

Technical Memorandum #7 – Investment Options Development

Introduction

This Technical Memorandum presents the development of representative investment options for the Illinois High-Speed Rail Feasibility Study. The investment options define the range of infrastructure, systems, rolling stock, and supporting facilities required to implement high-speed rail service between Chicago and East St. Louis under the operating scenarios evaluated in the Service Plan.

Each investment option reflects the physical improvements necessary to support planned operating speeds, service frequency, and system reliability.

Investment options were developed at a feasibility level to identify major cost drivers, infrastructure requirements, and implementation complexity rather than to represent final engineering designs. This approach supports comparison of alternatives while recognizing that further refinement will occur in subsequent planning, design, and environmental review phases.

Capital Investments

Capital elements were defined using conceptual engineering assumptions, industry-standard unit cost frameworks, and peer project experience. Infrastructure improvements are organized in accordance with Federal Railroad Administration (FRA) Standard Cost Categories to ensure consistency and comparability. Table 1 presents the Standard Cost Categories.

Category	Category Description
10	TRACK STRUCTURES & TRACK
20	STATIONS, TERMINALS, INTERMODAL
30	SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.
40	SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS
50	COMMUNICATIONS & SIGNALING
60	ELECTRIC TRACTION
70	VEHICLES
80	PROFESSIONAL SERVICES
90	UNALLOCATED CONTINGENCY
100	FINANCE CHARGES

Table 1 - FRA Standard Cost Categories

Each category is described at a high level below.

Track Structures & Track

Track infrastructure represents the primary cost driver for all route options. Improvements include:

- New main track construction on new roadbed and embankment
- Elevated structures
- Undergrade bridges
- Highway barriers
- Security fencing

The extent of elevated structure versus at-grade construction varies by route and directly influences capital cost.

Stations, Terminals, Intermodal

Each proposed station is assumed to include new facilities sized to accommodate high-speed rail operations. Station costs include passenger buildings, platforms, vertical circulation elements, parking and access improvements, and associated mechanical and electrical systems. Station siting assumptions and access considerations are documented separately in Technical Memorandum #9 – Station Access Development.

Support Facilities: Yards, Shops, Admin. Bldgs.

Layover Facilities

Two layover facilities are assumed to support the operating plan, one in the Chicago area and one in the East St. Louis area. These facilities provide overnight train storage, daily inspections, light maintenance activities, interior servicing, and support for early morning departures. The number and location of layover facilities are consistent with the service assumptions described in Technical Memorandum #3 – Service Plan Development. Additional details are also provided in that technical memorandum.

Heavy Maintenance Facility

A centralized Heavy Maintenance Facility (HMF) is assumed in the East St. Louis area. The HMF supports periodic inspections, major component overhauls, system upgrades, and corrective maintenance activities beyond the scope of daily servicing. Additional information on heavy maintenance facilities can be found in Technical Memorandum #3 – Service Plan Development.

Sitework, Right of Way, Land, Existing Improvements

Right-of-way requirements are estimated at a feasibility level, assuming a nominal 100-foot corridor width for new alignments. Actual requirements will vary by route and will be refined in future design phases.

Communications & Signaling

The high-speed rail corridor is assumed to include a fully integrated signaling and communications system consistent with contemporary high-speed rail standards. This includes Automatic Train Control, a Wayside Protection System, and a fiber optic communications backbone. The signaling estimate incorporates wayside equipment, onboard systems, and central control software and hardware. The Wayside Protection System includes monitoring for intrusion, obstacles, flooding, wind, seismic activity, and equipment faults. The fiber optic backbone supports corridor-wide communication and operational control.

Electric Traction

The electric traction system includes traction power substations, overhead contact system infrastructure, traction power distribution systems, electric utility interconnection costs, and associated right-of-way modifications. Substation costs include site preparation, foundations, cable trenches, fencing, and electrical equipment.

Vehicles

The capital cost estimate includes procurement of twelve high-speed trainsets:

- Eight trainsets required for daily revenue service
- Two hot spares to maintain schedule reliability
- Two sets rotating through heavy maintenance

Unit costs reflect recent North American procurement experience for a high-speed trainset. The fleet size aligns with service plan assumptions and incorporates an appropriate spare ratio to support reliability and lifecycle maintenance needs.

Professional Services

Professional services are included as a percentage of construction cost and reflect typical industry benchmarks for feasibility-level planning:

- Environmental Planning - 3%
- Design Engineering - 10%
- Insurance - 2%
- Legal - 2%
- Program Management - 4%
- Construction Management - 6%
- Engineering services during construction - 2%
- Testing and Commissioning - 2%
- Noise Mitigation - 1%
- Hazardous waste - 1%
- Erosion control - 1%

These allowances are consistent with early-phase high-speed rail program development.

Allocated and Unallocated Contingency

Contingency costs are added as an overall percentage of the total construction cost. Contingencies are an allowance added to the estimate of costs to account for items and conditions that cannot be realistically anticipated. FRA identified “rules of thumb” for cost contingencies in their Capital Cost Estimating Guidance from 2016¹. These rules of thumb are presented in Figure 3.

¹ [160830 FRA RPD Capital Cost Estimating Guidance.pdf](#)

Cost Contingencies – Rules of Thumb

Milestones	Allocated	Unallocated	Total
Completion of Planning/Concept Design (15% Design)	25-35%	10-20%	35-55%
Completion of PE (30 – 60% Design)	20-30%	7-15%	27-45%
Completion of Final Design (preparing documents for bidding) Ready to procure / bid construction in DBB At partially bid: For work already bid For work ready to bid For work not yet ready	15-20% 10% 15% 25%	5-10%	20-30%
Start of Construction	10-15%	3-7%	13-22%
At 20% Construction Complete	7-10%	5%	12-15%
At 50% Construction Complete	5-7%	2-5%	7-12%

Figure 1 - FRA Cost Contingencies "Rules of Thumb"

Allocated contingency is applied to each cost category. Unallocated contingency is applied to the total of cost categories 10-70. Allocated and unallocated contingencies are shown in Table 2.

Category	Allocated Contingency	Unallocated Contingency
10 TRACK STRUCTURES & TRACK	40%	20%
20 STATIONS, TERMINALS AND INTERMODAL	40%	20%
30 SUPPORT FACILITIES, YARDS, SHOPS, ADMIN BLDGS	40%	20%
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	40%	20%
50 COMMUNICATIONS & SIGNALING	40%	20%
60 ELECTRIC TRACTION	40%	20%
70 VEHICLES	40%	0%
80 PROFESSIONAL SERVICES	0%	0%

Table 2 – FRA Cost Categories and Contingencies

Overall, allocated contingency is equal to 19% of the total capital cost and unallocated contingency is equal to 13% of the total capital cost, for a total of 32% contingency applied to the project capital costs. The contingency for this feasibility level will be reduced as the project advances into more detailed

engineering and conceptual uncertainties are investigated and resolved.

Finance Charges

Finance charges were not calculated for the IL HSR Feasibility Study. The estimates represent feasibility-level costs to design and construct each alternative and are intended to support comparative evaluation. Financing costs, including interest during construction and debt service, depend on the project's eventual funding and delivery strategy and will be evaluated during subsequent phases of project development once a preferred alternative and financing approach have been identified.

Quantity Development and Unit Cost Framework

Cost estimates were developed at a feasibility level using a combination of conceptual alignment development, CADD-based measurement, typical cross-section assumptions, and industry-standard unit cost benchmarks. The objective of this methodology for a feasibility-level study is to produce consistent and comparable estimates across route options rather than detailed capital costs.

Quantity Development

Feasibility-level conceptual designs were developed for each route and evaluated using CAD. Total route mileage was measured from terminal to terminal, and segments were categorized by construction type, including at-grade construction, retained fill, and elevated structure. River crossings and highway crossings were identified to inform structure assumptions.

Segment-level measurements were used to estimate total track miles, structure miles, and other infrastructure quantities required for cost development.

Interstate median route options assume a single-track alignment, while greenfield route options assume a double track alignment. Standard single- and double-track cross sections were applied consistently across both interstate median and greenfield route options to ensure comparability. Where routes follow interstate corridors, geometric constraints and median widths were considered in determining infrastructure requirements. Greenfield alignments were evaluated based on typical embankment and cut section assumptions appropriate for rural Illinois terrain.

Quantities for communications, signaling, and electrification systems were developed on a corridor-mile basis.

Unit Costs

Unit costs were developed using estimates from previous high-speed rail studies including the California High-Speed Rail project, Colorado Department of Transportation (CDOT) Interregional Connectivity Study (ICS), and Rocky Mountain Rail Authority Feasibility Study, as well as other conventional steel-wheel/steel-rail intercity passenger service planning and design projects throughout the Midwest. These unit costs were compared to costs from the California High-Speed Rail project that is currently under design and construction. A more detailed description of the cost estimating methodology can be found in Technical Memorandum #6 – Feasibility-Level Cost Estimating Methodology.

Feasibility-Level Costs

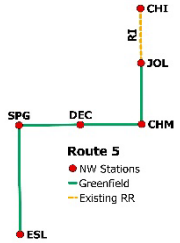
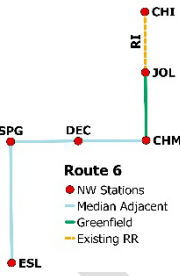
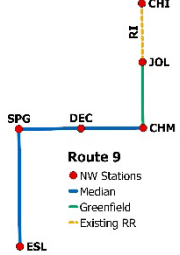
Table 2 presents the total feasibility-level costs (2025 dollars) by route. Costs range from:

- \$42 billion (Route 12 – Interstate Median and Greenfield via Champaign/Urbana and University Park)
- to
- \$67 billion (Route 8 – Greenfield via Peoria and Joliet)

Variations in total cost are primarily driven by the extent of elevated structures, the proportion of greenfield construction, right-of-way acquisition requirements, and total track mileage.

Detailed breakdowns by FRA Standard Cost Category are provided in Tables 3 through 13.

Route	Route Configuration	Total Capital Cost (\$2025, billions)
Route 1 – I-55 Corridor	Route 1 ● NW Stations — Median — Existing RR	\$55
Route 2 – Greenfield via Bloomington and Joliet	Route 2 ● NW Stations — Greenfield — Existing RR	\$59
Route 3 – I-57/I-72/I-55 Corridor	Route 3 ● NW Stations — Median — Existing RR	\$52
Route 4 – Greenfield via Champaign/Urbana and University Park	Route 4 ● NW Stations — Greenfield — Existing RR	\$46

Route 5 – Greenfield and County Road via Champaign/Urbana and Joliet		\$57
Route 6 – Interstate Adjacent and County Road via Champaign/Urbana and Joliet		\$66
Route 7 – I-55/I-155/I-74 Corridor		\$56
Route 8 – Greenfield via Peoria and Joliet		\$67
Route 9 – Interstate Median and County Road via Champaign/Urbana and Joliet		\$56

Route 10 – Interstate Median and Greenfield via Champaign/Urbana and University Park	Route 10 - NW Stations - Median - Greenfield - Existing RR	\$45
Route 11 – Interstate Median and Greenfield/County Road via Champaign/Urbana and Joliet	Route 11 - NW Stations - Median - Greenfield - Existing RR	\$52
Route 12 – Interstate Median and Greenfield via Champaign/Urbana and University Park	Route 12 - NW Stations - Median - Greenfield - Existing RR	\$42

Table 3 - Total Capital Costs by Route Option

Route 1 – I-55 Corridor

Route 1 feasibility-level capital costs are presented in Table 3.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$19
20 STATIONS, TERMINALS, INTERMODAL	\$4
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$2
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$11
90 UNALLOCATED CONTINGENCY	\$7
TOTAL CAPITAL COST	\$55

Table 4 - Route 1 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 2 – Greenfield via Bloomington and Joliet

Route 2 feasibility-level capital costs are presented in Table 4.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$23
20 STATIONS, TERMINALS, INTERMODAL	\$4
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$1
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$12
90 UNALLOCATED CONTINGENCY	\$7
TOTAL CAPITAL COST	\$59

Table 5 - Route 2 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 3 – I-57/I-72/I-55 Corridor

Route 3 feasibility-level capital costs are presented in Table 5.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$15
20 STATIONS, TERMINALS, INTERMODAL	\$5
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$3
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$11
90 UNALLOCATED CONTINGENCY	\$6
TOTAL CAPITAL COST	\$52

Table 6 - Route 3 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 4 – Greenfield via Champaign/Urbana and University Park

Route 4 feasibility-level capital costs are presented in Table 6.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$11
20 STATIONS, TERMINALS, INTERMODAL	\$5
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$3
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$9
90 UNALLOCATED CONTINGENCY	\$6
TOTAL CAPITAL COST	\$46

Table 7 - Route 4 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 5 – Greenfield and County Road via Champaign/Urbana and Joliet

Route 5 feasibility-level capital costs are presented in Table 7.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$18
20 STATIONS, TERMINALS, INTERMODAL	\$5
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$3
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$12
90 UNALLOCATED CONTINGENCY	\$7
TOTAL CAPITAL COST	\$57

Table 8 - Route 5 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 6 – Interstate Adjacent and County Road via Champaign/Urbana and Joliet

Route 6 feasibility-level capital costs are presented in Table 8.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$25
20 STATIONS, TERMINALS, INTERMODAL	\$5
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$2
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$13
90 UNALLOCATED CONTINGENCY	\$8
TOTAL CAPITAL COST	\$66

Table 9 - Route 6 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 7 – I-55/I-155/I-74 Corridor

Route 7 feasibility-level capital costs are presented in Table 9.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$18
20 STATIONS, TERMINALS, INTERMODAL	\$5
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$2
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$11
90 UNALLOCATED CONTINGENCY	\$7
TOTAL CAPITAL COST	\$56

Table 10 - Route 7 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 8 – Greenfield via Peoria and Joliet

Route 8 feasibility-level capital costs are presented in Table 10.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$24
20 STATIONS, TERMINALS, INTERMODAL	\$5
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$1
50 COMMUNICATIONS & SIGNALING	\$4
60 ELECTRIC TRACTION	\$8
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$14
90 UNALLOCATED CONTINGENCY	\$8
TOTAL CAPITAL COST	\$67

Table 11 - Route 8 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 9 – Interstate Median and County Road via Champaign/Urbana and Joliet

Route 9 feasibility-level capital costs are presented in Table 11.

FRA STANDARD COST CATEGORY	Capital Costs, (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$18
20 STATIONS, TERMINALS, INTERMODAL	\$5
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$2
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$11
90 UNALLOCATED CONTINGENCY	\$7
TOTAL CAPITAL COST	\$56

Table 12 - Route 9 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 10 – Interstate Median and Greenfield via Champaign/Urbana and University Park

Route 10 feasibility-level capital costs are presented in Table 12.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$11
20 STATIONS, TERMINALS, INTERMODAL	\$5
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$2
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$9
90 UNALLOCATED CONTINGENCY	\$6
TOTAL CAPITAL COST	\$45

Table 13 - Route 10 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 11 – Interstate Median and Greenfield/County Road via Champaign/Urbana and Joliet

Route 11 feasibility-level capital costs are presented in Table 13.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$16
20 STATIONS, TERMINALS, INTERMODAL	\$5
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$3
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$11
90 UNALLOCATED CONTINGENCY	\$7
TOTAL CAPITAL COST	\$52

Table 14 - Route 11 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Route 12 – Interstate Median and Greenfield via Champaign/Urbana and University Park

Route 12 feasibility-level capital costs are presented in Table 14.

FRA STANDARD COST CATEGORY	Capital Costs (2025\$, billions)
10 TRACK STRUCTURES & TRACK	\$9
20 STATIONS, TERMINALS, INTERMODAL	\$5
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS.	\$1
40 SITEWORK, RIGHT OF WAY, LAND, EXISTING IMPROVEMENTS	\$3
50 COMMUNICATIONS & SIGNALING	\$3
60 ELECTRIC TRACTION	\$6
70 VEHICLES	\$2
80 PROFESSIONAL SERVICES	\$8
90 UNALLOCATED CONTINGENCY	\$5
TOTAL CAPITAL COST	\$42

Table 15 - Route 12 Feasibility-Level Capital Costs

Note: costs were rounded to the nearest billion dollars; rows may not add up to total due to rounding

Summary

The investment options presented in this memorandum provide a consistent, feasibility-level capital framework to compare route alternatives. The estimates reflect standardized assumptions applied across all alignments to ensure comparability while identifying key cost drivers.

Further refinement of quantities, unit costs, and contingency allowances would occur in subsequent project phases.