Section 3

ALTERNATIVES

3.0 Alternatives

The Springfield Rail Improvements Project Build Alternatives would utilize different routes. 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. The existing Amtrak service will be improved with 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) FRA and FHWA, 2003) and 2011 FONSI (Joliet to Dwight improvements) (FRA).

This chapter describes the alternatives considered in detail and the screening process used to identify reasonable alternatives carried forward for further analyses. The screening process compared each of the alternatives using screening criteria developed by IDOT and the FRA from the purpose and need. In Chapter 2 of this volume, Purpose and Need, a series of goals and objectives were established. Specific measures were used as screening criteria to compare the alternatives for each of the stated objectives. The criteria are stated in Section 3.1 and a comparison of the alternatives is included in Section 3.2 and 3.3.

3.1 Tier 2 Alternatives Screening Process

3.1.1 Tier 2 Screening and Selection Process

The purpose of the screening process is to identify the set of reasonable alternatives for full evaluation for the Springfield Improvements Project. IDOT and FRA developed a set of screening criteria was developed specifically for this project. The screening criteria were applied to the project alternatives to determine if any of the identified alternatives had any fatal flaws or would result in disproportionate impacts or costs. The screening criteria were developed based on the following:

- the purpose and need of the 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 Tier 2 screening objectives and their corresponding criteria, as well as the units or methodology that were 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) were evaluated through the Tier 2 screening to the same level of engineering and environmental study. 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 engineering detail and a greater level of environmental information. Some of the screening criteria from Tier 1 are not included in Tier 2, because for those criteria additional information is not necessary or relevant at the Tier 2 level. Additionally, screening criteria have been added to address the additional 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.

Screening based on railroad operational criteria is included in Tier 1. There are no operational differences among the Tier 2 Build Alternatives. The operational issues associated with the No-Build Alternatives are primarily issues related to operating on a single track in the UP corridor and are discussed in the Tier 1 Draft EIS (Volume 1, Section 3).

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.

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	• **Lifecycle 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**.

3.1.1.1 Safety

Annual vehicle/train accidents, including injuries and fatalities, for each grade crossing were predicted for each alternative 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.

3.1.1.2 Congestion

Daily traffic delays at grade crossings were computed for future conditions for all alternatives.

3.1.1.3 Improve Livability and Commercial Activity

The amount of time that train horns blow at grade crossings was computed for future conditions for all alternatives.

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 Lifecycle and Capital Costs

Capital costs were computed for each alternative. Capital Costs are for design, land acquisition and construction. They do not include operations and maintenance costs. A lifecycle cost analysis using USDOT procedures and analysis inputs (OMB Circular No. A-94; EPA Publication EPA 420; DOT 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 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 U.S. Department of Transportation. 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/year, 3.0 percent/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/year) and anticipated project life.

3.1.1.5 Operational Issues

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

The operational issues associated with the No-Build include insufficient capacity on the single track for UP's anticipated freight trains plus the proposed passenger trains, the inability to accommodate meets and passes in Springfield on the single track, and the inability to board northbound and southbound passenger trains simultaneously. These issues are presented in more detail in Tier 1 Draft EIS.

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

Anticipated right-of-way impacts 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 social and economic impacts.

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

3.2 No Action – 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) (see Volume 1 Section 3.2). No additional grade separations would be constructed. Quad gate 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 Action – Build Alternatives

The Alternatives Considered for the Chicago to St. Louis High Speed Rail Project are described in Section 3.3 of Volume I. Additional detail regarding the elimination of alternatives is described in the Tier 1 document. The analysis in Tier 1 eliminates the following Springfield build alternatives (the alternatives are described in Section 3.3.5.1 of Volume 1):

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

Screening and elimination of these alternatives is included in Section 3.3.5.2 of Volume 1.

The following Build Alternatives were retained for Tier 2 analysis.

3.3.1 Alternative 1

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

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

From approximately Monroe Street to south of Laurel Street the existing UP right-of-way is approximately 30 feet wide. Two tracks at 13 feet – 6 inches 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 – 0 inches in general and 9 feet – 0 inches for poles. The UP requirement is 9 feet – 0 inches. There is insufficient width within the existing right-of-way to provide these clearances.

Since 3rd Street exists on both sides of the track in most of this segment, there are vehicles and pedestrians immediately adjacent to the narrow railroad right-of-way. There are also numerous residences and businesses that front directly onto 3rd Street. This situation does not exist in the 10th Street corridor.

The City of Springfield requested that a concrete barrier and chain link fence be constructed on both sides of the UP track in this corridor to prevent vehicle and pedestrian encroachment onto the UP single residences and businesses front directly on 3rd Street. To provide the minimum clearances listed above 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 for over a mile of track could complicate UP track maintenance.
- Third Street would be reduced to an unacceptable width.

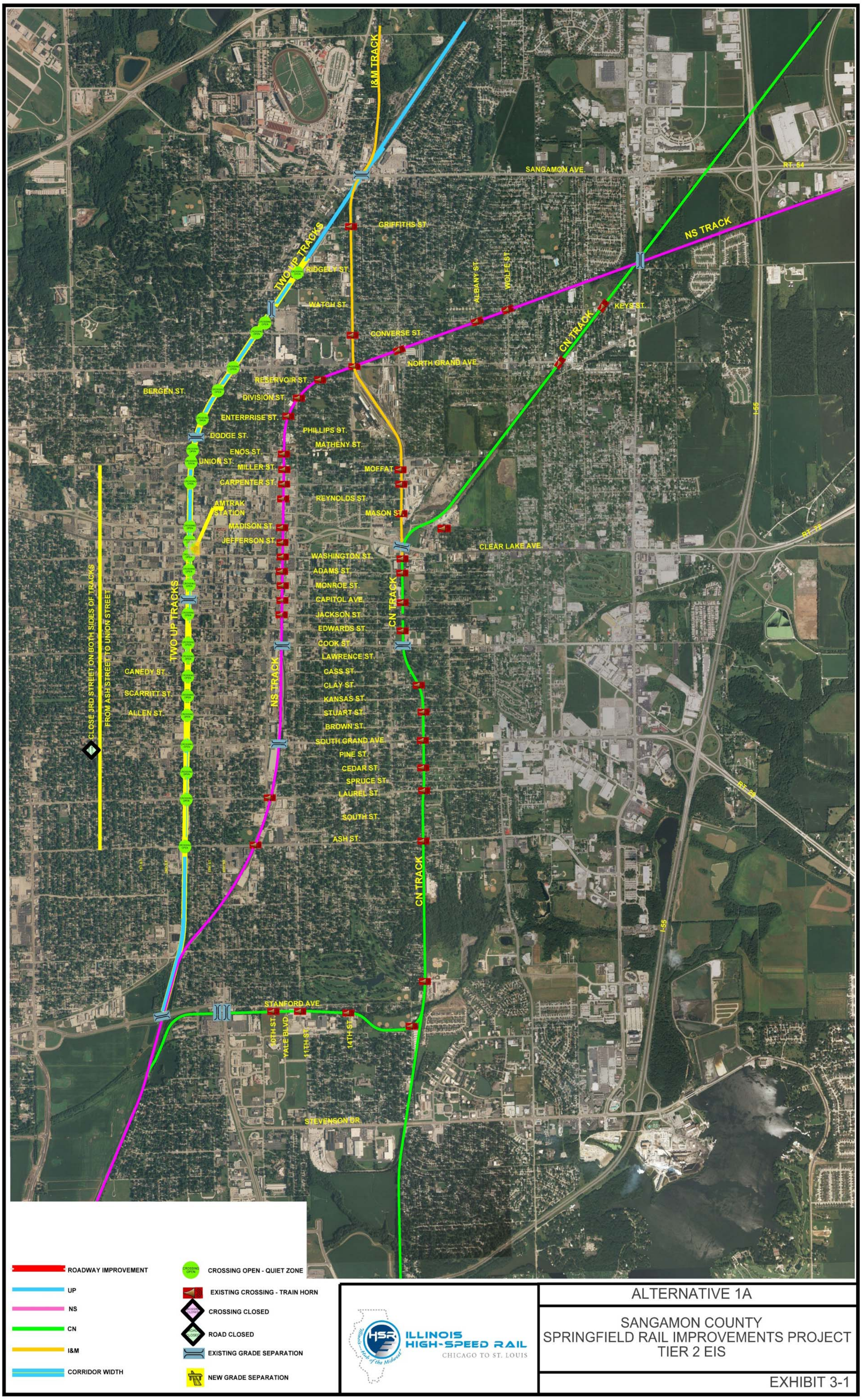

Exhibit 3-1. Alternative 1A

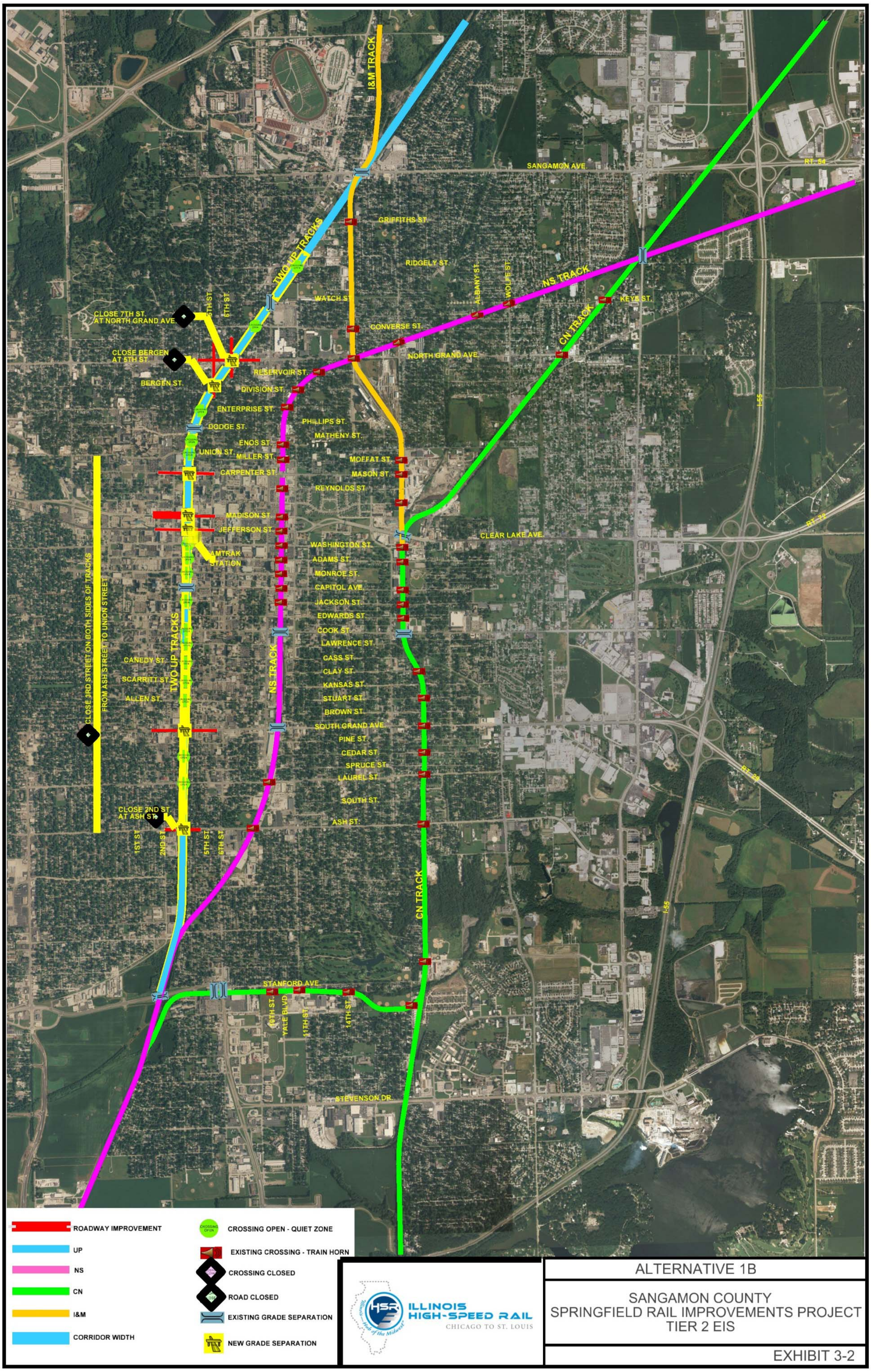

Exhibit 3-2. Alternative 1B

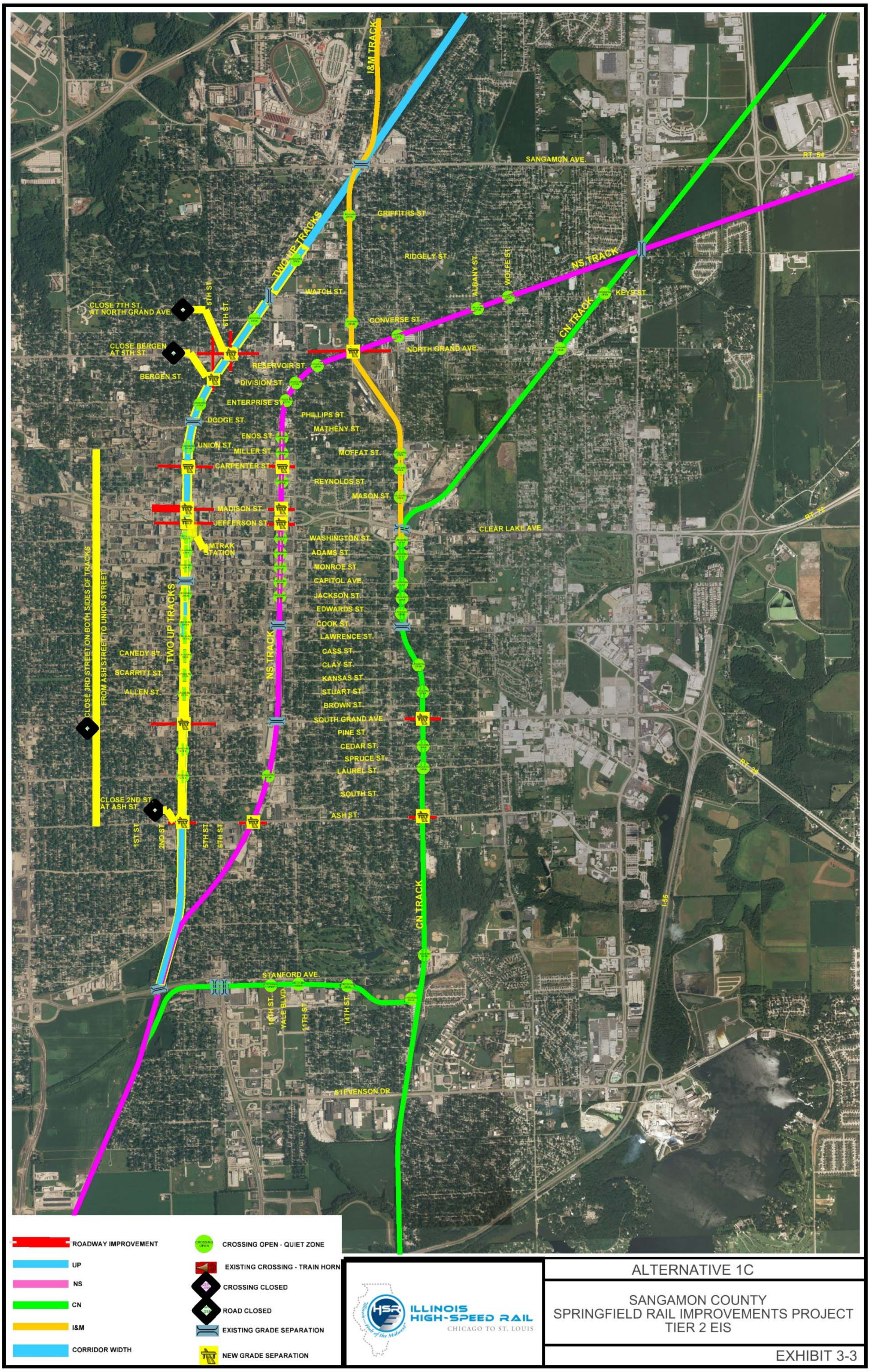

Exhibit 3-3. Alternative 1C

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

- The barrier and fence on both sides of the track could trap trespassers with no easily accessible escape route or place of refuge.

- Each of the cross streets' crossing signals and gates would need to be installed. 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.

In order to resolve these issues 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.

- 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 adjacent to the track at cross streets.

- Closing 3rd Street would not result in a noticeable increase in traffic on any other streets.

The passenger station along 3rd Street for Alternatives 1A, 1B and 1C would be at the site of the existing Amtrak Station and on 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 Street.

3.3.2 Alternative 2

Alternative 2 – Relocate UP freight and passenger (HSR) traffic to the 10th Street corridor. This alternative includes two subalternatives, each of which includes an alternative specific combination of grade separations and grade crossing closures. (See Table 3-2).

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

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

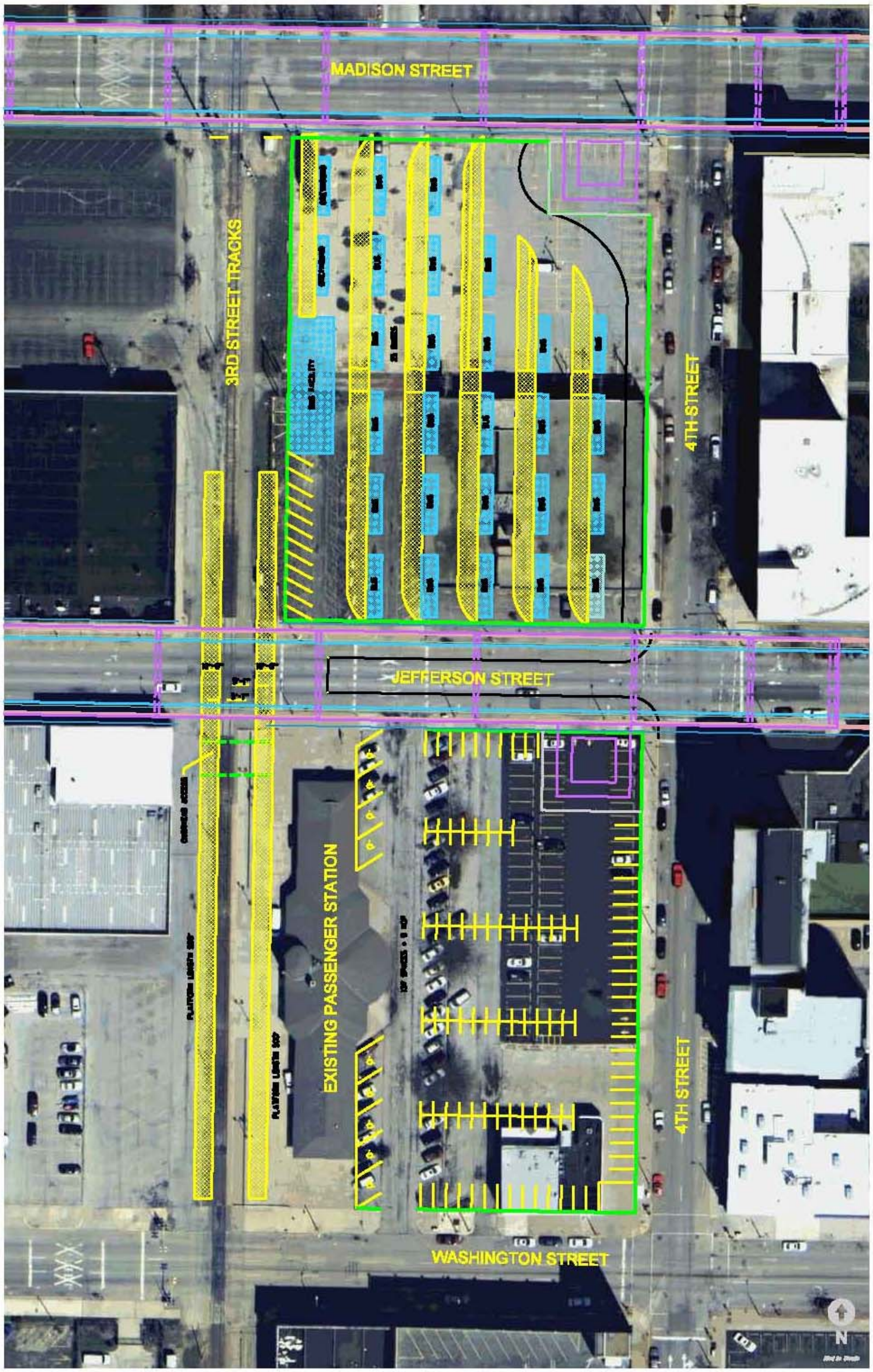

Exhibit 3-4. Passenger Station on 3rd Street

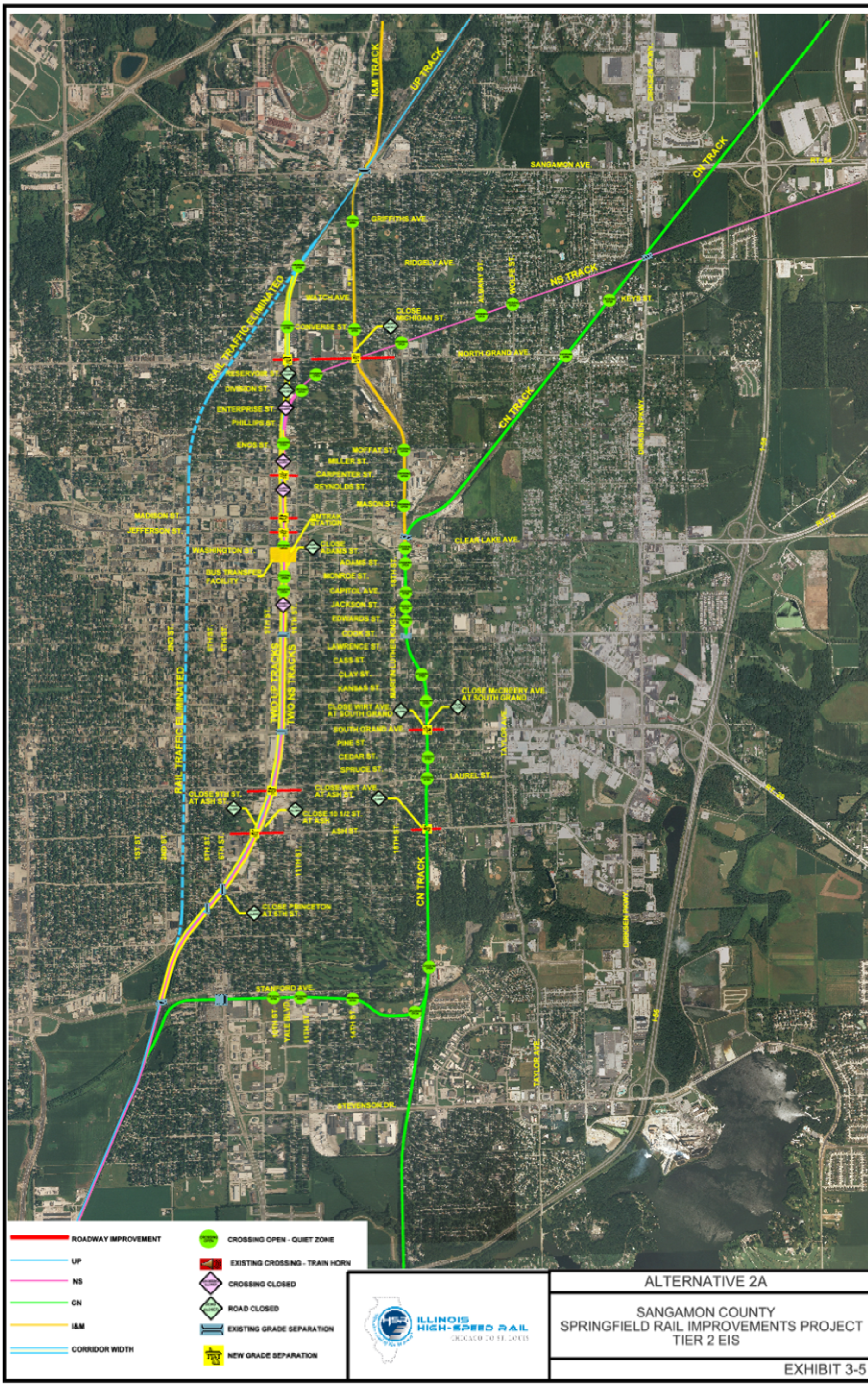

Exhibit 3-5. Alternative 2A

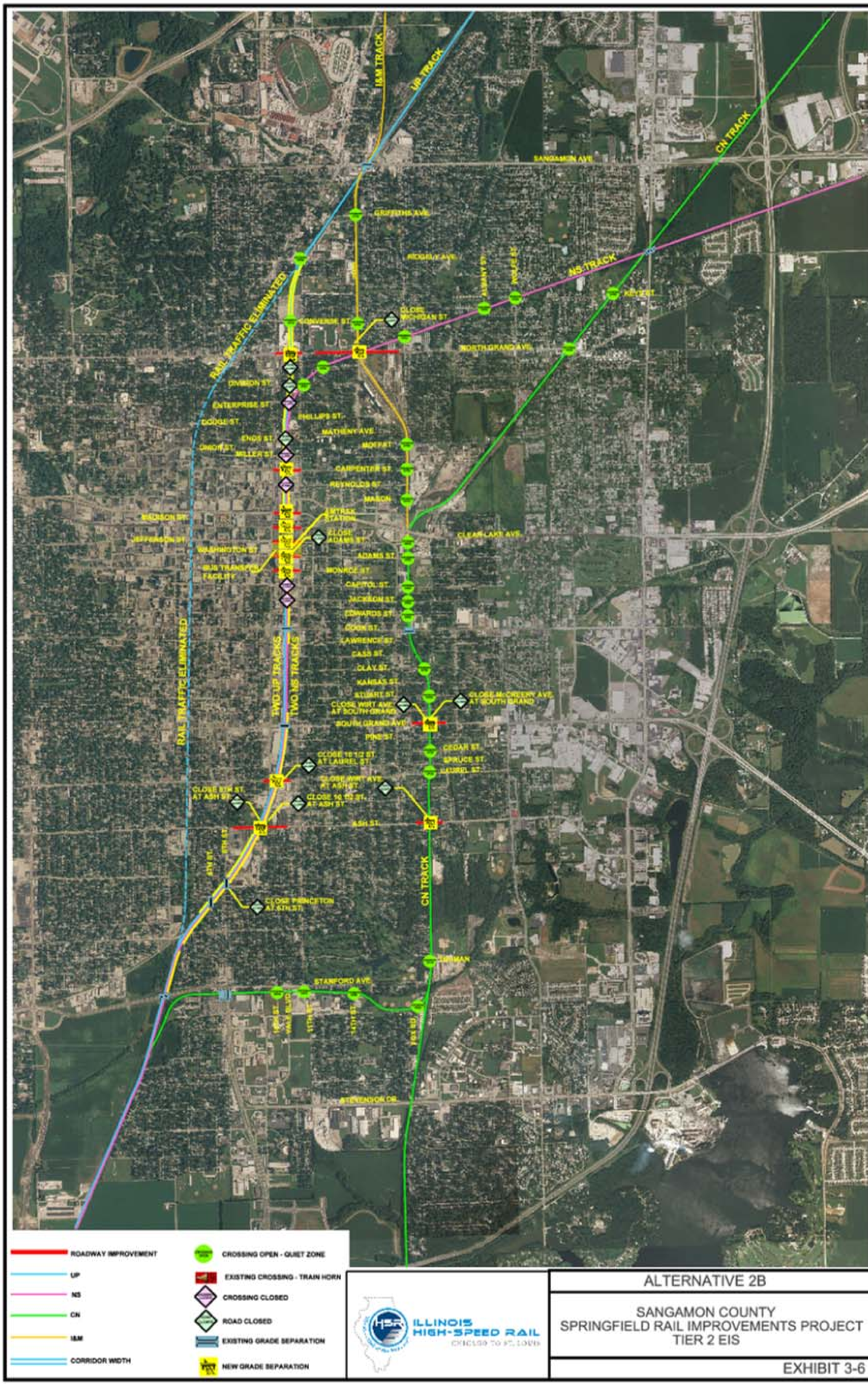

Exhibit 3-6. Alternative 2B

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.

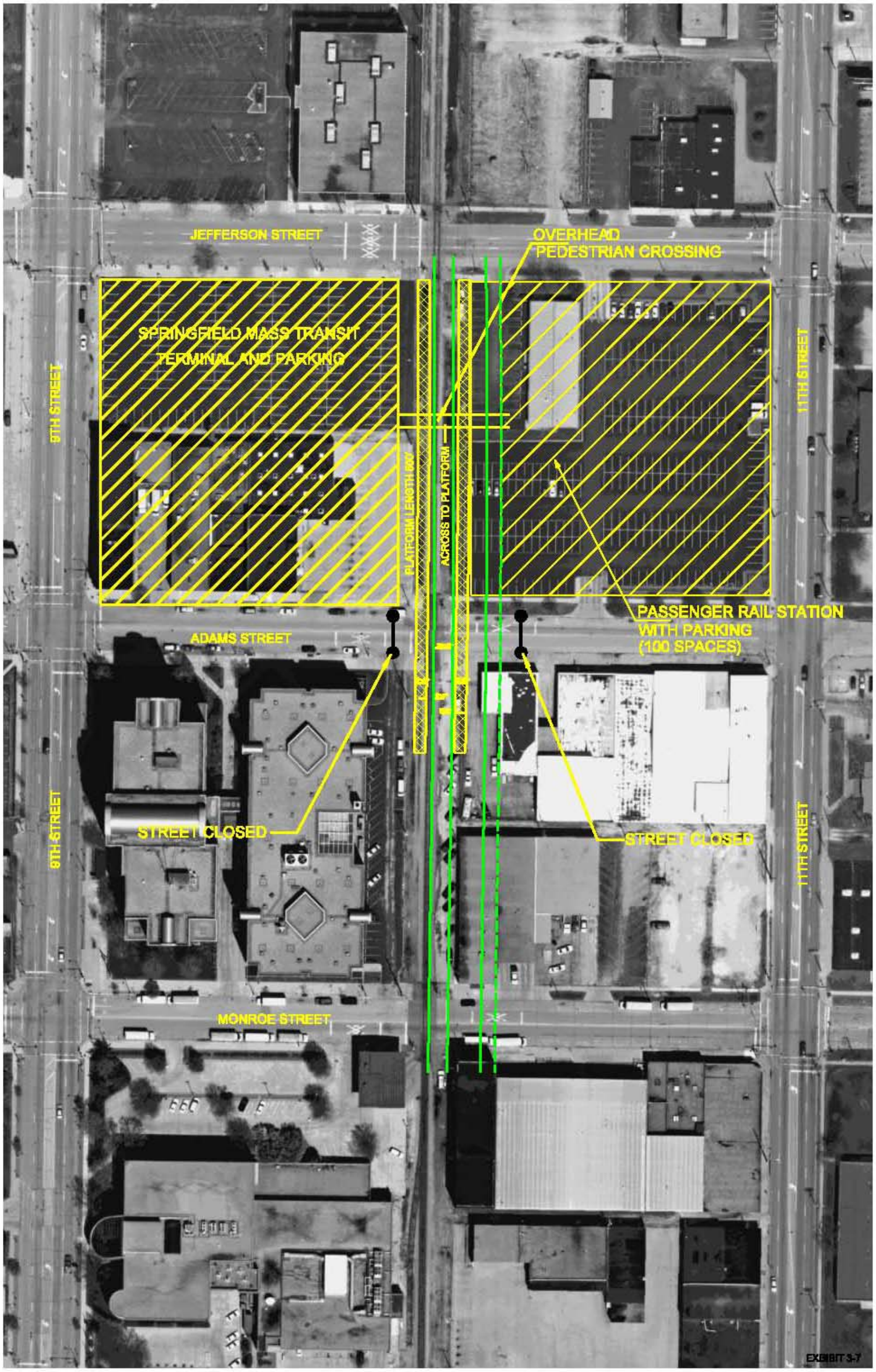

Exhibit 3-7. Passenger Station on 10th Street

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. The No-Build Alternative includes 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.

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) have the lowest projected number of crashes. Simply building more grade separations without consolidating (Alternatives 1B and 1C) is not as effective as consolidating and building grade separations (2A and 2B). Alternatives 1A, 1B and 1C would fence the UP right-of-way only, leaving the NS and CN corridors subject to existing level of trespass. Alternatives 2A and 2B would fence both of the City's remaining north-south corridors, reducing trespass opportunities throughout the City.

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.

3.4.2 Congestion

As with safety, the alternatives that consolidate corridors and provide grade separations at busy streets are most effective at reducing vehicle congestion resulting from trains blocking crossings. With three north-south rail corridors and limited grade separations, Springfield east-west streets are vulnerable to frequent delays because of 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 veh-min per day (2030)
No-Build	47,500
1A	45,900
1B	28,500
1C	18,900
2A	13,500
2B	7,100

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

Alternatives 1C, 2A and 2B would result in fully grade separating Carpenter Street, Madison Street, Jefferson Street, Ash Street and South Grand Avenue, five of the busiest east-west arterials in the City. 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 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 the city. 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 min/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

The City of Springfield has a long-held goal to eliminate rail traffic on 3rd Street and to consolidate rail traffic on 10th Street (see *Springfield Railroad Consolidation Study*, 2005; and *The 10th Street Solution*, 2011). The 3rd Street (UP) and 19th Street (CN) corridors are the most residential of the three corridors in the City; the 10th Street (NS) 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. The City'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 the City'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 heart of the Medical District. These alternatives also do not reduce the number of rail corridor barriers that divide the City. These alternatives leave rail traffic on the 3rd Street corridor which has a higher concentration of critical community facilities than the 10th Street Corridor.

Alternatives 2A and 2B eliminate rail traffic from downtown and shift it away from the center of the Medical District. These alternatives eliminate 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 Lifecycle and Capital Costs

3.4.4.1 Annual and Lifecycle Costs

Annual and lifecycle 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 the lifecycle analysis length extends past 2030.

Table 3-6. Annual and Lifecycle Cost Assumptions

Annual and Lifecycle Costs		Footnote Reference
Lifecycle Length	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 lifecycle cost comparison are:

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

Lifecycle length of 75 years was chosen since it is a standard service life for some of the most costly components like the 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. Rehabilitation costs account for the extension cost items that can recur over the lifecycle length such as 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 lifecycle costs for the various alternatives are shown in Table 3-7.

Table 3-7. Present Value of Annual and Lifecycle 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 have the lowest lifecycle 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 necessary to accommodate increased freight and high-speed passenger traffic and are shown in Table 3-8. These costs include construction, right-of-way, engineering and utility relocations. 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.

Table 3-8. Capital Cost for Each Alternative

Double Track Third Street Alternatives			
Work Item	Alternative 1A	Alternative 1B	Alternative 1C
Third Street Track Work	**$33,000,000**	**$33,000,000**	**$33,000,000**
Non-Recoverable ROD Costs	**0**	**0**	**0**
Station Improvements (not including ROD)	**$19,000,000**	**$19,000,000**	**$19,000,000**
Bridge Replacement			
Bridge at Capitol	$5,300,000	$5,300,000	$5,300,000
Bridge at Dodge	$4,200,000	$4,200,000	$4,200,000
Bridge at Ninth	$8,800,000	$8,800,000	$8,800,000
Total	**$18,300,000**	**$18,300,000**	**$18,300,000**
Third Street Grade Separations			
Ash Street Underpass at Third St		$14,700,000	$14,700,000
South Grand Overpass at Third St		$23,000,000	$23,000,000
South Grand Underpass at Third St			
Jefferson Street Overpass at Third St	$22,700,000	$22,700,000	$22,700,000
Jefferson Street Underpass at Third St			
Madison Street Overpass at Third St		$22,500,000	$22,500,000
Madison Street Underpass at Third St			
Carpenter Overpass at Third St		$22,100,000	$22,100,000
Carpenter Underpass at Third St			
Fifth Street Underpass at Third St		$14,800,000	$14,800,000
Sixth Street Overpass at Third St		$47,600,000	$47,600,000
Sixth Street Underpass at Third St			
Total	**$22,700,000**	**$167,400,000**	**$167,400,000**
Tenth and Nineteenth Street Grade Separations			
Ash Street Underpass at Tenth St			$17,800,000
Jefferson Street Underpass at Tenth St			$14,200,000
Madison Street Underpass at Tenth St			$14,500,000
Carpenter Street Underpass at Tenth St			$15,100,000
North Grand Overpass at NS (North Align)			$18,400,000
Ash Street Underpass at Nineteenth St			$ 8,600,000
South Grand Underpass at Nineteenth St			$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**
TOTAL	**$113,000,000**	**$251,000,000**	**$377,000,000**

Shift UP to Tenth Street Alternative		
Work Item	**Alternative 2A**	**Alternative 2B**
Track Improvements		
10th St North Alternative	$88,200,000	$88,200,000
Total	**$88,200,000**	**$88,200,000**
Non-Recoverable ROD Cost	**0**	**0**
Bridge Replacement		
Fifth Street Underpass at Tenth St	$11,300,000	$11,300,000
Sixth Street Underpass at Tenth St	$10,600,000	$10,600,000
South Grand Underpass at Tenth St	$5,800,000	$5,800,000
Cook Street Underpass at Tenth St.	$7,000,000	$7,000,000
Sangamon Underpass at UP		
Total	**$34,700,000**	**$34,700,000**
Station Improvements	**$21,000,000**	**$21,000,000**
Grade Separations		
Laurel Street Underpass at Tenth St	$13,200,000	$13,200,000
Ash Street Underpass at Tenth St	$17,800,000	$17,800,000
Monroe Street Underpass at Tenth St.		$14,700,000
Washington Street Underpass at Tenth		$15,900,000
Jefferson Street Underpass at Tenth St	$14,200,000	$14,200,000
Madison Street Underpass at Tenth St	$14,500,000	$14,500,000
Carpenter Street Underpass at Tenth St	$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 Nineteenth St	$8,600,000	$8,600,000
South Grand Underpass at Nineteenth St	$9,500,000	$9,500,000
Total	**$125,300,000**	**$155,900,000**
UP/NS At-Grade Crossing Improvements	**$14,900,000**	**$7,600,000**
CN At-Grade Crossing Improvements (Quiet Zone)	**$13,700,000**	**$13,700,000**
New NS Yard	**$17,300,000**	**$17,300,000**
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. Alternatives 1A, 1B and 1C have the most grade crossings of the Build Alternatives. 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 Existing At-Grade Street Crossings and 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 Tier 1 Draft 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 Impacts to Existing Development

Additional right-of-way is 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

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	108	49	29	186
2B	108	52	41	205

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

Alternatives 1A and 1B do 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.

Critical 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

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 are not reasonable because of their high annual and lifecycle costs, and high train horn duration. They do 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 1

Section 3.3.5.2, most affected environmental justice communities. These alternatives are also 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 present 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 lifecycle costs than Alternative 2A or 2B.

3.5 Alternatives Carried Forward

Alternatives 2A and 2B are the alternatives to be brought forward and analyzed in detail since they achieve the project purpose and need while minimizing capital and lifecycle costs and impacts to social resources. These alternatives 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 lifecycle 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 NS and CN corridors by building new grade separations in both rail corridors.

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 ($M)	0	118	259	387	329	368
	●	●	◕	◑	◑	◑
Minimize Impacts to Existing and Planned Development						
Right-of-way Impacts (ac)	0	6	13.7	21.6	42	42.6
	●	◕	◕	◕	◑	◑
Reduce Vehicle Traffic Delay						
Delay (veh-min per day) (2030)	47,500	45,900	28,500	18,900	13,500	7,100
	◔	○	◑	◕	◕	●
Improve Liveability and Commercial Activity						
Predicted Horn Blowing Duration (min/day)	314	151	151	0	0	0
	○	◑	◑	●	●	●
Minimize Annual & Lifecycle Cost						
Annual & Lifecycle Cost ($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