Section

3 ALTERNATIVES

3.0 Alternatives

The Springfield Rail Improvements Project Build Alternatives place rail traffic on the three existing routes in different configurations, as well as include two tracks for high-speed rail. The No-Build Alternative includes the continuation of existing freight service along with intercity passenger service between Chicago and St. Louis including the currently planned and funded improvements. Existing Amtrak service will be improved with high-speed rail (HSR) service through much of the corridor (between Joliet and St. Louis) following completion of upgrades to the existing tracks that were approved by a 2004 Record of Decision (ROD) (Dwight to St. Louis improvements) (Federal Railroad Administration (FRA) and Federal Highway Administration (FHWA), 2003) and 2011 FONSI (Joliet to Dwight improvements) (FRA, 2011).

This section describes the alternatives assessed in detail in Chapter 5 of Volume II of this Final EIS and the screening process used to identify these alternatives. In Chapter 2 of Volume II of this Final EIS, Purpose and Need, a series of goals and objectives were defined. Measures of success in meeting the goals and objectives were used to compare potential alternatives. The criteria are described in Section 3.1. The No-Build Alternative and the Build Alternatives undergoing screening are defined in Sections 3.2 and 3.3, respectively. The alternatives screening is described in Section 3.4 and its results are presented in Section 3.5.

3.1 Tier 2 Alternatives Screening Process

3.1.1 Alternatives Screening and Selection Process

The purpose of the screening process was to identify the set of reasonable alternatives for the Springfield Rail Improvements Project. The Illinois Department of Transportation (IDOT) and FRA developed the screening criteria specifically for this project. The screening criteria were applied to the project alternatives identified in the Tier 1 Final EIS. The screening criteria considered the following:

- The purpose and need of the Springfield Rail Improvements Project;
- The goals and objectives established for the project in the Purpose and Need;
- Minimizing impacts to humans and the natural environment; and
- Minimizing costs.

Table 3-1 lists the Springfield Rail Improvements Project screening objectives and the corresponding criteria, as well as the units or methodology used to quantify or characterize these criteria. Quantitative criteria were measured in appropriate units such as number, time, or dollars, while qualitative criteria that cannot be captured adequately by a single number are encapsulated in a brief narrative description. Each of the alternatives that passed the Tier 1 screening (Volume 1, Section 3.3.5) was evaluated

through this Tier 2 screening. Some of the Tier 2 screening criteria are the same as those used in the Tier 1 screening. However, more detailed analysis was conducted for the Springfield Rail Improvements Project alternatives at Tier 2 because of a greater level of available engineering detail and environmental information. Some of the screening criteria from Tier 1 were not included in Tier 2, because for those criteria additional information is not necessary or relevant at the Tier 2 level. Additionally, screening criteria were added to address the specific Springfield Project needs. Differences in impacts and costs from Tier 1 to Tier 2 are a result of the more detailed analysis undertaken for Tier 2.

Table 3-1. Tier 2 Objectives and Screening Criteria

Objective	Criteria and Measures
Safety	• **Train/Vehicle Accidents at Grade Crossings (# of predicted accidents)**
Congestion	• **Vehicle Traffic delay (# of minutes of vehicle delay)**
Livability and commercial activity	• **Predicted sound levels (Amount of time horns are blown per day (# of minutes)** • **Reduce rail traffic through the Medical District and downtown (qualitative discussion)**
Lifecycle and capital costs	• **Present value cost (dollars)** • Capital cost (dollars)
Operational issues	• Number of at-grade crossings
Impacts to existing development	• Right-of-way Impacts (acres of right-of-way required)
Impacts to social and economic resources	• Residential and commercial displacements (# of displacements) • Parcels with changes in access (# of parcels) • Neighborhood severances and public services (qualitative discussion)

Note: Criteria not included in the Tier 1 Screening are in **bold**.

Screening based on railroad operational criteria is included in Tier 1. There are no operational differences between the Tier 2 Build Alternatives.

A discussion of the Tier 2 screening criteria that are not included in Tier 1 is provided after Table 3-1. The items with bold text are new criteria not included in the Tier 1 screening.

3.1.1.1 Safety

Annual vehicle/train accidents, including injuries and fatalities, for each grade crossing were predicted for each alternative using U.S. Department of Transportation's (USDOT) Grade Crossing Accident Prediction method described in the summary of the IDOT

Rail-Highway Crossings Resource Allocation Procedure-Revised, (June 1987) and *Rail-Highway Crossing Resource Allocation Procedure: User's Guide, Third Edition*, (August 1987).

3.1.1.2 Congestion

Daily traffic delays at grade crossings were computed for future conditions for all alternatives based on forecast traffic volumes and gate closure times.

3.1.1.3 Improve Livability and Commercial Activity

The amount of time that train horns blow for grade crossings was computed for future conditions for all alternatives based on current horn blowing procedures used by the railroads and Amtrak and the number of forecast trains.

Each of the alternatives was evaluated with regard to whether they reduced rail traffic through the Mid-Illinois Medical District and through downtown.

3.1.1.4 Present Value and Capital Costs

Capital costs were estimated for each alternative. Capital costs are for design, land acquisition, and construction; they do not include operations and maintenance costs.

A present value cost analysis using USDOT procedures and analysis inputs (OMB Circular No. A-94; EPA Publication EPA 420; USDOT Guideline: Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analysis; USDOT Memorandum: Valuation of Travel Time in Economic Analysis; USDOT Memorandum: Treatment of Value of Life and Injuries in Preparing Economic Evaluations) was prepared for a 75-year project life. Annual costs including operations and maintenance costs, were computed for each year of the anticipated project life. These include:

- Crossing maintenance, crossing rehabilitation and structure rehabilitation.
- Delays based on the traffic delay calculations and an average hourly delay cost.
- Cost for collisions, injuries and fatalities at highway grade crossings as computed by the crash prediction model.
- Emissions and fuel costs as a result of delayed rail and vehicles.
- Incident, injury, and fatality costs for hazardous material releases. Information on hazardous material releases from railroad cars is tabulated by the USDOT. This information was used to compute an average of incidents, costs, injuries, and deaths per train mile traveled. This was used to predict the number and cost of incidents in the study area for the various alternatives (Illinois Commerce Commission, 2001-2010).

These annual costs were escalated to account for inflation (1.8 percent per year for operations and maintenance, 3.0 percent per year for construction) and any anticipated increases because of rail and vehicle traffic growth. The present value of these annual

costs was computed using the discount rate (4.5 percent per year) and anticipated project life of 75 years.

3.1.1.5 Operational Issues

The number of remaining at-grade rail crossings and grade separation bridges in the study area were determined for each of the alternatives. There are no other rail operational differences among the alternatives selected for detailed environmental analysis. All of the alternatives selected for detailed environmental analysis improve UP operations by adding a second track through Springfield. All of the alternatives selected for detailed environmental analysis would have the same length, speed, travel time, and switching requirements.

3.1.1.6 Impacts to Existing Development

The number of acres of required new right-of-way was computed for each alternative. This included right-of-way for new grade separations, crossing improvements, and track improvements.

3.1.1.7 Impacts to Social and Economic Resources

New right-of-way requirements along the alternatives were used to determine the number of displacements along each alternative. As part of this analysis, previous stakeholder comments obtained through the Springfield Rail Improvements Project were assessed to assist in identifying other social and economic impacts such as neighborhood severances and public service disruptions.

The alternatives were also compared as to whether the rail lines passed through residential neighborhoods and whether they affected access to critical community buildings.

3.2 No-Build Alternative

The No-Build Alternative consists of maintaining the existing rail and street facilities after completion of the improvements approved by the FRA in the 2004 Record of Decision (ROD Improvements) and the 2011 FONSI (see the Tier 1 Final EIS Volume I, Section 3.2). No additional grade separations would be constructed. Quad gate (gates in all four quadrants of the crossing to minimize opportunities for drivers to drive around the gates when down) installation along 3rd Street as part of the ROD Improvements would allow for a quiet zone for the 3rd Street corridor (UP). The No-Build Alternative would have a substantial increase in freight rail traffic compared to existing.

3.3 Build Alternatives

The alternatives considered for the Chicago to St. Louis High-Speed Rail Project are described in Section 3.3 of Volume I of the Tier 1 Final EIS, including reasons for eliminating several potential alternatives. The analysis in Tier 1 eliminated the following Springfield Build Alternatives (described in Section 3.3.5.1 of Volume I of the Tier 1 Final EIS):

- Alternative 3 – UP and CN relocation to 10th Street
- Alternative 4 – Split passenger and freight traffic in different corridors
- Alternative 5 – Split passenger and freight traffic with CN relocation to 10th Street

Screening of these alternatives and reasons for their elimination are included in Section 3.3.5.2 of Volume I of the Tier 1 Final EIS.

The following build alternatives were retained for Tier 2 analysis.

3.3.1 Alternative 1

Alternative 1 – consists of adding a second track to the existing 3rd Street corridor to accommodate UP freight and passenger (HSR) traffic. This alternative includes three subalternatives, each of which includes a specific combination of grade separations and grade crossing closures (see Table 3-2). The subalternatives are:

- 1A – Double track UP on 3rd Street – grade separation at passenger station (Exhibit 3-1).
- 1B – Double track UP on 3rd Street– some grade separations on UP corridor only (Exhibit 3-2).
- 1C – Double track UP on 3rd Street– some grade separations on all corridors (Exhibit 3-3).

Alternatives 1A, 1B, and 1C include closure of 3rd Street parallel to the UP tracks from Ash Street to Union Street. This consists of abandoning 3rd Street in areas where it is immediately adjacent to the track and the existing UP right-of-way width is less than 66 feet. This would require that the street right-of-way and any property with access only from 3rd Street be purchased. There are several reasons for this requirement as detailed below.

- From approximately Monroe Street to south of Laurel Street the UP right-of-way is approximately 30 feet wide. Two tracks at 13.5 foot centers would leave only about 8 feet from the centers of the track to the right-of-way line. In other areas north of Monroe Street, the right-of-way is wider but would not accommodate UP's design requirements for spacing and clearance.
- Illinois legal horizontal clearance requirement (Title 92 I.A.C.) is 8 feet in general and 9 feet for poles. The UP requirement is 9 feet. There is insufficient width within the existing right-of-way to provide these clearances with two tracks.
- Since 3rd Street exists on both sides of the track in most of the segment from Monroe Street to Laurel Street, there are vehicles and pedestrians immediately adjacent to the railroad right-of-way. There are also numerous residences and businesses that front directly onto 3rd Street.

- Springfield requested that a concrete barrier and chain link fence be constructed on both sides of the UP track in the 3rd Street corridor to prevent vehicle and pedestrian encroachment onto the UP right-of-way in areas where residences and businesses front directly on 3rd Street. To provide the minimum clearances listed above,

Table 3-2. Tier 2 Alternatives

Alternative			Double Track UP			Shift UP to 10th	
			1A	1B	1C	2A	2B
New Grade Separations	3rd St	Ash		X	X		
		South Grand		X	X		
		Jefferson	X	X	X		
		Madison		X	X		
		Carpenter		X	X		
		5th		X	X		
		6th at North Grand		X	X		
	10th St	Ash			X	X	X
		Laurel				X	X
		Monroe					X
		Washington					X
		Madison			X	X	X
		Jefferson			X	X	X
		Carpenter			X	X	X
		North Grand at UP				X	X
		North Grand at NS			X	X	X
	19th St	Ash			X	X	X
		South Grand			X	X	X
Replace/Rehab Rail Bridges	UP	Capitol	X	X	X		
		Dodge	X	X	X		
		9th	X	X	X		
	10th St	6th				X	X
		5th				X	X
		South Grand				X	X
		Cook				X	X
Rail Crossing Closure	10th St	Jackson				X	X
		Capitol					X
		Adams				X	X
		Reynolds				X	X
		Miller				X	X
		Enos					X
		Enterprise				X	X
Street Closure	UP	3rd - Ash to Union	X	X	X		
		7th at North Grand		X	X		
		Bergen at 5th		X	X		
		2nd at Ash		X	X		
	10th St	Princeton at 6th			X	X	X
		9th at Ash			X	X	X
		10-1/2 at Ash			X	X	X
		9th at Laurel			X	X	X
		10-1/2 at Laurel				X	X
		Division at UP				X	X
		Reservior at UP				X	X
		10th at N. Grand				X	X
		Mich. at N. Grand			X	X	X
		Wirt at Ash			X	X	X
	19th St	Wirt at S. Grand			X	X	X
		McCreery at S. Grand			X	X	X
Quiet Zone		UP	X	X	X		
		NS			X	X	X
		CN			X	X	X
Abandon UP Corridor						X	X

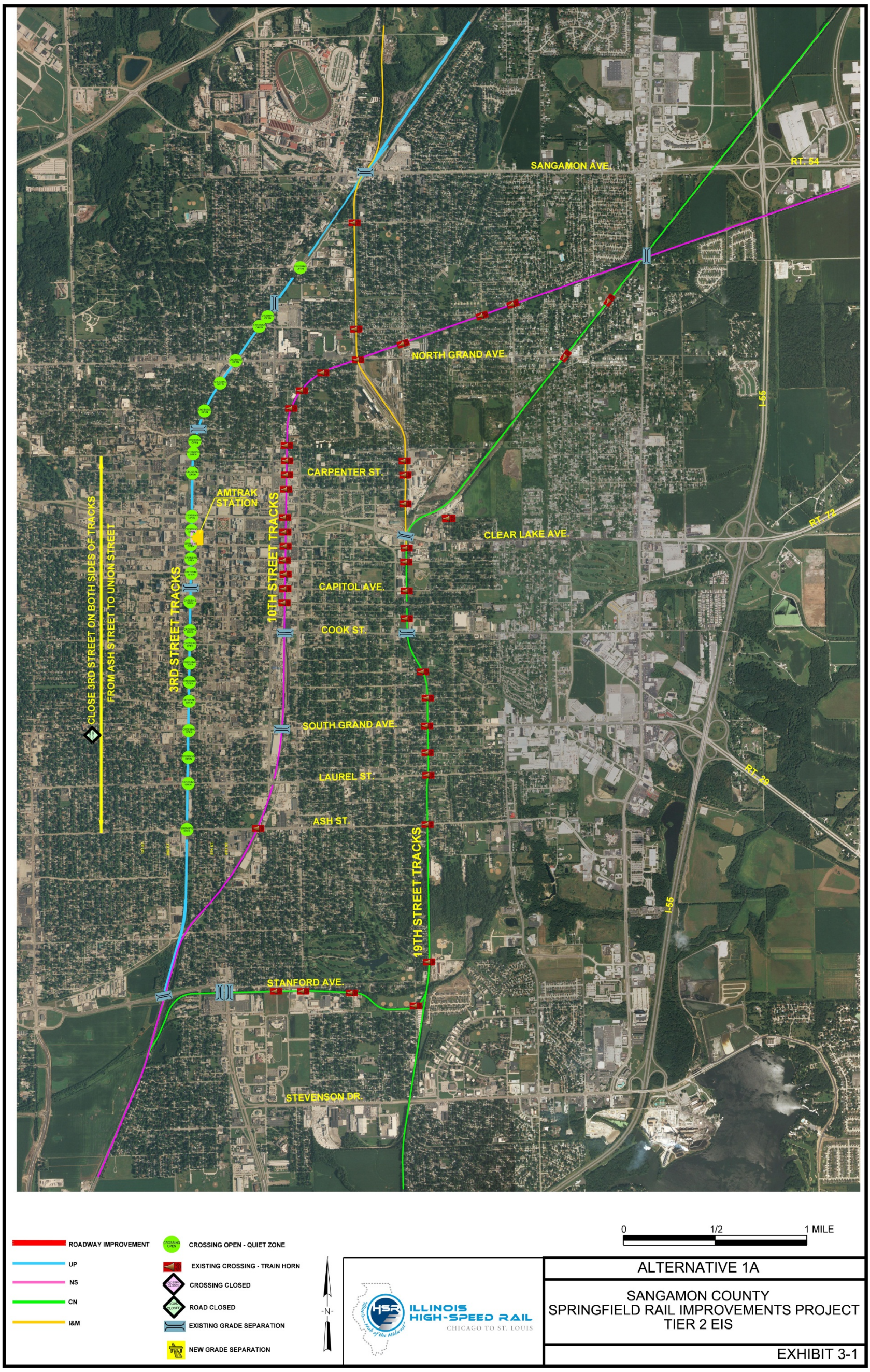

Exhibit 3-1. Alternative 1A

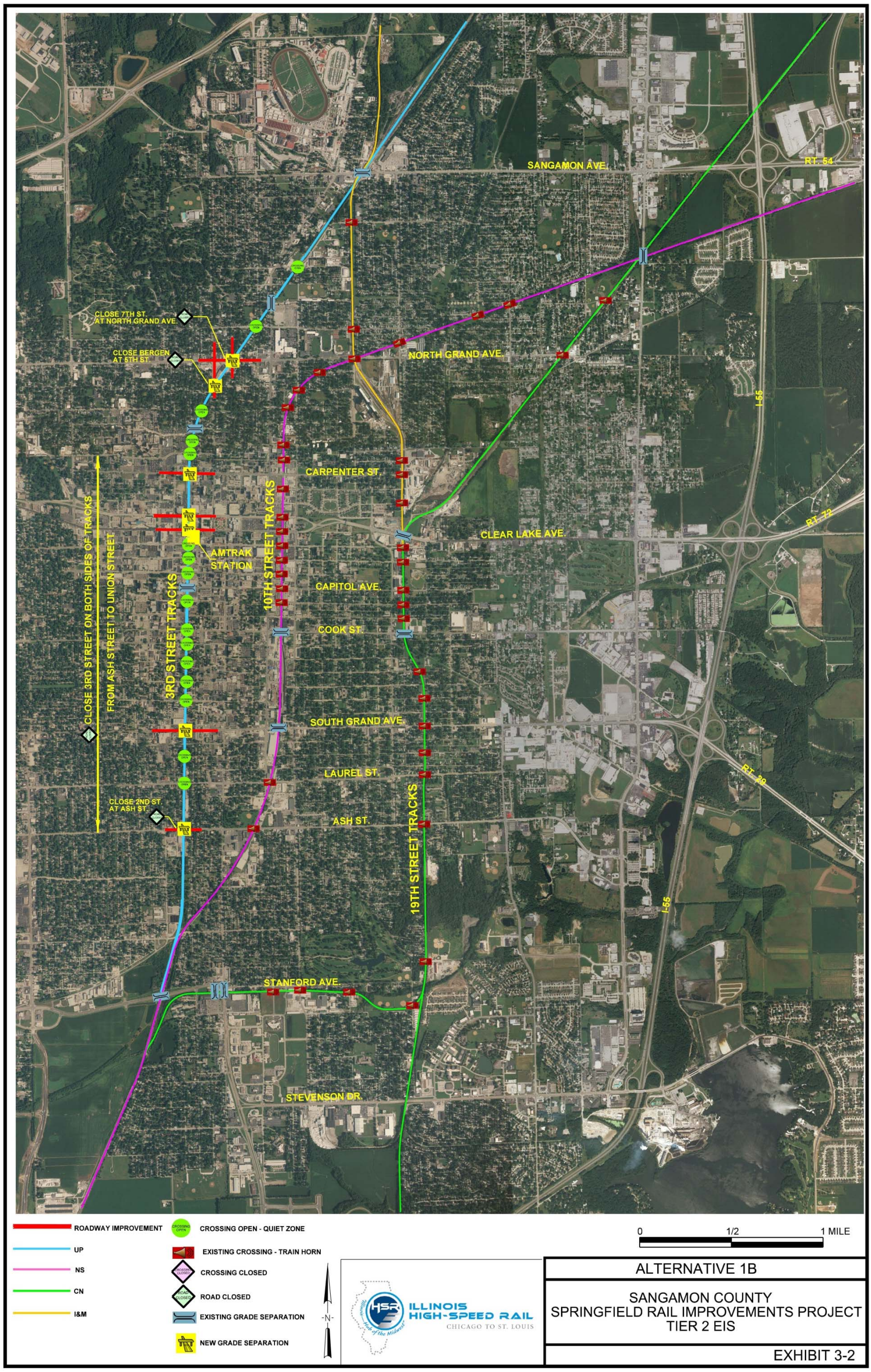

Exhibit 3-2. Alternative 1B

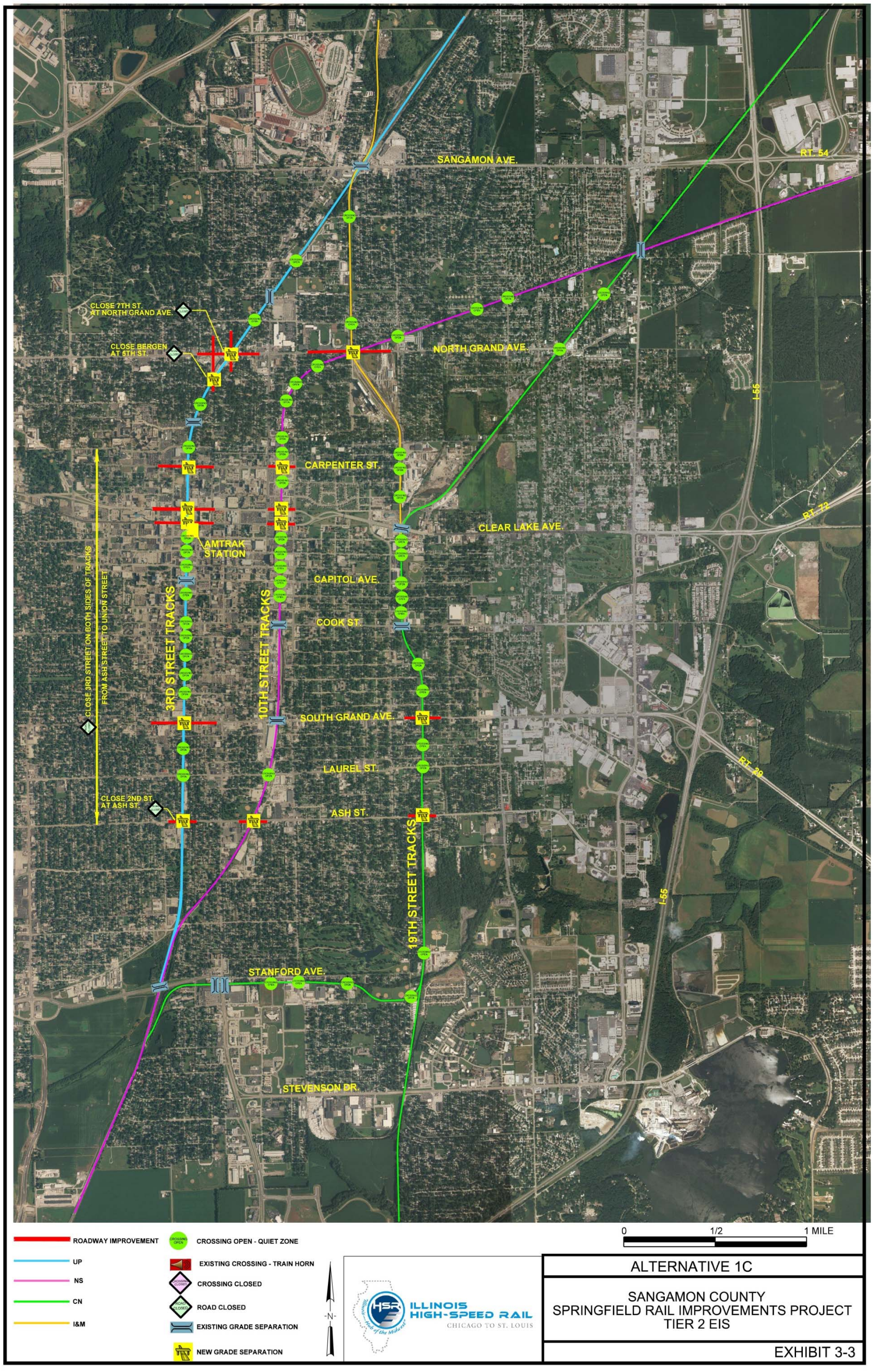

Exhibit 3-3. Alternative 1C

it would be necessary to place this fence and barrier on 3rd Street, off of existing railroad right-of-way. This arrangement results in the following concerns:

- A fence and barrier at the minimum clearance point from Monroe Street to Laurel Street could complicate UP track maintenance since there would be limited space for personnel, equipment, and materials.
- Third Street would be reduced to a width less than 16 feet.
- The barrier and fence on both sides of the track could trap trespassers with no easily accessible escape route or place of refuge.
- Crossing signals and gates would need to be installed at each of the cross streets. The installation of vehicle and pedestrian gates would require that 3rd Street be relocated further away from the track at the at-grade crossings. This would require the acquisition of right-of-way and result in intersections on both sides of, and immediately adjacent to, the rail crossings.

Resolution of these issues results in other actions that are part of this alternative, Alternatives 1A, 1B, and 1C include abandoning 3rd Street in areas where it is immediately adjacent to the track and the existing UP right-of-way width is less than 66 feet. This would require that the street right-of-way and any property with access only from 3rd Street be purchased. Purchase and abandonment of 3rd Street provides the following advantages from the perspective of rail operations as well as pedestrian and vehicle circulation:

- Elimination of most of the concerns associated with pedestrian and vehicle traffic immediately adjacent to the railroad.
- A 15 feet track center and a service road could be provided for the UP, improving its maintenance activity and operations.
- Elimination of the 3rd Street intersections with cross streets adjacent to the track.
- Closing 3rd Street would not result in a noticeable increase in traffic on any other streets since its purpose is to serve trips with destinations on 3rd Street.

The passenger station along 3rd Street for Alternatives 1A, 1B, and 1C would be at the site of the existing Amtrak Station and would extend to the block immediately to the north. The alternatives include a grade separation at Jefferson Street to provide the required 500 feet station platform length (see Exhibit 3-4). Station parking (minimum 100 spaces) would be located immediately east of the station in the block between Jefferson and Washington streets.

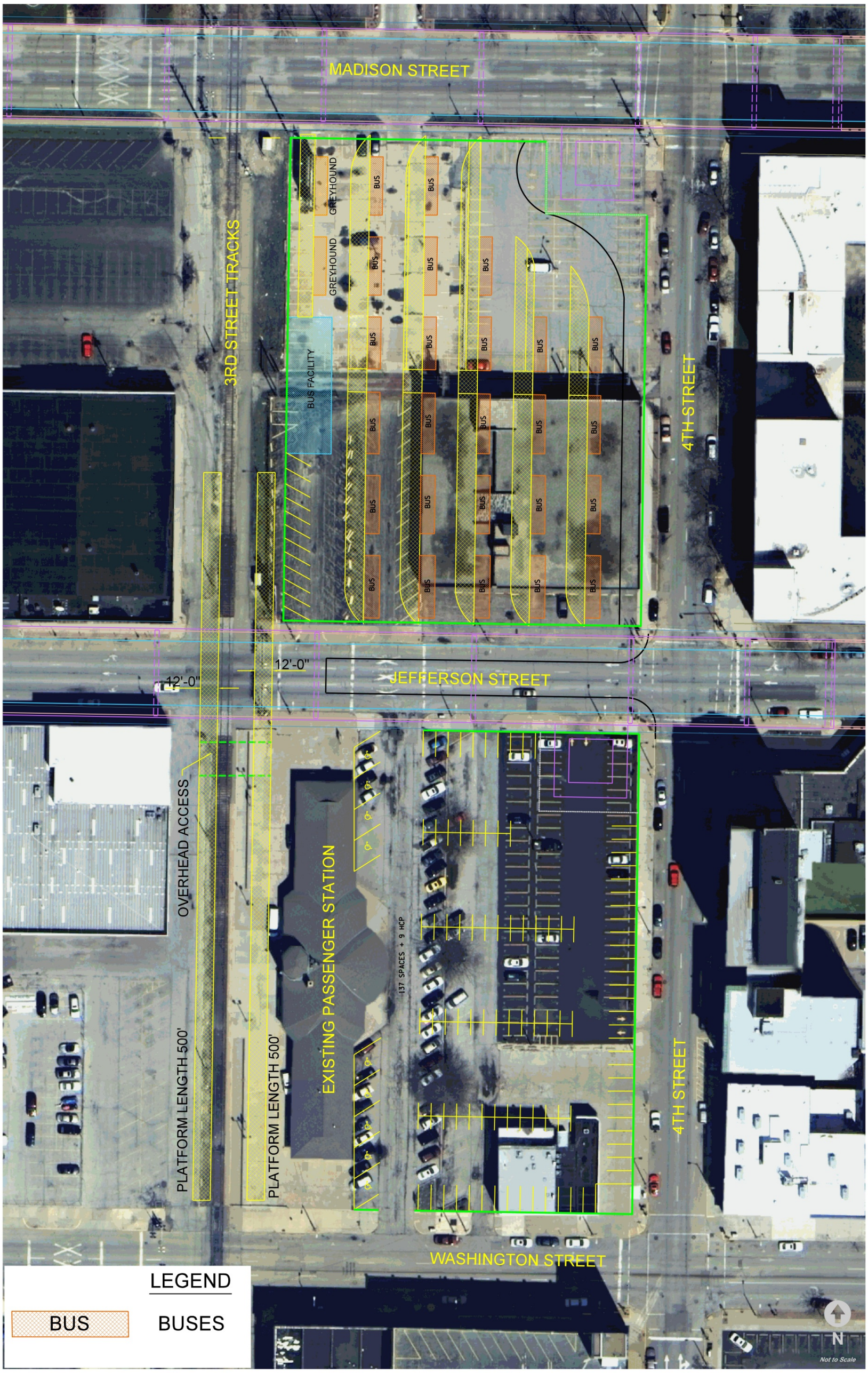

Exhibit 3-4. Passenger Station on 3rd Street

3.3.2 Alternative 2

Alternative 2 would relocate UP freight and passenger (HSR) traffic to the 10th Street corridor and add a second track. This alternative includes two sub-alternatives, each of which includes a specific combination of grade separations and grade crossing closures. (See Table 3-2). The subalternatives are:

- 2A – Relocate UP to 10th – some grade separations on 10th Street and 19th Street (Exhibit 3-5).

- 2B – Relocate UP to 10th – grade separation or closure of all crossings on 10th Street south of North Grand Avenue, some grade separations on 19th Street (Exhibit 3-6).

Alternative 2B was developed at the request of the UP to evaluate the cost, impacts, and benefits of eliminating all at-grade crossings where the NS and UP would operate in adjacent, parallel corridors (North Grand Avenue to Stanford Avenue).

The passenger station along 10th Street for Alternatives 2A and 2B would be on the east side of the rail corridor on the block between Adams and Washington streets. An overhead pedestrian crossing would provide access to the platforms. These alternatives include closing the Adams Street crossing to provide the required 500 feet station platform length (see Exhibit 3-7). Station parking (minimum 100 spaces) would be located east of the station between Adams and Jefferson streets.

3.4 Springfield Tier 2 Screening of Alternatives

The Springfield-specific Tier 2 screening criteria were applied to the No-Build Alternative and to Alternatives 1A, 1B, 1C, 2A, and 2B. All of the alternatives, including the No-Build Alternative, include a substantial increase in passenger and freight rail traffic, and this is reflected in the screening comparison. The results of the screening analysis are described in the paragraphs that follow.

3.4.1 Safety

Reducing the number of crossings and improving crossing protection are the primary ways to improve safety. As stated in the purpose and need, the 3rd Street Corridor (Alternatives 1A, 1B, and 1C) also has additional pedestrian safety concerns.

The anticipated number of vehicle-train crashes in the design year 2030 is shown for each alternative in Table 3-3. These were predicted using USDOT Grade Crossing Accident Prediction based on the method published in summary of the *IDOT Rail-Highway Crossings Resource Allocation Procedure-Revised*, (June 1987) and *Rail-Highway Crossing Resource Allocation Procedure: User's Guide, Third Edition*, (August 1987).

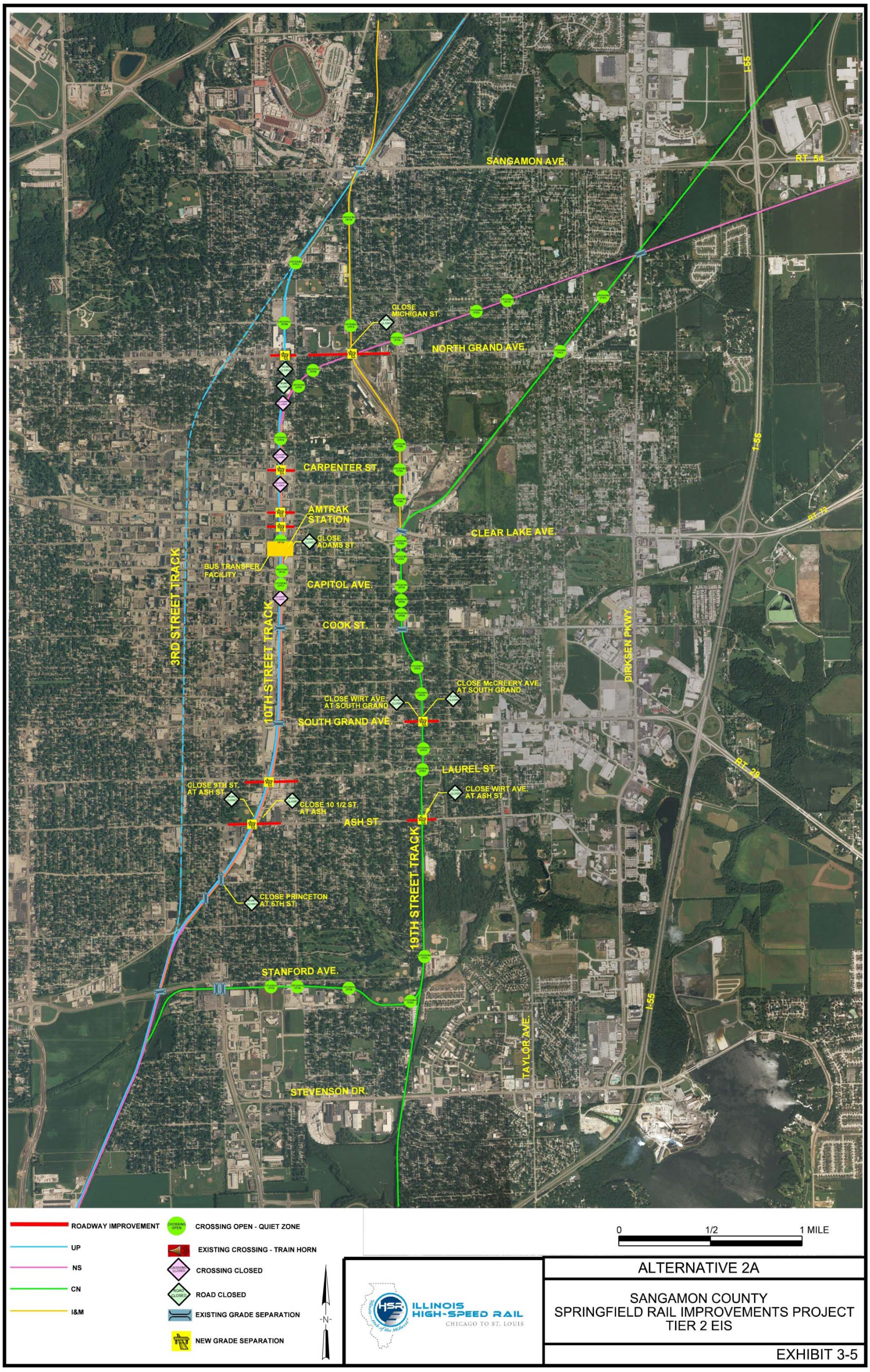

Exhibit 3-5. Alternative 2A

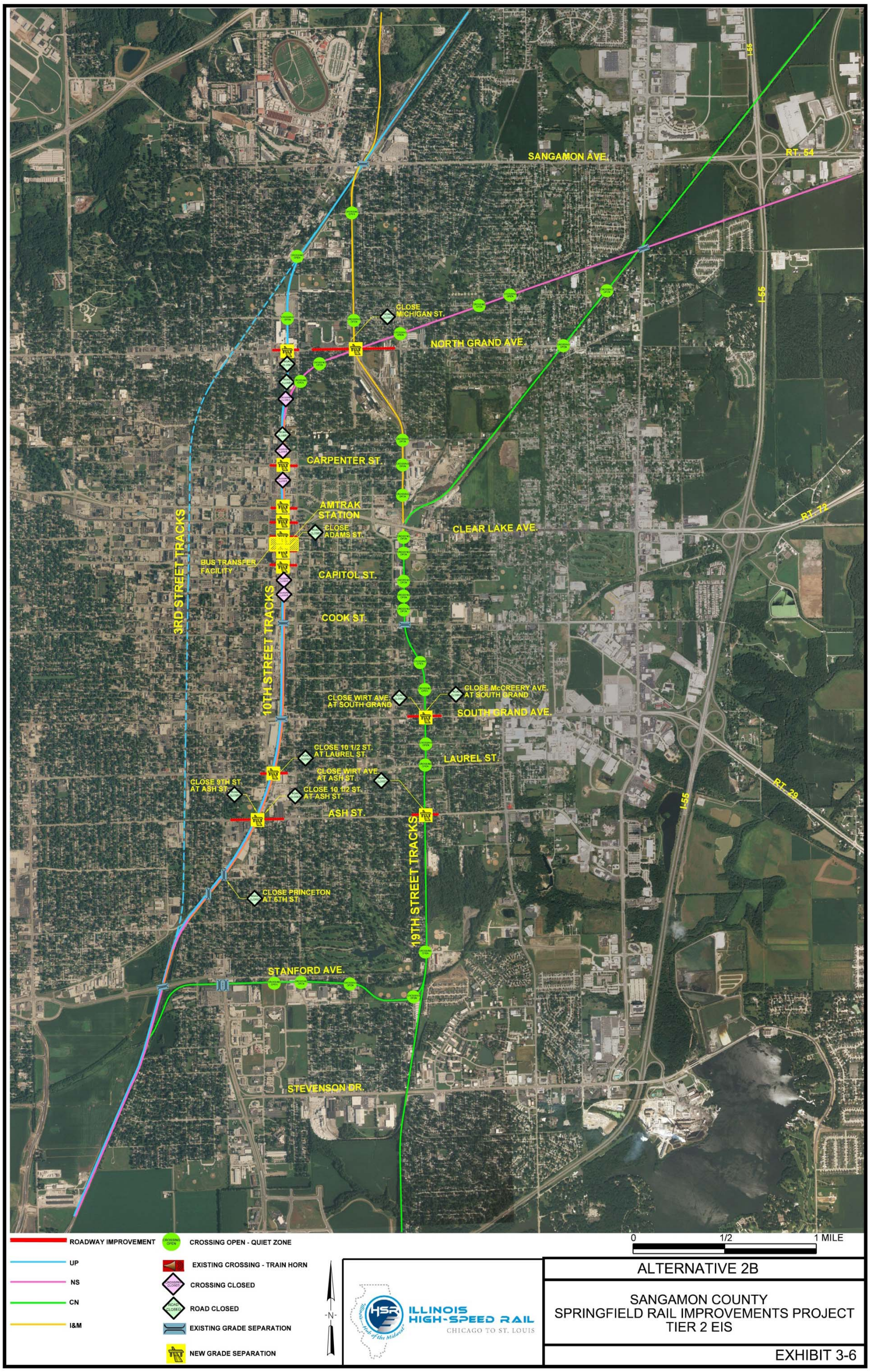

Exhibit 3-6. Alternative 2B

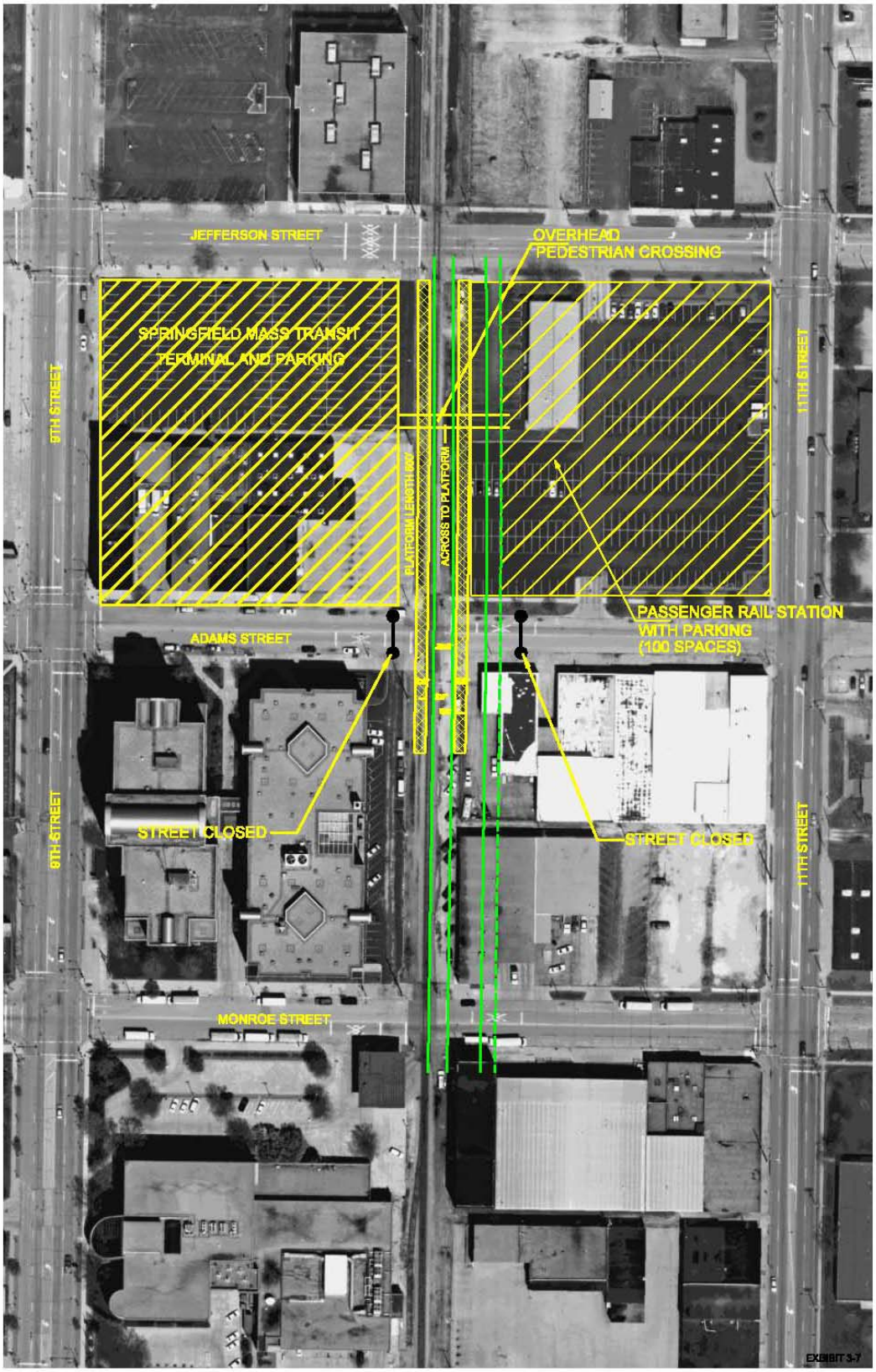

Exhibit 3-7. Passenger Station on 10th Street

Table 3-3. Predicted Crashes

Alternative	Predicted Crashes per Year (2030)
No-Build	1.30
1A	1.42
1B	1.31
1C	0.58
2A	0.26
2B	0.08

Alternatives that consolidate rail traffic on corridors with grade separations at the busiest streets (2A and 2B) would have the lowest projected number of crashes. Simply building more grade separations without consolidating rail operations (Alternatives 1B and 1C) is not as effective as consolidating rail operations and building grade separations (2A and 2B). Alternatives 1A, 1B, and 1C would fence the UP right-of-way only, leaving the 10th Street and 19th Street corridors subject to existing level of trespass. Alternatives 2A and 2B would fence both of Springfield's remaining north-south corridors, reducing trespass opportunities throughout Springfield.

Alternatives 1A, 1B, and 1C would not fully address the 3rd Street pedestrian safety issues because rail traffic would remain on the 3rd Street corridor. Closing 3rd Street would eliminate the problem of the street immediately adjacent and parallel to the tracks. The issue of the busy corridor through a dense residential area with numerous pedestrian attractions would remain however. Alternatives 2A and 2B would remove rail traffic from the 3rd Street corridor, eliminating the issue.

3.4.2 Congestion

As with safety, the alternatives that consolidate rail traffic and provide grade separations at busy streets would be the most effective at reducing vehicle congestion resulting from trains blocking crossings.

Anticipated daily vehicle delays in 2030 as a result of trains blocking at-grade crossings were computed for each alternative. These are shown in Table 3-4.

Table 3-4. Vehicle Delays

Alternative	Vehicle Delay in vehicle -minutes per day
No-Build	47,500
1A	45,900
1B	28,500
1C	18,900
2A	13,500
2B	7,100

Alternatives 2A and 2B would have the fewest delays of the Tier 2 alternatives. This is because of the consolidation of rail traffic in the 10th Street corridor and construction of grade separations at the busiest streets. Consolidation would move trains off of the 3rd Street corridor which is crossed by more vehicles than the 10th Street corridor. The 10th Street corridor also has more effective existing grade separations.

Alternatives 1C, 2A, and 2B fully grade separate Carpenter Street, Madison Street, Jefferson Street, Ash Street and South Grand Avenue, five of the busiest east-west arterials in Springfield. Traffic on these streets would no longer be stopped by trains.

3.4.3 Livability and Commercial Activity

3.4.3.1 Train Horn Blowing

The large number of at-grade street crossings in Springfield produces frequent train horn blowing, which can affect livability. The most effective ways to reduce the frequency of train horns is to consolidate rail traffic to corridors that have fewer at-grade crossings and/or to create quiet zones.

The predicted duration of train horn blowing in minutes per day for each alternative is shown in Table 3-5. This was calculated based on the number and duration of horn blowing for each train as it approaches each crossing in Springfield. Horn blowing sequences are prescribed by law. Alternatives 1C, 2A, and 2B would have no horn blowing since quiet zones would be implemented for all rail corridors.

Table 3-5. Horn Blowing

Alternative	Horn Blowing minutes/day (2030)
No-Build	314
1A	151
1B	151
1C	0
2A	0
2B	0

3.4.3.2 Reduce Rail Traffic Through Medical District and Downtown

Springfield has a long-held goal to eliminate rail traffic in the 3rd Street corridor (UP) and to consolidate rail traffic in the 10th Street corridor (NS) (see *Springfield Railroad Consolidation Study*, 2005; and *The 10th Street Solution*, 2011). The 3rd Street and 19th Street (CN) corridors are the most residential of the three corridors in Springfield; the 10th Street corridor is the least residential. The 3rd Street corridor passes through downtown, the State Capital Complex and the Mid-Illinois Medical District. The rail corridor inhibits planned development in the Medical District because of the reluctance to construct medical, academic or research structures too close to the tracks (Springfield Area Transportation Study, 2010). Development in downtown, especially residential development is restricted by the 3rd Street rail corridor. Much of the 10th Street corridor passes through the east edge of downtown and a warehouse and industrial area. Springfield's comprehensive plan calls for relocation of the 3rd Street corridor to 10th

Street and construction of an intermodal station on 10th Street. Alternatives 2A and 2B achieve this goal and are consistent with Springfield's plan since they eliminate rail traffic on 3rd Street and consolidate on 10th Street.

Alternatives 1A, 1B, and 1C would increase rail traffic through downtown and the center of the Medical District. These alternatives also would not reduce the number of rail corridor barriers that divide Springfield in that all three corridors continue to carry rail traffic. These alternatives would leave rail traffic on the 3rd Street corridor which has a higher concentration of important community facilities than the 10th Street corridor.

Alternatives 2A and 2B would eliminate rail traffic from downtown and shift it away from the center of the Medical District. These alternatives eliminate operations on one of the rail corridor barriers and mitigate the effects of the other two by constructing grade separations at critical locations on both 10th and 19th streets.

3.4.4 Present Value and Capital Costs

3.4.4.1 Annual and Rehabilitation Costs

Annual and rehabilitation costs were computed for each alternative using the assumptions shown in Table 3-6. The project design year is 2030. It is anticipated that the project will retain a useful life beyond 2030, and thus the analysis length extends past 2030 to 75 years from completion of construction.

Table 3-6. Annual and Rehabilitation Cost Assumptions

Annual and Rehabilitation Costs		Footnote Reference
Service Life	75 Years	1
Base Year for Costs	2011	2
Inflation Rate	1.80 Percent	3
Construction Inflation	3.00 Percent	4
Discount Rate	4.50 Percent	3
Fatality Cost	$5,800,000 Each Occurrence	5
Injury Cost	$1,000,000 Each Occurrence	5
Collision Cost	$50,000 Each Occurrence	5
Auto Delay Cost	$15.00 Per Hour	6
Truck Delay Cost	$50.00 Per Hour	6
Percent Trucks	7 Percent	7
VOC Emissions Cost	$1,700 Per Ton	6
NOx Emissions Cost	$4,000 Per Ton	6
Fuel Cost	$3.33 Per Gallon	8
VOC Emissions	0.05 Pounds Per Hour of Idling	6
NOx Emissions	0.01 Pounds Per Hour of Idling	6
Vehicle Traffic Growth	2.00 percent Per Year	7
Rail Traffic Growth	1.20 percent Per Year	9
Crossing Signal Maintenance	$12,000 Per Year	10
Crossing Rehab	$200,000 Each	10

Anticipated Structure life is 75 years	1
Structure rehabilitation every 25 years at 20 percent of structure cost	10
Grade crossing and signal rehabilitation every 10 years	10
Hazardous materials spill frequency and cost	11

[1] Anticipated Service Life of Improvement
[2] Current Year
[3] Office of Management and Budget Circular A-94
[4] IDOT Five-year Program
[5] DOT Guideline: Treatment of the Value of Preventing Fatalities and Injuries in Preparing Economic Analysis
[6] EPA Publication 420: Idling Vehicle Emissions
[7] IDOT Traffic maps
[8] Current National Average
[9] Recent Average National Growth
[10] Discussions with UP and CN railroads
[11] Federal Railroad Administration – Office of Hazardous Materials Safety

These costs were not intended to be a comprehensive estimate of cost, but rather a means to compare the long-term costs of different alternatives. The costs do not include items that are common to all alternatives, such as street and track maintenance and train operations. The items included in the annual and rehabilitation cost comparison are:

- Crossing Maintenance
- Vehicle Delays
- Vehicle-Train Collisions
- Emissions
- Hazardous Material Spills
- Fuel
- Structure Rehabilitation
- Grade-Crossing Rehabilitation

Service life of 75 years was chosen since it is IDOT's standard design service life for some of the most costly components like the bridges, retaining walls and storm sewers for the trackwork, and grade separations. It is longer than the service life of some components such as track and shorter than the service life of other components like right-of-way (one-time cost). Rehabilitation costs account for the cost items that can recur over the service life such as replacement and rehabilitation of track crossing signals. The annual costs were escalated to account for inflation and anticipated increases from rail and vehicle traffic growth. The present value of the cost was computed using the discount rate. The estimated annual and rehabilitation costs for the various alternatives are shown in Table 3-7.

Table 3-7. Present Value of Annual and Rehabilitation Costs (Millions)

Alternative	Delays	Crashes	Emissions	Crossing Maintenance	Rehabilitation	HAZMAT Spills	Total
No-Build	$300	$89	$1.1	$26	$48	$0.9	$467
1A	$270	$96	$1	$26	$55	$0.9	$450
1B	$168	$83	$0.6	$25	$63	$0.9	$341
1C	$110	$42	$0.4	$23	$64	$0.9	$241
2A	$80	$18	$0.3	$20	$54	$0.9	$173
2B	$42	$5	$0.2	$12	$42	$0.9	$103

Alternatives 2A and 2B would have the lowest present value costs of the Tier 2 alternatives, primarily because of the reduced delay and accident costs.

3.4.4.2 Capital Cost

Capital costs for each alternative were estimated based on the required infrastructure improvements, including station improvements and grade separations included to accommodate increased freight and high-speed passenger traffic and are shown in Table 3-8. These costs consist of construction, right-of-way, engineering and utility relocation. Construction quantities were computed for each of the major items of construction, and average unit prices were applied to these quantities. An appropriate contingency was added along with engineering costs. Land acquisition costs were based on assessed values and include appraisal, preparation of documents, condemnation and relocation costs.

Table 3-8. Capital Cost for Each Alternative

Double Track 3rd Street Alternatives			
Work Item	Alternative 1A	Alternative 1B	Alternative 1C
3rd Street Track Work	**$33,000,000**	**$33,000,000**	**$33,000,000**
Non-Recoverable 2004 Record of Decision (ROD) Costs	**0**	**0**	**0**
Station Improvements (not including ROD)	**$19,000,000**	**$19,000,000**	**$19,000,000**
Bridge Replacement			
Bridge at Capitol Street	$5,300,000	$5,300,000	$5,300,000
Bridge at Dodge Street	$4,200,000	$4,200,000	$4,200,000
Bridge at 9th Street	$8,800,000	$8,800,000	$8,800,000
Total	**$18,300,000**	**$18,300,000**	**$18,300,000**
3rd Street Grade Separations			
Ash Street Underpass at 3rd Street		$14,700,000	$14,700,000
South Grand Overpass at 3rd Street		$23,000,000	$23,000,000
South Grand Underpass at 3rd Street			

Jefferson Street Overpass at 3rd Street	$22,700,000	$22,700,000	$22,700,000
Jefferson Street Underpass at 3rd Street t			
Madison Street Overpass at 3rd Street		$22,500,000	$22,500,000
Madison Street Underpass at 3rd Street			
Carpenter Overpass at 3rd Street		$22,100,000	$22,100,000
Carpenter Underpass at 3rd Street			
5th Street Underpass at 3rd Street		$14,800,000	$14,800,000
6th Street Overpass at 3rd Street		$47,600,000	$47,600,000
6th Street Underpass at 3rd Street			
Total	**$22,700,000**	**$167,400,000**	**$167,400,000**
10th and 19th Street Grade Separations			
Ash Street Underpass at 10th Street			$17,800,000
Jefferson Street Underpass at 10th Street			$14,200,000
Madison Street Underpass at 10th Street			$14,500,000
Carpenter Street Underpass at 10th Street			$15,100,000
North Grand Overpass at NS (North Align)			$18,400,000
Ash Street Underpass at 19th Street			$ 8,600,000
South Grand Underpass at 19th Street			$9,500,000
Total			**$98,100,000**
UP At-Grade Crossings (Quiet Zone)	**$19,800,000**	**$13,700,000**	**$13,700,000**
NS At-Grade Crossings (Quiet Zone)			**$14,900,000.00**
CN At-Grade Crossings (Quiet Zone)			**$13,200,000.00**
GRAND TOTAL	**$113,000,000**	**$251,000,000**	**$377,000,000**

Shift UP to 10th Street Alternative		
Work Item	**Alternative 2A**	**Alternative 2B**
10th Street Track Work	**$88,200,000**	**$88,200,000**
Non-Recoverable ROD Cost	**0**	**0**
Station Improvements	**$21,000,000**	**$21,000,000**
Bridge Replacement		
5th Street Underpass at 10th Street	$11,300,000	$11,300,000
6th Street Underpass at 10th Street	$10,600,000	$10,600,000
South Grand Underpass at 10th Street	$5,800,000	$5,800,000
Cook Street Underpass at 10th Street	$7,000,000	$7,000,000
Sangamon Underpass at UP		
Total	**$34,700,000**	**$34,700,000**
Grade Separations		
Laurel Street Underpass at 10th Street	$13,200,000	$13,200,000
Ash Street Underpass at 10th Street	$17,800,000	$17,800,000

Monroe Street Underpass at 10th Street		$14,700,000
Washington Street Underpass at 10th Street		$15,900,000
Jefferson Street Underpass at 10th Street	$14,200,000	$14,200,000
Madison Street Underpass at 10th Street	$14,500,000	$14,500,000
Carpenter Street Underpass at 10th Street	$15,100,000	$15,100,000
North Grand Underpass at UP (North Align)	$14,000,000	$14,000,000
North Grand Overpass at NS (North Align)	$18,400,000	$18,400,000
Ash Street Underpass at 19th Street	$8,600,000	$8,600,000
South Grand Underpass at 19th Street	$9,500,000	$9,500,000
Total	**$125,300,000**	**$155,900,000**
UP/NS At-Grade Crossings (Quiet Zone)	**$14,900,000**	**$7,600,000**
CN At-Grade Crossings (Quiet Zone)	**$13,700,000**	**$13,700,000**
New NS Yard	**$17,300,000**	**$17,300,000**
GRAND TOTAL	**$315,000,000**	**$338,000,000**

Costs include engineering, land acquisition, and construction in 2010 dollars.

3.4.5 Operational Issues

At-grade street crossings provide conflict points for rail traffic, increasing safety concerns, and vehicle delays. Minimizing these conflicts benefits both street and rail users. The number of at-grade street crossings for each alternative is shown in Table 3-3. Alternatives 2A and 2B would have the fewest crossings. Grade separations require the maintenance of bridges. The number of new grade separations for each alternative is shown in Table 3-9. Alternative 1C has the most grade separations.

Table 3-9. Number of At-Grade Street Crossings and New Grade Separations

Alternative	Number of At-Grade Street Crossings	Number of New Grade Separations
No-Build	68	0
1A	67	1
1B	60	8
1C	52	16
2A	32	10
2B	28	12

There are no other operational differences among the Build Alternatives. The operational issues associated with the No-Build are explained in Volume I of the Tier 1 Final EIS and are primarily related to insufficient capacity for the total freight and high-speed rail traffic on the one existing track in the UP's 3rd Street corridor.

3.4.6 Right-of-Way Required

Additional right-of-way would be required for all of the alternatives, see Table 3-10. Alternatives 1A, 1B, and 1C would require the least new right-of-way of the Build Alternatives.

Table 3-10. Additional Right-of-Way

Alternative	Right-of-Way Required (acres)
No-Build	0
1A	6.0
1B	13.7
1C	21.6
2A	42.0
2B	42.6

Right-of-way requirements are higher for Alternatives 2A and 2B because of the need to acquire property for the new UP corridor parallel to the existing NS corridor.

3.4.7 Impacts to Social and Economic Resources

The residential and commercial displacements associated with each alternative are shown in Table 3-11. The parcels with changes to current access are also listed. In most cases, this involves the loss of one of multiple access points to the property. The number of displacements includes properties that lost all access points.

Table 3-11. Displacements and Access Changes

Alternative	Displacements		Parcels with Access Changes	Total
	Residential	Commercial		
No-Build	0	0	0	0
1A	36	4	135	175
1B	102	31	219	352
1C	162	42	248	452
2A	117	53	28	198
2B	117	56	40	213

Alternatives 1B and 1C would have the largest number of displacements and parcels with changes in access. Alternative 1A would have the fewest. Alternatives 2A and 2B would have similar numbers of displacements and Alternative 2B has more parcels with a change in access than 2A.

Alternatives 1A and 1B would not address the issues of neighborhood connectivity and access to critical community buildings along the 10th Street and 19th Street corridors since they do not include any new grade separations in these corridors.

Important community buildings, such as fire, ambulance, police, and medical facilities exist along each of the corridors, primarily along 3rd Street and 10th Street. Rail traffic frequently blocks neighborhood access to these facilities which in some instances, such as schools, are present to primarily serve that neighborhood. As stated in the purpose and need, the number of these facilities along the 3rd Street and 10th Street corridors are:

3rd Street (1A, 1B, 1C) -	96
10th Street (2A, 2B) -	50
Total	146

Alternatives 1A, 1B, and 1C would maintain rail traffic along both the 3rd Street and 10th Street corridors so that all 146 of these facilities remain affected. Alternatives 2A and 2B would reduce the number of facilities affected by rail traffic to 50 along 10th Street.

3.4.8 Tier 2 Screening Results

The results of the Tier 2 screening process are summarized in Table 3-12.

The Tier 2 screening eliminated the following alternatives:

- Alternatives 1A and 1B were not reasonable because of their high annual and rehabilitation costs, and high train horn duration. They did not effectively meet the project purpose and need as measured by vehicle-train crashes and vehicle delay. They also had the highest community and neighborhood impacts and, as shown in Volume I of the Tier 1 Final EIS Section 3.3.5.2, most affected the environmental justice communities. These alternatives also were not effective in addressing pedestrian safety concerns along 3rd Street. Alternative 1B had the second highest number of displacements and parcels with access changes.

- Alternative 1C was not reasonable because of its high number of at-grade street crossings, high capital costs, its large number of displacements and changes in access, and it did not have any benefits in safety or reduction in vehicle delay compared to Alternative 2A or 2B. It also had a high number of community and environmental justice impacts. It had the highest total number of displacements and parcels with access changes. This alternative also had higher present value costs than Alternative 2A or 2B.

Since these were found not to be reasonable in the screening process, they are not considered further in this Final EIS; they are not assessed in detail in Chapter 5 of this Final EIS.

3.5 Alternatives Carried Forward for Detailed Study

Alternatives 2A and 2B are the alternatives brought forward and analyzed in detail in the Final EIS since they achieve the project purpose and need while minimizing capital and present value costs and impacts to social resources. These alternatives best meet the project purpose and need by minimizing at-grade street crossings and the predicted car/train crashes. They also are effective in reducing vehicle delays. Normal train horn blowing would be eliminated by these alternatives and they have the lowest annual and rehabilitation costs. Both of these alternatives eliminate rail traffic from downtown, the Medical District and the neighborhoods along 3rd Street. They reduce the barrier effect of the 10th Street and 19th Street corridors by building new grade separations in both rail corridors.

3.6 Preferred Alternative

Alternative 2A has been identified as the Preferred Alternative based on the following comparison of Alternatives 2A and 2B.

Purpose and Need

Alternative 2B would have lower delays, crash rates, and present value costs, but this results primarily from constructing new grade separations at Monroe and Washington streets and closing Capitol Avenue and Enos Street. The grade separations both have a benefit/cost ratio much less than 1.0. The grade separations and street closures create undesirable access and adverse travel issues as discussed in Section 5.2.3.1 and 5.2.3.2.

There are no differences between the alternatives with respect to track capacity, livability, and commercial activity or downtown and Medical District Division.

Impacts

Alternative 2B would require more right-of-way acquisition, and would result in more commercial displacements and more parcels with a change in access.

Alternative 2B changes the access to the Great Western Railroad Depot due to the construction of an underpass grade separation along Monroe Street.

There are no other anticipated differences between the impacts for Alternatives 2A and 2B including environmental justice concerns, Section 4(f) properties, noise, or vibrations impacts.

Cost

Alternative 2A would have lower capital cost than Alternative 2B.

Description

Alternative 2A consists of relocating the existing UP freight and passenger rail corridor to a new location parallel to the NS tracks on 10th Street. The improvement consists of constructing two UP tracks at 20 foot centers in a 75 foot right-of-way. The NS right-of-way would be 65 feet wide with one main track and provision for a future track at 15 feet from the main track. The existing underpasses at Cook Street, South Grand Avenue, 5th Street, and 6th Street would remain and be modified as necessary to accommodate the new track.

New grade separations would be constructed at the following locations:

- Ash at 10th (underpass)
- Laurel at 10th (underpass)
- Madison at 10th (underpass)
- Jefferson at 10th (underpass)

- Carpenter at 10th (underpass)
- North Grand at new UP track (underpass)
- North Grand at NS (overpass)
- Ash at CN (19th Street) (underpass)
- South Grand at CN (19th Street) (underpass)

The existing rail crossings would be closed at 10th Street and:

- Jackson
- Adams
- Reynolds
- Miller
- Enterprise

Streets would be closed at the following locations:

- Princeton at 6th
- 9th at Ash
- 10 ½ at Ash
- 9th at Laurel
- 10 ½ at Laurel
- Division at new UP
- Reservoir at new UP
- 10th at North Grand
- Michigan at North Grand
- Wirt at Ash
- McCreery at South Grand

Improvements would be made to the remaining at-grade crossings to allow implementation of quiet zones on the CN, UP, and NS rail corridors in the project area.

The new rail passenger station would be located adjacent to the 10th Street rail corridor north of Adams Street. The cost and impacts for the station are included with the overall project. The existing NS rail yard would be purchased. Costs are included in overall project costs.

Rail traffic would be eliminated from the existing UP corridor from north of Ridgely Avenue to south of Iles Avenue. Portions of Ridgely Avenue, Factory Street, Iles Avenue, and Burton Drive would be realigned to accommodate the track improvements.

Summary

Alternative 2A has been identified as the Preferred Alternative because it achieves the project purpose and need at a lower capital cost and with fewer impacts than Alternative 2B.

Table 3-12. Summary of Springfield Tier 2 Screening

Alternative Carried Forward | Alternative Eliminated | Primary or Secondary Reason for Elimination

Evaluation Criteria	No-Build	1A	1B	1C	2A	2B
Improve Safety						
Predicted Vehicle-Train Crashes per year (2030)	1.3	1.42	1.31	0.58	0.26	0.08
Number of At-Grade Highway Crossings	68	67	60	52	32	28
Minimize Capital and Maintenance Costs						
Capital Cost ($M)	0	118	259	387	329	368
Minimize Impacts to Existing and Planned Development						
Right-of-way Impacts (ac)	0	6	13.7	21.6	42	42.6
Reduce Vehicle Traffic Delay						
Delay (veh-min per day) (2030)	47,500	45,900	28,500	18,900	13,500	7,100
Improve Liveability and Commercial Activity						
Predicted Horn Blowing Duration (min/day)	314	151	151	0	0	0
Minimize Annual & Present Value Cost						
Annual & Present Value Cost ($M)	467	450	341	241	174	104
Minimize Impacts to Social Resources						
Relocations and Changes in Access	0	175	352	452	186	205

Least Favorable — Most Favorable