossing #5, SW Frank Phillips Avenue on SKOL (DOT 008485A), and Crossing #6, W 14th Street on SKOL (DOT 008495F)



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Eighteen of the crossings lie within city limits with railroad tracks in some manner splitting the town. These improvements will promote safer travel within the city, in addition to providing an alternative route between halves of the town. In Ardmore at Crossing #12, this means improving the 5-track crossing near an Amtrak Station. In Clinton at Crossing #11, this means improved connectivity for a secondary route for those needing to get to the health facilities and Integris Clinton Regional Hospital on the west side of town from the east. See **Figure 8**.

Figure 8: Clinton, Oklahoma – Crossing #11, Modelle Avenue on the FMRC (DOT 018116F)



5.1.4 Environmental Sustainability

The crossing improvements described in this application will not have any significant change to environmental sustainability.

5.1.5 Safety

None of the 27 identified crossings currently have gates. Fourteen of these crossings only have passive warning devices (crossbucks). The improvements included in this application will install gates at each of these crossings, thereby greatly increasing the safety of both the rail and roadway traffic. The benefit to the public and the railroad operators, over the 20 years examined in the Benefit Cost Analysis (BCA), is valued at over \$31.7 million, about three and a half times the project cost. The benefit/cost ratio for the project improvements is 3.79, and the Accident Reduction benefit represents 100% of the total evaluated benefits.

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Sight distance is a major concern with crossings that only have passive or limited warning devices. With limited sight distance, vehicles can cross in front of a train more easily than if gates are present, potentially causing a safety concern. An example is at Crossing #27, in Clinton, where the track in either direction is curved. This leads to sight distance issues that can't easily be remedied (see **Figure 6**). Adding gates and improving the flashing lights at this crossing will improve the visibility of the crossing to drivers when a train is approaching and limit their ability to cross in front of a train. Being the primary access to the Clinton Indian Hospital from I-40, safety is extremely important. The proposed improvements at this crossing highlight just one of the aspects of safety that will be improved as part of this application.

Two other illustrative examples of the need for these safety improvements are the crossings at York Street on the BNSF in Muskogee, Crossing #24, (**Figure 9**), and Modelle Avenue on the FMRC in Clinton, Crossing #11, (**Figure 10**). As the aerial views show, both crossings are close to major intersections and driveways. The AADT for these crossings is 14,000 and 5,200, respectively.

The crossing on the BNSF railroad in Muskogee, at York Street is a high traffic crossing. It is also at a significant skew in close proximity to an unsignalized intersection with Old Shawnee Road, as see in **Figure 9**. In addition, the intersection with East Shawnee Bypass is within 500', as well as several driveways being in proximity. Due to these conditions, adding gates and flashers at this crossing will greatly reduce the potential for vehicle-train collision.

Figure 9: Crossing #24, York Street on the BNSF in Muskogee (DOT 674008R)



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Figure 10: Crossing #11, Modelle Avenue on the FMRC in Clinton (DOT 018116F)



In Clinton, the Modelle Avenue crossing, Crossing #11, is located approximately 160' from Hwy 73/W Gary Boulevard, a four lane divided road with high traffic volumes and a major thoroughfare for Clinton. The intersection of Modelle Avenue and Hwy 73 is a major intersection with commercial and business traffic as well as vehicles entering and leaving town from the west, south, and east. This traffic includes a high volume of vehicles headed to and from several tribal facilities located within 5 miles of this crossing, such as the Lucky Star Casino and Cheyenne & Arapaho Ambulance Service. This crossing is also directly between an industrial spur to the south of the crossing and a FRMC facility to the north. The FRMC facility is a switching yard and car storage facility as well as their main maintenance and material storage facility in the area. Both the industrial spur and FRMC facility add switching movements through the crossing, sometimes up to several in a day. The addition of gates and upgraded flashers will significantly improve the visibility of this railroad crossing in an area with a lot of vehicular movements; thus improving the safety for the community in Clinton.

There are 3 crossings that currently have an unacceptable level of safety risk due to school bus traffic. The proposed improvements at these crossings will enhance safety for the school busses and also improve the flow of traffic through these crossings.

The installation of new signals with gates and other crossing improvements proposed in this application will decrease the probability of collisions occurring, leading to fewer fatalities, injuries and unnecessary suffering. In addition, most of

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these crossings were selected for improvement because they are needed to provide safer access to the tribal facilities. Specific tribal facilities within 5 miles and other community related benefits are listed per each crossing in **APPENDIX A**.

5.2 Secondary Selection Criteria

5.2.1 Innovation

Our specific project is not expected to result in any technological or funding/finance innovations or any innovative practices. However, these safety improvements will result in fewer crashes. This reduction will reduce the resources dedicated to accident management activities, and more resources can to be allocated to innovative transportation projects in the State of Oklahoma.

5.2.2 Partnership

5.2.2.1 Jurisdictional and Stakeholder Collaboration

The State of Oklahoma is working together with city and county governments, the federal government, tribal jurisdictions, and private railroads to make this project a model for cooperative public-private infrastructure efforts in America. Oklahoma has a long and rich history when it comes to energy transportation and safety, and this project will enhance the productivity and efficiency of both these sectors.

Our TIGER application website www.okladot.state.ok.us/tiger/index.htm includes letters of support for this project from:

- AOK
- BNSF
- FMRC
- KCS
- SKOL
- SWLC
- Cherokee
- Cheyenne-Arapaho
- ODOT

5.2.2.2 Disciplinary Integration

This project does not at this time include any partnerships with non-transportation public agencies.

6.0 Results of Benefit Cost Analysis

A formal benefit-cost analysis (BCA) was conducted for this project using best practices for BCA in transportation planning, and reflecting all TIGER VIII grant application guidelines. It is important to note that a formal BCA is not a comprehensive measure of a project's total economic impact, as many benefits cannot be readily quantified or occur under conditions of uncertainty.



Safety: With the addition of warning devices, including new gates at all crossings, driver awareness of oncoming trains will improve and accidents will become less frequent. Fatalities, injuries, and property damage will all be reduced if this project proceeds.



Economic Competitiveness: Qualitative benefits.



Environmental Sustainability: Qualitative benefits.



Quality of Life: Qualitative benefits.



State of Good Repair: With the surface improvements at the crossings, the overall quality of the existing infrastructure will improve, which is expected to result in fewer critical repairs in the future. It is assumed that the increase in maintenance costs for the proposed improvements to the warning devices will be offset by the need for fewer critical repairs. These benefits were not quantified.

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The calculated benefit-cost ratio for the grade crossing project is estimated at 3.79 using a seven percent discount rate. The BCA compares the capital construction costs, along with the increase in operating and maintenance costs, with the quantifiable benefits of the project for 20 years following construction.

The quantified project benefits are accident reduction.

Federal TIGER guidance recommends applicants discount future benefits and costs to present values using a real discount rate of seven percent to represent the opportunity cost of money in the private sector, and a three percent discount rate when the funds dedicated to the project would be other public expenditures. This is largely the case for this project, which is five percent privately funded. The benefit-cost ratio at three percent is 5.41.

The project benefits are presented in **Figure 11** using the more conservative 7% discount rate to demonstrate that the project’s long term benefits clearly outweigh the project’s costs.

6.1 Cost Benefit Results

Figure 12 summarizes the project’s cost and the quantifiable benefits in present value terms.

Detailed analysis of costs and benefits, including data sources and methodology descriptions, are available on the project website in the BCA Technical Memo and in **APPENDIX B**. As shown in the table, the present value of the project’s capital costs is \$8.36 million in 2017. The benefits have an estimated present value of \$31.6 million over the 20-year period, yielding the 3.79 benefit-cost ratio.

Figure 12: Cumulative Benefits and Costs in 2015 Dollars (Discounted at 7 percent)

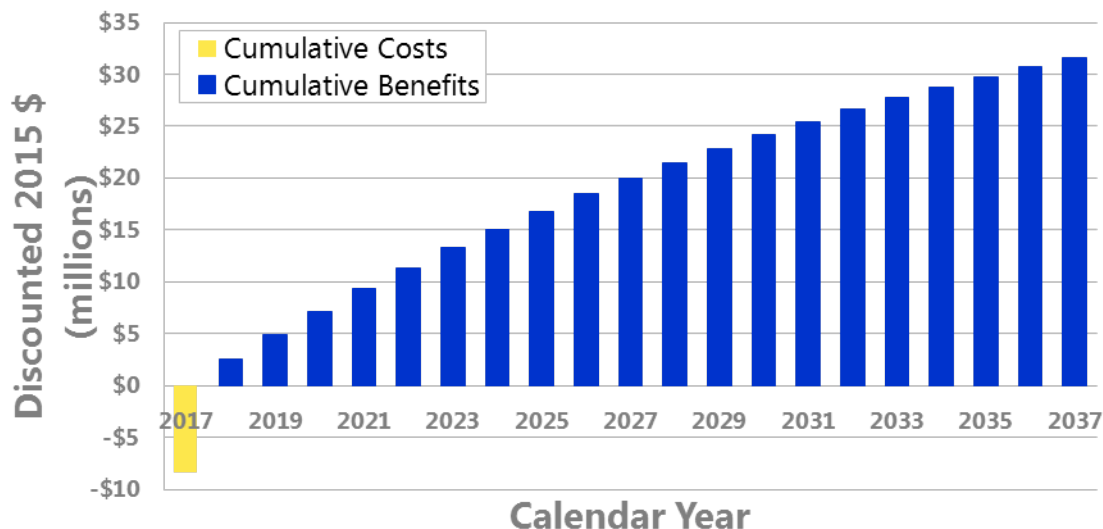


Figure 11: Benefit Cost Analysis Summary (in 2015 \$)

Category	Present Value at 7%
Evaluated Costs	
● Capital costs	\$8,355,140
● Maintenance costs	not evaluated
● Total Evaluated Costs	\$8,355,140
Evaluated Benefits	
● Accident reduction	\$31,657,362
● Total Evaluated Benefits	\$31,657,362
● Net Present Value	\$23,302,222
BENEFIT/COST RATIO	3.79

While the BCA assesses the project for a 20-year period, the project’s assessed benefits are projected to cover the total project costs within 4 years of operation (before the end of 2021). This is illustrated in **Figure 12**.

6.2 Benefit Calculation Assumptions

The Benefit Cost Analysis is based on the difference between an assumed **Build** scenario and an assumed **No Build** scenario, both of which were developed conservatively.

The analysis assumes that rail will continue to be an important mode of freight transportation within and through Oklahoma. Road and rail traffic are forecast to grow at a rate of 0.35 percent per year.

In the Build scenario, the same assumptions with respect to road and rail traffic growth are used. In addition, the proposed signaling and surfacing improvements will proceed at the 27 rural grade crossings as detailed above. **Figure 13** illustrates the impact of the Build scenario on some key factors driving the benefit evaluation.

Capital expenditures and construction will take place during a one year period beginning in 2017, with the improvements yielding their first full year of benefits in 2018. As a result of these improvements, maintenance expenditures are expected to increase.

6.2.1 Accident Reduction

With improved warning devices at each crossing, the frequency of accidents will decrease. The 27 crossings are presently equipped with passive devices or flashing lights, but all lack gates. These crossing characteristics served as inputs to the U.S. DOT Accident Prediction Model (APM), which was used to forecast accident frequency in the No Build scenario. Other inputs to the model include road and rail traffic volumes, and historical accident frequency as per the FRA Accident Reports for each crossing. As an output of the APM, the number of accidents in the base year (2015) was modeled as 2.34 accidents, gradually growing in line with road and rail traffic to 2.53 accidents in the final forecast year, 2037.

The APM was run a second time for the Build scenario. The key variable impacting the APM’s outputs was the addition of gates at all crossings, which are proven to reduce the anticipated frequency of accidents. The Build scenario models 1.32 accidents in the first year of operation, 2018, which also grows slowly year over year to 1.42 accidents in 2037. These accident rates are approximately half of the rates in the No Build scenario.

The TIGER BCA Resource Guide (2016) was used to monetize these forecasted accident rates. The present value of accident reduction is \$31.7 million, which represents 100% of the total monetized benefits in this analysis. This dollar value is driven primarily by a reduction in fatalities. As the safety engineering of vehicles continues to improve, it is possible that the share of fatalities will reduce in the future, although this condition applies to both the Build and No Build scenarios and therefore has minimal impact on the analysis.

Figure 13: Project Impacts for Grade Crossing Improvements, Cumulative from 2018-2037 (inclusive)

Category	Quantity
Total accidents (number)	▼ 21
Total fatalities (number)	▼ 6

6.2.2 Other Non-Quantifiable Costs and Benefits

There are a number of other project benefits as well as costs that could not be reasonably quantified for the benefit-cost analysis. Among these were:



Travel time savings resulting from fewer accidents

While accident reduction was monetized, there are also travel time savings due to fewer accidents resulting from less frequent lane closures and lane blockages. This benefit was not monetized as it is difficult to quantify the number of hours that would be saved. The standard deviation among quantity and duration of lane blockages per accident is very high, even among accidents of the same AIS level. There is also a large variance in road users' preferences as to whether or not to alter their route to escape any closures or congestion. In rural areas with limited crossings, reductions in accidents leading to closures can save a lot of strain on the traveling public.



Improved community connectivity

With fewer road blockages, residents have improved access to amenities that are located on the opposite side of the crossing from which they live. This is especially relevant in rural areas where access to tribal facilities such as Indian Health Facilities is of particular importance.



Improved emergency response times

With fewer blockages comes the benefit of improved emergency response times.



Increased pedestrians and bicycles:

Another possible outcome resulting from improved crossing conditions is a greater incentive for walking and bicycling at and around the crossings. This brings health benefits in the form of increased pedestrian and bike miles while likely further reducing automobile emissions.

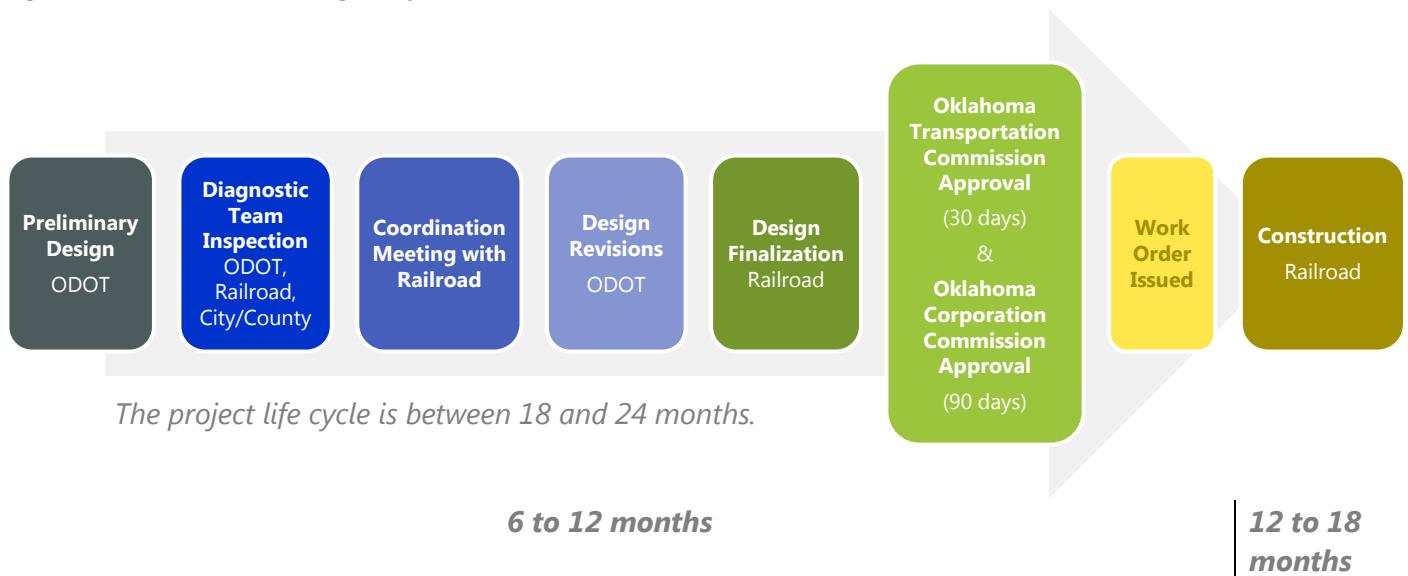
7.0 Demonstrated Project Readiness

ODOT has agreements with each of the railroads for these crossings that has an established process and roles and responsibilities that increases the speed at which these crossings can go from design through construction. This process is currently in place and is shown below in **Figure 14**.

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Figure 14: ODOT Crossing Project Process



This process combined with ODOT's improvement planning process has proven to expedite the time it takes to go from identification of crossing improvement needs to prioritization to implementation of improvements. In 2015, 26 crossing improvement projects were completed.

7.1 Technical Feasibility

Seven of the crossing projects have already had a Diagnostic Team Inspection (DTI) as noted in Figure 4. Due to the lapse in time since, the proposed recommendations for each of these crossings will be re-evaluated to ensure they are still valid. The remainder of the crossing improvements has a basis of design identified (see project descriptions in **Section 2.0**) and preliminary cost estimates (see **Figure 4**). These crossings will begin the preliminary design phase upon notice of award.

7.2 Financial Feasibility

ODOT is committed to these rural crossing improvements as part of this TIGER Grant application project. This project is programmed into the state budget. Upon notice of award, these projects are ready to proceed through the process as defined above.

7.3 Project Schedule

Two major slowdowns to any project schedule are right-of-way acquisition and permitting. For these crossing locations, neither of these are an issue. Each location lies within existing railroad or state right-of-way and will not require additional property acquisition. Like previous projects, as the work for these crossings is not planned to be outside of railroad or state right-of-way, the only environment approval needed is a Categorical Exclusion. This is not anticipated to result in any project delays.

ODOT, along with our partners at the local public agencies, and the railroad operators, are ready to proceed with design/construction upon notice of award. The average project timeframe for each crossing improvement is anticipated to be between 18 and 24 months (design through construction). See **Figure 15**. All the crossings are anticipated to be constructed in FY2018.

7.4 Required Approvals

7.4.1 Environmental Permits and Reviews

7.4.1.1 NEPA

Due to these crossing improvements being proposed within railroad and state right-of-way, the only environmental approval required is a Categorical Exclusion.

7.4.1.2 Reviews by Other Agencies

Reviews by the Oklahoma SHPO Office and the U.S. Fish and Wildlife Service may be required at some locations. There are no other agency approvals known to be required for these locations at this time.

7.4.2 Legislative Approvals

The Rail Programs Division of ODOT uses the FRA system to determine which public at-grade crossings are the best candidates for improvements. This system is known as the "Priority Index Ranking." The ranking is comprised of many factors and prioritizes all public crossings within the state. These factors may include but are not limited to: roadway geometrics and train speed, traffic counts, lanes of traffic, collisions, and fatalities. Motor vehicle incidents are the greatest determining factor. For this application the impact on Oklahoma's Tribes was included as a factor. The Safety Section of the Rail Programs Division selects the highest ranked crossings to establish each year's funding expenditures. All projects have to be approved by the Oklahoma Transportation Commission (OTC). The Rail Programs Division presents its recommendations to the Director of Capital Programs to have the items placed on the Commission's agenda. The OTC meets on the first Monday of every month. Once the OTC approves, each project is assigned a project number to move forward.

After OTC approval, the Railroad has to file an application to the Oklahoma Corporation Commission (OCC) seeking regulatory approval for the crossing improvement. After notice and hearing the OCC signs an order approving the project. Each process takes 30 to 60 days to complete. The Rail Programs Division with OTC approval proceeds concurrently with planning each project but does not start construction until after the OCC's order is received.

7.4.3 State and Local Planning

As part of the ODOT State Rail Plan, the safety section, based on the FRA priority formula, recalculates annually the rankings on Oklahoma rail/highway crossings. Annual recommendations are based on these rankings and funding availability from federal sources.

7.5 Assessment of Project Risks and Mitigation Strategies

An assessment of risks that may pose a threat to the project meetings its objectives and schedule, along with proposed mitigation actions, is presented in **Figure 15**.

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Figure 15: Project Risks and Mitigation Strategies

Risk #	Risk Category	Risk Name	Description	Mitigation Strategies
1	Financial	Loss of Private Funding	Loss of funding due to unforeseen circumstances	Highly unlikely. Railroads have master contracts with ODOT to show their commitment to projects such as these.
2	Financial	Loss of Public Funding	Loss of funding due to unforeseen circumstance.	Additional funds would have to be obtained; the project would be delayed significantly.
3	Management	Stakeholders	Stakeholders to the project may have additional objectives at crossings	ODOT has successfully worked numerous times with the railroads and local agencies involved, and feels all obstacles could be overcome with stakeholder communication to address potential concerns.
4	Technical	Site-Specific Issues	Specific sites may have construction challenges	ODOT/railroads have successfully installed systems at difficult sites in the past.
5	Contracting and Procurement	Administrative Burden	ODOT will administer the federal and state transportation spending, while the railroads will manage the rail contracting	ODOT has successfully worked numerous times with the railroads and local agencies involved, and feels all obstacles could be overcome with stakeholder communication to address potential concerns. ODOT is the official state executive agency for administration and implementation of federal and state transportation spending. ODOT will help administer the rail contracts as needed.
6	Construction	Traffic	Traffic congestion during construction of rail crossing and site infrastructure	Close collaboration between local agencies, tribal jurisdictions and ODOT to identify potential detour routes and optimize scheduling of construction.
7	Environmental	NEPA	Historic/Archaeological/cultural resources discoveries	ODOT/railroads own the land required for the proposed improvements. It is unlikely that significant historic or archaeological resources are present within existing rights-of-way. The small footprints of these projects within previously disturbed areas make adverse effects to cultural resources unlikely.
8	Environmental	Wetlands	Project impact on existing wetlands	Wetlands, if any, will be addressed during the pre-construction phase and addressed if necessary. Design revisions will be evaluated as an option to avoid impacts.
9	Environmental	Endangered Species	Impact to any endangered species within the project area	Preliminary investigation suggests this is not a problem. If encountered, design measures will be taken to circumvent and/or phasing measures to minimize impact during construction. It is unlikely that T&E habitat would be present within existing rights-of-way. The small footprint of these projects would be unlikely to have adverse impacts on any T&E species. Any vegetation clearing would be assessed for impacts as part of the NEPA process.
10	Right of Way	Property ownership	The entire project area is owned by the state or railroads. There are not likely to be right of way issues	Right of way issues, if any, will be addressed during the pre-construction phase and addressed if necessary. Design revisions will be evaluated as an option to avoid impacts.

8.0 Project Cost and Benefits

Detailed analysis of project costs and benefits, including data sources and methodology descriptions, are available on the project website in the BCA Technical Memo. Based on the BCA, the present value of the project's capital costs is \$8.36 million in 2017. The benefits have an estimated present value of \$31.6 million over the 20-year period, yielding the 3.79 benefit-cost ratio.

9.0 Cost Sharing or Matching

As an eligible grant applicant under TIGER, ODOT is committed to providing the required 20% matching funds for this project. As the official state executive agency for administration and implementation of federal and state transportation spending, ODOT is also committed administering the federal funding for this project. ODOT has received support from the private railroads involved in this project to provide 5% of the funds necessary for each of their crossings.

10.0 Federal Wage Certification

Signed certification stating that the Oklahoma Department of Transportation will comply with the requirements of subchapter IV of chapter 31 of title 40, United States Code (Federal wage rate requirements) as required by the FY 2016 Appropriations Act is completed and attached as **APPENDIX C**.