

Wichita Railroad Master Plan



Prepared for City of Wichita

Prepared by TranSystems

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Section I. Introduction

Wichita's history is defined, in part, by the transportation connections provided by railroads. In 1872, the Santa Fe Railway extension to Wichita stimulated the city's economic development with this new rail service. The growth of agriculture in the Plains states, as well as the processing of agriculture products and the distribution of farm equipment relied on Wichita's connection to rail transportation in the early 1900s. During the 1950s, Wichita's entry into the aircraft industry and activation of McConnell Air Force Base continued the city's dependence on multimodal transportation including rail. Today, the availability of rail service continues to be an important economic driver in Wichita.

As Wichita has grown, the conflicts between rail traffic and highway traffic have increased. These conflicts present safety concerns, travel delays and increased travel distance for both highway vehicles and trains. In an effort to minimize these conflicts active warning devices are installed and at-grade highway-rail crossings are closed or grade separated along with construction of track improvements. In the Wichita area over 60% of at-grade highway-rail crossings have active warning devices installed. Recent projects to grade separate crossings include the Union Pacific Railroad (UPRR) over Grand Avenue in Haysville and the Central Corridor project in Downtown Wichita.

While past projects have eliminated some conflicts between rail and highway traffic in Wichita, there are still several congestion points and areas where improvements would positively impact both highway and rail users. The **purpose** of the Wichita Railroad Master Plan (WRMP) is to develop a coordinated, comprehensive master plan outlining achievable projects that will improve transportation mobility in Wichita for highway users and railroads (operators and customers).

This master plan will approach solutions that focus on benefits for highway and rail transportation. Many times the safety, quality of life, and congestion issues stem from railroad operational procedures or constraints; to garner the support of the railroads it is important to identify projects that help improve their operations and safety as well as create a highway user solution.

Each identified project will be designed to meet the master plan goals – long-range targets to accomplish through project implementation. A set of objectives are outlined for each master plan goal to measure how each project alternative meets the overall master plan purpose. The goals and objectives will be used to help select and provide justification for project implementation.

The WRMP purpose, goals and objectives were developed through collaboration with stakeholders in the community including elected officials, railroad operators, business owners and citizens.

Wichita Central Corridor

The forty daily trains traveling the Central Corridor caused drivers as long as a 30-minute delay with each passing train. The solution was building grade separations by elevating two miles of track, providing new railroad bridges at three streets, removing low clearance bridges, and widening one historic bridge.

Extensive coordination occurred with the Union Pacific and BNSF as well as two short line railroads during the course of construction.

The project was completed in September 2009. The result was a reduction in traffic congestion and train noise along the corridor, with associated improvements in safety, air quality and quality of life for Wichita residents. Railroads also benefitted by improved operations through track realignment.

Table I. Master Plan Goals and Objectives

Goals	Objectives
Promote Efficient Transportation System Management and Operation	<ul style="list-style-type: none"> ▶ Minimize Travel Delay During Construction ▶ Decrease Overall Travel Time ▶ Decrease Operational Costs ▶ Minimize Utility Impacts ▶ Minimize Right of Way Impacts
Enhance Transportation System Safety	<ul style="list-style-type: none"> ▶ Reduce or Eliminate Crash Occurrences
Protect the Environment and Promote Energy Conservation	<ul style="list-style-type: none"> ▶ Reduce Air Emissions and Minimize Use of Fossil Fuels ▶ Reduce Noise
Support Regional Economic Vitality	<ul style="list-style-type: none"> ▶ Minimize Business Disturbance During Construction ▶ Lower Logistics Costs ▶ Promote Corridor Preservation

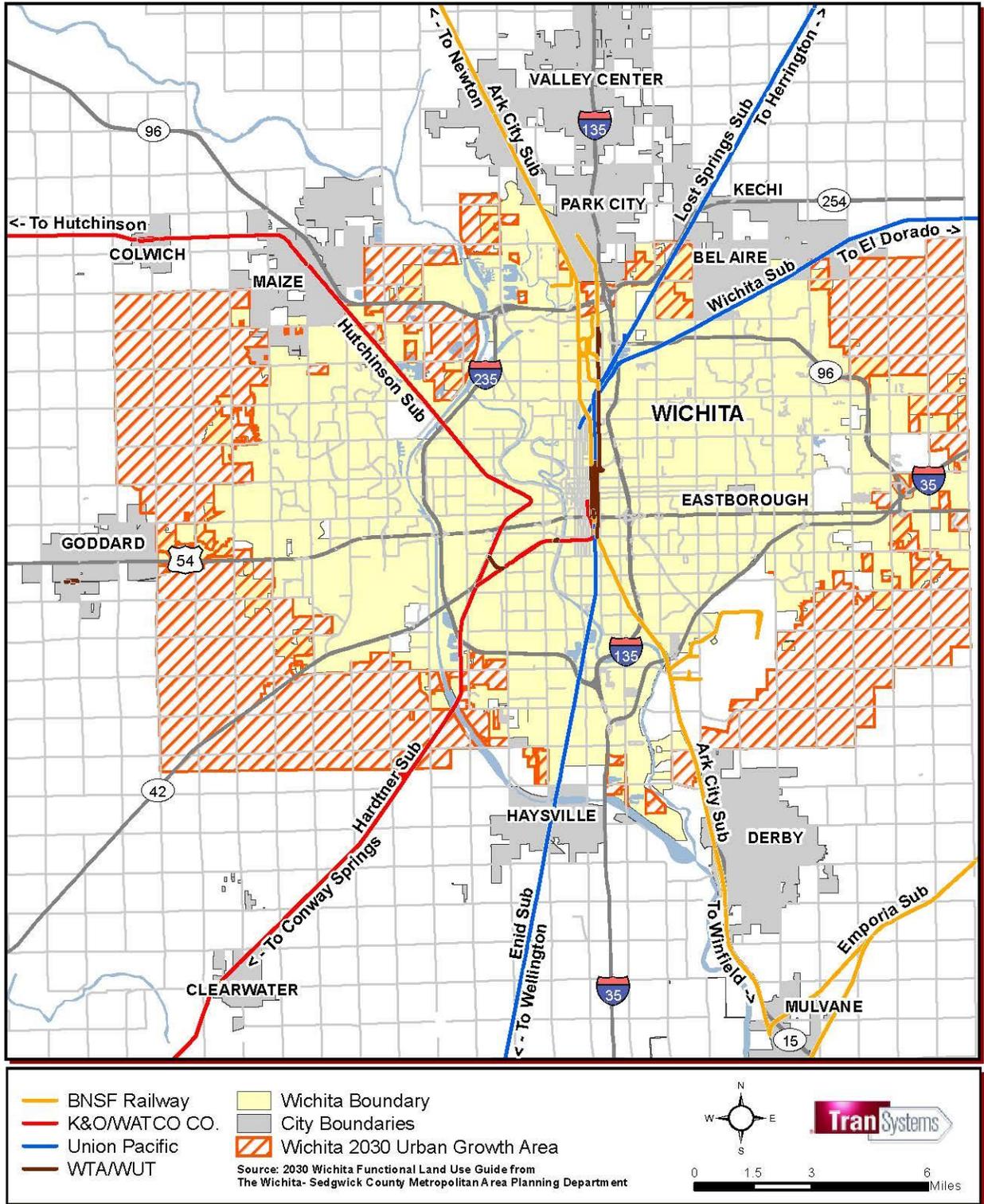
The following sections of the WRMP provide background information and outline the process undertaken to select projects for implementation. The extensive stakeholder coordination undertaken by the City and planning team is summarized. The project alternatives and the alternatives analysis process is described in detail. Additional information on future passenger rail service is provided as well as a financial analysis.

Section 2. Background and Context

Wichita is located in southeast Kansas and has an estimated population of 368,630 (*2010 Development Trends Report: Demographics*). As the largest city in Kansas, Wichita represents an important commercial center at the intersection of two Class I railroads and one shortline railroad. BNSF Railway (BNSF) and Union Pacific Railroad (UPRR) are the Class I carriers operating in Wichita. The BNSF operates 33 trains per day through the area; the UPRR operates 7 trains per day. The Kansas & Oklahoma Railroad (K&O) operated by WATCO Companies operates 1-2 trains per day through the Hutchinson (northwest of Wichita) and Conway Springs Subdivisions (southwest of Wichita). **Figure I** is a map of the master plan study area.

The BNSF and the UPRR are part owners of the Wichita Terminal Association/Wichita Union Terminal (WTA/WUT) in north Wichita and by agreement train movements are controlled by the BNSF through the Central Corridor. This joint agreement allows for coordinated railroad operations through Wichita's core.

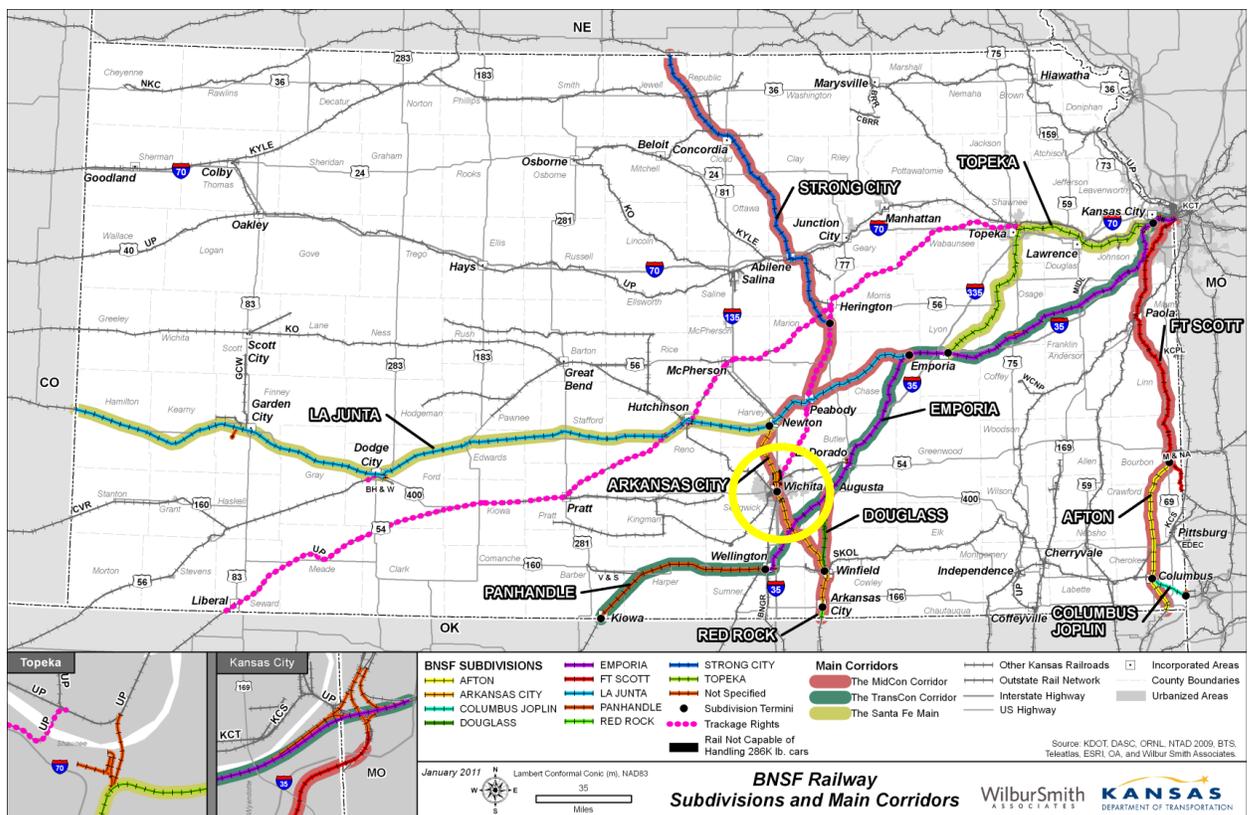
Figure 1. Master Plan Study Area



BNSF Railway in Kansas

BNSF Railway operates one of the largest railroad networks in North America. BNSF has five principal corridors in and through Kansas. Each corridor carries substantial through traffic as well as origin and termination service for shippers and receivers. The BNSF rail system is shown in **Figure 2**. Two of the five corridors travel through Sedgwick County and one through Wichita. The TransCon Corridor is an east-west corridor extending from the California coast to Chicago. In Kansas, the TransCon is comprised of the Emporia Subdivision and passes through Mulvane. The MidCon corridor is a north-south corridor extending from Canada to the Texas Gulf Coast and Mexico. In Kansas, the MidCon is comprised of the Arkansas City Subdivision and passes through the center of Wichita.

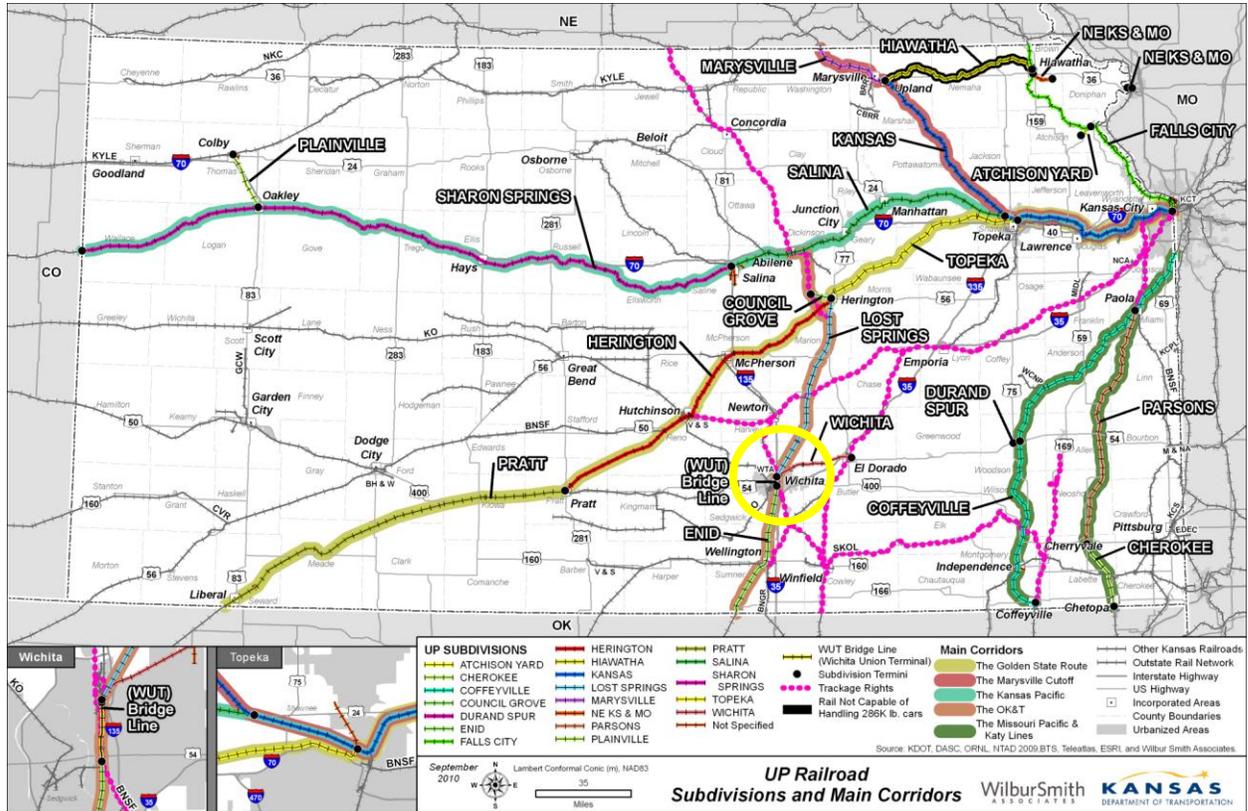
Figure 2. BNSF Railway in Kansas



Union Pacific Railroad in Kansas

The Union Pacific Railroad’s rail network encompasses 23 states and links the Midwest to the Pacific and Gulf Coast ports. UPRR also provides several key Mexican gateways. UPRR has six principal corridors in and through Kansas. Each corridor carries substantial through traffic as well as origin and termination service for shippers and receivers. The UPRR rail system is shown in **Figure 3**.

Figure 3. Union Pacific Railroad in Kansas



K&O Railroad in Kansas

The Kansas and Oklahoma Railroad is a subsidiary of WATCO Companies, Inc., a Pittsburg, KS, based company. It originates in Wichita and extends to the Colorado state line as shown in **Figure 4**. It has connections to both the BNSF and UPRR in Wichita and operates two corridors into Wichita. The Hutchinson subdivision enters Wichita from the northwest. This line generally runs parallel to Zoo Boulevard until it makes a tight curve near Douglas Avenue between Meridian Avenue and Seneca Street. At the curve the trains operate at less than 10 mph causing congestion at the numerous at-grade highway-rail crossings it traverses. The Hardtner Subdivision from Conway Springs enters Wichita from the southwest and connects with the other line near Harry Street and Meridian Avenue.

As a shortline, the K&O Railroad provides switching service to industries including heavy equipment, aggregates, and grain. A primary concern for Kansas shortlines as identified in the Kansas State Rail Plan is the loading characteristics of the rail to support 286,000 pounds. **Figure 5** illustrates those segments on Kansas shortlines with weight limitations. The K&O's Hardtner Subdivision as well as several other subdivisions (such as the Stafford, Englewood, H&S and Wichita Subdivisions) that can connect to the Hardtner are identified as having rail not capable of handling 286,000 lb cars.

Figure 4. K&O Railroad in Kansas

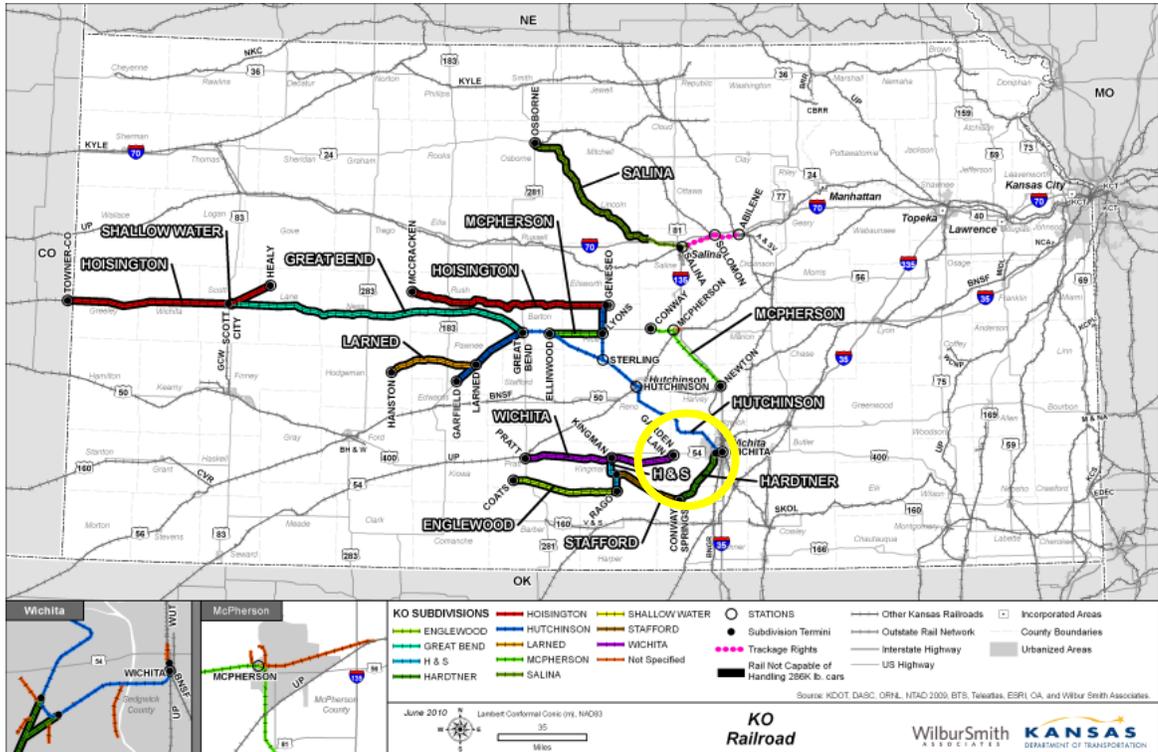
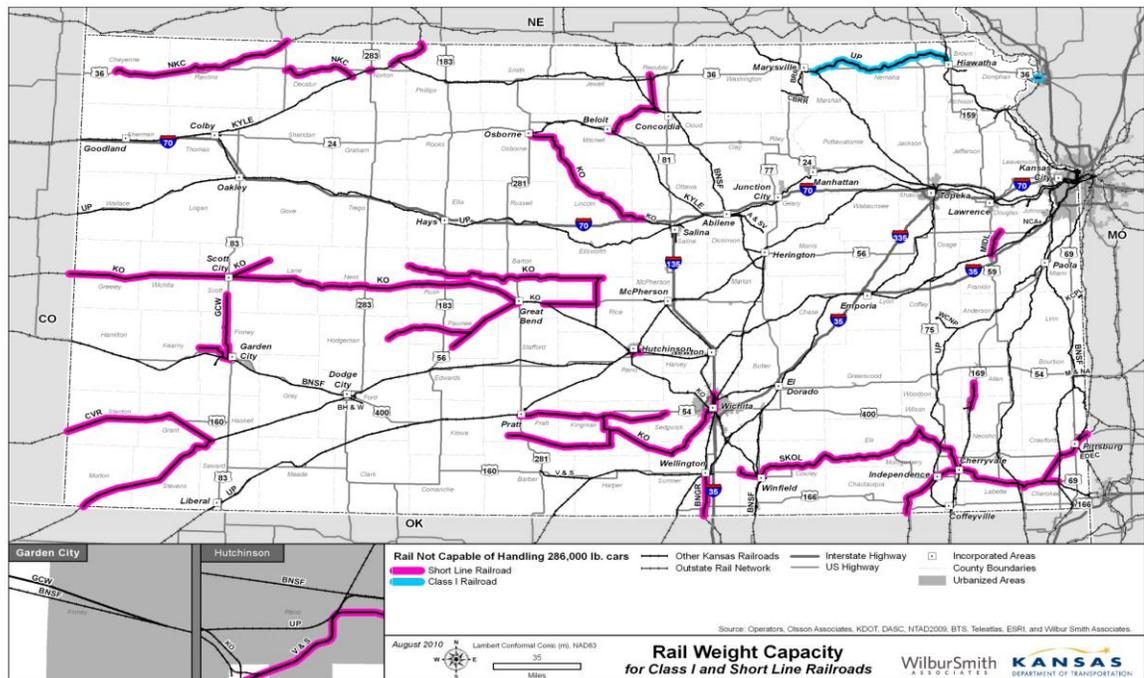


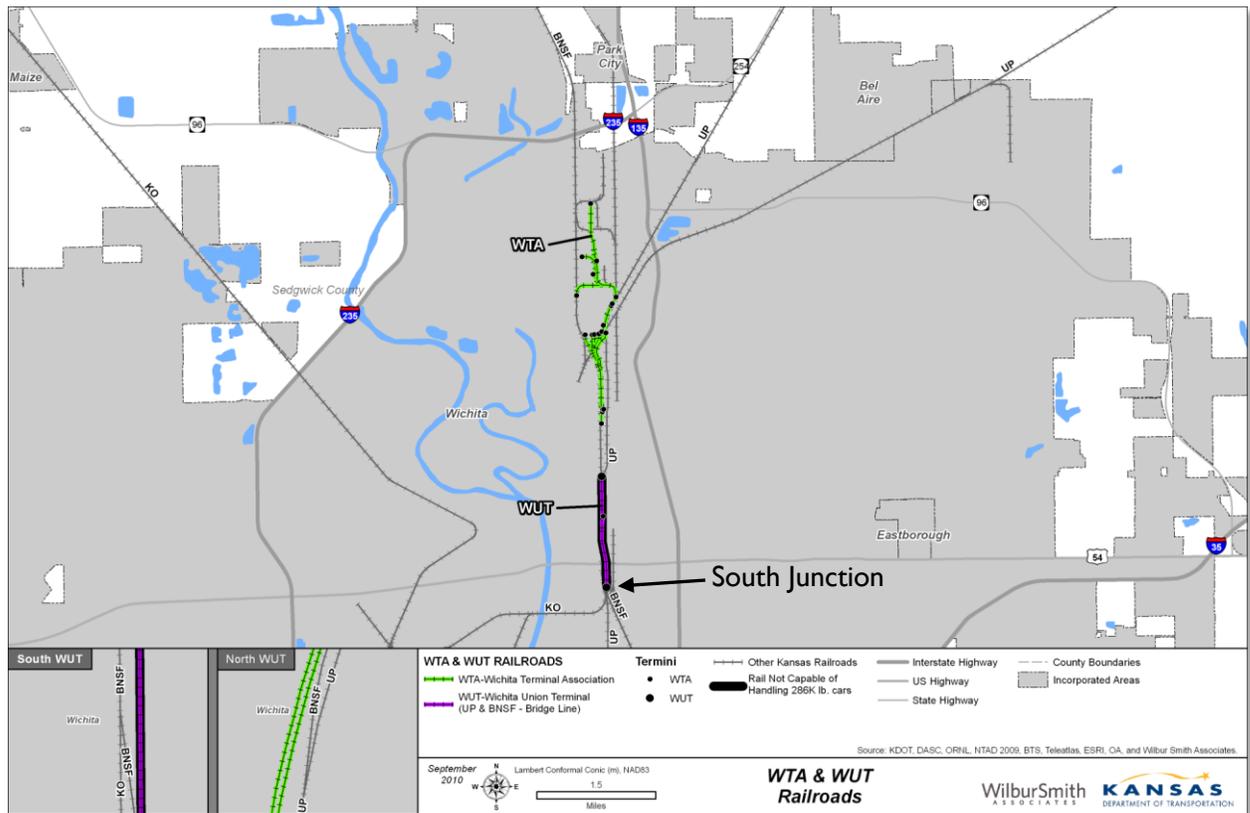
Figure 5. Rail Weight Capacity in Kansas



WTA and WUT in Wichita

These railroads are concentrated in the area from the South Junction to as far north as 33rd Street, as shown in **Figure 6**. The Wichita Union Terminal covers operations along the “bridge line” within Wichita. The Wichita Terminal Association provides service to numerous grain elevators in the area bounded by 13th Street to 33rd Street between Broadway and Ohio Streets.

Figure 6. WTA and WUT in Wichita



Statewide and National Rail Perspective

Figure 7 shows the numerous rail carriers and their rail corridors throughout the State. As noted above, three of the rail carriers converge in Wichita. From a national perspective, primary rail freight corridors are shown in **Figure 8**. These primary corridors include two rail lines in Sedgwick County, BNSF’s Emporia Subdivision (or TransCon Corridor) as well as UPRR’s Enid Subdivision (along its OKT line).

In terms of rail traffic or volume to and through Wichita, as shown in **Figure 9**, the BNSF’s Arkansas City Subdivision (or MidCon corridor) is shown with the most volume with a range between 10 and 25 million total net tons in 2007. The next utilized corridors (up to 5 million tons per year) occur along the UPRR Lost Springs Subdivision to Herrington and the K&O’s Hutchinson Subdivision.

Figure 7. Kansas Railroads

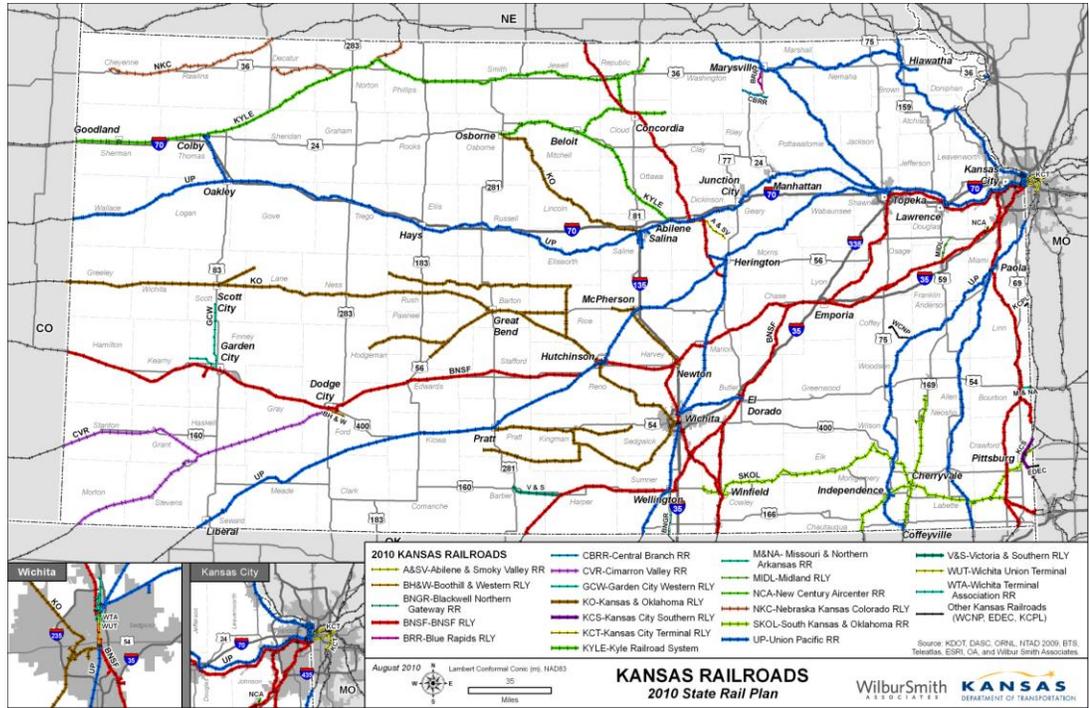


Figure 8. Primary Rail Corridors (National)

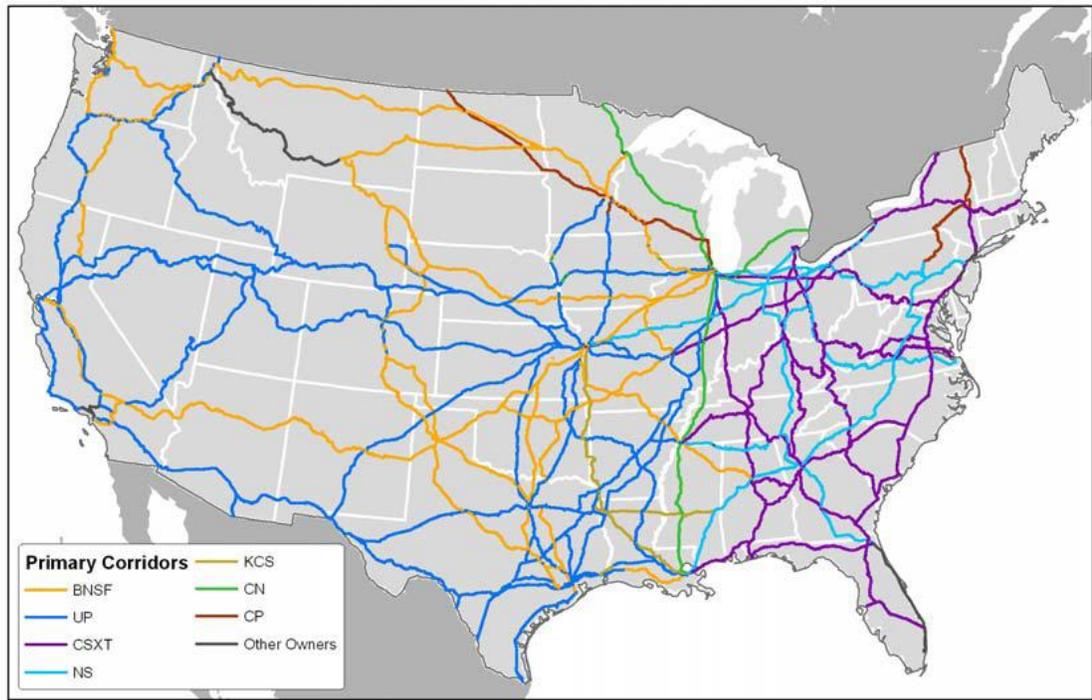
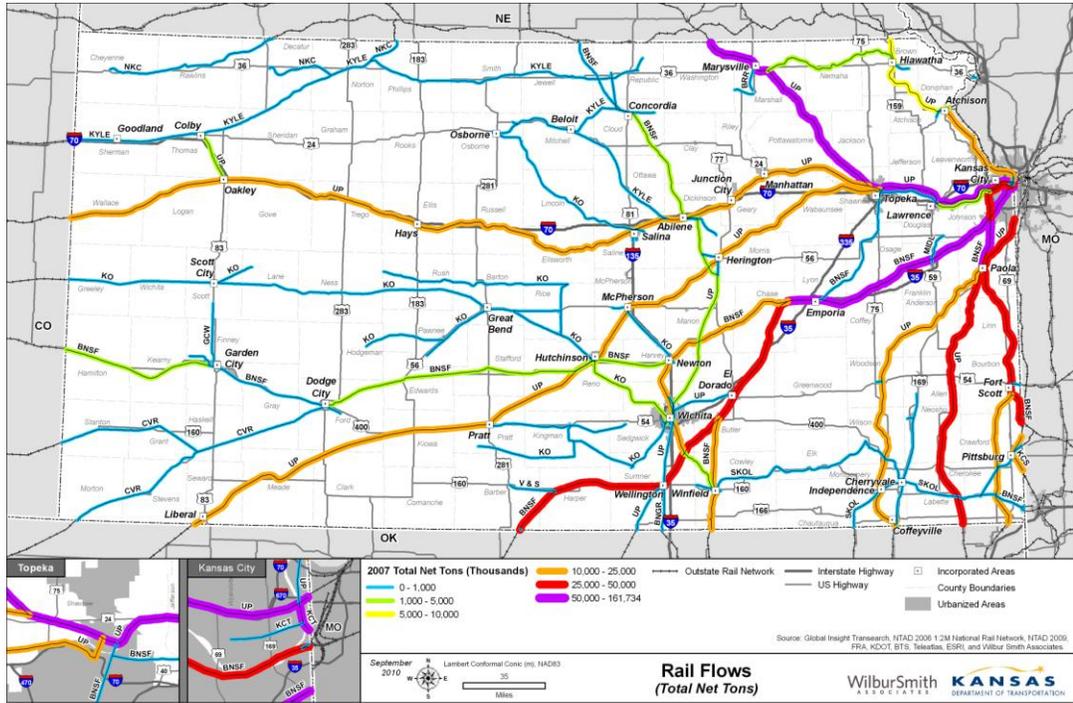


Figure 9. Rail Flows in Kansas (2007)



According to the American Association of Railroads (AAR) modeled primary corridors as shown in **Figure 10**, train traffic is expected to increase to the year 2035. Growth is expressed in a range of number of trains per day. Within and around the Wichita region, growth is shown along both the BNSF Railway and the UP Railroad corridors. No growth is shown along the short line railroads. This is then translated to a level of service (LOS) in 2035 (see **Figure 11**) that indicates these corridors (without improvements) would operate at capacity (LOS F).

Figure 10. Projected (2035) Growth

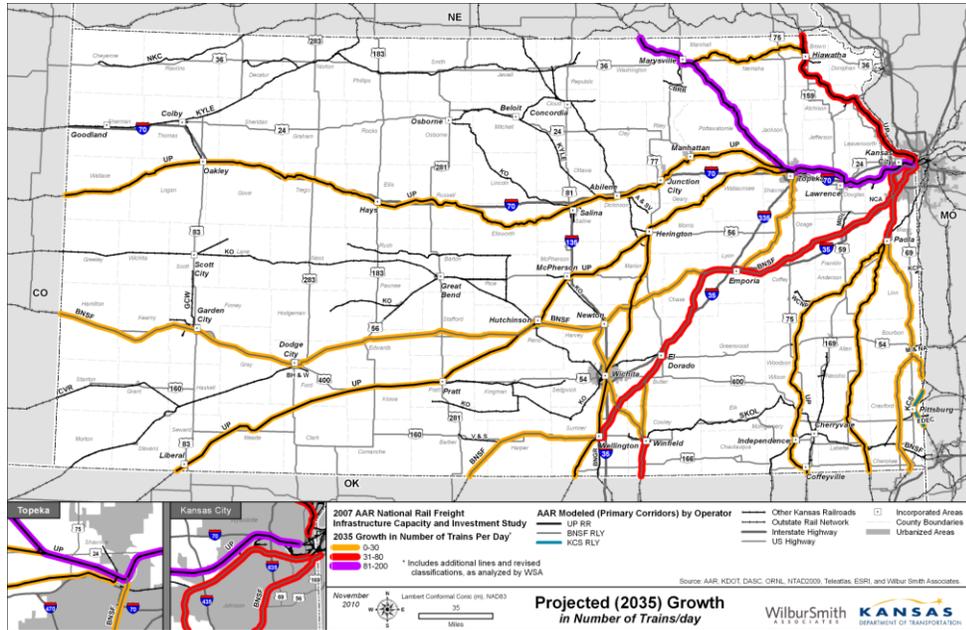
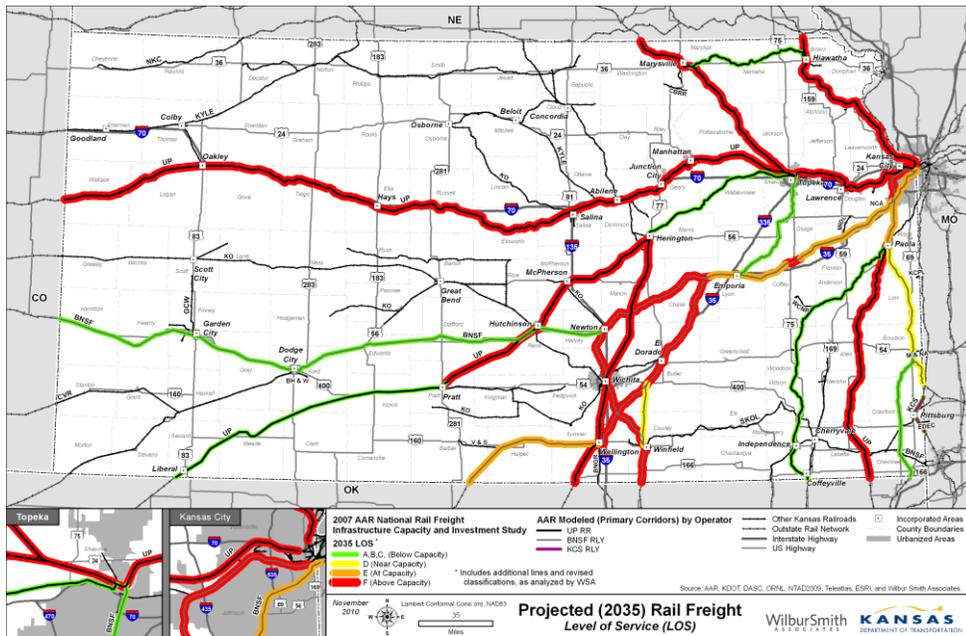


Figure 11. Projected (2035) Rail Freight Level of Service



Past Studies in Wichita

The Wichita/Sedgwick County Railroad Alternatives Analysis (October 1997) investigated the feasibility of constructing a railroad bypass route to be used by the BNSF and UPRR, as well as potential improvements to the Central Corridor in Wichita. The study was a follow-up to the Surface Transportation Board's mitigation plan for Wichita after the merger of the UPRR and the Southern Pacific. The study concluded that bypass alternatives were feasible and the Central Corridor option offered substantial reduction in vehicular congestion and improved safety. While this study did not firmly recommend an alternative for implementation it did provide valuable analysis of alternatives to improve transportation in Wichita.

Following the October 1997 study, a supplemental report was completed in April 1998. This report developed additional alternatives at BNSF crossings. The results of the study were feasible alternatives to grade separate highway-rail crossings at five locations that could be independently implemented as funding became available.

A major component of the April 1998 report was studying options for a grade separation at 21st Street. Both the BNSF and UPRR have major switching yards with extensive trackage intersecting this roadway corridor. This area, as well as 29th Street to the north, has been the subject of numerous efforts to develop concepts that reduce congestion and safety concerns. As part of the 21st Street Revitalization Plan (2004), a specific design concept study was initiated to develop an overpass alternative to address traffic flow, safety, cost, and impacts on businesses, right-of-way and utilities. Numerous studies were completed but none garnered enough support to be carried forward.

In addition to these very specific studies that developed concept alternatives, the Wichita Area Metropolitan Planning Organization completed the Railroad Crossing Plan (2007) to provide a toolbox to apply solutions at the region's at-grade highway-rail crossings. This plan acts as a tool to educate on ways to manage crossing safety and delay.

While these past studies have led to project implementation in Wichita, not all issues have been addressed and it is the intent of the WRMP to provide a comprehensive plan outlining achievable projects still waiting for implementation or through developing new solutions.

Section 3. Coordination

As part of executing the development of this Plan, public participation was garnered through various means. **Table 2** below identifies relevant stakeholders and describes the level of engagement with each identified group. Not only is it important to engage the public and key stakeholders when developing this plan, it will be important to use their involvement to build support for future implementation.

Table 2. Stakeholder Engagement Details		
Stakeholder Group	Level of Engagement	Tools
Railroad companies	Collaborate: help to develop alternatives and identify preferred solution	One-on-One meetings
Elected Officials	Collaborate: help to develop alternatives and identify preferred solution	One-on-One meetings
Government Agencies	Collaborate: help to develop alternatives and identify preferred solution	Committee Meetings, One-on-One meetings
Business and Neighborhood Representatives	Collaborate: help to develop alternatives and identify preferred solution	Area Meeting Committee Meetings
General Public	Inform: provide balanced and objective information to assist understanding	Through contact with staff and elected officials

Early on in the study, meetings with the railroads (BNSF, UPRR, WATCO and WTA/WUT) were held to gather their input on existing operational and physical constraints. They were also asked to provide feedback on concepts that were presented in past studies and initial ideas for concepts that could be developed within this study effort.

One-on-one meetings with Wichita City Council members were conducted several times during the study process. These meetings were used to inform these elected officials of the project status and to gather their feedback. These meetings allowed for additional issues to be brought to the study team’s attention based on constituent interaction with the council members. Congressman Jerry Moran’s staff was also contacted during the study for his feedback.

The Federal Highway Administration, Federal Railroad Administration, the Wichita Area Metropolitan Planning Organization and Sedgwick County were consulted to gather their input on potential concepts, funding sources and procedures for future project implementation.

The first resident and business meetings were held by area so that distinct issues could be identified by the residents, property owners and businesses directly located near those rail corridors. The feedback helped to identify issues that the general public feels are important to their day-to-day transportation needs and impact to the community they live or work in. During these meetings the issues that were discussed were generally consistent with issues that have been identified in the past. The stakeholders were aware of past

concepts and the constraints of funding and implementation. A second, combined resident and business meeting was held to confirm their initial feedback, educate on available solutions and present initial concept ideas for feedback.

Interaction with the general public was not directly conducted but input was gathered through elected officials and staff. Many of the general public's comments were related to noise, wait times at crossings and general safety concerns which are common responses gathered from this type of stakeholder group.

An overall summary of the issues identified by stakeholders and concepts developed out of those discussions are included in the following chapters of this plan.

Section 4. Existing Conditions

As part of the study process, the City of Wichita was divided into four distinct regions or project area locations. This allowed the study team to coordinate stakeholder involvement to specific areas of the city rather than focusing on general, large areas that might not impact various stakeholders. The four areas are shown on **Figure 12**.

The railroad Master Plan focuses on the railroad corridors within the City limits of Wichita. However as a planning document, the urban growth area is recognized as well as the need to consider any rail corridor as part of the overall rail transportation system. Consequently, the descriptions and supporting tables focus upon the characteristics within the Wichita City limits, yet issues and potential solutions are not constrained by the political boundaries.

Each project area is discussed from two perspectives: railroad and highway system. The rail corridors are defined by their physical characteristics: length, number of tracks, industry service, right-of-way width and crossings of other physical features both at-grade and grade separated. While other physical rail characteristics such as weight, construction method and signal control systems are important, this plan does not focus upon those aspects. Operational issues, like yard maneuvers or speed considerations are included as they were identified by the railroads during their stakeholder meetings. The physical elements of the highway system focus on the functional classification and general characteristics like number of lanes, traffic volumes and surrounding land use.

One important element that is also discussed that directly relates to the interaction between the railroad and highway systems is the highway-rail grade crossings. Information regarding the warning device (e.g., crossbucks, flashing lights, gates) is listed as well as a calculation of the Hazard Index (HI) at each location. The Hazard Index serves as a measure of the risk and exposure associated with highway-rail grade crossing and is defined as the product of the number of trains per day times the number of vehicles crossing the railroad track(s) per day times the value associated with the warning device. A passive warning device, like crossbucks, is assigned a value of 1.0 which does not diminish the product of the highway and rail volume (exposure). Flashing lights alone are assigned a value of 0.6 which does diminish the product of the volumes (exposure). Flashing lights and gates is assigned a value of 0.1 which significantly diminishes the product of the volume (exposure). These factors relate to the level of control provided at each crossing.

Area I

Area I is located in the south central part of the city primarily following three to five miles of the UPRR and BNSF rail corridors from downtown Wichita south to Haysville and Derby. This area is comprised of Wichita council districts 1, 3, 4 and 6. **Figure 13** shows the land use surrounding the two rail corridors in this area.

Figure 12. Study Areas 1, 2, 3 and 4

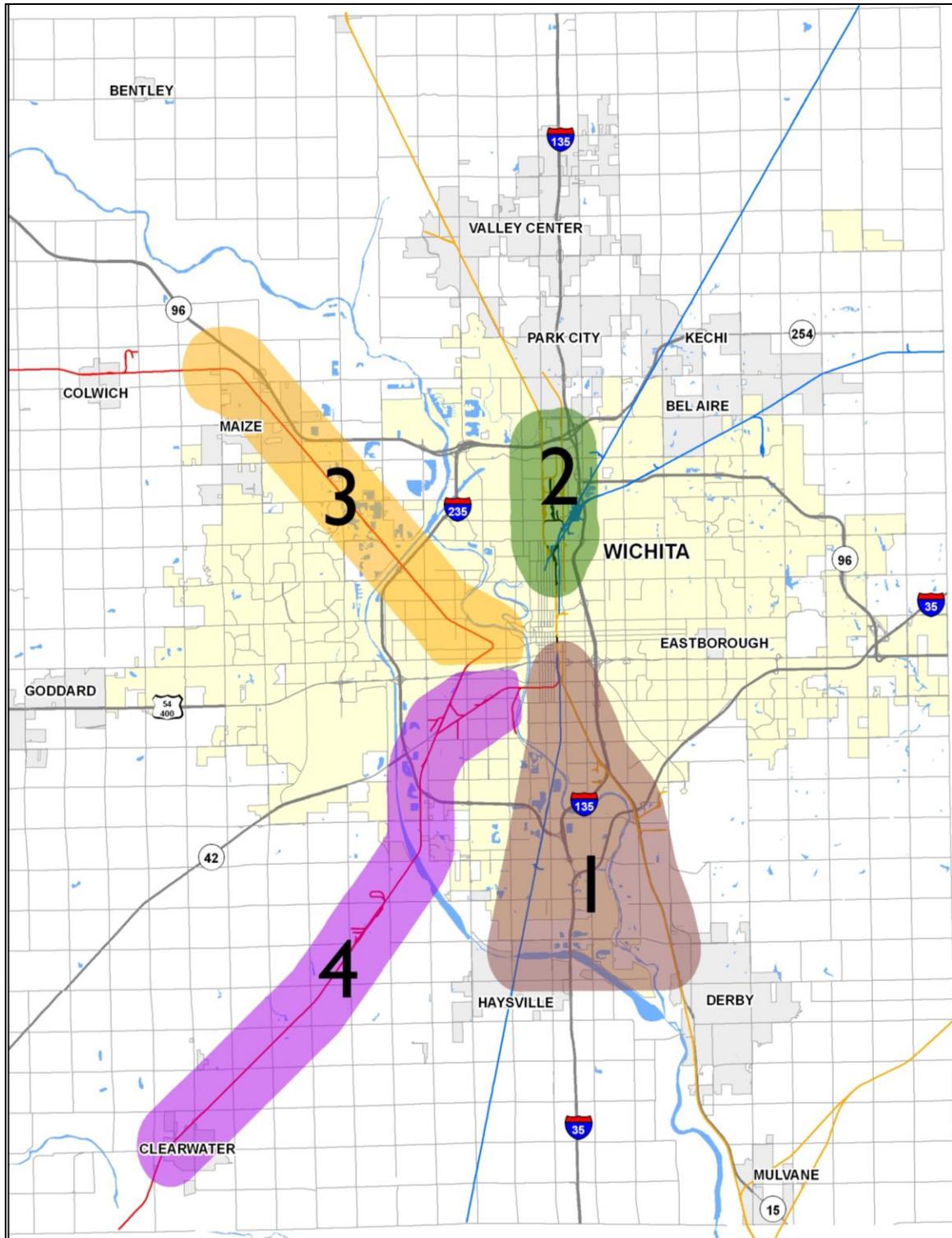
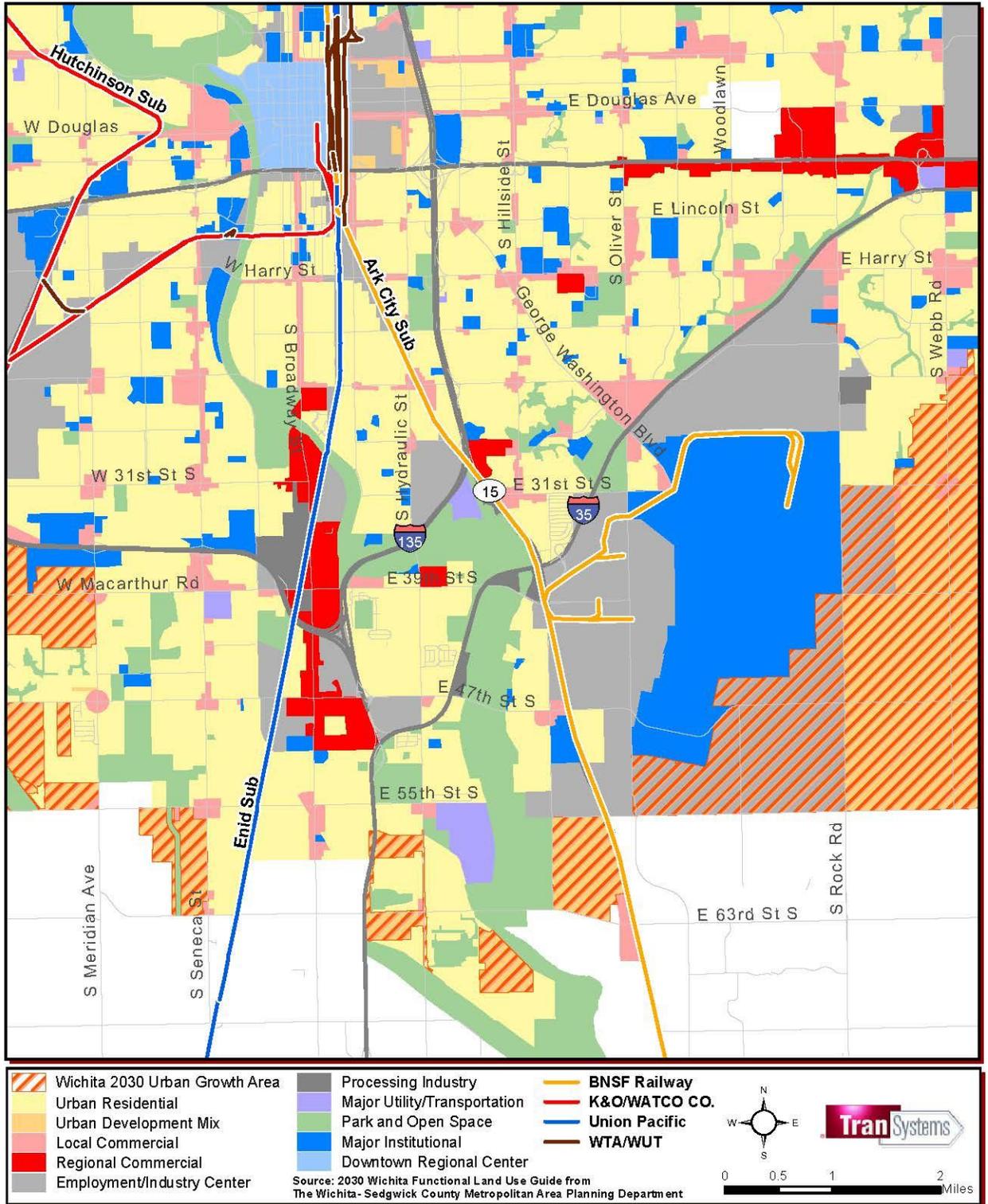


Figure 13. Area I Land Use

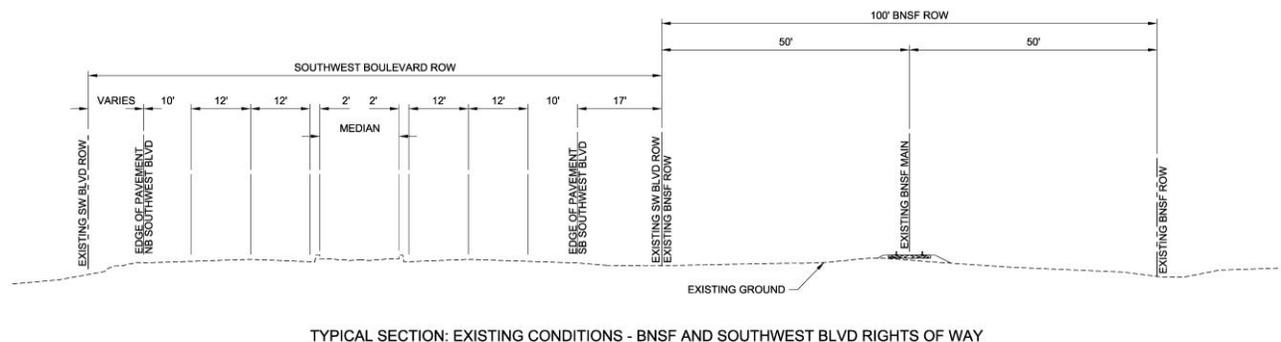


The BNSF Newton-Arkansas City corridor is on the east parallel to Southeast Boulevard/K-15. The UPRR OKT Subdivision corridor is on the west. At the north end of the UPRR corridor the track is parallel to Mead Street. These two rail lines join the K&O at a point north of Lincoln referred to as the “South Junction.” While both corridors are within the same area, each rail corridor is discussed separately. As both rail corridors run north to south, many of the at-grade crossings are with the same east-west streets.

BNSF Newton-Arkansas City Corridor

The section of the corridor under evaluation concentrates on the 2.3-mile long segment essentially from Lincoln Street to Wassell Street. The rail corridor has one track within the typical 100-foot right-of-way and often shares a common right-of-way line with the adjacent highway. South of Washington Avenue, the east side of the rail corridor is paralleled by the roadway corridor of Southwest Boulevard, as shown in **Figure 14**. Consequently, only the west side of the rail corridor abuts land uses that are typically industrial, then surrounded by residential land use until the junction of Hydraulic and Pawnee which is a commercial node. There is an industrial complex immediately south of Wassall Street that is served by industry leads to rail served clients. The industrial complex is generally contained by Wassall Street to the north, I-135 to the east/south and Hydraulic Avenue to the west. While previously served by several rail spurs, the industrial complex is now served by one rail spur, though it serves several properties. The only other rail served industries by the BNSF along this corridor are north of Lincoln Street via a spur line running in the center of Mosley Street. The spur line splits from the mainline and has two tracks crossing Bayley and Lincoln Streets. Formerly a third track (service) crossed Lincoln Street, though this crossing has been removed. This corridor carries 33 or more trains per day. Continued growth in train volume is expected along this corridor and may increase by as much as 30 trains per day by 2035.

Figure 14. BNSF Railway and Southeast Blvd (K-15) Typical Section Looking South



In this segment, the closest at-grade crossings are merely 600 to 700 feet apart while the longest separation is approximately 0.6 miles long between Pawnee Avenue and Wassell Street. There is one (1) local street crossing, one (1) collector street crossing and six (6) arterial street crossings. Daily traffic volumes on these crossings range from 1,000 to 19,000 vehicles per day. There are six (6) gates and two (2) flashing lights, as shown in **Figure 15**. A cumulative Hazard Index along the corridor exceeds 175,000. A listing of the at-grade crossings is provided in **Table 3**.

Figure 15. Area I – BNSF and UPRR Corridor At-grade Crossings



Table 3. BNSF Newton/Arkansas City Subdivision At-grade Crossings

DOT #	Street Names	Mile Post	Total Trains	Tracks-Main	ADT	Warning Device	Hazard Index
009280K	E. Lincoln Street	213.31	33	1	3,375	FLG	11,138
009281S	Bayley Street	213.44	33	1	1,013	FLG	3,343
009282Y	Washington Street	213.56	33	1	5,421	FLG	17,890
009283F	Harry Street	213.86	33	1	10,374	FLG	34,234
009284M	E. Mt. Vernon Street	214.41	33	1	5,819	FLG	19,203
009285U	Hydraulic	214.81	33	1	5,824	FLG	19,219
009286	E. Pawnee	214.95	33	1	19,006	FLG	62,720
009287H	Wassall Street	215.55	33	1	2,850	FLG	9,405
Segment Length within city limits (mi)		2.24	Segment HI				177,152
009290R	Keeler Cone Plant/31st Street	216.20	33	1	1,287	FLG	4,247
009377G	K-15	217.20	2	0	26,300	FL	31,560
009293L	McArthur Road	217.33	33	1	9,249	FLG	30,522
009382D	K-15	217.50	2	1	26,300	FL	31,560
009294T	Clifton Avenue	217.61	33	1	1,862	FLG	6,145
009295A	47th Street	218.35	33	1	17,988	FLG	59,360
009385Y	55th South	219.38	33	1	348	FLG	1,148
009388U	63rd South	220.45	33	1	10,340	FLG	34,122
Segment Length within growth boundary (mi)		4.25	Segment HI				198,664
Corridor Length (mi)		6.49	Corridor HI				375,816

Source: FRA Highway-Rail Crossing Inventory, accessed 2012. Some inaccuracies in databases may result in some crossing being unlisted or incorrectly listed.

Warning Devices include FLG: Flashing Lights and Gates, FL: Flashing Lights, X: Crossbucks.

- ▶ **Lincoln Street** – Between the two railroad corridors, a short distance of only 240 feet, Lincoln Street is a four-lane undivided roadway with a posted speed of 30 mph. It is classified as a minor arterial. There are no major roadway intersections between the two rail corridors.
- ▶ **Zimmerly Street** – Between the two railroad corridors, a distance of only 800 feet, Zimmerly Street is a two-lane roadway. It is classified as an urban collector. It intersects Washington Street immediately west of the BNSF corridor.
- ▶ **Washington Avenue** – Washington Avenue is a four-lane undivided roadway in the north-south direction. It is classified as a principal arterial. It only crosses the BNSF corridor.
- ▶ **Harry Street** – Between the two railroad corridors, a distance of approximately one-quarter of a mile, Harry Street is a four-lane undivided roadway with a posted speed of 30 mph. It is classified as a principal arterial. The only major roadway junction between the two rail corridors is with Washington Street.
- ▶ **Osie** – Osie Street is a two-lane roadway. It is classified as an urban collector. It only crosses the UPRR corridor.

- ▶ **E. Mt Vernon** – E. Mount Vernon is a two-lane undivided roadway. It is classified as a minor arterial. The distance between the two rail corridors is approximately one-half mile.
- ▶ **E. Pawnee** – E. Pawnee is a five-lane undivided roadway with a posted speed of 30 mph. It is classified as a principal arterial. The distance between the two rail corridors is approximately 0.7 miles.
- ▶ **Hydraulic Ave** – Hydraulic Avenue, running in the north-south direction, is a four-lane undivided roadway with a posted speed limit of 35 mph. It is classified as a minor arterial. Its crossing of the BNSF corridor is in close proximity to Pawnee crossing, a distance of approximately 750 feet.
- ▶ **MacArthur Road** – MacArthur Road is a four-lane divided roadway with a posted speed limit of 40 mph. It is classified as a principal arterial.
- ▶ **Clifton Ave** – Clifton Ave is a two-lane roadway. It is classified as an urban collector. It crosses only the BNSF corridor.
- ▶ **47th Street** – 47th Street is a four-lane undivided roadway with a posted speed limit of 35 mph. It is classified as a principal arterial. A portion of 47th Street, between Broadway and I-135 has a raised median. Between I-135 and I-35, 47th Street is essentially five-lanes including a center turn lane.
- ▶ **55th Street** – 55th Street is a two-lane roadway and is classified as a minor arterial. While it crosses both the UPRR and BNSF rail corridors, 55th Street is not a continuous street as it does not cross the Arkansas River. At its crossing with the UPRR corridor the roadway has a posted speed limit of 40 mph. At its crossing with the BNSF corridor the roadway has a posted speed limit of 55 mph.
- ▶ **East 63rd Street South** – 63rd Street is classified as a principal arterial. East of Broadway, 63rd Street is a five-lane roadway with a posted speed limit of 45 mph when it crosses the BNSF corridor. West of Broadway, 63rd Street is a two-lane roadway with a posted speed limit of 45 mph when it crosses the UPRR corridor.

Union Pacific Wichita OKT Subdivision

The section of the corridor under evaluation concentrates on the 2.2-mile long segment from Lincoln Street to a point south of Pawnee Street before crossing the Arkansas River. This segment of the corridor carries 7 or more trains per day. Continued growth in train volume is expected along this corridor and may increase by up to 30 trains by 2035. The current rail corridor has one track and shares a common right-of-way with the adjacent Mead Street, as shown in **Figure 16**.

Abutting land use along the Union Pacific corridor is industrial, yet the depth of the parcels is limited to approximately 200 feet on either side, between Harry Street and Pawnee Avenue. While some former rail service appears evident, no industry service appears active today until crossing over the Arkansas River and passing underneath Broadway. South of MacArthur Road, a second rail track is provided for 1.4 miles. This track also provides service to industry near 49th Street.

In this segment there are twelve (12) at-grade crossings. The closest are consistently 600 to 800 feet apart while the longest separation is 1,400 feet between Kinkaid and Pawnee. This greater separation is associated with the existing closure of Blake Street as Mead Street runs parallel to both sides of the railroad track near the Blake Street junction. There are six (6) local street crossings, two (2) collector street crossings and four (4) arterial street crossings. Daily traffic volumes on these crossings range from 400 to over 22,500 vehicles per day. There are three (3) crossbucks, six (6) flashing lights and two (2) gates. A cumulative Hazard Index along the corridor is estimated at nearly 36,000. A listing of the at-grade crossings is provided in **Table 4**.

Figure 16. Union Pacific Railroad and Mead Street – Typical Section



Table 4. UPRR OKT Subdivision At-grade Crossings

DOT #	Street Names	Mile Post	Total Trains	Tracks-Main	ADT	Warning Devices	Hazard Index
595049C	E. Lincoln Street	245.35	7	1	3,375	FLG	2,363
595050W	Bayley Street	245.50	7	1	547	FLG	383
595051D	Zimmerly	245.65	7	1	534	FLG	374
595052K	Boston	245.78	7	1	352	FLG	246
595053S	Harry	245.90	7	1	10,542	FLG	6,325
595054Y	Osie	246.03	7	1	552	FLG	386
595055F	Funston	246.15	7	1	386	FLG	270
595056M	Skinner	246.28	7	1	532	FL	1,915
595057U	Mt. Vernon	246.43	7	1	4,577	FLG	3,204
595058B	Clark	246.55	7	1	388	X	2,328
595059H	Kinkaid	246.68	7	1	752	X	4,512
595060C	Pawnee	246.95	7	1	22,508	FLG	13,505
Corridor Length (mi)		1.60				Corridor HI	35,811

Source: FRA Highway-Rail Crossing Inventory, accessed 2012. Some inaccuracies in databases may result in some crossing being unlisted or incorrectly listed.

Warning Devices include FLG: Flashing Lights and Gates, FL: Flashing Lights, X: Crossbucks.

Area 2

Area 2 is located in the north central part of the city from downtown north to near Park City. The BNSF and UPRR rail corridors and their yards are the focus of this area, though it is also important to understand the role that the WTA and WUT have within the downtown area. The majority of the land use within this boundary, as shown in **Figure 17**, is industrial and many of the properties are served by rail. The area can also be generally defined in terms of roadways as being bounded from 13th Street on the south side to I-235 on the north side, and from Broadway on the west side to I-135 on the east side. The area with several rail yards, contiguous industrial areas and the rail combining into a common corridor (referred to as the Central Corridor) south of 13th Street is also different than the two separate rail corridors described in Area 1.

The rail network involves three rail companies which through trackage rights may permit operations on their rail corridors to other carriers, such as the K&O.

BNSF

Mainline – The BNSF corridor to Newton is single-track north of 37th Street. Around 35th Street, the corridor increase to a double track line. Then by 21st Street, the corridor has increased to triple-track. Prior to entering the elevated Central Corridor, the corridor has returned to double track.

BNSF Wichita Yard – The yard is essentially located east of the mainline tracks between 24th Street and 32nd Street, a distance of approximately 5,000 feet. The yard, at its maximum width, has twelve (12) tracks not including the two mainline tracks.

Service Tracks – Several service tracks are in operation in this area; a southern line essentially along Mead Street that terminates at 13th Street, a northern line also essentially along Mead Street that terminates at 45th Street, and a split from the Newton subdivision near Mid Kansas Co-op Association that terminates at the ditch south of Interstate 235.

UPRR

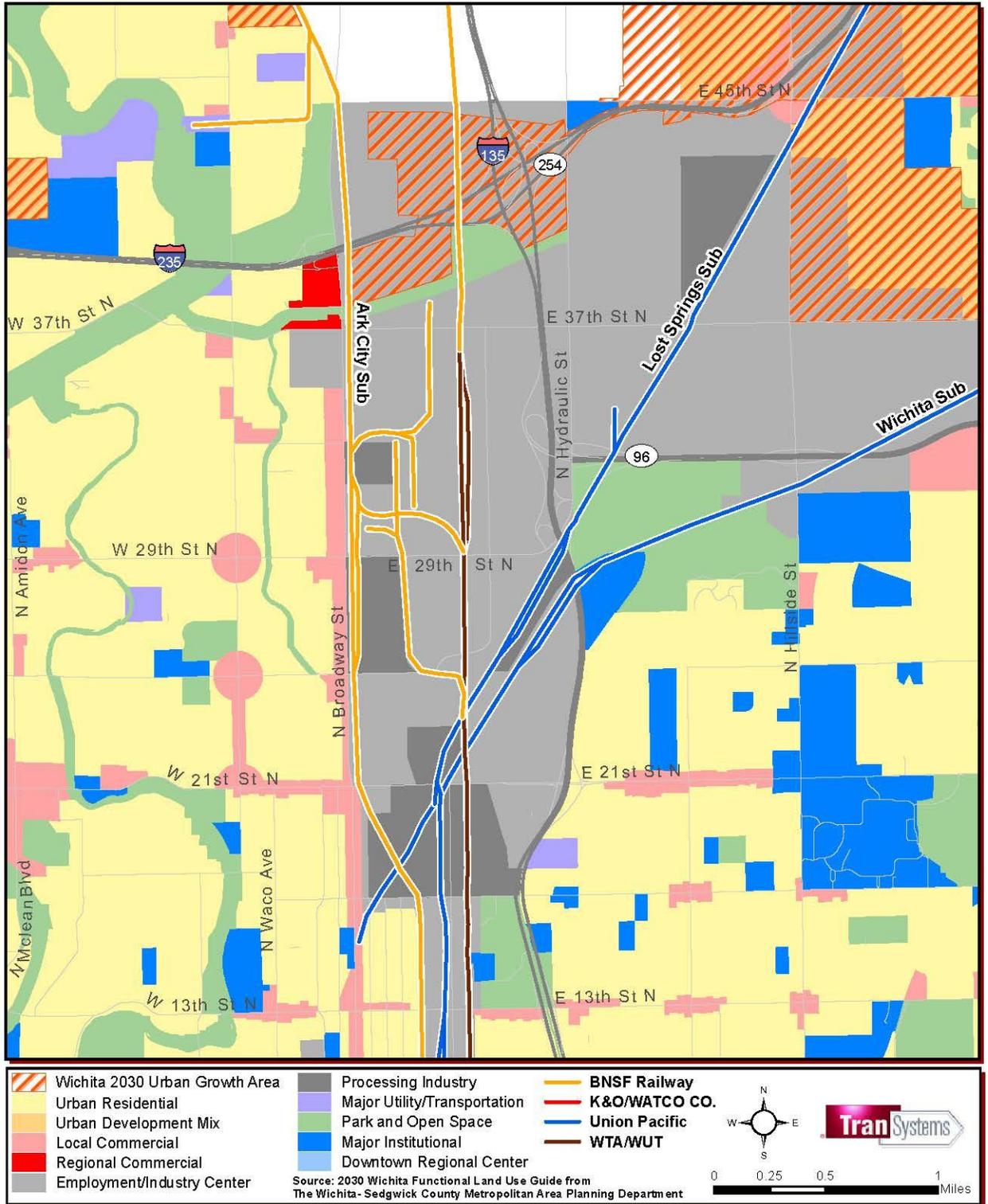
Mainlines – UPRR has two main lines, each with their own yards. The line to El Dorado goes through the Wichita Yard with as many as fourteen tracks that curves and passes beneath Interstate I-135. There is also a large grain facility that separates the Cline Yard and The Wichita Yard. In discussion with the UPRR, growth along this corridor is considered low. Therefore, no further investigation of this corridor was included. The line to Herrington goes through the Cline Yard approximately 4,000 feet long with as many as a dozen tracks.

Service Tracks – UPRR has a service line south along Mead Street that terminates at 13th Street.

WTA

Service Tracks – The WTA has service tracks that begin north of 9th Street, extend along 25th Street, and go as far north as 33rd Street to serve the Bartlett Grain facility.

Figure 17. Area 2 Land Use



The highway network includes numerous east-west streets several of which have closely spaced at-grade crossing with several rail corridors. In some cases the streets are diverted to avoid crossing the railroad while in others, the streets cross a rail yard. Because of the complexity of the surrounding roadway network, a brief description of each roadway within the area is provided.

- ▶ **North Broadway** – From 13th Street to its interchange with I-235 over a distance of nearly 3.5 miles, North Broadway is a four-lane undivided roadway in the north-south direction. It is classified as a minor arterial. Broadway has major intersections with traffic signal control at 13th Street, 17th Street, 21st Street, 29th Street and 37th Street. Other important junctions include side streets such as 23rd, 25th and 33rd Streets with crossings of the BNSF Yard as well as the fire station and emergency traffic signal at 32nd Street.
- ▶ **13th Street** – This four-lane east-west minor arterial street has the elevated Central Corridor immediately east of Santa Fe as well as the service industry track immediately east of the Central Corridor to the Horizon Milling facility. Two former at-grade rail crossings of 13th along Mead for industry service are now removed, though industry service remains from points south of 13th Street. 13th Street has an interchange with Interstate-135.
- ▶ **17th Street** – This two-lane east-west minor arterial street has a four-track at-grade crossing of a BNSF service track east of Topeka Street. This rail line formerly crossed the Arkansas River, but now only serves a grain industry immediately north of 17th Street. Another four-track at-grade crossing of the BNSF mainline to Newton occurs east of St. Francis. This crossing also includes the WTA tracks servicing industry to the north. At 17th Street the elevated Central Corridor has returned to being at-grade. Immediately west of Santa Fe is the single track WTA service industry track to a grain facility. Immediately east of Mead Street is the single track UPRR service industry track which terminates at 11th Street. 17th Street crosses over a drainage ditch and is crossed by Interstate 135. East of I-135, 17th Street widens to four-lanes.
- ▶ **21st Street** – This four-lane east-west principal arterial street has a three-track at-grade crossing of the BNSF mainline to Newton immediately east of Broadway. A two-track at-grade crossing of the WTA service line occurs at the extension of Mead Street and a single-track at-grade crossing of a UPRR line into their Cline Yard. Then a single-track crossing occurs 180 feet east on the UPRR line into their Wichita Yard just west of Mosley Street. A double-track crossing occurs another 480 feet to the east on the BSNF service line. 21st Street crosses a drainage ditch and has an interchange with Interstate I-135. East of I-135, 21st Street widens to four-lanes with a continuous center turn lane.
- ▶ **23rd Street** – This two-lane east-west local street has a three-track at-grade crossing of the BNSF mainline to Newton immediately east of Broadway. The crossing, noted above, previously served an industry that is no longer active.
- ▶ **25th/26th Street** – This two-lane east-west urban collector street is north and parallel to the WTA track between Broadway and an extension of Mead Street. Then the roadway curves northward and crosses the single-track at-grade crossing of the BNSF line to Newton. Then 26th Street curves to become the north-south Ohio Street. Ohio Street intersects 29th Street.
- ▶ **29th Street** – This four-lane east-west minor arterial street has a fourteen-track at-grade crossing of the BNSF mainline to Newton and yard immediately east of Broadway. A single-track at-grade crossing of the WTA service line occurs west of St. Francis. A double-track at-grade crossing of the BNSF line to Newton occurs between Mead and Ohio Streets. 29th Street then curves northward to become Hydraulic Avenue and is parallel to the UPRR tracks with an interchange with Interstate 135.

- ▶ **33rd Street** – This two-lane east-west local street extends approximately 2,400 feet east of Broadway. It has a three-track at-grade crossing of the BNSF mainline to Newton immediately east of Broadway. Then the roadway has a single-track at-grade crossings of the BNSF service track west of Topeka Street and again at Mead Street.
- ▶ **37th Street** – This two-lane east-west minor arterial street has a single-track at-grade crossing of the BNSF mainline to Hutchinson immediately east of Broadway. Another single-track at-grade crossing of a BNSF industry track occurs immediately east of Mead Street. Another single-track at-grade crossing of a BNSF industry track occurs at the extension of Washington Avenue. Then 37th Street is crossed by Interstate 135.

Figure 18 has an overview of the at-grade rail crossings of the various rail corridors and streets in Area 2. This area is crisscrossed by numerous rail lines and highways. However, the nature of the rail yard operations and the close proximity of the at-grade crossing suggest that the listing of at-grade crossings be presented by the two four-lane highway corridors, specifically 21st Street and 29th Street that lead to interchanges with I-135.

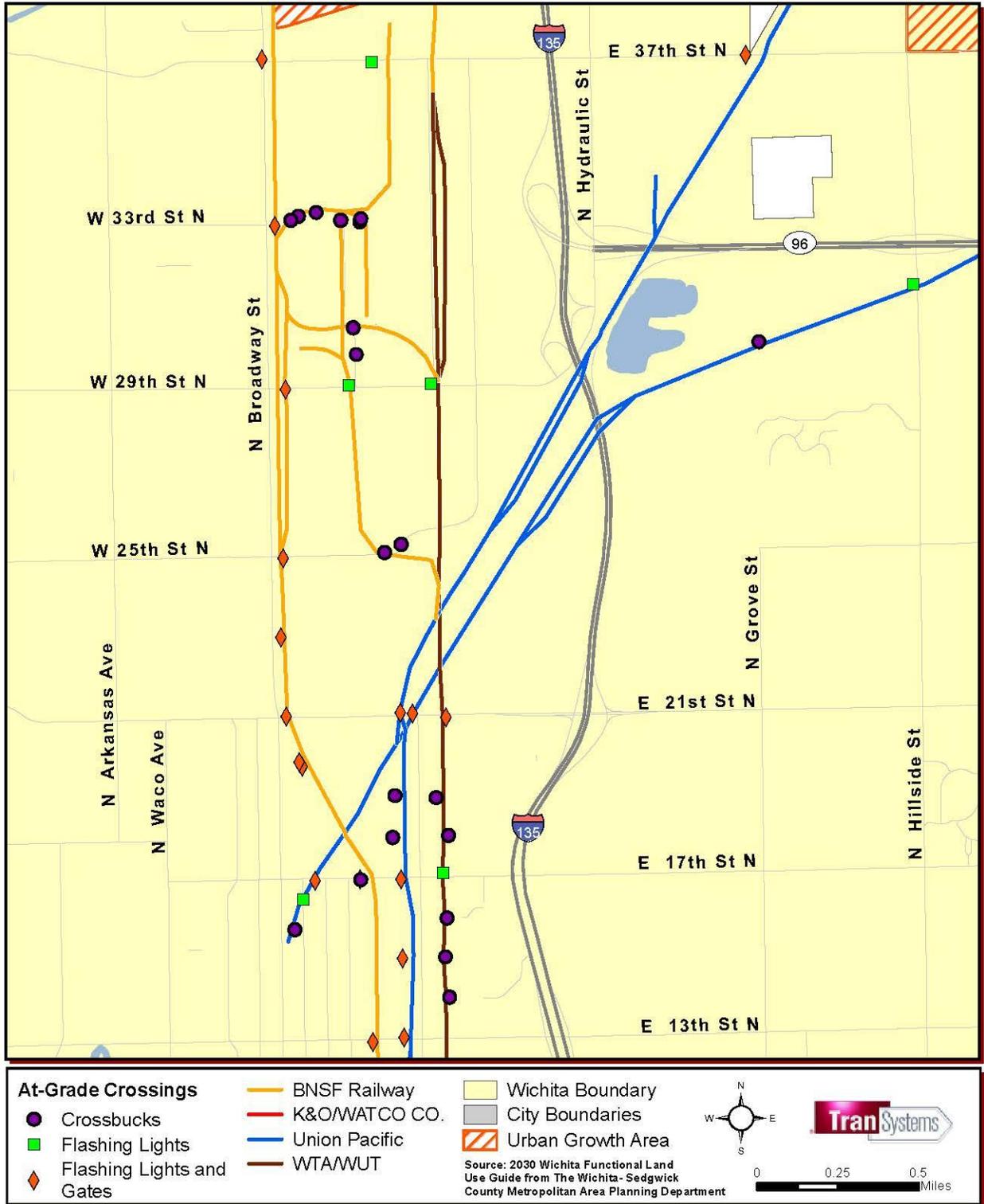
The 21st Street corridor extends from Broadway to the interchange with Interstate I-135. On the 21st Street segment there are four at-grade crossing locations protected with flashing lights and gates and eight at-grade tracks (main and industry). The daily traffic volume on 21st Street is approximately 12,500 vehicles per day. A cumulative Hazard Index along the highway corridor is estimated in excess of 80,000. The 29th Street corridor extends from Broadway to the interchange with Interstate 135. On the 29th Street segment there are three at-grade crossing locations and seventeen at-grade tracks. There is one at-grade crossing controlled with flashing lights and gates and two controlled by flashing lights only. The daily traffic volume on 29th Street is approximately 7,000 vehicles per day. A cumulative Hazard Index along the highway corridor is estimated in excess of 65,000. A listing of the at-grade crossings for both highway corridors is provided in **Table 5**.

Table 5. 21st Street and 29th Street At-grade Crossings						
DOT #	Railroad	Total Trains	Tracks-Main	ADT	Warning Device	Hazard Index
009263U	BNSF	34	3	12,535	FLG	42,619
09312N	UPRR	5	1	12,535	FLG	6,268
445091N	UPRR	20	1	12,535	FLG	25,070
670132H	WTA	6	0	12,535	FLG	7,521
21st Street HI						81,478
009259E	BNSF	32	2	6896	FLG	22,067
009309F	WTA	4	0	6896	FL	16,550
670135D	BNSF	6	0	7425	FL	26,730
29th Street HI						65,347

Source: FRA Highway-Rail Crossing Inventory, accessed 2012. Some inaccuracies in databases may result in some crossing being unlisted or incorrectly listed.

Warning Devices include FLG: Flashing Lights and Gates, FL: Flashing Lights, X: Crossbucks.

Figure 18. Area 2 – Overview of At-grade Crossings



Area 3 and Area 4

Area 3 is located in the northwest part of the city from US-54/400 towards Maize, while Area 4 is located in the southwest part of the city from US-54/400 towards Clearwater. These areas are served by the K&O rail corridors. **Figures 19** and **20** show the surrounding land use.

The K&O has two subdivisions, the Hutchinson Subdivision (essentially Area 3) and the Hardtner Subdivision (essentially Area 4). According to the Kansas State Rail Plan, the Hardtner subdivision diverges near West Street and Pawnee Avenue. A portion of the rail corridor (the Hutchinson subdivision) continues eastward to the Central Corridor's South Junction near Lincoln Street. However, crossing inventory data from the Federal Railroad Administration (FRA) indicates otherwise. FRA indicates that the subdivisions begin at a common point at the former railroad wye near Douglas Avenue and Elizabeth Street. In rail terminology, a wye is a triangular shaped arrangement of rail tracks with a switch or set of points at each corner. In mainline railroads this can be used at a rail junction where two rail lines join in order to allow trains to pass from one line to the other line.

Previously, the rail combined at this point and continued easterly across the Arkansas River into Downtown Wichita. Now without the easterly extension, the rail corridor is in the shape of a boomerang. The Hutchinson subdivision begins just north of Douglas Avenue with increasing mileposts as the rail heads towards Maize, while the Hardtner subdivision (at the same common milepost with the Hutchinson Subdivision) begins just southwest of Douglas Avenue with increasing mileposts as the rail heads towards Conway Springs. The K&O rail corridor east towards the South Junction, along Orient Boulevard, is identified as the Eastern Wichita subdivision. The location of the K&O in central Wichita is shown in **Figure 21**.

K&O Hutchinson Subdivision

The common starting point, at the former wye MP 486.33, had a rail corridor heading due east that crossed the Arkansas River and connected to rail lines near the Central Corridor. The Hutchinson subdivision corridor extends northwesterly across 2nd Street (urban collector) and Meridian (minor arterial) as it heads towards the extension of Zoo Boulevard at its junction with Central Avenue. The land use adjacent to the rail is primarily residential. The K&O rail corridor is on the north side of Zoo Blvd and the right-of-way width appears to be approximately 50 feet. Before crossing underneath I-235 and over the Wichita Valley Center Flood Control Project (also referred to as the Big Ditch), the rail has at-grade crossings with 9th (urban collector), West Street (other principal arterial), 13th Street (minor arterial) and Westdale Drive (an urban collector). Again, the land use adjacent to the rail is primarily residential along this segment approximately 3.2 miles long.

After crossing the Big Ditch, the rail corridor is followed by Zoo Boulevard for a short distance (approximately one-half mile) and then continues diagonally towards the town of Maize. The rail has an at-grade crossing with Hoover (urban collector), W 21st Street (minor arterial) and Ridge Road (principal arterial). The rail serves two industries on the south side between 23rd and 29th Streets. The land use adjacent to the rail is predominantly residential though with some remaining industry along this segment, also approximately 3.2 miles in length.

The next at-grade crossings of 37th Street and Tyler/87th Street are just outside the City limits of Wichita.

Figure 19. Area 3 Land Use

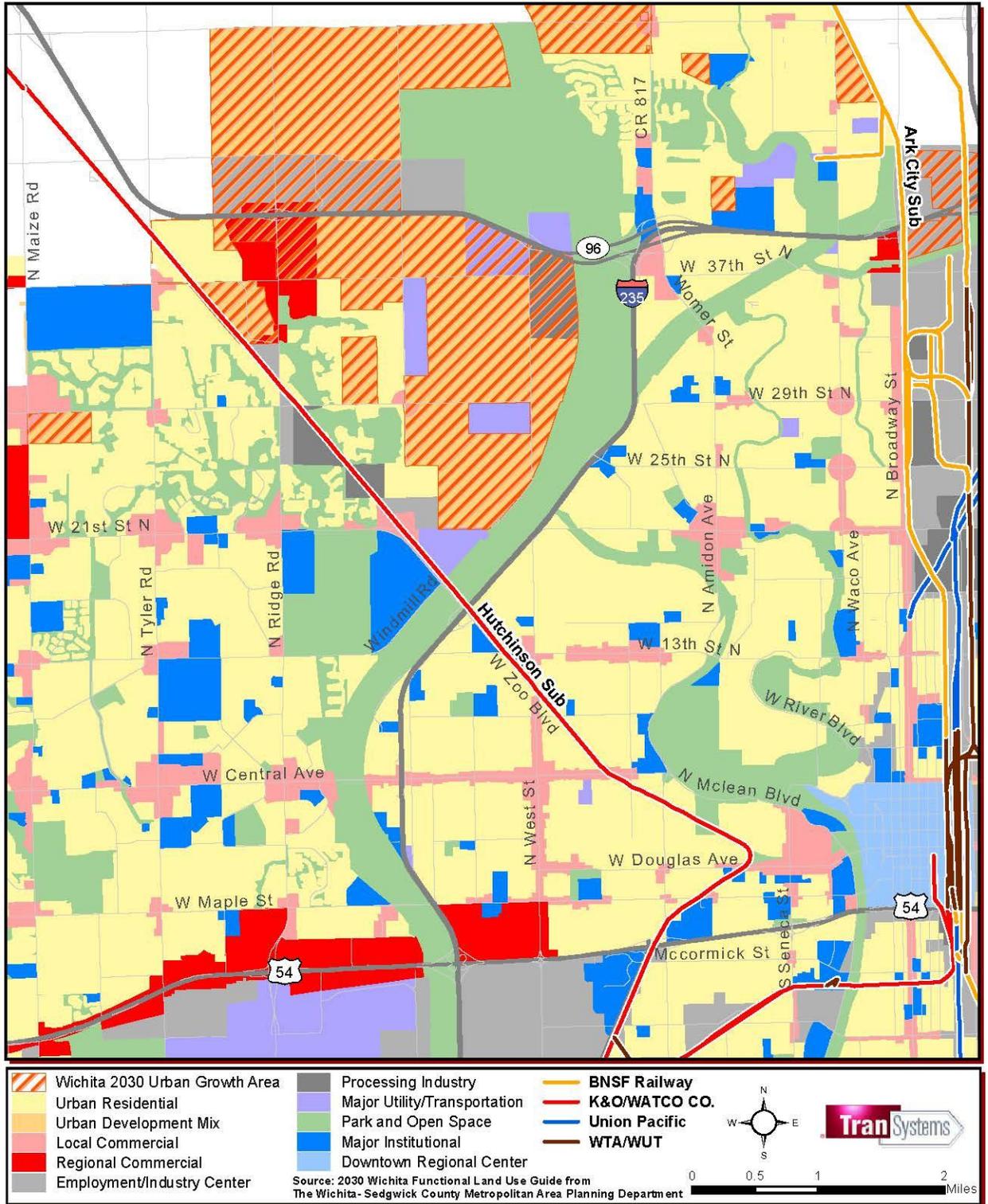


Figure 20. Area 4 Land Use

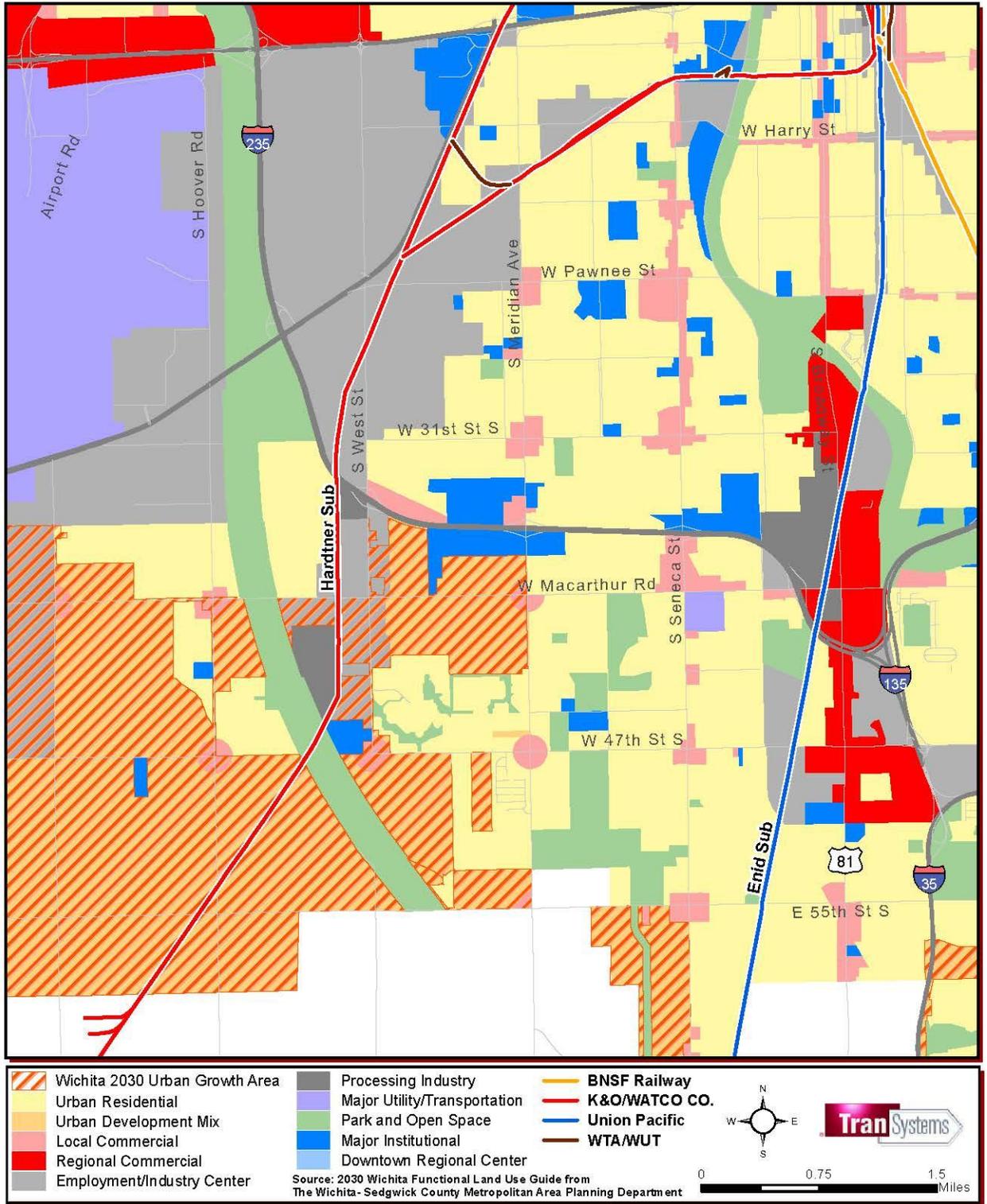
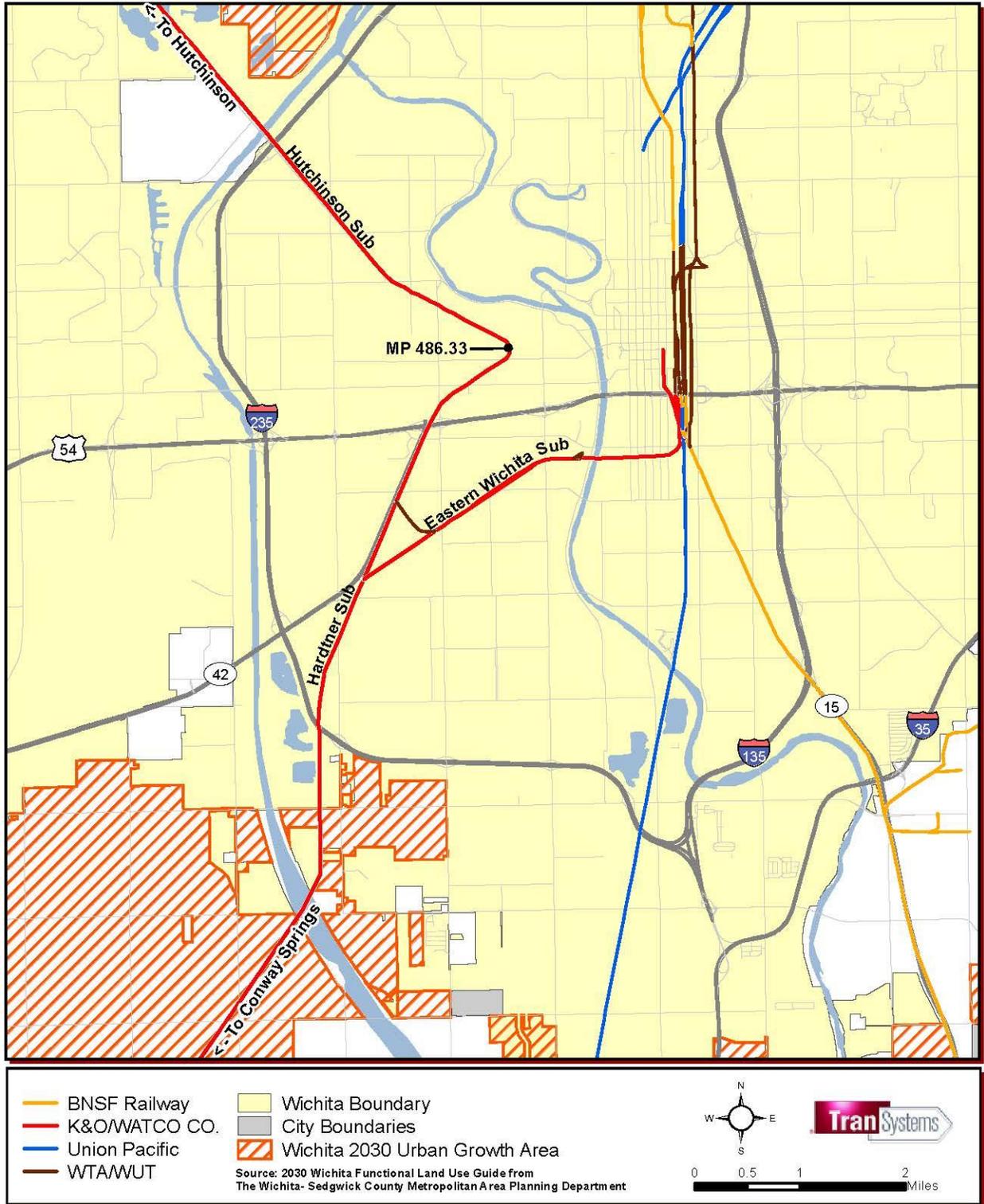


Figure 21. K&O Lines in Central Wichita



The limits of the Area 3 corridor begin within Downtown Wichita and extend northwesterly. While the Kansas Rail Plan indicates that the Hutchinson subdivision also continues southwesterly, information from the Federal Railroad Administration's database of crossing inventory indicates that this portion of the K&O line is part of the Hardtner Subdivision. In order for K&O trains to connect to the Central Corridor when travelling from Maize to Wichita requires a turn from the Hutchinson Subdivision to the Hardtner Subdivision and then another turn to the Wichita Subdivision. Area 4 is considered to consist of the Hardtner and Eastern Wichita Subdivisions as defined by the FRA crossing inventory.

K&O Hardtner Subdivision

The rail corridor and its mileposts (again beginning at MP 486.33) extend southwesterly at a diagonal across the minor arterials of Douglas Avenue, Maple and Meridian Streets. Along the way, several other local streets are also crossed. While US-54/400 is elevated over the railroad, both the eastbound on- and off-ramps have at-grade crossings with the railroad. Immediately after US-54/400, there is an at-grade crossing of McCormick Street, an urban collector. At Harry Street, an urban collector, approximately two-thirds of a mile south of US-54/400, the rail is single track and is typically centered within a 60 foot wide right-of-way. The rail is paralleled by the four-lane expressway Southwest Blvd (K-42). Adjacent to the rail is a mix of industrial and residential land uses. However, there are no rail served industries along this approximately 1.8 mile long segment.

According to the Kansas Rail Plan, the Hardtner Subdivision begins as two rail segments, each approximately three-quarters of a mile in length along K-42 and along an extension of Orient Boulevard. Each rail segment is essential double track with a siding and each has a spur line to industry. The spur along K-42 actually crosses K-42, while the spur along the extension of Orient Boulevard near May Street does not have an at-grade crossing with any streets. The two rail segments join less than 900 feet north of the at-grade crossing of Pawnee Street, an arterial street. Previously this junction point was a diamond crossing with a rail line extending southwesterly (essentially followed by K-42) to the community of Schulte and points beyond.

The Hardtner Subdivision continues southwesterly across West Street and then beneath I-235 before its at-grade intersection with MacArthur Road, an arterial. Several industries along both sides of the rail are served along this two-mile long segment. The rail then crosses over the Big Ditch into Sedgwick County. Here the K&O provides service to several large industrial complexes between Hoover and Ridge Roads, from 51st to 67th Streets, including the Foreign Trade Zone (FTZ) 161 of the Garvey Public Warehouse over a two mile length. South of this segment the rail passes outside the 2030 urban growth area. The Hardtner Subdivision continues on southwesterly through Clearwater and towards Conway Springs in Sumner County another 17 miles away.

At the 'X' crossing, several former spurs and existing rail connections are present that the Kansas State Rail Plan terms "non specified". These include a rail corridor extended to the west, crossing K-42 and Harry Street (west of K-42). The corridor formerly crossed the Big Ditch and headed westward reaching Goddard and Garden Plain. The rail along that corridor has been removed approximately a quarter mile east of West Street. Nonetheless, this spur provides service to at least one industry. It is worth noting that the K&O is able to provide service to Garden Plain by reaching that community from the west, see Figure 4. Another spur immediately west of McLean Boulevard heads south along the Arkansas River for nearly 0.9 miles crossing Harry Street with potential service to adjacent industries.

K&O Eastern Wichita Subdivision

The Eastern Wichita subdivision mile posts begin at the South Junction near with the K&O yard between Gilbert and Waterman Streets. US-54/400 passes over this yard and its four tracks. At Lincoln, the rail curves west and follows along Bayley Street from St. Francis to the River. Here for nearly a mile, the rail is paralleled by a multi-use path on both the north and south sides. The rail corridor runs due west essentially paralleled by Walker Street west of the Arkansas River. The railroad turns southwesterly at Seneca Street and is paralleled by Orient Boulevard. Here Harry Street crosses three tracks and small yard (approximately 3,000 feet long). The rail crosses Meridian Avenue for the third time and heads westward across May Avenue towards K-42 and Harry Street.

The classified roadway network that crosses the rail corridors includes numerous streets. Because of the diagonal alignment of the rail in relation to the roadway grid, several crossings are closely spaced near the junction of east-west and north-south classified streets. The at-grade crossings with classified streets are listed here in ascending mile post by the railroad subdivision. The streets are noted by their directional orientation.

Hutchinson Subdivision

Area 3

- ▶ **2nd Street** – 2nd Street is a two-lane roadway in the east-west direction. It is classified as an urban collector.
- ▶ **N. Meridian** – N Meridian is a three-lane roadway in the north-south direction. It is classified as minor arterial.
- ▶ **West Central Avenue** - W Central Ave is a five-lane roadway in the east-west direction. It is classified as an urban collector.
- ▶ **N West Street** – N West Street is a five-lane roadway in the north-south direction. It is classified as a principal arterial.
- ▶ **13th Street** – 13th Street is a four-lane roadway in the east-west direction. It is classified as minor arterial.
- ▶ **Westdale** - Westdale Street is a two-lane roadway. It is classified as an urban collector.
- ▶ **Hoover Road** - Hoover Road is a two-lane roadway in the north-south direction connecting to N 53rd Street. It is classified as an urban collector.
- ▶ **W 21st Street** - W 21st Street is a two-lane roadway in the east-west direction. It is classified as a minor arterial.
- ▶ **W 29th Street** – At the railroad crossing, W 29th Street is a two-lane roadway in the east-west direction. It is classified as minor arterial. Immediately west of Ridge Road, W 29th Street is a five-lane roadway.
- ▶ **N Ridge** – N Ridge Road is a four-lane roadway in the north-south direction. It is classified as principal arterial.
- ▶ **W 37th Street** - W 37th Street is a four-lane roadway in the east-west direction. It is classified as minor arterial.
- ▶ **87th Street/Tyler** – This roadway is two-lanes in the north-south direction. It is classified as principal arterial.

Area 4

- ▶ **Douglas** – Douglas Avenue is a two-lane roadway in the east-west direction. It is classified as minor arterial.
- ▶ **W. Maple**– W Maple Street is a four-lane roadway in the east-west direction. It is classified as minor arterial.

- ▶ **S. Meridian** – S. Meridian is a four-lane undivided roadway in the north-south direction. It is classified as a minor arterial.
- ▶ **McCormick Street** – McCormick Street is a four-lane roadway in the east-west direction. It is classified as an urban collector.
- ▶ **W Harry Street** – W Harry Street is a three-lane roadway east of its crossing with the railroad. It is classified as an urban collector.

Hardtner Subdivision

Area 4

- ▶ **E. Pawnee** – E Pawnee is a four-lane undivided roadway in the east-west direction. It is classified as a principal arterial.
- ▶ **West Street** – West Street, running in the north-south direction, is a four-lane undivided roadway. It is classified as a minor arterial.
- ▶ **MacArthur Road** – MacArthur Road is a two-lane roadway in the east-west direction. It is classified as a minor arterial.
- ▶ **South Hoover Road** – South Hoover Road is a two-lane roadway in the north-south direction. Outside the City limits it is classified as rural major collector. The next at-grade crossing along the railroad is just under a quarter-mile at 55th Street.
- ▶ **55th Street** – 55th Street is a two-lane roadway in the east-west direction and is classified as a rural major collector.

Eastern Wichita Subdivision

Area 4

- ▶ **Lincoln** – Lincoln Street is a four-lane roadway in the east-west direction. It is classified as a principal arterial. This crossing is immediately west of the UPRR and BNSF rail corridors.
- ▶ **Main Street** – Main Street is a one-way southbound roadway with three-lanes. It is classified as an urban collector.
- ▶ **Market Street** – Market Street is a one-way northbound roadway with two-lanes. It is classified as an urban collector.
- ▶ **Broadway** – Broadway is a four-lane roadway in the north-south direction. It is classified as a minor arterial.
- ▶ **Emporia Street** – Emporia Street is a one-way northbound roadway with two-lanes. It is classified as an urban collector.
- ▶ **St. Francis Street** – St. Francis Street is a one-way southbound roadway with two-lanes and is classified as an urban collector.
- ▶ **MacLean Boulevard** – MacLean Boulevard is a four-lane roadway in the north-south direction. It is classified as principal arterial.
- ▶ **Seneca Street** – Seneca Street is a four-lane roadway in the north-south direction. It is classified as a principal arterial.
- ▶ **W Harry Street** – W Harry Street is a two-lane roadway in the east-west direction. It is classified as an urban collector.
- ▶ **S. Meridian** – S. Meridian is a four-lane roadway in the north-south direction. It is classified as a minor arterial.

Figure 22 illustrates the at-grade crossings along the K&O rail lines within Areas 3 and 4. A listing of the at-grade crossings is provided in **Tables 6, 7 and 8**.

Figure 22. K&O Railroad Hutchinson, Hardtner and Eastern Wichita Subdivision Crossings



Table 6. K&O Hutchinson Subdivision At-grade Crossings

DOT #	Street Names	Mile Post	Total Trains	Tracks-Main	ADT	Warning Device	Hazard Index	
445207M	37th	492.50	4	1	4,595	X	18,380	
445206F	N Ridge	491.37	2	1	15,389	FL	18,467	
445205Y	W 29th N	491.25	2	1	1,455	FL	1,746	
445201W	W 21st N	490.00	2	1	1,309	FL	1,571	
445200P	N Hoover	489.70	2	1	1,586	FL	1,903	
445196C	N Westdale near I-235	489.12	2	1	4,981	FL	5,977	
445195V	W 13th	488.90	2	1	12,827	FL	15,392	
445194N	N West	488.33	2	1	12,817	FL	15,380	
445193G	N 9th	488.03	2	1	1,883	X	3,766	
445192A	Mt Carmel (Central)	487.50	6	1	19,257	FLG	11,554	
445191T	N Custer	487.40	6	1	271	X	1,626	
445190L	N St. Paul	487.23	6	1	2,429	FL	8,744	
445189S	N Gordon	487.17	6	1	213	X	1,278	
445188K	N Edwards	487.07	6	1	527	X	3,162	
445187D	Meridian Ave	486.99	6	1	9,412	FLG	5,647	
445166V	St Clair	486.96	6	1	101	X	606	
445185P	N Athenian	486.79	6	1	918	X	5,508	
445183B	2nd & Glenn	486.53	6	1	4,311	FLG	2,587	
445182U	Vine	486.43	6	1	487	FL	1,753	
445181M	Millwood	486.33	6	1	475	FL	1,710	
Corridor Length (mi)		6.17					Corridor HI	126,758

Source: FRA Highway-Rail Crossing Inventory, accessed 2012. Some inaccuracies in databases may result in some crossing being unlisted or incorrectly listed.

Warning Devices include FLG: Flashing Lights and Gates, FL: Flashing Lights, X: Crossbucks.

Table 7. K&O Hardtner Subdivision At-grade Crossings

DOT #	Street Names	Mile Post	Total Trains	Tracks-Main	ADT	Warning Device	Hazard Index
445161B	Douglas	486.30	6	1	7,975	FLG	4,785
445162H	Millwood	486.33	6	1	517	X	3,102
445163P	Vine	486.43	6	1	421	X	2,526
445164V	Glenn	486.50	6	1	373	X	2,238
445166K	Charles	486.60	6	1	388	X	2,328
445167S	Maple	486.73	6	1	7,955	FLG	4,773
445168Y	N St. Clair	486.89	6	1	435	FLG	261
445169F	Meridan at Univ	487.07	7	1	11,878	FLG	8,315
917753S	WB Access Kellogg	487.30	6	1	5,731	FLG	3,439
917754Y	EB Access Kellogg	487.41	6	1	5,125	FLG	3,075
445171G	McCormick	487.46	6	1	4,757	FL	17,125
445172N	Harry	487.98	6	1	4,200	FL	15,120
445174C	Service St	488.33	4	0	5,756	FL	13,814
445177X	May St	488.43	5	1	1,480	FL	4,440
445178E	Pawnee	489.00	6	1	9,755	FLG	5,853
445179L	West St	489.50	6	1	11,411	FLG	6,847
445335V	31st St	489.62	6	1	599	X	3,594
445338R	MacArthur Rd	490.77	6	1	7,206	FLG	4,324
445348V	Hoover	493.07	4	1	3,140	X	12,560
445349D	55th St. S	493.26	4	1	1,002	FLG	401
Corridor Length (mi)		6.96			Corridor HI		118,919

Source: FRA Highway-Rail Crossing Inventory, accessed 2012. Some inaccuracies in databases may result in some crossing being unlisted or incorrectly listed.

Warning Devices include FLG: Flashing Lights and Gates, FL: Flashing Lights, X: Crossbucks.

Table 8. K&O Eastern Wichita Subdivision At-grade Crossings

DOT #	Street Names	Mile Post	Total Trains	Tracks-Main	ADT	Warning Device	Hazard Index
009353T	Santa Fe St	0.36	2	1	1025	FL	1,230
009354A	St Francis	0.46	2	1	1,177	FL	1,412
009358C	Broadway	0.67	2	1	11,383	FLG	2,277
009359J	Market St	0.75	2	1	2,706	FL	3,247
009360D	Main St	0.82	2	1	2,709	FL	3,251
009365M	McLean Blvd	1.21	2	1	459	FL	551
009369P	Dodge St	1.74	2	1	951	FL	1,141
011266P	Harry St	2.05	2	1	2,394	FLG	479
015158G	Gordon Ave	2.36	2	1	473	X	946
015159N	Kay St	2.53	2	1	994	X	1,988
015160H	Southwest Blvd	2.70	2	1	4,878	FLG	976
015162W	Southwest Drive	2.80	2	1	267	FL	320
015163D	Sheridan Ave	2.86	2	1	350	X	700
015164K	Harry St	2.90	2	1	3,952	FLG	790
Corridor Length (mi)		2.54			Corridor HI		22,385

Source: FRA Highway-Rail Crossing Inventory, accessed 2012. Some inaccuracies in databases may result in some crossing being unlisted or incorrectly listed.

Warning Devices include FLG: Flashing Lights and Gates, FL: Flashing Lights, X: Crossbucks.

Section 5. Developing Concepts

The approach used to develop concepts began by identifying the issues for each area. Issues were identified by the various stakeholder groups and through evaluation of the operations and infrastructure of the railroad corridors and intersection roadways.

Once the issues were identified various concepts were developed to provide solutions. The goals of the WRMP encompass broad aspects of safety and efficiency. While several on-going programs throughout the State have the potential to address such needs, the main focus here goes beyond warning device upgrades and concentrates upon major investment solutions. This study also looks to identify corridor-level solutions rather than spot improvements to gain the most from the overall investment that is possible for each concept.

Issues Identification

In the previous section existing conditions information was provided on the physical elements of the rail and highway corridors, including the Hazard Index for certain corridors and individual at-grade crossings. This information helps to identify areas where further investigation is required. Other information includes safety history, operational inefficiencies and general feedback from the traveling public. Each of the areas in this study are evaluated separately to identify the overall issues that impact them.

Area 1

The South Junction of BNSF/UPRR/K&O was identified as an area of operational concern by the railroads. At this location, BNSF trains receive priority to travel on their corridor while the UPRR and K&O must wait to travel on their intersecting corridors. While the core issue of the railroad-railroad grade crossing was not known by general stakeholders, they did comment on trains blocking crossings or traveling slowly which relates to operations at the South Junction.

There are numerous highway-rail grade crossings in this area that cause delay and present safety concerns. This is a general concern with certain locations receiving more comment than others. For instance, Pawnee Street has been identified in the past as an important location to identify a solution.

The parallel BNSF corridor to Southeast Boulevard/K-15 was described as an issue because the close proximity of the railroad and the highway limits storage capacity for cars at intersections to Southeast Boulevard. Also, the possibilities for grade separation (road over rail) are limited because there would be no space for the roadway to span the railroad.

Area 2

North Broadway runs parallel to the BNSF mainline and yard from 21st Street north to I-235. Along this corridor the intersection roadways all have grade crossings of multiple railroad tracks. At 21st Street, the close proximity of the grade crossing to the signalized intersection leaves little room for vehicle storage and the number of trains on this route cause the road to be blocked numerous times during the day.

East of North Broadway, 29th Street crosses mainline, yard tracks and industry tracks (a total of 17 tracks) that result in inefficient train operations and vehicular delay. The BNSF has to break trains into various blocks or pieces to allow the road crossing to remain open which is inefficient for their yard operations.

Not only does the BNSF intersect these roadways but the UPRR has crossings and the WTA/WUT operates in the area, too. The multiple crossings along the roadways cause congestion and safety issues with vehicle entrapment.

Area 3

The geometry of the track near the Douglas Avenue curve causes trains to travel at low speed along this corridor. Slow trains then block many highway-rail grade crossings at the same time. The number of highway-rail grade crossings along the corridor is high because of the many residential streets in close proximity that are open at the southern end of this area.

An additional concern expressed by stakeholders in this area is the transport of hazardous materials through residential neighbors along this corridor. While it is reported that transport of hazardous materials by rail is one of the safest delivery methods the track condition and number of grade crossings continues to make this issue important to consider.

Area 4

Several rail-served industries are located in this area. When train switching for industry service occurs, many times this will block highway-rail grade crossings causing delay at the numerous crossings in this area. Stakeholders in this area also expressed concern about hazardous materials transported through residential areas.

Most of the issues along the K&O stem from geometric constraints causing slow train speeds and delays associated with trains waiting to traverse the Central Corridor.

Concept Solution Options

Since this study is focused on corridor-level, major investment solutions a menu of options was gathered to keep the focus away from spot improvements that may be looked at through other programs for minor issues. The options considered for this study included grade separations and bypass alignments.

Grade separations can be developed in two basic types: road over rail or rail over road. Both have the same result although the different design criteria for each result in different lengths, heights and associated costs. For this study, grade separation concepts were evaluated using a set of design criteria and by reviewing the constructability and construction and permanent impact to adjacent property. The design criteria listed in **Table 9** was used for this study.

Table 9. Rail and Highway Grade Separation Design Criteria		
Criteria	Road Over Rail	Rail Over Road
Design Speed	Varies	Varies
Horizontal Curvature	Varies	Varies
Maximum Grades	6%	1%
Desirable Maximum Grades	3%	<1%
Vertical Clearance	23.5 ft	16.5 ft
Approx. Depth of Structure	6 ft	6 ft

Cost of construction was also considered during concept development. When considered individually a road over rail grade separation is typically less expensive than a rail over road grade separation. However, once the rail is elevated and with closely spaced crossings, rail over road can be a cost effective solution as seen with the Central Corridor.

Another option for consideration is construction of a bypass route for a rail corridor. This could involve relocating and/or removing existing rail corridors to be combined with other existing or construction of a new rail corridor. With a combination of potentially different rail carriers within one corridor, institutional issues arise that may either require separate tracks for each carrier within a larger corridor or the establishment of a “terminal” railway under joint/multiple ownership that operates and maintains a common network.

The following section provides descriptions of the project concepts developed to address the issues identified during the study.

Section 6. Project Concept Descriptions

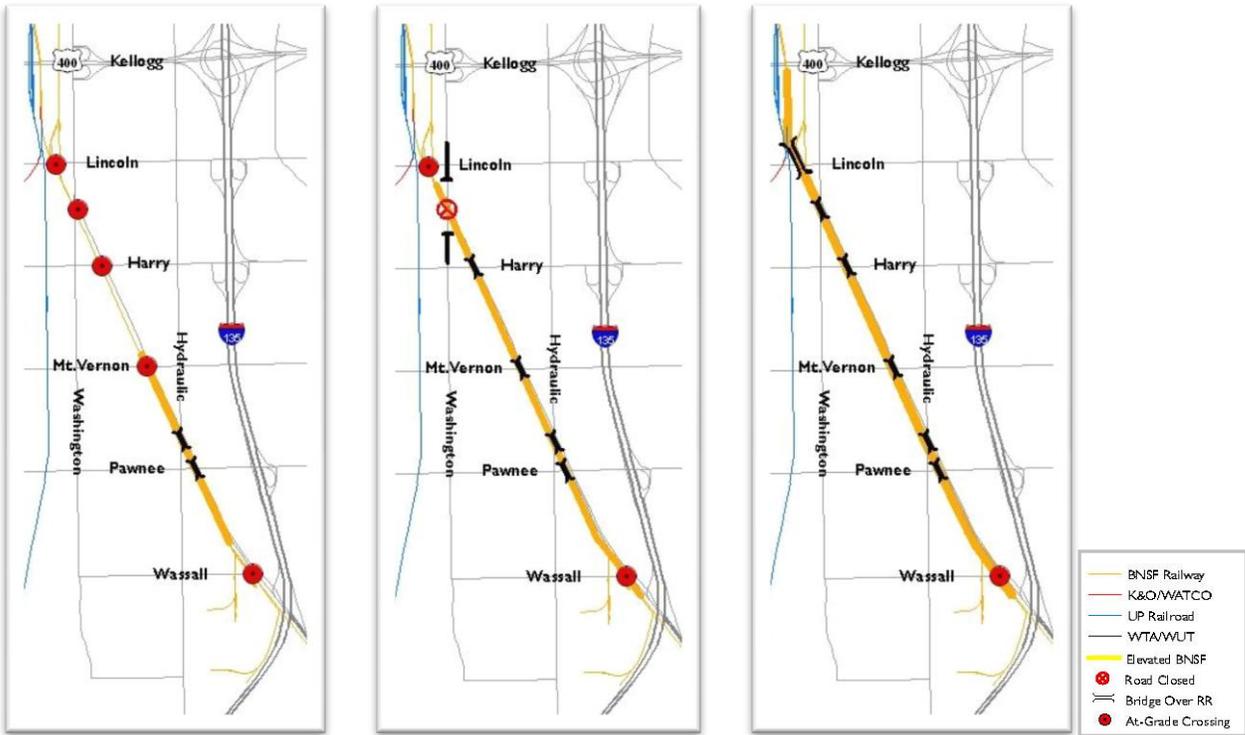
Area I

The existing conditions section describes several crossings of arterial streets with heavy traffic volumes and a series of closely spaced at-grade crossings. Consequently, one or more grade separations are possible, along with the potential for combining the rail corridors in this area.

BNSF Newton-Arkansas City Corridor

Three grade separation options were considered along the BNSF corridor: one “spot” location due to the close proximity of Pawnee Avenue and Hydraulic Street and two corridor separations. Since Southeast Boulevard/K-15 runs parallel to the BNSF, a road over rail design is essentially impractical as it would mean elevating Southeast Boulevard/K-15 between several intersections to accommodate the grades required for railroad vertical clearance. The physical limits of elevating the rail over the road also require a greater distance between crossings to allow the railroad to transition from existing ground to a grade separation elevated some 24 feet higher. Three projects were considered and are illustrated in **Figure 23**.

**Figure 23. Potential Grade Separation Concepts
 BNSF Newton-Arkansas City Corridor**



Grade Separation at Pawnee and Hydraulic – Rail over Road

This concept is the shortest of the three concepts developed and only grade separates the two closest intersections of Pawnee and Hydraulic Avenues. This concept can be considered a “spot” location as it is

impossible for only one of the intersections to be grade separated with the rail elevated over the roadway because of their close proximity.

Grade Separation from South of Lincoln to Pawnee – Rail over Road

This concept extends further north to add three more grade separations for a total of five grade separations. This concept begins to provide an elevated rail corridor of sufficient length to influence train speeds as well as assist the motoring public by providing several north-south and east-west grade separated crossings. However, the northern end of the corridor near the Lincoln Street crossing and the junction with Union Pacific remain at-grade.

Grade Separate from North of Lincoln to South of Pawnee – Rail over Road

This concept attempts to provide a solution for the South Junction at the north end of the corridor. The concept includes a grade separation of Lincoln Street, as well as a grade separation over the Union Pacific rail corridor. The grade separation of the railroads may offer the most benefit operationally in dealing with the crossing patterns of the BNSF and the UPRR between the South Junction and 21st Street.

UPRR Wichita OKT Subdivision

Two grade separation options were also considered along the UPRR corridor; one “spot” location and one combined corridor. While a corridor rail elevation would allow numerous grade separations along the UPRR (or selected grade separations with several road closures), the train volumes on this rail corridor are not yet sufficiently high enough to provide enough safety, mobility, or environmental benefit to offset costs.

Grade Separate Pawnee – Road under Rail

Previous studies have identified a road under rail grade separation at Pawnee Avenue. The concept looked at removing the hump from Pawnee Avenue and raising the UPRR rails approximately fourteen feet to provide the necessary vertical clearance. The plan was to permanently close Mead at Pawnee (South side), Blake Street at UPRR, Kinkaid Street at UPRR, Clark Street at UPRR, and include 8,600 lineal feet of rail improvements. The plans were developed to an approximate 50% level before the project was put on hold. The prior cost estimate for the lowering of Pawnee Avenue beneath the UPRR rail line was inflated to the current year and is budgeted at approximately \$20 million.

Combined Corridor Concept – Relocate UPRR to BNSF Corridor

Since the UPRR and the BNSF corridors in this area intersect at the South Junction, a concept to relocate the UPRR corridor (removing the existing line) and combining adjacent to the BNSF corridor was developed. New alignments would need to be created between the UPRR and the BNSF corridors to connect at the south end of the corridors. A new alignment concept, on the order of 3.5 miles in length, is shown between Haysville and Derby in **Figure 24**. Any new alignment location farther south (while possible) would only be physically longer and consequently more costly as the UPRR and BNSF corridors diverge and the length of double tracking the combined corridor increases.

Figure 24. Combined Corridor Concept (Area I)

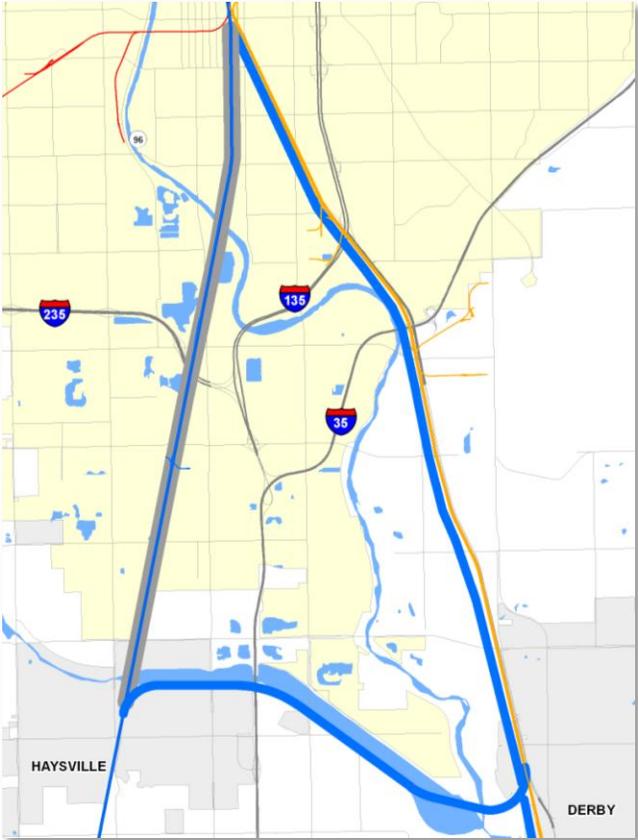


Table 10. Area I Opinion of Probable Costs	
Concepts under consideration	\$ Million (2012)
Grade Separation	
BNSF Corridor	
Pawnee and Hydraulic – Rail over Road	\$22
South of Lincoln to Pawnee – Rail over Road	\$105
North of Lincoln to South of Pawnee – Rail over Road	\$130
UPRR Corridor	
Pawnee – Road under Rail	\$20
Combined Corridor	
Relocate UPRR to BNSF Corridor	\$350

Area 2

The existing conditions sections notes that with several closely spaced rail corridors crossing the arterial roadways of 21st and 29th Streets and yard operations with slow moving trains, causes motorists to be physically “trapped” between the rail corridors and experience significant delay when trains pass. Consequently, the potential for stand-alone grade separations along either or both 21st and 29th Streets are possible solutions to address these issues. Another key issue to address here is the access to other side streets as well as to businesses along the highway corridors, which may require a more comprehensive area-wide solution.

21st Street Relocation and Grade Separation

Several years ago, a concept was put forth that attempted to deal with the consolidation of railroad crossings as well as maintaining access along 21st Street. The concept explored realigning 21st Street approximately 1,000 feet to the north between the west drainage ditch and Cleveland Street. Connections were included to allow access to the existing 21st Street. While attempting to minimize impacts, the alignment required acquisition of several active industrial businesses. The bridge was approximately 900 feet long and crossed the two UPRR corridors as well as the east BNSF service line. However, the three-track BNSF crossing east of Broadway remained at-grade. See **Figure 25**.

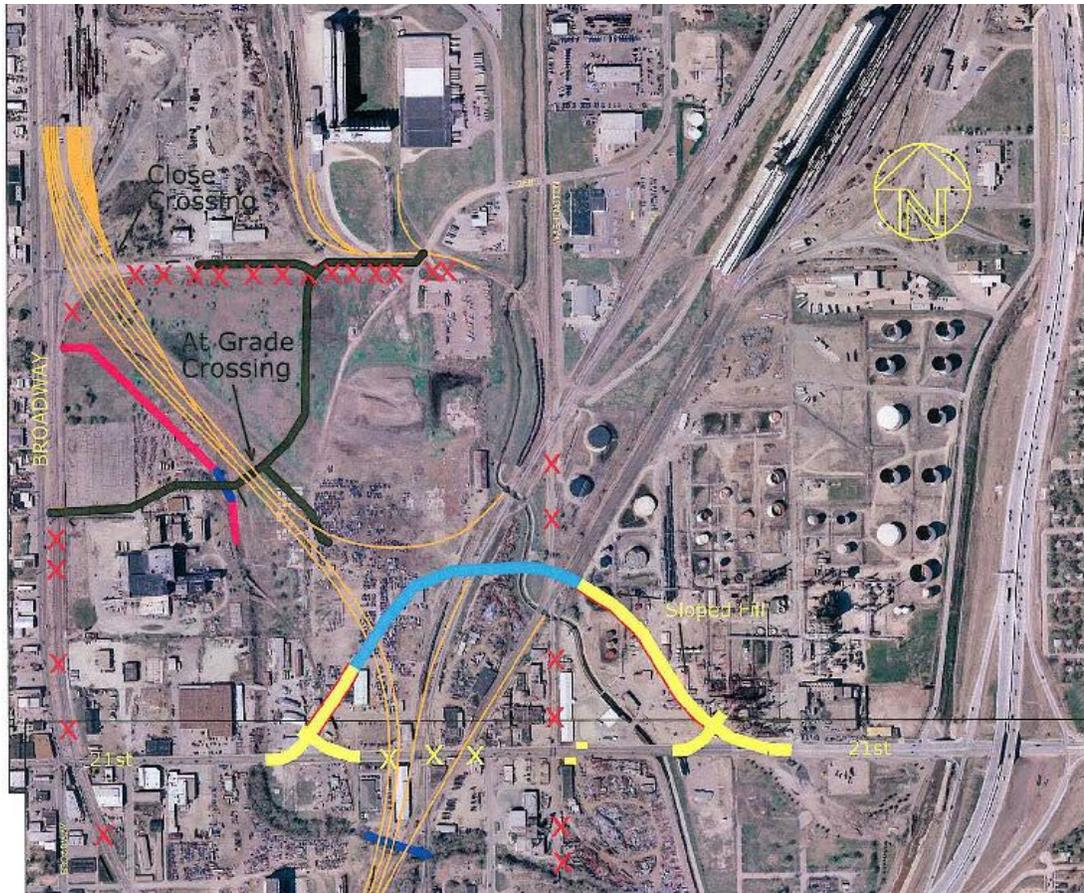
Figure 25. 21st Street Relocation and Grade Separation



21st Relocation Grade Separation and BNSF Yard Partial Relocation

To address the BNSF mainline crossing at 21st Street, the above concept was modified to include a relocation of the BNSF rail corridor closer to the UPRR corridors and an extension of the bridge to grade separate all four rail corridors. The relocation of the BNSF rail corridor also afforded the opportunity to modify the BNSF yard and provide additional track storage, as shown in **Figure 26**. This in turn results in more tracks across 25th Street east of Broadway. Consequently, additional local access road improvements were provided and included a connection of a new 23rd Street to 26th Street. The WTA rail corridor along 25th Street would be removed. Drainage improvements are included along portions of the ditch. The relocation of the BNSF rail corridor also has additional right-of-way impacts.

Figure 26. 21st Street Relocation Grade Separation and BNSF Yard Partial Relocation



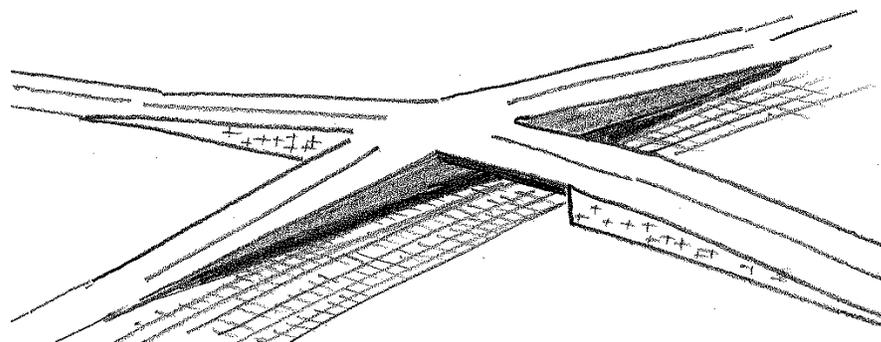
29th and Broadway Grade Separation

29th Street crosses in the middle of the BNSF Yard. This creates the need to “break” trains and effectively destroys the efficiency of the storage track length. Grade separating 29th Street above the BNSF would restore the yard to a more efficient operation. However, the issue of grade separation is further complicated by the number of tracks that need to be crossed and the placement of structural supports between the tracks. To span the 14 tracks would require a continuous span of more than 200 feet. While certainly feasible, the design seeks to also balance the depth of structure and the associated increase in the length of approach because of the required clearance of 23.5 feet. Increasing the depth of structure is not desirable. A shorter span could be considered, yet this would require relocation of several of the tracks in order to create the adequate horizontal clearance from a support.

The structural design is further complicated in the intersection treatment of Broadway. Broadway is a minor arterial with an interchange at I-235. There are several options to provide mobility along Broadway as well as access. One option could be to continue the grade separation over Broadway and utilize the existing grid network of north-south and east-west streets to access Broadway at grade. For example, a “loop” type connection via Park Place and 28th Street to the south and 30th Street to the north could be instituted. This would force industrial truck traffic through a residential neighborhood. Another option could be to raise the grade along Broadway to intersect 29th Street at an elevated level. Either design must deal with the

transition section between at-grade and elevated. Retaining wall sections for such transition sections are expensive. While they may have less physical impact upon adjacent properties, the differences in elevation can often restrict access. A retaining wall section would be required along the east side of Broadway to not impact the BNSF yard. Fill slope sections are less expensive, yet the physical impacts to property are greater. In either case, a design that keeps the rail and road in its current location would require coordination with the surrounding stakeholders. A potential illustration of such a grade separation is shown in **Figure 27**.

Figure 27. 29th Street and Broadway Grade Separation



21st and 29th Street Grade Separations and BNSF Yard Relocation

A combination of the 21st Street and 29th Street grade separations could have a larger system benefit and coupled with a BNSF yard relocation could address some of the structural issues at the 29th and Broadway intersection noted above. For example, shifting the BNSF yard to the south and east away from Broadway would allow the roadway profile to return to grade at Broadway and allow for a common four-legged intersection design. Nonetheless, local access to side streets such as Emporia and St Francis as well as the WTA service line also need consideration. Property access must also be addressed. A similar design aspect arises on 21st Street. Mosley Street is an important local street connection to the south of 21st Street. As well as the BNSF service line east of Mosley. A schematic of the grade separations of 21st and 29th Streets as well as the relocation of the BNSF Yard is shown in **Appendix A**.

**Table 11. Area 2
Opinion of Probable Costs**

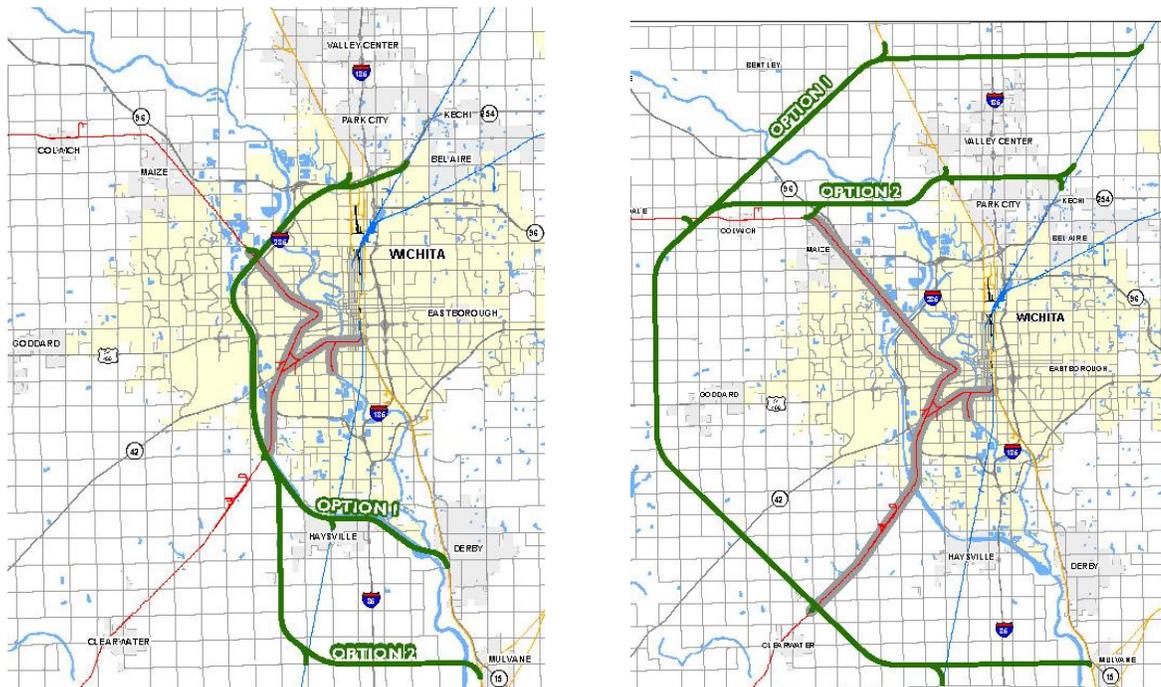
Concepts under consideration	\$ Million (2012)
Grade Separation	
21st Relocation and Grade Separation	\$50
21st Relocation Grade Separation and BNSF Yard Partial Relocation	\$90
29th and Broadway Grade Separation	\$35 to \$50
21st and 29th Street Grade Separations and BNSF Yard Relocation	\$100

Areas 3 and 4

The existing conditions section notes that while there are relatively few trains per day traveling the K&O Subdivisions, the number of closely-spaced, at-grade crossings, coupled with slow moving trains can create delays for motorists. The tracks boomerang alignment between Central and Kellogg Avenues creates several crossings of Meridian Street. With train sets consisting of 80 or more cars, the majority of crossings are blocked simultaneously. Hazardous material is also being moved on these trains through several residential areas. Stakeholder concerns resulted in the exploration of rail relocation outside the urban area.

Consequently, two concepts were explored that investigated what are referred to as an inner belt and an outer belt bypass, see **Figure 28**. For either concept to be effective, the relocation must tie back into the key rail corridors of the BNSF and UPRR both in the north and south areas of Wichita. A key component of the connections is to maintain access to the Central Corridor as well as access to industries within Wichita. As noted in the description of existing conditions, the Hardtner Subdivision has a higher concentration of active industrial service within and adjacent to Wichita.

Figure 28. K&O Railroad Inner and Outer Belt Bypass Concepts



in close proximity to the urbanized area. Consequently, a more rural outer belt was explored in an effort to reduce right-of-way costs.

The Outer Belt

This concept is represented by a broad corridor on the map, to illustrate the schematic nature of the concept. This concept is best described as a ring around Wichita passing near a series of communities including Valley Center, Colwich, Goddard, Clearwater and Mulvane. The overall length of this broad corridor is approximately 40 miles. While the initial objective to reduce right-of-way costs could be achieved with overall construction costs estimated to drop on per mile basis, the increase in total length results in an overall increase in costs to nearly \$400 million.

Other concepts considered minor improvements to switching operations particularly in the area near West and Pawnee. However, likely impacts to a residential area between the two rail corridors (Hardtner and Eastern Wichita) could be significant, and this concept was also dropped from further consideration.

Table 12. Area 3 and 4 Opinion of Probable Costs	
Concepts under consideration	\$ Million (2012)
Bypass	
Inner Belt	\$300 to \$350
Outer Belt	\$400

These shortline rail corridors highlight the benefits afforded by less intensive physical and capital efforts such as crossing consolidation and upgrades to warning devices. Coordination with KDOT who administers many of the available funds for such improvements should continue and target high hazard locations. In fact the Delano Neighborhood Revitalization Plan, which encompasses a sizeable portion of the Area 3 (bounded by the Arkansas River, Kellogg Avenue and Meridian), recognizes the zoning problems that excessive industrial zoning created. In an attempt to resolve the numerous conflict points between trains, cars and pedestrians, the plan discusses a proposal for the use of cul-de-sacs or closures at several locations. Such measures were intended to bring a sense of control to the neighborhood. In fact, the 2020 future land use concept plan goes well beyond the down zoning initiative (approved in January 2003) by essentially removing limited industrial zones and replacing them with multi-family residential and public greenways, even a linear railway park east of Elizabeth Street.

Section 7. Project Concept Analysis

The Project Concept Analysis is conducted through a tiered process. Tier I is an overall assessment of the eleven concepts developed in the four study areas. It is a qualitative review of the concepts based on the project goals. The second tier (Tier II) continues the evaluation by developing a concept design plan with a more detailed probable construction cost, as well as potential impacts. The concept design plan together with an operating concept is used to conduct a benefit-cost analysis.

Tier I Analysis

The first tier (Tier I) assesses the schematic concepts using a “ballpark” cost estimate for relative comparison purposes and the goals developed for the overall plan. Using the goals and relative costs, the concepts that meet the highest number of goals will undergo a more detailed evaluation in Tier II. Two concepts pass through to more detailed evaluation as shown in **Table 13**.

Table 13. Tier I Screening Summary Chart												
PROJECT AREA		AREA 1				AREA 2				Areas 3 & 4		
RAILROAD		BNSF		UPRR	BNSF UPRR	BNSF	UPRR	BNSF UPRR	BNSF UPRR	K&O		
PROJECT CONCEPTS		Pawnee and Hydraulic – Rail over Road	South of Lincoln to Pawnee – Rail over Road	North of Lincoln to South of Pawnee – Rail over Road	Pawnee – Road under Rail	Combined Corridor Concept – Relocate UPRR to BNSF	29th and Broadway Grade Separation	21st Relocation and Grade Separation	21st Relocation and Grade Separation	21st and 29th Street Grade Separations and BNSF Yard Relocation	Inner Belt Bypass	Outer Belt Bypass
PROJECT GOALS	Promote Efficient Transportation System Management and Operation – Rail	○	○	●	○	◐	○	○	◐	●	○	○
	Promote Efficient Transportation System Management and Operation – Highway	◐	◐	●	◐	○	◐	◐	◐	●	○	○
	Enhance Transportation System Safety	○	◐	◐	◐	◐	◐	◐	◐	●	◐	◐
	Protect the Environment and Promote Energy Conservation	○	◐	◐	○	○	○	○	○	◐	○	○
	Support Regional Economic Vitality	○	○	○	○	○	○	○	○	●	○	○
Pass through to Tier II		-	-	YES	-	-	-	-	-	YES	-	-

● = Fully meets project goal ◐ = Partially meets project goal ○ = Limited impact on project goal

From a practical point of view, a continuous separation along the BNSF corridor in Area I, while increasing costs, has a holistic network benefit and is recommended to be carried forward into a Tier II evaluation. At this time, the UPRR Wichita OKT corridor in Area I lacks sufficient train volumes to make grade

separations beneficial considering the extensive construction costs and adjacent impacts. Consequently, these individual highway grade separations are not recommended for further evaluation.

While possible, the extensive cost and need to retain industry service resulted in the Combined Corridor Concept – Relocate UPRR to BNSF Corridor in Area 1 being screened from further consideration. Leaving rail service to existing industry in place would negate many benefits of this concept. Irrespective of institutional issues at this time, a double track combined corridor would be required. This coupled with the identified need to review an elevated rail corridor for a portion of the combined corridor creates a significant cost.

While possible to grade separate the individual sites along 29th and 21st Streets, this still leaves potential at-grade crossings on the same highway less than half-mile from the grade separation and does not create the same benefits.

The magnitude of cost for either the inner belt or outer belt concept in Areas 3 & 4 is not considered financially practical and therefore these concepts were dropped from further consideration.

Tier II Analysis

The two concepts that pass the initial Tier I screening include the Grade Separate BNSF – North of Lincoln to South of Pawnee in Area 1 and Elevate 21st and 29th Streets and Relocate BNSF Yard in Area 2. These concepts are discussed and developed in more detail that allow for further concept refinement in terms of probable costs and impacts for the Tier II analysis. One of the impact assessments is a benefit-cost ratio, whose overall methodology is discussed below. The specific result of the benefit-cost analysis is discussed within each concept. More general discussion on impacts of each concept is included in the detailed descriptions.

The benefit-cost analysis determines the Net Present Value (NPV) of a string of costs and benefits over a 20 year period, beginning in 2013. The NPV of the costs and benefits are compared on a yearly basis. The benefits considered in this analysis include: Fuel Consumption, Reduced CO₂ Emissions, Annual Crash Savings, Reduced Train Delay, Reduced Idling Time, Annual Travel Time, and Salvage/Residual Value. The cost considered in this model includes construction and right-of-way. More details on the benefit-cost analysis are included in the Appendix for each area.

Area 1: Grade Separate BNSF – North of Lincoln to South of Pawnee

A conceptual plan and profile for the two-mile long corridor was developed to further review how the concept will benefit rail and highway operations and to evaluate any implementation issues associated with construction and sequencing. This concept will extend from US-50/400 (Kellogg Avenue) at the South Junction to Wassell Street along the BNSF corridor. It will provide seven highway-rail grade separations and one rail-rail grade separation. One roadway will be closed with this concept. Concept drawings illustrating the grade separation plan and profile are included in **Appendix A**.

The South Junction, as shown in **Figure 29**, is where the K&O (west), the UPRR (center) and the BNSF (east) railroad tracks meet at a point north of Lincoln. This point is approximately at Morris Street. The Morris Street right-of-way is shown between Santa Fe Street and Mosley Streets, however the road does not cross the railroad tracks. Along Lincoln Street there is a fourth track crossing east of the BNSF mainline which provides industry service to a facility immediately south of Douglas Avenue. This service track is located in the middle of Mosley Street and has at-grade crossings with Gilbert Street, Indianapolis Street,

Orme Street and Waterman Street. Two main tracks go underneath the elevated highway of US-50/400. The east track at the Gilbert Street crossing is the combined rail of UPRR and BNSF. The west track is the K&O track. Immediately north of Gilbert is a switching track from the east main to the west main when travelling in the northbound direction. The K&O track splits north of Lincoln Avenue and veers westward to provide service to an industry as well as connect to a four track yard. Along Gilbert there are five tracks crossing; one at the K&O yard, two at the joint K&O, UPRR, BNSF and two at the BNSF service track. The western BNSF service track serves an industry located west of Mosley Street. It appears that in the past this track also crossed at Lincoln Street, but now the track across Lincoln Street is removed.

The concept to grade separate Lincoln Street also allows for the grade separation of the BNSF over the UPRR track. Here the rail must be elevated higher to provide railroad clearances. Then the profile can descend to tie in with existing track on ground. The descent, with retaining wall on both sides because of parallel railroad tracks will close Gilbert Street. The UPRR rail would be relocated to the east, impacting several industrial properties. It is envisioned that this relocated line to the east could become the third main through the Central Corridor. The Central Corridor was designed to accommodate a third main which exists north of 15th Street.

In order to connect to the existing BNSF service line, a connection via the relocated UPRR line is required. While industry service is still provided, it is important to note that the carrier providing the service has changed from BNSF to UPRR. The descent of the elevated mainline would tie back to ground about 250 feet north of US-54/400. The vertical clearance provided beneath the elevated highway needs to be confirmed.

A basic issue along this corridor is construction sequencing. Sequencing requires constructing a second at-grade track for temporary use along the west side of the existing track. Then the existing track in the center would be removed and earthen fill placed with a retaining wall on the east side and an earthen slope on the west side. At highway crossings, the structural design and construction would accommodate a future second track along with an access road. When the new track is elevated and operational, the temporary detour track would be removed.

The profile provides for grade separation of seven roadways mostly with a vertical clearance of 15.5 feet and an assumed depth of structure of 6 feet. At some crossings, notably at Hydraulic Avenue, the existing roadway elevation could be lowered to provide for increased vertical clearance. The proximity of several vehicular, signalized intersections with Southwest Boulevard may also require design modifications to adjust the locations of traffic signal heads, or require supplemental heads, in order to maintain appropriate sight distance. Once elevated the rail profile remains essentially level with grades varying from 0.02% to 0.08%. Immediately south of Pawnee Avenue, the rail profile begins a descent of 1% with a lengthy vertical curve to return to existing grade. The roadway elevation at the at-grade crossing with Wassal Street may need to be raised by as much as one foot.

At several locations along the rail corridor, there is encroachment on the rail right-of-way by adjacent properties. Some adjacent properties also appear to utilize a portion of the rail right-of-way for property access. The existing rail right-of-way will need to be re-established and may require fencing.

Other design issues include potential utility conflicts with overhead electric power lines which are located near Osie Street, Skinner Street, Mt. Vernon Street, Pawnee Street, and Wassall Street. Several underground utilities are close to the rail right-of-way including a 36" water line but should be within the adjacent highway right-of-way. Nonetheless, steps may need to be taken to prevent any potential

construction impacts. The skewed intersection crossings of Southwest Boulevard currently utilize channelizing islands for southbound right-turn movements. That channelizing design could have significant cost implications for the structural support of the railroad overpasses if it were necessary.

Figure 29. South Junction Detail

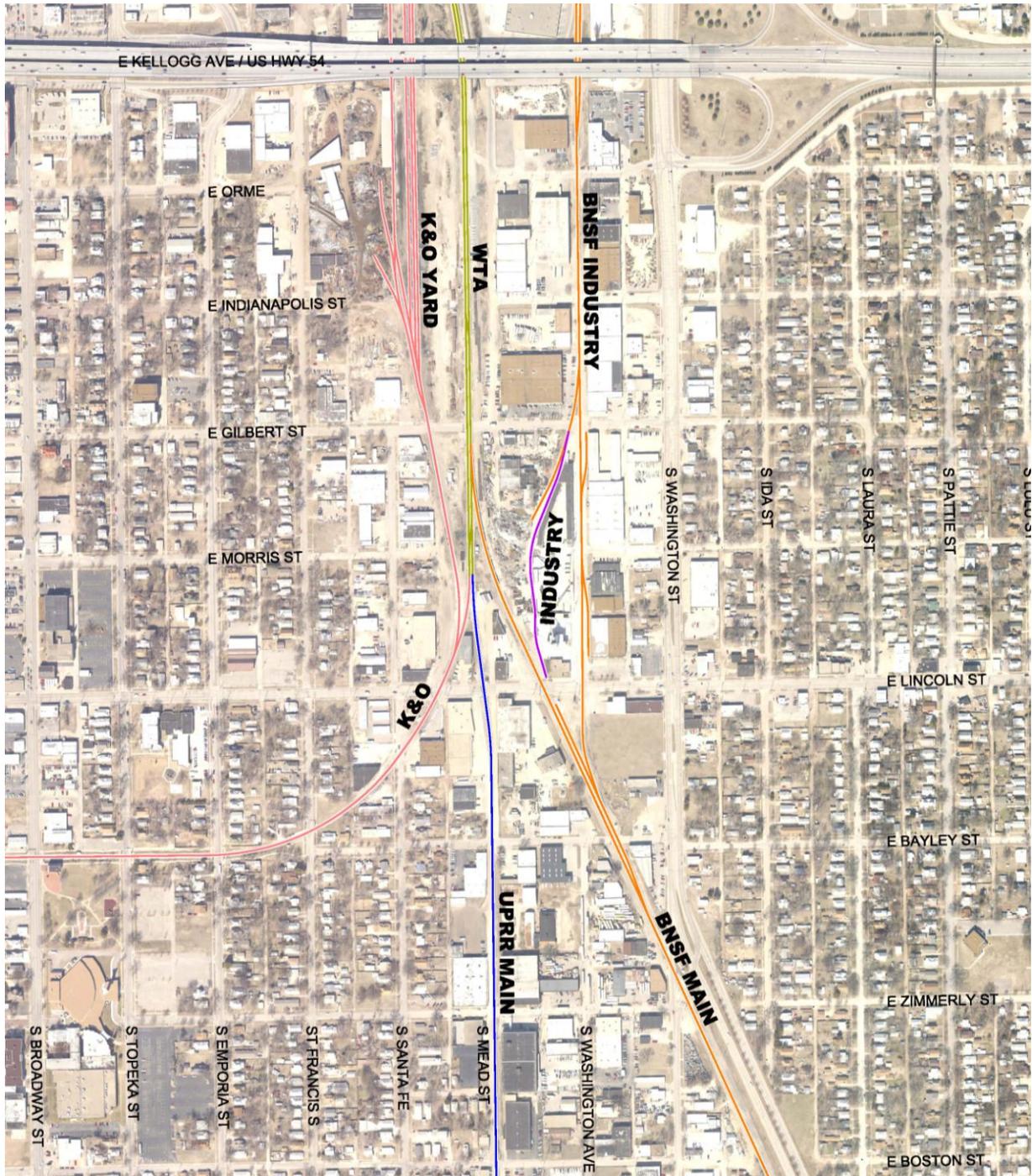


Table 14 is a short summary of the overall benefits and costs of the Grade Separate BNSF – North of Lincoln to South of Pawnee project. The benefits along with the respective benefit-cost ratios are discounted at both three and seven percent over the 20 year period. Detailed calculations according to the benefit-cost analysis methodology are included in the **Appendix A**. The benefits of the project in Area I outweigh costs at a discounted rate of 3 percent.

Table 14. Grade Separate BNSF – North of Lincoln to South of Pawnee Benefit-Cost Analysis Summary (\$ in Thousands)			
Description	Estimate	Discounted (3%):	Discounted (7%)
Area I			
Net Benefits	\$232,536	\$160,954	\$105,368
Costs	\$117,302	\$117,302	\$117,302
	Benefit-Cost Ratio	1.37	0.90
Area I without Private Benefits			
Net Benefits	\$109,940	\$72,362	\$44,542
Costs	\$117,302	\$117,302	\$117,302
	Benefit-Cost Ratio	0.62	0.38

Note: Private benefits are attributed to reductions in train delays.

Area 2: Elevate 21st and 29th Streets and Relocate BNSF Yard

A conceptual plan for the BNSF yard relocation and highway profiles for grade separations of both 21st and 29th Streets were developed to further review how the concept will benefit rail and highway operations and the implementation issues associated with construction and sequencing. Maintenance of traffic during construction as well as access to adjacent properties will be important with this project. Concept drawings illustrating the plan for the yard relocation and the grade separation plan and profiles are included in **Appendix B**.

The existing yard is approximately 5,000 feet long extending from 25th Street to 32nd Street and is parallel to Broadway. If the yard is shifted at an angle between 21st and 29th Streets, an equally long or even longer yard can be constructed. While this shift has property impacts, the industrial nature of the entire area and current available land should allow for business relocation within the same area. A review of access to the adjacent properties indicates that an extension of Ohio Street from 26th Street ought to occur southward to at least 21st Street. The existing at-grade crossings at 23rd, 25th and 33rd Streets would be removed. The next at-grade crossings would occur at 17th Street to the south and at 37th Street to the north.

Along 21st Street, the basic concept is to group the mainline rail corridors in the 1,200 foot distance between St. Francis and Mosley Street and elevate 21st Street over the rail. There is also the BNSF service line essentially along Washington Street east of Mosley. Access to this service line is from the UPRR yard north of 21st Street. To also grade separate this line, the limit of the grade separation is extended further to the east and reconstructs the drainage ditch crossing at a higher elevation. This in turn disconnects Mosley Street from 21st Street. Consequently, it is proposed to redirect traffic along 19th Street (with its bridge over the drainage ditch) to Cleveland Street to access 21st Street. Access to properties and existing businesses west of the relocated BNSF yard can be achieved through 20th Street (on the south side of 21st

Street) and through portions of Topeka Street (for properties on the north side of 21st Street). Mosley Street would also remain to provide access to existing businesses.

At 29th Street, the basic concept is to end the relocation of the BNSF yard such that the elevated 29th Street only crosses the mainline tracks. The existing mainline is two tracks, though the grade separation will provide sufficient room for an additional mainline track. The WTA also has a rail service crossing 29th Street between Emporia and St. Francis Streets. This crossing is proposed to be relocated and grouped adjacent to the BNSF mainline crossing. The proposed roadway grade of 4% has the western touchdown point before Broadway. As many as four yard tracks may be affected during construction. Details on construction sequencing and phasing will need further investigation.

The proposed roadway grade of 4% has the eastern touchdown point on 29th Street east of St. Francis. Consequently, St. Francis must be relocated further to the east to tie into 29th Street. The relocation could extend to a point as far east as Mead Street. Access to the business on the south side of 29th Street might also need to be relocated. The BSNF service line (Old Frisco Main) between Mead and Ohio Streets would remain an at-grade crossing.

With the relocation of the BNSF Yard, there is potential for development, redevelopment, and revitalization opportunities along Broadway and a new local road network along the east side of Broadway. This area is considered the Central Sub-Area and was previously studied in the 21st Street Revitalization Plan (2004).

Appendix B discusses the new land use pattern that could arise and a possible phasing strategy to implement the proposed land use plan. Impacts on access to existing business, environmental constraints and utility services are also discussed.

Table 15 is a short summary of the overall benefits and costs of the Elevate 21st and 29th Streets and Relocate BNSF Yard project in Area 2. The benefits along with the respective BCA ratios are discounted at both three and seven percent over the 20-year period. Detailed calculations according to the benefit-cost analysis methodology are included in the Appendix. The project benefits greatly outweigh the costs in both the 3 percent and 7 percent scenarios. The recipients of the benefits are largely the consuming public and the general public.

Table 15. Elevate 21st and 29th Streets and Relocate BNSF Yard Benefit-Cost Analysis Summary (\$ in Thousands)			
Description	Estimate	Discounted (3%):	Discounted (7%)
Area 2			
Net Benefits	\$637,415	\$446,490	\$296,227
Costs	\$96,090	\$96,090	\$96,090
	Benefit-Cost Ratio	4.65	3.08
Area 2 without Private Benefits			
Net Benefits	\$532,747	\$370,854	\$244,296
Costs	\$96,090	\$96,090	\$96,090
	Benefit-Cost Ratio	3.86	2.54

Note: Private benefits are attributed to reductions in train delays.

Section 8. Financial Analysis

Projects, like those outlined in this plan, are generally considered major investments that require the support of local, state, federal and private funds to be constructed. The Grade Separate BNSF – North of Lincoln to South of Pawnee project's estimated cost for construction is \$117 Million and the Elevate 21st and 29th Streets and Relocate BNSF Yard project's estimated cost for construction is \$96 Million. Both of these projects are in a similar cost range to the Wichita Central Corridor project that was completed in 2009 for \$105 Million.

The Central Corridor project received a portion of its funding from a set aside made when the Southern Pacific merged with the Union Pacific but it also drew funds from the City and State. The State of Kansas received funds for the Central Corridor project in Wichita through the former federal highway bill – SAFETEA-LU. Railroad Grade Separation and Local Partnership Grade Separation Program funds from KDOT were utilized to match federal funds for the project. Since the merger funds have been used, any future rail projects in Wichita must seek a combination of funds to be completed.

Federal Funding Sources

MAP-21, the Moving Ahead for Progress in the 21st Century Act (P.L. 112-141), was signed into law by President Obama on July 6, 2012. Funding surface transportation programs at over \$105 billion for fiscal years (FY) 2013 and 2014, MAP-21 is the first long-term highway authorization enacted since 2005. While MAP-21 includes funding for rail and freight projects, the bill will expire on September 30, 2014 and most funding programs are already allocated.

State Funding Sources

Transportation Works for Kansas (T-WORKS) is a 10-year, \$8 billion transportation program designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities in Kansas. While there are several partnership funding programs within the T-WORKS program, these funds would not be able to fund an entire project but could be used in combination with other funding sources.

Local Funding Sources

The City of Wichita's Capital Improvement Program (CIP) contains 346 capital projects that total \$2.4 billion between 2011 and 2020. A variety of funding sources will be used to finance these projects. Property taxes account for 13% of the total CIP financial resources, and it is one source used as leverage to secure state and federal grants (comprising 6% and 10% of the CIP, respectively). User fees and usage rates combine to form the most substantial revenue source of the CIP, with the utility funds constituting 37% of total revenue sources. Additionally, half of the City's share of the 1% countywide sales tax is devoted to the CIP, comprising over \$237 million of CIP funding over the 10-year planning period.

Considering the project load already contained in the City's CIP, it would be difficult to fund a project of the magnitude included in this WRMP. However, leveraging city funds could be a key component to future project implementation and looking at ways to reallocate projects or push projects to future years should be explored.

Private Funding Sources

According to language in MAP-21, a railroad participating in a hazard elimination project is responsible for compensating the State transportation department for the net benefit to the railroad of the project. The net benefit is determined by the Secretary of Transportation, but may not exceed 10 percent of the project

cost. [23 USC 130(b) and (c)]. In the past, railroads have contributed 5-10% of the structure cost spanning their right-of-way. These funds would be negotiated with the owning railroad but may be offset by additional requirements for added infrastructure based on railroad operational needs.

Funding Steps

As the next federal transportation bill is presented in Congress, it will be important for the City of Wichita to remain engaged in the funding discussions for major project investments. It will only be through a combination of local, state, federal and private sources that projects of this magnitude will be implemented. Engaging in the discussions that form funding programs at the federal level may give Wichita an advantage when funding availability is determined.

Section 9. Passenger Rail Analysis

Background and History

Wichita's mainline railroads are primarily north-south routes but do provide access northeasterly to Kansas City. The east-west routes through Wichita are secondary routes. Today, the two largest railroads west of the Mississippi, the BNSF and the UPRR, serve Wichita. Each has a history of passenger service to Wichita.

The BNSF was formed from the merger of the Burlington Northern Railroad and the Atchison, Topeka and Santa Fe Railroad (Santa Fe) in 1995. It was the Santa Fe that served Wichita. Chartered before the Civil War with a line between Atchison and Topeka, the road expanded westward following the war, through Newton, Hutchison, Dodge City, Garden City and on to Colorado, across Raton Pass into New Mexico and on to California. In the mid-1870's, the Santa Fe constructed a branch southward from Newton to capture cattle business formerly driven up the Chisholm Trail. This line was routed through Wichita enroute to Oklahoma City, Fort Worth, and eventually to the Gulf of Mexico at Galveston. In later years, the Santa Fe built southwest from Wichita to Amarillo and connecting back into their transcontinental mainline at Belen, New Mexico. The Santa Fe long-distance freight traffic could avoid the steep grades of Raton Pass along this route, and it became the Santa Fe's new mainline for freight.

During the heyday of passenger trains, the Santa Fe's renowned *Super Chief* and *El Capitan* passenger trains between Chicago and Los Angeles followed the Raton Pass line through Newton and bypassing Wichita, but several Santa Fe passenger services did stop at Wichita. These included the Chicago-San Francisco *San Francisco Chief*; the Chicago-Dallas *Kansas Cityian/Chicagoan*; the Chicago-Houston *Texas Chief*; and the unnamed #3/#4 trains operating between Kansas City and Gallup, New Mexico.

The UPRR through Wichita was originally part of the Chicago, Rock Island and Pacific Railroad (Rock Island). The Rock Island served Wichita with its *Twin Star Rocket* daily train operating between Minneapolis and Fort Worth via Des Moines and Kansas City. By 1970, the *Twin Star Rocket* was withdrawn from service.

The Santa Fe trains became Amtrak trains but several never operated under the Amtrak banner. In Wichita, only the *Texas Chief* remained an active route. The *Texas Chief*, renamed the *Lone Star* in 1974, served Wichita until a nationwide rationalization of Amtrak's least viable routes on October 6, 1979. Since that date, Wichita has not been served by passenger trains.

National Perspective

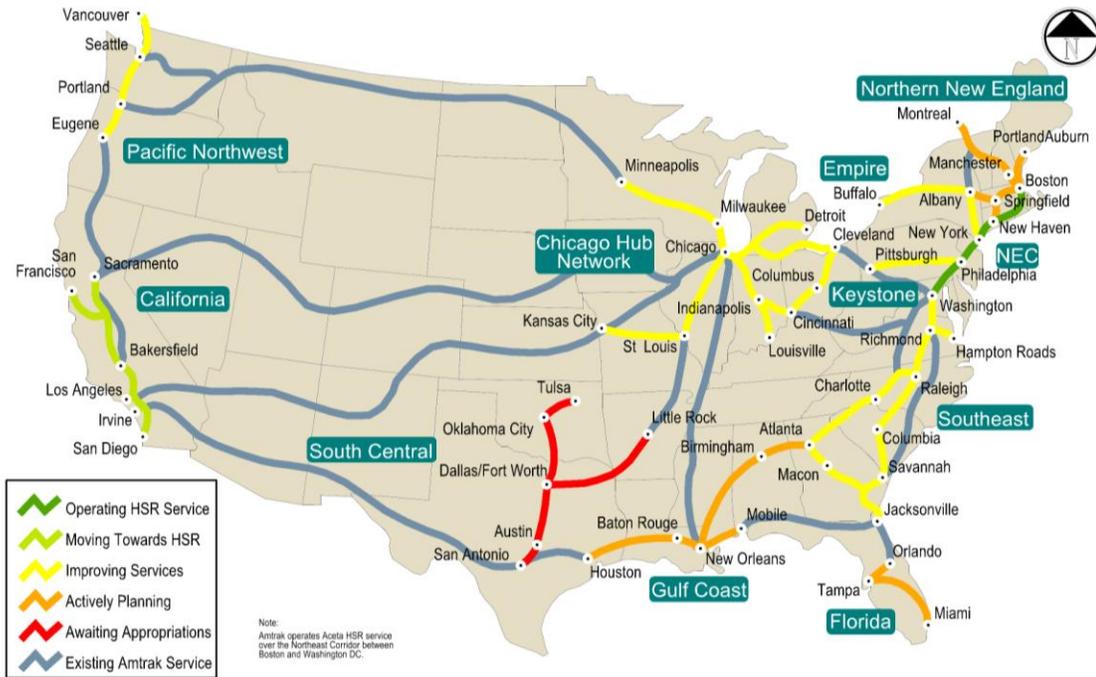
In the United States, intercity passenger rail service is provided by Amtrak, which was created in 1971. It operates passenger service on 21,200 miles (34,000 km) of track primarily owned by freight railroads. Amtrak operates more than 300 trains each day, connecting more than 500 destinations in the United States and three Canadian provinces. Amtrak also is the operator of choice for state-supported corridor services in 15 states and for four commuter rail agencies. In fiscal year 2011, Amtrak served 30.2 million passengers and had \$1.9 billion in ticket revenue.

The Passenger Rail Investment and Improvement Act of 2008 (PRIIA) directed the Administrator of the FRA to develop a Preliminary National Rail Plan to address the rail needs of the United States. The PRIIA also directed FRA to provide assistance to States in developing State rail plans to ensure consistency between the Federal long-range National Rail Plan and State rail plans. The PRIIA reauthorized Amtrak for five years and provided funding to improve the U.S. rail passenger network.

Following the adoption of the PRIIA, the American Reinvestment and Recovery Act of 2009, signed into law by President Obama on February 17, 2009, contained funding and set forth requirements for the development of high-speed intercity rail. This funding, as part of an economic stimulus, was designed to improve intercity passenger rail service in urban areas and create a pathway for high-speed rail in the US. Long-term trends demonstrate that the growth in intercity and commuter passenger rail services will continue. Most passenger service, however, occurs on rail infrastructure that is owned and operated by freight railroads.

The Federal Government is determining how and where to invest in an efficient, high-speed intercity passenger rail network, which would consist of 100–600 mile intercity corridors that connect communities across America. **Figure 30** illustrates the alignments and connectivity of the intercity corridors through a color coding system as described below:

Figure 30. Status of U.S. High-Speed Rail Development



Source: National Railroad Passenger Corporation

Operating High-Speed Service – Rail service currently operates over 125 mph along the corridor. Only one corridor, the NEC Mainline alignment, is color coded dark green to signify its status as an operational U.S. HSR corridor.

Moving Toward HSR – Planned rail services over 125 mph along corridor. The California HSR project falls into this category and is color coded light green.

Improving Services – Corridor is making incremental improvements and planning for 110 mph service along corridor. The Empire, Keystone, Southeast, Midwest, and Pacific Northwest corridors fall into this category and are color coded yellow.

Actively Planning – Corridor planning efforts underway for 79 mph or more along corridor, but no HSR service improvements achieved. The Northern New England, Florida, and Gulf Coast corridors fall into this category and are color coded orange.

Awaiting Appropriations – Corridor planning efforts for HSR have not advanced. These corridors are color coded red, as in the case of the South Central corridor, where minimal progress has been made since its designation.¹

Developing a comprehensive high-speed and intercity passenger rail network requires a long-term commitment at both the Federal and State levels. Over the past two decades, the Federal Government has taken small steps to lay the groundwork for an expansion of high-speed intercity rail and intercity passenger rail. The funding provided in the Recovery Act represents a significantly greater Federal commitment to high-speed intercity rail development in the United States. Along with a renewed Federal commitment, the country's success in creating a balanced and sustainable transportation future will require work to overcome these challenges through strong new partnerships among State and local governments, railroads, manufacturers, and other stakeholders.

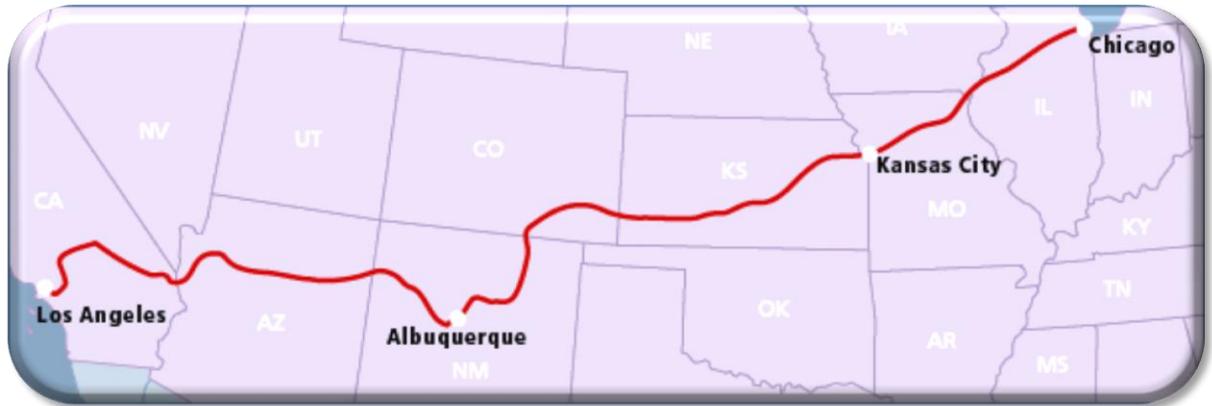
Regional Perspective

Amtrak's *Southwest Chief* is a passenger train operating on a 2,256-mile BNSF route through the Midwestern and Southwestern United States. It runs from Chicago, Illinois, to Los Angeles, California, passing through Illinois, Iowa, Missouri, Kansas, Colorado, New Mexico, Arizona, and California. The *Southwest Chief* formerly operated on a different alignment from Galesburg to Chicago via Chillicothe, Streator and Joliet, Illinois, until 1996 when it was routed over the *California Zephyr* route. Another route change took place in early 1994 when the train was re-routed onto the Santa Fe Third District via Fullerton and Riverside when previously it served Pasadena and Pomona via the Santa Fe Pasadena Line, until that route was closed to all through traffic and subsequently converted to the LACMTA Gold Line light rail system of today. During fiscal year 2011, the *Southwest Chief* carried over 350,000 passengers, a 3.7% increase from FY 2010. The train had a total of revenue of \$44,184,060 during FY 2011, a 6.2% increase from FY 2010.

The *Southwest Chief* operates on approximately 460 miles of BNSF-owned railway and makes six stops throughout Kansas daily. Its route from Kansas City to Garden City is approximately 8 hours. According to the 2011 Kansas Statewide Rail Plan, in federal fiscal year 2010, over 44,000 *Southwest Chief* passengers boarded or alighted at Kansas stations. This is a statewide increase of 27 percent from 2005 through 2010. Fiscal year 2010 ridership is the highest it had been since at least 2003 according to the plan. Ridership generated by Kansas stations in FY 2010 accounted for approximately 13 percent of the *Southwest Chief's* total annual ridership of 342,403.

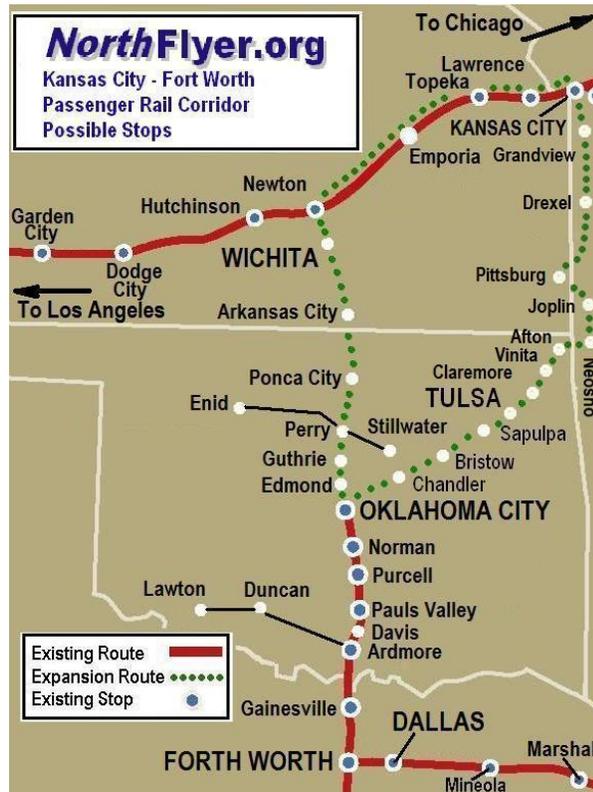
¹ High-Speed Rail: A National Perspective – High-Speed Rail Experience in the United States, National Railroad Passenger Corporation. December, 2008.

Figure 31. Southwest Chief Route



The Heartland Flyer is a daily passenger train that follows a 206-mile route between Fort Worth, Texas and Oklahoma City, Oklahoma. Amtrak serves as contractor, initially only for the State of Oklahoma, but now also to the State of Texas.

Figure 32. Proposed Northern Flyer Route



Several proposals for extending the route of the Heartland Flyer and creating the Northern Flyer or providing additional service over all or parts of its route have been made over the years. Expansion planning revolves around portions of the former Lone Star route and the state-owned route from Oklahoma City to Tulsa, Oklahoma and also following the route of Amtrak's Southwest Chief north of Wichita (Newton, KS). A line to Kansas City could potentially stop at Union Station in downtown Wichita. Recent interest in Kansas and Oklahoma communities has been sparked by the proposal and many towns have released resolutions supporting the idea and requesting stations should the route ever be extended.

The *Feasibility Report of Proposed Amtrak Service Kansas City, Missouri-Oklahoma City, Oklahoma to Fort Worth Texas*, which was published in March 2010 and cited in the Kansas State Rail Plan outlines four alternatives that were examined by Amtrak.

- ▶ Extend the existing Heartland Flyer route north to Newton, Kansas, where passengers could connect with the Southwest Chief to both Chicago and Los Angeles (overnight service).
- ▶ Extend the Heartland Flyer service from Oklahoma City to Kansas, creating a new overnight service between Ft. Worth and Kansas City. Connections would be provided to the Southwest Chief at Kansas City and Newton and with the Missouri River Runner at Kansas City.
- ▶ Create new daily daytime service between Kansas City and Ft. Worth. Frequencies would be doubled along the Ft. Worth-Oklahoma City segment.
- ▶ Create new daily daytime service between Kansas City and Oklahoma City. This service would not connect with the Heartland Flyer or Southwest Chief.

In November 2011, the Kansas Department of Transportation prepared a Service Development Plan (SDP)². This SDP examined two possible passenger rail services on the BNSF MidCon through Wichita. Both of these services envisioned the former railway station in downtown Wichita as a favorable location for a stop. The first service examined was an extension of the *Heartland Flyer* from Oklahoma City to Newton. The second service was the establishment of a new schedule train between Kansas City and Fort Worth during the daytime hours.

Heartland Flyer Extension:

Since 1999, the State of Oklahoma has sponsored the *Heartland Flyer*, operating daily between Oklahoma City and Fort Worth. The sponsorship is under Section 403(b) of the Rail Passenger Service Act of 1970 that allows state, local, or special authority government entities to fund trains operating on routes and schedules of their choosing. The trains are afforded the rights of access that were established under the act. In 2004, the State of Texas joined Oklahoma as a 50% funding partner of the service.

The current *Flyer* schedule affords a convenient connection to the daily Chicago-San Antonio *Texas Eagle* at Fort Worth. The eastbound and westbound *Eagle* trains pass each other at Fort Worth, so the connection with the *Flyer* can be in either direction. Three days per week, the *Eagle* continues through to Los Angeles via El Paso.

² A Service Development Plan is a Federal Railroad Administration defined document that is part of the requirements for receiving federal funding to assist in passenger rail service development.

The *Heartland Flyer Extension* extends the operation north of Oklahoma City to Newton, Kansas. Extending the *Flyer's* current schedule to Newton affords convenient connection with the daily Chicago-Los Angeles *Southwest Chief*, although in the early morning hours. The eastbound and westbound sections of the *Chief* pass each other at Newton (WB at 2:45 AM, EB at 2:59 AM), providing for connections in either direction. On its current historic Santa Fe route, the *Chief* serves Kansas at Kansas City (station on Missouri side), Lawrence, Topeka, Newton, Hutchinson, Dodge City, and Garden City. The *Chief* continues into Colorado crossing Raton Pass and Cajon Pass and onto Los Angeles via Albuquerque and Flagstaff.

KC-Wichita-OKC-Ft. Worth Daytime Service:

The second service examined in the KDOT SDP was a daily daytime service between Kansas City and Ft. Worth via Wichita and Oklahoma City. This train is also proposed to be operated under the auspices of Section 403(b). This service does not afford connections to national Amtrak trains.

Table 16. Proposed Schedules

KC-Wichita-OKC-FtW Daytime	Heartland Flyer Extension	Station			Heartland Flyer Extension	KC-Wichita-OKC-FtW Daytime		
Southbound Read Down					Northbound Read Up			
7:00 AM		Dp	Kansas City, MO	Ar		7:25 PM		
7:28 AM		↓	Shawnee/Johnson Co, KS	↑		6:15 PM		
7:56 AM			Lawrence			5:44 PM		
8:29 AM			Topeka			5:08 PM		
9:31 AM			Emporia			4:08 PM		
9:48 AM			Strong City			3:50 PM		
10:35 AM	4:20 AM		Newton		1:46 AM	3:02 PM		
11:04 AM	4:49 AM		Wichita		1:01 AM	2:36 PM		
12:09 PM	5:54 AM		Arkansas City, KS		11:56 PM	1:29 PM		
12:32 PM	6:17 AM		Ponca City, OK		11:30 PM	1:05 PM		
1:07 PM	6:51 AM		Perry		10:57 PM	12:32 PM		
1:34 PM	7:19 AM	Guthrie	10:29 PM	12:03 PM				
1:51 PM	7:36 AM	Edmond	10:12 PM	11:47 AM				
2:54 PM	8:15 AM	Ar	Oklahoma City	Dp	9:49 PM	11:24 AM		
3:04 PM	8:25 AM	Dp		Ar	9:39 PM	11:14 AM		
3:28 PM	8:49 AM	↓	Norman	↑	9:01 PM	10:33 AM		
3:45 PM	9:06 AM		Purcell		8:44 PM	10:15 AM		
4:10 PM	9:31 AM		Pauls Valley		8:19 PM	9:49 AM		
4:32 PM	9:54 AM		Davis		7:59 PM	9:30 AM		
5:04 PM	10:26 AM		Ardmore, OK		7:27 PM	8:58 AM		
5:46 PM	11:08 AM		Gainesville, TX		6:45 PM	8:17 AM		
6:26 PM	11:48 AM		Krum/Denton		6:05 PM	7:40 AM		
7:20 PM	12:40 PM		Ar		Fort Worth, TX	Dp	5:25 PM	7:00 AM

Both of these services, as developed for the SDP did not have cost/benefit ratios greater than one. Subsequent analysis by the State of Kansas concluded that it was not in the state's interest to pursue either of the services at this time, under the current travel market conditions.

Southwest Chief Reroute:

The most probable event that could restore passenger train service to Wichita is a contemplated reroute of Amtrak's *Southwest Chief*. West of Newton, the *Chief* uses the BNSF transcontinental line across western Kansas, southeastern Colorado and across Raton Pass into New Mexico. While having a scenic crossing into Raton, the pass has steep grades, and over the years, freight traffic has dwindled over the route. In 1908, the former Santa Fe Railroad open an alternative line known as the Belen Bypass (named for Belen, NM). The Belen Bypass line avoided the steep grades of Raton Pass as it is routed south of the Colorado Rockies. Transcontinental traffic has, over the years, been routed more and more over the southern line. The BNSF has completed the double-track improvements over the line also, making it more attractive for operating its freight train. The Belen Bypass is part of BNSF's Southern TransCon, a high-performance intermodal freight route. Only local freight traffic remains on the Raton Pass line.

Under Amtrak's financial arrangements with the freight railroads, Amtrak pays the incremental cost of track maintenance that is attributable to its presence on a line. Without priority freight on the Raton Pass line, and the need to maintain higher speed capability for passengers, Amtrak's share of maintenance costs is rising considerably. It is becoming financially feasible, if not yet a financial imperative, to route the passenger service over the high-density, high-performance double track Belen Bypass.

With such a reroute, the following towns and cities would lose passenger service: Hutchinson, Dodge City and Garden City in Kansas; Lamar, LaJunta and Trinidad in Colorado; Raton, Las Vegas, Lamy (Santa Fe) and Albuquerque in New Mexico. If the reroute would follow the pattern of the former Santa Fe *San Francisco Chief* over the Belen Bypass, the following cities and towns could gain passenger service: Wichita and Wellington in Kansas; Woodward, OK; Amarillo, TX; Clovis, Vaughn and Belen in New Mexico. No definite plans or dates or business arrangements or even the inevitability have been established for a rerouting.

Wichita Passenger Station

The timeline for implementation of passenger rail service in Wichita is uncertain but planning for a future station is considered in the WRMP. Future passenger rail service to Wichita has been an expressed desire by local and state officials as well as local stakeholders. During the stakeholder group meetings for the WRMP, several locations for a future passenger rail station were discussed. The locations ranged from the 21st and Broadway area to Derby along K-15. However, Union Station was discussed as the most logical location for a station because of its proximity to tourist attractions, the central business district, Wichita transit and parking. This location was also discussed favorably in the KDOT SDP and *Project Downtown: The Master Plan for Wichita*.

In February 2013, a local developer purchased the Union Station property intent on redeveloping the site as a destination attraction, including retail, restaurants and potentially hospitality and office space – a key business generator for *Project Downtown*. Local elected officials feel this redevelopment opportunity will be a great partnership to leverage in acquiring future passenger rail service.³

³ "Developer seals deal to buy Union Station in downtown Wichita," The Wichita Eagle. February 1, 2013. <http://www.kansas.com/2013/02/01/2659282/developer-seals-deal-to-buy-union.html#storylink=cpy>

An exhibit in **Appendix A** illustrates how a passenger train could access a platform at Union Station. This design assumes the Grade Separate BNSF – North of Lincoln to South of Pawnee concept is also constructed. The passenger train can approach the station from the north or south using a switch off the mainline. This configuration preserves access to the storage tracks for the Great Plains Transportation Museum and allows direct access to a platform adjacent to Union Station.

Section 10. Summary and Conclusions

The Wichita Railroad Master Plan is a coordinated, comprehensive master plan that outlines long-term projects to improve transportation mobility in Wichita for highway users and railroads. Each identified concept is designed to meet the master plan goals – long-range targets to accomplish through project implementation. The WRMP is a long-term plan because of the scale and magnitude, both physically and financially, of the rail improvement projects and in turn the associated time needed to acquire adequate funds.

The process used to reach the recommendations followed several planning steps that involved a review of existing conditions along several rail corridors within four areas of the city. Through the identification of the Hazard Index along these corridors, it was possible to target locations for physical improvements along several of the corridors. A comparison of corridor hazard indices indicates that the BNSF corridor in Area 1 (south central Wichita) and the industrial area of Area 2 (bisected by 21st and 29th Streets) are locations for potential improvements such as grade separations. Concepts were then developed to address these needs. Costs for the concepts were prepared and a benefit-cost analysis conducted to determine the validity of advancing the concepts. Both the Grade Separate BNSF – North of Lincoln to South of Pawnee and the Elevate 21st and 29th Streets and Relocate BNSF Yard concepts yield a benefit-cost ratio above 1.0.

The costs of these concepts are significant; however, the level of concept design and cost estimating included in the WRMP allows this plan to be utilized when seeking funding from sources outside of the city. Implementation of these solutions will take time but having an overall plan in place reinforces how to proceed with phased implementation or adjacent projects.

While this plan, suggests that Grade Separate BNSF – North of Lincoln to South of Pawnee and the Elevate 21st and 29th Streets and Relocate BNSF Yard concepts be pursued for implementation, it also recognizes that smaller-scale improvements should continue to be implemented in the region. Working with the FRA, KDOT and the railroads, grade crossing consolidations and warning device upgrades should be continued to increase safety at highway-railroad grade crossings in the city.

Additionally, future connections to passenger rail service via Amtrak and the Northern Flyer should continue to be discussed. Wichita sees itself as being well positioned to accommodate the potential for increased passenger rail service. The investments in Wichita's Downtown point to a re-use of Union Station as a multi-modal transportation hub.