

Appendix L

I-290 Cost Estimating Procedures

I-290 Eisenhower Expressway
Cook County, Illinois

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1.0 Introduction

This document describes the procedures used to prepare the conceptual level cost estimate for the I-290 Preliminary Engineering and Environmental Study – West of US 45 (Mannheim Road) to Racine Avenue (I-290 Study). The estimates are intended to provide an indication of the magnitude of costs for the proposed project components in the Draft Environmental Impact Statement (DEIS), and to support the alternatives evaluation process.

2.0 Project Background

The Project Corridor begins at the intersection of I-290/I-88 to the west and traverses east through the Villages of Hillside, Bellwood, Westchester, Broadview, Maywood, Forest Park, Oak Park, and City of Chicago. Reconstruction is proposed for I-290 extending from the I-88/I-290 split in the west to approximately Kostner Avenue. This section is proposed to be completely reconstructed including mainline, interchanges, and multiple crossroads structures and is referred to as the *Reconstruction Section*. Restriping of the existing eight-lane section is proposed from east of Kostner Avenue to Racine Avenue with improvements dedicated to accommodating operational/managed lane features of the preferred alternative and is referred to as the *Restriping Section*. The extent of improvements from Kostner Avenue to Racine Avenue include pavement restriping and potential noise abatement wall placement. Existing overhead bridges in this section are proposed to be reconstructed as part of separate, stand-alone projects.

3.0 Methodology

The conceptual cost analysis began with a parametric estimate for major construction categories and refined with actual quantity breakdowns and takeoffs. Unit costs were determined and calibrated using similar projects based on order of magnitude, project location, and the nature of the overall project such as an urban environment with constrained right of way and high traffic volumes. High cost value construction categories are further subdivided increasing detail and accuracy for the overall conceptual cost estimate. Unit costs were adjusted and assessed for a base year of 2015. Inflation was applied as necessary to provide Year of Expenditure costs for the project analysis.

Example projects used for calibration include several Circle Interchange projects and the Illinois Tollway I-90 reconstruction. Both projects are located adjacent to or near the Project Corridor and are currently under construction.

3.1 FHWA Major Project Review

The Federal Highway Administration (FHWA) completed a “Major Project Review” of the proposed project in September 2015. The objective was to conduct an unbiased risk-based review to verify the accuracy and reasonableness of the current estimate and apply an independent risk based probability range for the cost estimate.

Based on the assumptions and risks discussed during the review, the cost estimate at the 70 percent confidence level is \$2,630 million (year of expenditure). For the purposes of the review, the project was assumed to be completed in year 2027 at the 70 percent confidence level. The cost ranged between \$2,080 million (0 percent) to \$3,069 million (100 percent). These estimates are based on the best information available at the time they were developed. It is expected that cost estimates will be revised and refined through further project development, such as Phase 2 design and future procurement activities.

4.0 Major Construction Items and Unit Costs

The major construction items were identified as items with the greatest influence on the construction cost which can be reasonably defined at the preliminary level of design. Quantities for these major items were generated based on quantity takeoffs and historical project data. The major construction items are grouped into the following headings:

- Roadway Related Items,
- Structures (bridges and retaining walls),
- Land Acquisition, Right-of-Way and Land Remediation,
- Environmental Mitigation (noise walls),
- Engineering Services,
- Transit Related Costs, and
- Project Contingency.

4.1 Roadway Related Items

This category includes pay items related to demolition and removal, pavement, earthwork and grading, pedestrian improvements, roadside safety, traffic signals and signing, lighting, drainage, intelligent transportation system (ITS), tolling, utilities, traffic control, erosion control and landscaping, aesthetics, mobilization, and construction layout.

4.1.1 Demolition and Removal

Demolition and removal costs were estimated based on the conceptual design footprint. Existing bridge and sign structure demolition within the *Reconstruction Section* is included in this cost. Bridge demolition costs are broken down further by distinguishing between railroad bridges (CSX, CTA, and IHB Railroads), minor crossroad bridges, and bridges associated with a full interchange. Removal of existing pavement, curb and gutter, concrete barrier, guardrail and sidewalks are measured directly from existing topographic survey and individually quantified within this cost.

4.1.2 Pavement

The proposed project assumes multiple pavement designs based on roadway classifications. The cost estimate separated out the pavement design into three classifications based on past pavement designs by the Illinois Department of Transportation. The three classifications include mainline pavement, interchange ramps, and local roadways/frontage roadways. The mainline pavement and ramps costs are based on a durable rigid pavement (Jointed Concrete) with a hot mix asphalt base. Mainline and ramp shoulders costs are based on full depth concrete pavement construction. The same pavement design is used for both the mainline and ramps. The frontage/local roadway pavements are based on a standard flexible hot mix asphalt design. Pavement pricing may vary significantly depending on the final design and material selection. The design and pricing are based upon pavement life cycle for the project.

4.1.3 Earthwork and Grading

Roadway profiles and cross sections were developed for the proposed design. Estimated quantities for earth excavation and fill materials are based on quantity takeoffs and calculated per cubic yard. An estimated quantity of unsuitable material is included as part of the overall earthwork quantities. A special waste excavation quantity and cost is provided as part of the project based on a percentage of the overall earthwork cost.

4.1.4 Pedestrian Improvements

This cost is intended to cover project improvements for a multi-use path and pedestrian friendly improvements such as increased width sidewalks. Costs are generated based on historical data for projects of this magnitude and geographic location.

4.1.5 Roadside Safety

This cost covers the approximate cost and quantities of concrete median barrier and locations requiring guardrail protection and Jersey barrier wall associated with the proposed project.

4.1.6 Traffic Signals, Signing, and Pavement Markings

This cost is intended to cover the cost of proposed traffic signals, signing, and pavement markings. The cost for traffic signals are broken down into three general types of categories and applied throughout the project. The three categories for traffic signals

include a proposed cost for the Single-Point Urban Interchange at 25th Avenue and 1st Avenue interchanges, a cost for a Single-Point Urban Interchange for Harlem Avenue and Austin Boulevard interchanges, and cost for a standard urban local roadway intersection scenario. The proposed signing cost is intended to cover full replacement of sign panels and ground mounted posts throughout the project corridor and replacement of the existing truss and cantilever supports within the *Reconstruction Section* of the project. The signing cost is based on a percentage of the overall construction cost. The pavement markings cost is based on quantity takeoffs for the proposed pavement marking design for both the *Reconstruction* and *Restriping* sections.

4.1.7 Lighting

This cost category is intended to cover the cost of proposed lighting along the I-290 Eisenhower Expressway median, interchanges, and along local roadways as applicable. The cost assumes all existing lighting is replaced. The proposed lighting costs are generated using specific pay items and applied for each type of location mentioned above.

4.1.8 Drainage

This cost is intended to cover all temporary and permanent roadway drainage including storm water retention/detention, median drains, catch basins, inlets, laterals, roadside ditches, etc. required for a closed drainage system. This cost also included the placement of an additional main trunk sewer for the I-290 Study. The drainage cost was estimated as a percentage of the total construction cost based on similar local urban major highway reconstruction projects and increased for overall complexities of the project including the additional work associated with the proposed mainline trunk sewer.

4.1.9 Intelligent Transportation System (ITS) and Tolling

This cost category is intended to cover standard items utilized for a typical ITS system and tolling system catered for the Project Corridor. Costs include ramp meters and sensors, toll points, cameras, toll signs, active traffic management equipment, and communication equipment. The cost includes electric toll collection and enforcement for the tolling alternatives. The overall cost extends into both the *Reconstruction* and *Restriping* sections.

4.1.10 Utilities

This cost is intended to cover the cost of relocation or protection of identified utilities within the *Reconstruction Section*. Engineering services for utility work are included in this cost and based on historical percentages of the overall estimated utility construction costs. The known utilities are itemized and unit costs developed using the existing utility type, size, and general construction methodology for either replacement or protection of the utility. The cost will be updated and modified as the project progresses to include actual work plans and engineering costs provided by the utilities based on final design.

4.1.11 Traffic Control (Maintenance of Traffic)

This cost is intended to cover the general traffic control during construction and is based on a percentage of the total construction cost. This category includes all typical traffic control for the I-290 Study and detours including, but not limited to; temporary signing, temporary pavement and pavement markings for minor roadways, temporary signalization, channelizing devices, barricades, etc. Significant temporary improvements associated with the maintenance of traffic are itemized and added to the overall cost including temporary pavement, walls, and structures.

4.1.12 Erosion Control and Landscaping

This cost category is intended to cover the cost of erosion control and landscaping during construction and is based on a percentage of the total construction cost. Erosion control and landscaping costs include all sediment and erosion control, seeding, mulching, etc. to minimize erosion.

4.1.13 Aesthetic Improvements

This cost category is intended to cover standard aesthetic improvements along the *Reconstruction Section* of the project associated with public outreach. The cost is based on a percentage of the associated total construction cost for the project.

4.1.14 Mobilization

This cost is intended to cover the cost of mobilization of the construction workforce based on a percentage of the total construction related cost.

4.1.15 Construction Layout

This cost is intended to cover the cost of construction layout as provided for in construction contracts based on a percentage of the total construction related cost and historical data.

4.2 Structures

This category includes pay items related to roadway structures and retaining walls.

4.2.1 Roadway Structures

Roadway structures consist of grade separated and waterway crossing structures. The structures are subdivided into pedestrian bridges, standard crossroad bridges, interchange bridges, railroad bridges and mainline expressway bridges. Bridge costs are for the structures in the *Reconstruction Section* only and are based on historical square footage determined from newly constructed bridges associated with the Circle Interchange project and other local projects. As the complexity of the bridge design increased, so did the estimated cost per square foot.

4.2.2 Retaining Walls

The cost of the walls is for the *Reconstruction Section* and is based on exposed wall heights determined by proposed cross sections. Both mechanically stabilized earth walls (MSE) and soldier pile walls are assumed to achieve the proposed design. Based on existing terrain and proximity to existing facilities, soldier pile walls are estimated for 80 percent of the total wall locations and MSE walls for the additional 20 percent. The unit pricing for the walls are based on historical unit costs for projects of similar scope and location. Overall, the soldier pile wall unit costs are greater than the unit costs used for MSE walls.

4.3 Land Acquisition, Right-of-Way and Land Remediation

Land values for permanent right-of-way and temporary easement are based on the fair market value of the Cook County Assessor website for Year 2008 and escalated to the current based year. Costs are categorized as either residential or commercial and are reported on a square footage basis. A conceptual cost is included for removal and remediation of hazardous materials during building demolition and earthwork. Assumptions for the amount of soil removed and the quantity of contaminated soil are estimated.

4.4 Environmental Mitigation (Noise Walls)

This cost is intended to cover the cost of the proposed noise abatement wall placement in both the *Reconstruction* and *Restriping Sections*. The noise abatement wall unit cost is generated based on the exposed area of the wall and historical unit cost data. The location and size of the noise abatement walls are approximate and based on the first preliminary round of analysis. Final noise abatement wall location and types have not been determined at this time.

4.5 Engineering Services

This category includes pay items related to engineering design and services, and construction inspection and services. Descriptions of these items are as follows.

4.5.1 Design Engineering Services (Phase 2)

This cost is intended to cover the services associated with detailed design documentation for bidding purposes and to construct the proposed project. The Phase 2 costs are estimated as a percentage of the total construction cost at this time.

4.5.2 Construction Inspection and Services (Phase 3)

This cost is intended to cover the associated construction inspection services to observe and construct the proposed project. The assumed Phase 3 costs are estimated as a percentage of the total construction cost at this time.

4.6 Transit Related Costs

The proposed project will result in impacts to existing Chicago Transit Authority (CTA) crossroad Blue Line station head houses and ramps in the *Reconstruction Section*. Costs were based on historical data from several local transit projects and from the CTA Blue Line Vision Study. Associated costs include the building structure, structural support of each head house and the affected ramp structure only. Stations were divided into major and minor categories based on ridership and current usage for the purposes of the cost estimate. A lump sum was assigned to each major and minor station.

An additional cost is included for railroad flagging in the *Reconstruction Section* of the proposed project for proposed improvements at and along the IHB Railroad, CTA, and CSX Railroads.

4.7 Project Contingency

This cost is intended to cover additional project unknowns such as general project related roadway items not quantified in detail and additional future detailed design development associated with Phase 2 of the project. The project contingency is estimated as a percentage of the total construction cost and determined based on current level of design development at this time and historical data.