



APPENDIX C

Cost Estimating Methodology



MEMORANDUM

Date: August 27, 2015

Re: Updated I-69 Section 6 Cost Estimating Methodology for Preliminary Alternatives Evaluation

1 Introduction

Capital cost estimates were developed for five I-69 Section 6 Preliminary Alternatives as part of the evaluation and screening process. The cost estimates for the Preliminary Alternatives are intended to capture the cost of major project elements at a planning level of detail and allow for comparison of the alternatives. Too many uncertainties exist at this stage of project development to provide reliable absolute cost estimates. Major cost items accounted for in the estimates include roadway pavement, drainage, earthwork, interchanges, overpasses, land acquisition, residential and business relocations, utility relocations, and anticipated mitigation of environmental impacts.

2 Preliminary Alternatives

The five Preliminary Alternatives under consideration for I-69 Section 6 are shown in Appendix A. Preliminary alternative alignments were developed on digital aerial photography using Microstation CAD software. Preliminary travel demand forecasting has been conducted to help establish the lane requirements for each of the alternatives. Since the travel forecasting is preliminary and has not been supplemented with detailed traffic operations analysis, lane requirements could change for alternatives that are advanced as Reasonable Alternatives to the DEIS.

3 Methodology and Assumptions

Unit costs for the major items were developed from average unit prices for INDOT pay items of projects bid within the last three years. Costs from projects of similar size, such as I-69 Sections 4 and 5, were used to the extent possible. Unit costs for structures and some additional items were derived from recent INDOT projects and HNTB engineer experience. Information on the methodology and assumptions for the various cost items is provided below.

3.1 Roadway

Major quantities for roadway items associated with each alternative were estimated. These major items are pavement, earthwork, and drainage. The costs of other items, such as mobilization, construction engineering, maintaining traffic, erosion control and traffic control devices were estimated at 12% of the total project cost based on analysis of recent large INDOT projects (US 31 in Hamilton County, I-465/I-65 interchange and I-65/Worthsville Road interchange).



Pavement costs were estimated on a per linear foot basis using typical sections to develop quantities. Where the proposed I-69 can be located at the same horizontal and vertical location as existing pavement, such as along existing SR 37, an overlay of the existing pavement was assumed in the per linear foot quantity.

Drainage quantities were estimated on a per each basis for inlet structures and a per linear foot basis for storm sewer pipes. Small structures were identified on Alternative C where the alignment crosses an existing small structure that would require replacement. Small structure locations were approximated for Alternatives B, D, K3 and K4.

Earthwork quantities for the I-69 mainline were estimated based on CAD analysis of the preliminary alternative alignments and existing topography using Inroads design software. Earthwork quantities for ramps and local access roads were estimated based on typical sections, as horizontal and vertical alignments have not yet been established for these facilities.

3.2 Structures

Structures estimated for each alternative included bridges and retaining walls. Bridges were identified wherever an alternative alignment crosses a body of water, railroad or roadway. Quantities for bridges were estimated using the I-69 roadway typical sections and estimated lengths based on floodways, floodplains and clear zone requirements. Unit costs were assigned for each structure type based on prior experience.

Approximate locations of retaining walls were identified where the construction limits have significant impact on existing right of way and as part of proposed bridges over roadways. The unit costs of retaining walls were based on a per square foot basis. Total costs were calculated using an estimated length and height for each wall.

An assessment of existing bridges along SR 37 was conducted to determine what could be re-used in a proposed I-69 alignment. Based on a functional and structural condition assessment from bridge condition reports, each bridge was assigned a rehabilitation cost equal to some proportion of a full bridge replacement cost. The rehabilitation cost was calculated to include any widening and structural repairs necessary.

3.3 Utility Relocations

At this time the I-69 project team has limited knowledge about the locations of existing utilities. Utility relocation costs were estimated on a per mile basis using information from the I-69 Section 5 and Illiana Corridor projects. Higher per mile costs were assumed for segments of I-69 that would be constructed in the SR 37 or Mann Road/Centenary Road corridors. Lower costs were assumed for segments that would be constructed in new terrain outside of these corridors. This is because utilities are often located adjacent and parallel to existing roads. Where I-69



would be co-located with I-70, it was assumed that any widening could be accommodated in the median and there would be minimal utility relocation cost.

3.4 Right of way

The right of way costs include the cost to acquire property and to relocate displaced residences or businesses. The property acquisition cost was based on average land values. Average values of residential, agricultural, and commercial land by township were aggregated by a licensed appraiser from a database of recent transactions. In addition to the property value, typical administrative fees were included for each parcel affected. Relocation costs were quantified for impact assessment. For cost estimation purposes, any primary building or billboard within 50 feet of the right of way limit was assumed to require relocation. Individual relocations will not be disclosed to the public during the Preliminary Alternative evaluation due to the uncertainty of right of way limits at this phase of project development. The cost to relocate identified residences and non-residential primary buildings was based on FHWA information on the average relocation costs within the state by year. The cost to relocate billboards was based on the estimated cost used in the I-69 Section 5 environmental document.

3.5 Mitigation

Compensatory mitigation is required for unavoidable impacts to wetlands, streams, forested floodway and endangered species habitat. Costs for compensatory wetland and forest mitigation include land acquisition, design, construction, and monitoring and were calculated on a per acre basis. Acreage of mitigation required was calculated as the acreage of each habitat type impacted multiplied by established mitigation ratios. Standard buffers of 50 feet and a 20 percent contingency were also utilized in calculating mitigation areas. Standard mitigation ratios utilized were 2:1 for emergent wetland, 3:1 for scrub-shrub wetland or forested lands, and 3:1 for forested wetland. Costs per acre for land acquisition were the same as for rural agricultural land used elsewhere in this cost estimate. Costs for design and construction were consistent with those used in the I-69 Section 5 Final Environmental Impacts Statement. The cost of stream mitigation was estimated per linear foot of impacted stream, with unit costs based on actual mitigation costs from I-69 Section 4.

3.6 Widening Existing Interstates

Widening would be required where existing interstate LOS would degrade to an unacceptable level due to the construction of I-69 Section 6. The segments where LOS would degrade were identified by travel demand modeling. The costs to widen the identified interstate segments were calculated separately from the I-69 Section 6 project costs unless otherwise noted below.

Under Alternatives B and D, I-70 would require widening from 4 to 6 lanes between the I-69 interchange and SR 267. Alternative C would require I-465 to be widened from 6 to 8 lanes from the west side of the White River to Mann Road. Widening of the I-465 bridge over the



White River itself is included in the cost of Alternative C, as it would likely be needed for operation of the I-69/I-465 interchange. Under Alternatives K3 and K4, auxiliary lanes would be added to I-465 as part of the I-465/I-69 interchange, so no additional costs were estimated.

3.7 Capital Improvements and Rehabilitation on SR 37

If an alternative that diverts from SR 37 is ultimately selected, the northern portion of SR 37 would remain open to traffic and continue to be maintained by INDOT. The added costs of capital improvements to provide acceptable LOS for the traffic remaining on SR 37, along with the costs of continued pavement and bridge rehabilitation needed for SR 37 were calculated for Alternatives B, D, K3, and K4. Specific improvements to SR 37 were identified by performing planning-level capacity analysis. A 50-year schedule of periodic pavement and bridge rehabilitation was used based on the assumed life expectancy of the I-69 construction. The rehabilitation costs for bridges and pavement were derived from past INDOT projects. These costs were calculated separately from the I-69 Section 6 project costs.

3.8 Contingencies

Due to the early stage of alternative development, a 20% contingency was added to project construction costs to account for unknown conditions. A 10% contingency was added to the mitigation costs to account for variations in property value. A 15% contingency was added to right of way acquisition costs to account for both property value and acreage requirement variations. The unit costs for utility relocation were considered to include contingency.

3.9 Professional Services

The cost of preliminary engineering for I-69 Section 6 was estimated to be 6% of the project estimated construction cost (including the contingency). This includes survey and design costs but excludes preparation of the environmental document. The cost of construction administration was estimated to be 9% of the construction cost (including the contingency), which includes construction inspection and construction management services. The costs of professional services for right of way acquisition and relocations are included on a per-parcel basis within the cost of right of way. The unit costs for utility relocation include professional services related to utilities.

3.10 Cost Escalation

Preliminary Alternative cost estimates were calculated in 2015 dollars. At this time, no cost escalation has been applied.



3.11 Excluded Costs

The following items are not specifically included in the cost estimates developed for Preliminary Alternatives:

- Damage payments to property owners for loss of use or access
- Costs of project financing
- Costs of transportation demand management or system management strategies during construction
- Costs of public outreach during construction
- Cost escalation to an assumed construction year