



**MID-STATES
CORRIDOR**

SCREENING OF ALTERNATIVES REPORT

CONSTRUCTION COST ESTIMATES APPENDIX

Mid-States Corridor Tier 1 Environmental Impact Study

Prepared for

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Mid-States Regional Development Authority

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Construction Cost Estimates

Construction costs for each alternative are calculated on a unit cost basis that takes into account facility type and terrain. Only roadway construction costs are calculated for preliminary alternatives. For preliminary alternatives, excluded costs include right-of-way, relocations, design, construction management, utility relocation, and contingencies. The roadway construction costs were determined using previously constructed projects similar to the facility types being analyzed in this report.

Representative projects were analyzed to determine a per-mile roadway cost on a contract by contract basis. These were escalated to provide Year 2019 construction costs.

Items within each contract that were included in the per-mile roadway costs are as follows:

- **Earthwork** – Consists of all earth moving activities such as removal of existing dirt and asphalt pavement, placement of embankments and slopes, and rough grading for roadway bases and ditches.
- **Drainage** – Consists of fine grading for slopes, placement of outlet control devices, and placement of any closed conduit storm sewer structures such as inlets, manholes, and buried pipe.
- **Aggregate** – Consists of any crushed stone or aggregate used for base material under the paving material, or for backfill of utility trenches where required.
- **Paving** – Consists of either asphalt or concrete placed as the driving surface of the roadway. Both options were used on different aspects of the sampled projects.
- **Bridges** - Piling, concrete for abutments, riprap for slope stabilization, concrete for bridge decks, bridge drainage systems, reinforcing steel, epoxy coating, and any other items required specifically for the bridge construction.
- **Pavement Markings** – Consists of all lane markings, edge-lines, centerlines, and hatching required to convey information to drivers.
- **Permanent Signage** – Consists of all signs required to convey information to drivers. These signs include roadside warning signs, overhead directional signs, mile markers, wayfinding, and all other necessary signs.
- **Erosion Control** – Consists of all elements required to satisfy permitting requirements and limit site sediment runoff. These elements include silt fence, check dams, pipe protection, construction entrances, and other items deemed necessary.
- **Landscaping** – Consists of all vegetation required along the project, such as mulched seeding, sodding, tree planting, or other permanent vegetation.

Non-construction related costs are excluded in the costs of the preliminary alternatives. These costs will be included for the alternatives carried forward for detailed study. At this level of analysis, comparisons between alternatives are based solely on roadway construction costs. The non-construction items that are not estimated include:

- **Right-of-Way** – This is the property on which the roadway is constructed. It is purchased by the agency that will own and maintain the road and will be purchased, where necessary.

- **Relocations** – Relocations occur when the construction of a roadway makes a building unusable by the current occupant. Relocation costs are the costs for the current owner and/or occupant to relocate to another building.
- **Design** – This is the cost to design the proposed roadway. This also would include the cost for permitting and preparing environmental documentation (EIS, EA or CE, as appropriate).
- **Construction Management** – This is the cost of overseeing the construction of the project, ensuring that it satisfies appropriate standards, and is constructed as designed.
- **Utility Relocations** – This is the cost to relocate utilities impacted by the construction that are eligible for reimbursement per applicable state laws and federal regulations.
- **Contingencies** – These are costs added during preliminary phases of design to account for future uncertainties. These include future design modifications, cost fluctuations, and unknown future costs which arise during final design or construction.

Once the roadway-only cost for each contract was determined, a per-mile unit cost was developed by dividing the roadway only cost by the length of the project. The per-mile unit cost for each contract was then adjusted from its respective bid year to 2019 costs using an average inflation rate of 3.0%. The average inflation rate is based upon the Federal Highway Administration’s National Highway Construction Cost Index from March 2011 to March 2019.¹

Modifications to this methodology for determining a per-mile roadway cost were as follows:

- **Super 2 per-mile Roadway Costs** - Representative projects with desirable cross section elements and consistent passing lanes were not available for analysis. Per-mile roadway costs for a Super 2 facility type was developed utilizing typical quantities and pay item unit prices. Pay item unit prices are based on INDOT bid tabulations for a representative project with a similar typical section (to that of a Super-2), but lacking a passing lane and desirable width shoulders. The unit prices were applied to typical planning level quantities that could reasonably be expected for each of the Super 2 Typical Sections (i.e. rural/level, rural/rolling and urban/level). The typical planning level quantities are based on a ¼ mile section of roadway and extrapolated out to determine one-mile planning level quantities.

The only quantity (or pay item) assumed to vary between a rural/level and a rural/rolling Super 2 Typical Section is the amount of earthwork required. In both cases, it is assumed that 75% of excavated material will be suitable for re-use and a 10% shrinkage factor will be applied to the amount of borrow required. For a rural/level typical section, an average cut and fill depth of 2 ft per ¼ mile was assumed. An average depth of 4 ft was utilized for the rural/rolling typical section. Additional factors considered in the development of earthwork quantities include the amount of private drives (2 each side per ¼ mile) and public road approaches (1 each side per ¼ mile). It should be noted that the earthwork balances are based upon the combined width of travel lanes, passing lane and shoulders. This removes the variability associated with unknown “tie-in” or “daylight” conditions. Further refinement of earthwork quantities will be completed for alternatives carried through to detailed analysis.

¹ See <https://www.fhwa.dot.gov/policy/otps/nhcci/pt1.cfm>. The indices for March 2011 and March 2019 are 1.4568 and 1.8477, respectively.

For the urban/level Super 2, a project on US 231 from 13th Street to 15th Street in Jasper was used as a typical ¼ mile urban roadway for determining representative quantities of street approaches, drives, traffic signals and other such elements.

Assumed percentages were applied to lump sum items such as clearing and grubbing (5.0%), signing (1.5%), storm drainage (5.0%), construction engineering (2.0%), mobilization and demobilization (5.0%), maintenance of traffic (5.0%) and erosion and sediment control (2.5%) were applied to the sum of all quantified pay items. This methodology was utilized for all Super 2 typical sections.

- **Expressway per-mile Roadway Costs for Rolling Terrain** - Representative projects used to determine expressway per-mile roadway costs were all designated as having level terrain. To develop a per-mile roadway cost for an expressway on rolling terrain, the percent increase for a rolling freeway from a level freeway was applied to the level expressway costs. Since each of these facilities have the same typical section at this stage of analysis, it is assumed that the increase in cost for the expressway facility type is proportional to that for the freeway facility type.
- **Expressway to Freeway Upgrades** - US 231 in Spencer County and SR 37 north of Mitchell currently are expressways. No construction costs are anticipated for these roadways for a Super-2 or Expressway facility type. To determine costs for upgrading the existing expressways to freeways, unit costs for access control measures were used in lieu of per-mile roadway costs. The access control measures considered were conversion of at-grade intersections to either a grade separated crossing or a full interchange. Similar to the per-mile roadway costs, access control measure unit costs were developed using representative projects. The access control unit costs may underestimate the cost to fully convert an expressway to a freeway. The density of intersections and ability to provide alternate access to remote properties could increase construction costs.

Recently completed projects were used as a basis for determining the cost estimates for these alternatives. The following briefly describes the projects that were used.

- Freeway: Rural/Level
 - **Contract IR-33040 I-69 RP 38+63 to RP 46+64** – Construction of 7.6 miles of freeway on new terrain.
 - **Contract IR-33042 I-69 RP 46+64 to RP 50+11** – Construction of 3.3 miles of freeway on new terrain.
 - **Contract IR-33045 I-69 RP 53+10 to RP 62+68** – Construction of 9.5 miles of freeway on new terrain
 - **Contract IR-33633 I-69 RP 50+01 to RP 52+86** – Construction of 2.6 miles of freeway on new terrain.
- Freeway: Rural/Rolling
 - **Contract IR-33737 I-69 RP 97+77 to RP 102+41** – Construction of 4.4 miles of freeway on new terrain.

- Expressway: Rural/Level
 - **Contract IR-30845 SR 25, Segment 2A** – Construction of 2.2 miles of expressway on new terrain.
 - **Contract IR-30846 SR 25, Segment 2D** – Upgrade of 2.7 miles of 2-lane highway to expressway.
 - **Contract IR-30849 SR 25, Segment 3A** – Upgrade of 2.9 miles of 2-lane highway to expressway with a new bypass around Rockfield, IN.
 - **Contract IR-30850 SR 25, Segment 3B** – Upgrade of 5.2 miles of 2-lane highway to expressway with a new bypass around Burrows, IN.

- Grade Separation/Overpass
 - **Contract R-35952 Styline Drive over Norfolk Railroad & 12th Street** – Construction of a new railroad overpass.

- Interchange
 - **Contract IR-35629 I-69 RP 203+70 to RP 204+30** – Conversion of an overpass to a full interchange. This contract has the minor road passing over the freeway.
 - **Contract IR-33291 I-69 at Union Chapel Road** – Conversion of an overpass to a full interchange. This contract has the minor road passing over the freeway.

On the following page are the **Unit Cost Summary Tables** (providing the per-mile roadway costs by facility type and terrain).

**Unit Cost Summary
Tables
01/25/2020**

Facility Type	Rural		Urban	
	Level	Rolling	Level	Rolling
Freeway	\$11,300,000	\$19,000,000		
Expressway	\$8,200,000	\$13,800,000		
Super 2	\$6,900,000	\$7,500,000	\$10,700,000	

Item	Unit Price
Grade Separation	\$6,200,000
Interchange	\$20,500,000