

# IOWA 5 / U.S. 65 RE-DESIGNATION UPDATE – INTERIM TRAFFIC ANALYSIS & DESIGN EXCEPTION AMENDMENT

## SCOPE OF SERVICES

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The Des Moines Area Metropolitan Planning Organization (Client) and HNTB Corporation (Consultant) have entered into an agreement for the following scope of services for the effort to update previously completed analyses required by FHWA and Iowa DOT to re-designate the Iowa Highway 5 and U.S. Highway 65 corridor between the I-35 and I-80 in the Des Moines metropolitan area to an Interstate facility. In 2012, HNTB Corporation, as requested by Iowa DOT, completed several planning-level needs analyses related to the designation of the IA 5/US 65 freeway corridor in the Des Moines metropolitan area as part of the federal Interstate system. In Fall 2020 and Spring 2021, HNTB updated the 2012 report with current data. As the next step in the redesignation process, this scope of services builds upon the previous work completed between 2011-2012 and 2020-2021 to satisfy FHWA traffic analysis and geometric analyses requirements as communicated through the FHWA/Iowa DOT/DMAMPO/HNTB scope coordination meeting held April 14, 2021. To satisfy those requirements, this scope of services includes the following:

- Interim-year (2027) traffic operations report for the IA 5 / US 65 corridor and including all interchanges and ramp terminals in the corridor;
- Predictive 2050 safety analysis for the IA 5 / US 65 corridor;
- Additional evaluation of the 10 controlling design criteria for highways to prepare design exception request; and
- Prepare an addendum to the previously prepared Summary Technical Report (February 2021) that summarizes the results of the above noted analyses.

### **Task 1: Interim-year (2027) traffic operations analysis and conceptual design**

#### *1.1 Traffic data gathering and forecasting*

The consultant and DMAMPO will coordinate to develop interim-year 2027 forecasts for the IA 5/US 65 corridor mainline segments, ramps, ramp terminals, and system interchange directional ramps. Assumption is consultant will utilize recent Iowa DOT traffic count volumes as the existing year basis for linear interpolation between the traffic counts and DMAMPO 2050 model forecasts. AM and PM peak period forecasts will also be developed from the linear interpolation between Iowa DOT traffic counts and 2050 forecast model results. Study corridor limits include the I-35/IA 5 system interchange to the I-80/US 65 system interchange.

**Aerial Review** - The Consultant will conduct a high-level review of current aerial photos and Google Street View of the corridor to determine if information related to ramp terminal configurations, speed limits and other geometric inputs needed for input into the traffic analysis models has changed from previous analyses. Information will be gathered for up to 22 intersections/ramp terminals and up to 98 basic merge/diverge and weave freeway segments.

**Signal Timing Plan Data** - The Consultant will utilize previously provided traffic signal phasing data provided during the 2020 traffic analysis update. Client will facilitate obtaining any changes in signal phasing and timings from local jurisdictions maintaining signals in the study corridor. The Consultant will review the information and prepare any changes in the information for input into the Synchro traffic model.

### *1.2 Interim-year Operational Analysis*

The Consultant will perform a Highway Capacity Manual (HCM) traffic operational analysis on the existing IA 5 / US 65 corridor network for the peak periods in the interim forecast year 2027. Analysis activities will include the following:

Synchro and Highway Capacity Software (HCS) Traffic Model Development - The Consultant will use previously developed Synchro models for both AM and PM peak periods for both signalized and unsignalized intersections/ramp terminals along the corridor. The Consultant will also utilize previously developed HCS Facilities models for both AM and PM peak periods for basic, merge/diverge and weave freeway segments along the corridor.

LOS Analysis - The Consultant will conduct LOS analysis for the identified study locations based on the methodologies of the HCM 6 (2016) for signalized and unsignalized intersections, as well as for basic, merge/diverge and weave freeway segments. LOS analysis will be conducted for both the AM and PM peak time periods using 2027 traffic data. LOS analysis will be conducted at up to 22 intersections/ramp terminals and up to 98 basic merge/diverge and weave freeway segments. Only the interim future year (2027) analysis will be performed. Analyses will be documented in tabular form, to be included in the Addendum.

### *1.3 Conceptual design of Ramp Terminal improvements for Interim Build*

For those ramp terminal intersections achieving LOS D or worse during the 2027 am or pm peak period, the Consultant will develop one intersection improvement concept per intersection to improve intersection operations to LOS C or better. For those ramp terminal intersections currently unsignalized and not achieving LOS C, the first proposed improvement to be analyzed (as a “first pass” improvement due to cost and ease of implementation) will be the signalization of the intersection utilizing Synchro software. For those intersections already signalized and those previously unsignalized intersections not improved to LOS C or better by signalization, intersection improvements such as turn lane channelization will be conceptually designed and analyzed for improvement in LOS. Ramp terminal intersection improvements will be developed utilizing Microstation design software and exhibits will be developed showing conceptual design. Ramp terminal intersections requiring signalization and no other physical improvements will not be developed in Microstation and conceptual design exhibits will not be prepared. It is anticipated 11 ramp terminal intersections will require signalization or other intersection improvements, while another 5 currently signalized intersections will require intersection improvements. All improvements will be designed utilizing Iowa DOT Design Manual geometric design criteria.

### *1.4 Cost Estimate Update*

The Consultant, per guidance from FHWA and Iowa DOT, will update the previously completed conceptual cost estimate to modify geometric factors in the study corridor that are necessary to achieve LOS C or greater at study corridor ramp terminal intersections. Cost estimates will be based upon unit costs from the Iowa DOT iPDWeb cost estimating system.

## **Task 2: Predictive Safety Assessment**

The consultant will perform a predictive safety assessment for IA 5/US 65 corridor utilizing the Highway Safety Manual (HSM). Safety Performance Functions (SPFs) for use on Interstate highway facilities in Iowa will be obtained from Iowa DOT Traffic and Safety Bureau. Should SPFs for primary routes not be available at the time of analysis, a combination of HSM calibration factors and applicable SPFs will be utilized for the analysis based on availability and applicability. The latest version of the IHSDM software will be utilized for this analysis. LandXML data that includes horizontal and vertical alignment information will be utilized to create both models. This data will be created as part of the design process. This analysis will include identifying conditions or designs in the corridor that may contribute to decreased future safety and identify corrective actions to mitigate for any decreased safety conditions. The Future No-Build and Future Build scenario predictive analyses will be compared to determine safety implications of increased traffic and minor ramp terminal improvements. DMAMPO 2050 daily traffic forecasts will be used where required for traffic data inputs.

2050 Future No-Build Predictive Safety Analysis - The Consultant will perform a predictive safety analysis utilizing the Highway Safety Manual (HSM) for the Future No-Build conditions for year 2050 for the study corridor. This analysis will cover the existing IA 5/US 65 freeway corridor and ramp terminal intersections that will experience substantial changes in traffic volumes in 2050. The latest version of the IHSDM software will be utilized for this analysis.

2050 Future Build Predictive Safety Analysis – The Consultant will perform a predictive safety analysis utilizing the Highway Safety Manual (HSM) for the Future Build conditions for year 2050 for the study corridor. This analysis will cover the existing corridor and adjacent roadways that will experience significant changes in travel patterns while incorporating proposed improvements included in DMAMPO's 2050 Build model. Any proposed improvements made as part of the Section 1.3 will also be incorporated into the 2050 Future Build scenario. Analyses will be documented in tabular form, to be included in the Addendum.

### **Task 3: Structure Load Ratings & Design Exceptions**

#### *3.1 Design Criteria*

The Consultant will prepare the Iowa DOT design criteria worksheet for rural interstates and validate that prior geometric analyses align with current design criteria and assumptions for the design exception request outlined in Section 3.3.

#### *3.2 Design Loading Structural Capacity*

To complete evaluation of the ten controlling design factors for highways, verification of design loading structural capacity for bridges in the corridor is required. The Consultant will obtain available design load ratings from the Structure Inventory and Inspection Management System (SIIMS) and coordinate with Iowa DOT and FHWA to determine if bridges in the IA 5/US 65 corridor meet minimum load rating criteria for Interstate facilities. The Consultant will develop a brief technical memorandum documenting design loading structural capacity of corridor bridges. This scope of services assumes 30 locations with 54 total bridges to evaluate.

#### *3.3 Design Exceptions*

The Consultant will develop design exception requests for three locations in the corridor not meeting Iowa DOT Design Manual criteria (01C-08) for two controlling criteria: horizontal curve radius and superelevation rate for a rural interstate design speed (70 MPH acceptable, 75 MPH preferred) as described in the 2021 IA 5/US 56 Corridor Summary Technical Report. To complete the design exception requests, the Consultant will develop no more than three high-level alternatives (one per location). No adverse impacts from design exceptions are anticipated and therefore mitigation measures are not required to be developed, and the resulting safety analysis will rely upon existing available crash data from Iowa DOT Traffic and Safety Bureau. The Consultant will develop pertinent design exception documentation in Iowa DOT and FHWA approved format for each location, one submittal per location. The Consultant will address one round of comments per design exception request from Iowa DOT and FHWA review.

### **Task 4: Documentation**

The Consultant will prepare an Addendum to the 2021 Summary Technical Report that summarizes the outcomes of the analyses included with this scope of services. Two iterations of review and comments are included in this scope of services prior to finalizing the addendum.

### **Task 5: Project Management and Coordination**

#### *5.1 Project Administration*

The Consultant will prepare and administer the following project and cost controls:

- Maintain a project cost control system to process and track project costs including implementation and coordination of financial reporting requirements and formats, reporting policies and guidelines, and invoicing and payment of project costs.
- Create monthly progress reports that include narrative descriptions, financial reports, and expenditures noting the actual percent of the project spent.
- Invoicing and payment requests, numbering submittals sequentially. The Consultant will attach a copy of the progress report to each invoice to support the overall percentage of the contract spent to date.

### 5.2 *Quality Control*

The Consultant will hold internal Project Review meetings for the purpose of monitoring project progress and to insure timely project completion. Monthly Project Review meetings will include the Project Manager, QA/QC Manager, and Principal in Charge to ensure adherence to project controls and the QA/QC Plan. The Consultant will also provide quality checks for each of the tasks included in this scope, to ensure client satisfaction and adherence to budget and schedule. The Consultant will develop, and adhere to, a quality control checklist ensuring that all deliverables have been thoroughly reviewed by applicable discipline leads for content and accuracy.

### 5.3 *Coordination Meetings*

The Consultant, in partnership with the Client, will attend up to three coordination/check-in meetings to discuss the direction of the study update, future steps in the re-designation process, and other pertinent information for the re-designation process. Additional participants will include representatives from FHWA Iowa Division, Iowa DOT District 1, Iowa DOT Location and Environment Bureau (LEB), and Iowa DOT Design Bureau. This meeting will occur either at District 1 offices in Ames or at DMAMPO offices in Des Moines. Up to four Consultant staff (Project Manager, Principle in Charge, Traffic Task Lead, and Highway Task Lead) will participate in this meeting.

## **Deliverables**

- Agenda and meeting notes for coordination meetings
- LOS analysis for interim 2027 forecasted 98 freeway and 22 intersection segments, in tabular form.
- Predictive Safety Analysis assessment and noted geometric conditions, in tabular form.
- Conceptual design exhibits (PDF) where ramp terminal intersections demonstrate need for additional improvements.
- Cost estimate for ramp terminal intersection improvements in tabular form (Excel).
- Technical memorandum documenting design loading structural capacity of corridor bridges.
- Three design exception documentation packages, one for each location.
- Addendum to 2021 Summary Technical Report summarizing analyses in this scope of services.

## **Assumptions**

- Design Loading Structural Capacity analysis results will not require the need for design exception requests.
- Iowa DOT to complete NEPA clearance required for design exception requests or federal action to re-designation the corridor to an Interstate.
- Input of cost estimates into iPDWeb is not included.