NEBRASKA

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DEPARTMENT OF TRANSPORTATION

STANDARD OPERATING PROCEDURES (SOP) FOR INTERSTATE ACCESS JUSTIFICATION REPORTS ON NDOT PROJECTS

September 1, 2026

Roadway Design Division

Contents

1. Introduction

1.1 PURPOSE

The purpose of this SOP is to provide policy guidance for the development of Interstate Access Justification Reports (IAJR). This SOP established how the Nebraska Department of Transportation (NDOT) implements federal requirements for IAJRs.

Compliance with this SOP does not guarantee approval. Each IAJR will be evaluated based on project need and justification, applicable federal requirements, and NDOT procedures. All requests are subject to case-by-case review. Early coordination between Roadway Design, Traffic Engineering, and FHWA is strongly recommended.

Local Public Agency requests for Interstate access changes must be completed in coordination with NDOT from project initiation. The Local Public Agency may perform the analysis and documentation required for an IAJR, however only NDOT can determine the Safety, Operations, and Engineering (SO&E) acceptability, as applicable, and submit the IAJR to FHWA for final approval.

1.2 OVERVIEW

An IAJR is a "technical report that documents the (SO&E aspects of a proposed change in access to the Interstate System and demonstrates that the proposal meets the provisions of Title 23 Code of Federal Regulations Part 624" (23 CFR 624). This document is prepared and submitted by NDOT when there is a request for a change in access to the Interstate System. An IAJR with a Safety, Operations, and Engineering determination is required before an access change is approved by FHWA. The primary guidance for IAJRs utilized by the Federal Highway Administration (FHWA) is the *Interstate System Access Information Guide*; this guidance provides support for an informed and consistent decision-making process that considers the impacts of proposed changes in access to the Interstate System. Title 23 CFR Part 624, Interstate System Access provides further requirements for changes in access and IAJRs.

The IAJR should follow the outline presented in the *Interstate System Access Information Guide* and include information from all Methods and Assumptions documents developed through the study process. The information in this Standard Operating Procedure (SOP) supplements the information presented in the *Interstate System Access Information Guide* and 23 CFR Part 624.

FHWA approval constitutes a federal action, and, as such, requires that National Environmental Policy Act (NEPA) procedures are followed. This is applicable to all segments designated as part of the Dwight D. Eisenhower National System of Interstate and Defense Highways (Interstate System) for which Federal-aid highway funds or other funds administered under tittle 23, United States Code, have been used in the past or are used to develop a project. (See 23 CFR 624.3(a)) Compliance with the NEPA procedures need not precede the determination of SO&E acceptability; however, final approval of access cannot precede the NEPA decision. Upon completion of the NEPA documentation, approval of access is granted if the design reviewed in the NEPA documentation is consistent with the preferred concept from the SO&E determination.

IAJR documents should be written as if the reader is not familiar with the area. The introductory materials should familiarize the reader with the project location, transportation facilities, and other impacts of the access change that will be presented throughout the document. All

conclusions must be substantiated by information provided in the document. A logical progression of ideas, evaluation criteria, measures, and supporting documentation must support each conclusion, which may include elimination or acceptance of an alternative.

The audience of the report is the general public; this includes Congressional delegates, public and private stakeholders, and others with an interest in the project. The ideas, engineering judgment, assumptions, conclusions, and support for conclusions must be clearly written so the audience can understand why one alternative was selected over another.

The concepts and analyses presented in the report must align with the purpose and need of the access change and demonstrate that the access change will maintain the safety and operational integrity of the Interstate System. The analysis and selection of alternatives is done through specific and measurable performance characteristics. A consistent analysis must be applied across all alternatives.

For the purpose of this SOP, use of the term “freeway” in the following sections to identify the access changes requiring an IAJR, refers to the Dwight D. Eisenhower National System of Interstate and Defense Highways as identified in 23 USC 101. An interchange where the crossroad to the Interstate is a non-Interstate freeway is defined as a “freeway-to-crossroad" interchange.

The information in this SOP describes the minimum required documentation and analysis for an IAJR, as applicable to the project. Any additional supporting information considered in the analysis or decision-making process should also be included.

1.3 INTERSTATE SYSTEM ACCESS REGULATIONS

Interstate System access change requests must provide sufficient documentation and analysis to allow the FHWA to make an informed decision, considering the potential consequences of a change in access. Specifically, the following regulations should be addressed:

23 CFR Part 624.7

(a) *The proposed change in access to the Interstate System shall not result in a significant adverse impact on the Interstate System traffic operations or the safety for all users of the transportation system in the project's area of influence, as demonstrated by operational and safety analyses based on both the current and future traffic projections using traffic data that is no more than 5 years old and at least the most recent 3 years of available safety data.*

(b) *Interstate System access points shall connect only to a public road. Connections directly to private developments, parking lots, or private roads are prohibited.*

(c) *Connections from outside of the Interstate System right-of-way to safety rest areas, information centers, weigh stations, and truck inspection stations located within the Interstate System right-of-way are prohibited.*

(d) *Each interchange shall provide for all traffic movements.*

(e) *A proposed change in access shall be designed to meet the standards in accordance with 23 CFR part 625 or have approved exceptions and shall comply with 23 CFR part 655.*

(f) *On a case by case basis, FHWA may grant exceptions to the requirements in paragraphs **(b)** through **(d)** of this section for:*

(1) *Locked gate access to private property for purposes of public safety;*

(2) *Locked gate access from an information center, weigh station, and truck inspection station to a local road for the purposes of public safety;*

(3) *Access from a safety rest area to an adjacent publicly owned conservation and recreation area if access to this area is available only through the safety rest area as allowed under 23 CFR 752.5(d);*

(4) *Locked gate access from a local public road to the safety rest area for the limited purpose of providing access to safety rest area employees, deliveries, and emergency vehicles; or*

A partial interchange where necessary to provide special access, such as to managed lanes or park and ride lots, or where factors such as the social, economic, and environmental impacts of a full interchange justify an exception.

1.4 INTERSTATE ACCESS JUSTIFICATION REPORT REQUIREMENTS

An Interstate Access Justification Report (IAJR) must present the need for the Interstate access change, relevant project information, and analysis and documentation for an SO&E determination to be made. To ensure all parts of an access change request are addressed, the following regulation requirements must be included in an IAJR:

23 CFR Part 624.11

(a) *The IAJR shall be a standalone report. Relevant information from other documents (such as feasibility studies, NEPA documentation or preliminary engineering reports) must be included in the appropriate section of the IAJR.*

(b) *At a minimum, an IAJR submitted to FHWA shall include all of the following, except as provided under paragraph (d) of this section:*

(1) *A description and overview of the proposed change in access including a project location map and distances to adjacent interchanges.*

(2) *Preliminary design documents sufficient to demonstrate the geometric viability of the proposal. The design documents shall include the design criteria, existing geometry overlaid with clearly labeled proposed geometric plan views, lane configuration schematics, typical sections, control-of-access lines, interchange spacing, ramp spacing, and other design features necessary to evaluate the proposed design.*

(3) *Operational and safety analyses that evaluate the impact of the proposed change in access on the Interstate System and local road network extending to the following area of influence limits at a minimum:*

i) *Along the Interstate System, and interchanging freeway if applicable, to the adjacent existing or proposed interchange on either side of the proposed change in access, extending further as needed to ensure the limits of the analysis are appropriate to fully understand the impact of the proposed change in access on the Interstate System.*

ii) *Along each crossroad to the first major intersection on either side of the proposed change in access, extending further as needed to demonstrate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local road network.*

(4) *A conceptual plan showing the type and location of the signs proposed to support the proposed design.*

(c) *The IAJR for a proposed partial interchange shall meet the following additional requirements.*

(1) *The IAJR shall include a full-interchange option with a comparison of the operational and safety analyses to the partial interchange option. The IAJR shall justify the necessity for a partial interchange alternative.*

(2) *The IAJR shall describe why a partial interchange is proposed and include the mitigation proposed to compensate for the missing basic movements, including wayfinding signage, local intersection improvements, mitigation of driver expectation leading to wrong-way movements on ramps, and other proposed strategies as necessary.*

(3) *The IAJR shall describe whether future provision of a full interchange is precluded by the proposed design.*

(d) *FHWA will consider the complexity of a change in access when determining the extent of the safety and operational analysis and the format of the IAJR.*

1.5 PROGRAMMATIC AGREEMENT FOR SO&E DELEGATION

Under 23 USC 111(e) and in accordance with 23 CFR 624.13, FHWA has determined that specific determinations may be delegated to State Departments of Transportation. In all circumstances, FHWA retains approval authority of the IAJR. A programmatic agreement between FHWA and NDOT allows delegation of authority to make SO&E determinations on behalf of FHWA for all or any part of the following types of changes in access requests:

1. *New freeway-to-crossroad (service) interchanges;*

2. *Modifications to existing freeway-to-crossroad (service) interchanges; and*

3. *Completion of basic movements at freeway-to-crossroad (service) interchanges.*

FHWA retains SO&E determination authority for all other types of changes in access requiring an IAJR and is responsible for final approval for all access changes requiring an IAJR. **Table 1.1** outlines the decision-making authority for types of access changes requiring an IAJR.

Type of Access Change Requiring an IAJR	**Final Approval Authority**		**NDOT SO&E Determination under PA**
	Retained by FHWA HQ	FHWA Division Office	
New Freeway-to-Freeway Interchange	X		
Major Modification of Freeway-to-Freeway Interchange	X		
New Partial Interchange or New Ramps to/from Continuous Frontage Roads that Create a Partial Interchange	X		
Completion of Basic Movements at Freeway-to-Freeway Partial Interchange		X	
New Freeway-to-Crossroad Interchange		X	X
Major Modification of Existing Freeway-to-Crossroad Interchange		X	X
Completion of Basic Movements at Freeway-to-Crossroad Partial Interchange		X	X
Locked Gate Access (New)		X	
Abandonment of Ramps or Interchanges		X	

Table 1.1 Access Changes Requiring an IAJR

1.6 OTHER TYPES OF ACCESS CHANGES

The following types of access **may** require an IAJR. NDOT will conduct a traffic and safety operations review. Coordination with FHWA is required to determine if any additional analysis is needed.

- Widening of an existing on-ramp to add lane(s)
- Adding auxiliary lane(s) between two adjacent interchange ramps
- Reconfiguration of the crossroad of an interchange, e.g.:
    - convert terminals to roundabouts or
    - reconfigure a diamond interchange to a diverging diamond interchange

The following types of projects **may not** require an IAJR but will undergo standard NDOT project development processes, including but not limited to traffic, safety, geometric, and structural reviews before implementation.

- Shift of ramp's location within the same interchange configuration along a freeway mainline which:
    - meets FHWA's ramp spacing design criteria
    - does not change travel patterns
    - maintains the same number of access points
- Increasing the length of acceleration or deceleration lanes on ramps
- Adding turn lane(s) or through lane(s) on crossroads at ramp termini
- Signal or channelization improvements of ramp terminal intersection with crossroad
- Implementation of ramp metering
- New signing, striping, and/or resurfacing on on-ramps or off-ramps
- Installation of roadside guardrail and concrete barriers
- Construction of overpasses or grade separation structures
- Relocation of ramp termini along crossroad

2. Methods & Assumptions Document

A Methods & Assumptions (M&A) document is developed at the beginning of the study phase of a project to capture assumptions and criteria such as traffic volumes, design year, opening date, travel demand assumptions, baseline conditions, and design year conditions. This document also serves as a record of the process, dates, and decisions made by the project design team. Complex projects, such as areas experiencing rapid traffic growth or building a new urban interchange where none currently exists, may require inclusion of supplemental analyses such as Travel Demand Modeling and microsimulation or HCM Traffic analysis.

The document may be developed through a cooperative effort between FHWA, NDOT, preliminary engineering consultant, or other applicable stakeholders, such as a local public agency and planning organization.

Sufficient details shall be provided in the document to support all conclusions. Graphics, tables, maps, analyses and other supporting documentation may be used to clarify content.

2.1 METHODS & ASSUMPTIONS DOCUMENT OUTLINE

The Methods & Assumptions document should use the following outline as described in the corresponding sections.

- Introduction and Objectives
- Project Description
- Analysis Years/Periods
- Area of Influence
- Travel Forecast and Travel Data
- Traffic Operations Analysis
- Safety Analysis
- Alternative Analysis Process and Selection of Measure of Effectiveness (MOE)

2.2 INTRODUCTION AND OBJECTIVES

The M&A document should begin with the purpose and need of the project and identify study goals and objectives by answering the question, "*Why is this project being built?'*

The objectives serve as the basis for establishing evaluation criteria for the alternatives analysis. They should be realistic, context sensitive, support the project goal, and identify the desired performance characteristics (specific and measurable). Level of Service goals may be included, as applicable.

2.3 PROJECT DESCRIPTION

This section should provide a description of the project, including project leads and proponents, environmental class of action (Environmental Impact Statement, Environmental Assessment, Categorical Exclusion), background information, location, existing conditions, funding status, schedule, facilities that will be affected by the project, existing studies, team members, and a list of attachments. Define how the IAJR will address the regulations in 23 CFR 624.7.

2.4 ANALYSIS YEARS/PERIODS

This section should identify the analysis years and periods that will be used in the study. A 20-year analysis period is required for Interstates per 23 U.S.C. 109.b. Operational and safety analyses are based on both the current and future traffic projections using traffic data that is no more than 5 years old and at least the most recent 3 years of available safety data. At a minimum, the following scenarios should be analyzed during the AM/PM peak periods:

- Existing Year
- Design Year- No-Build
- Design Year- Build

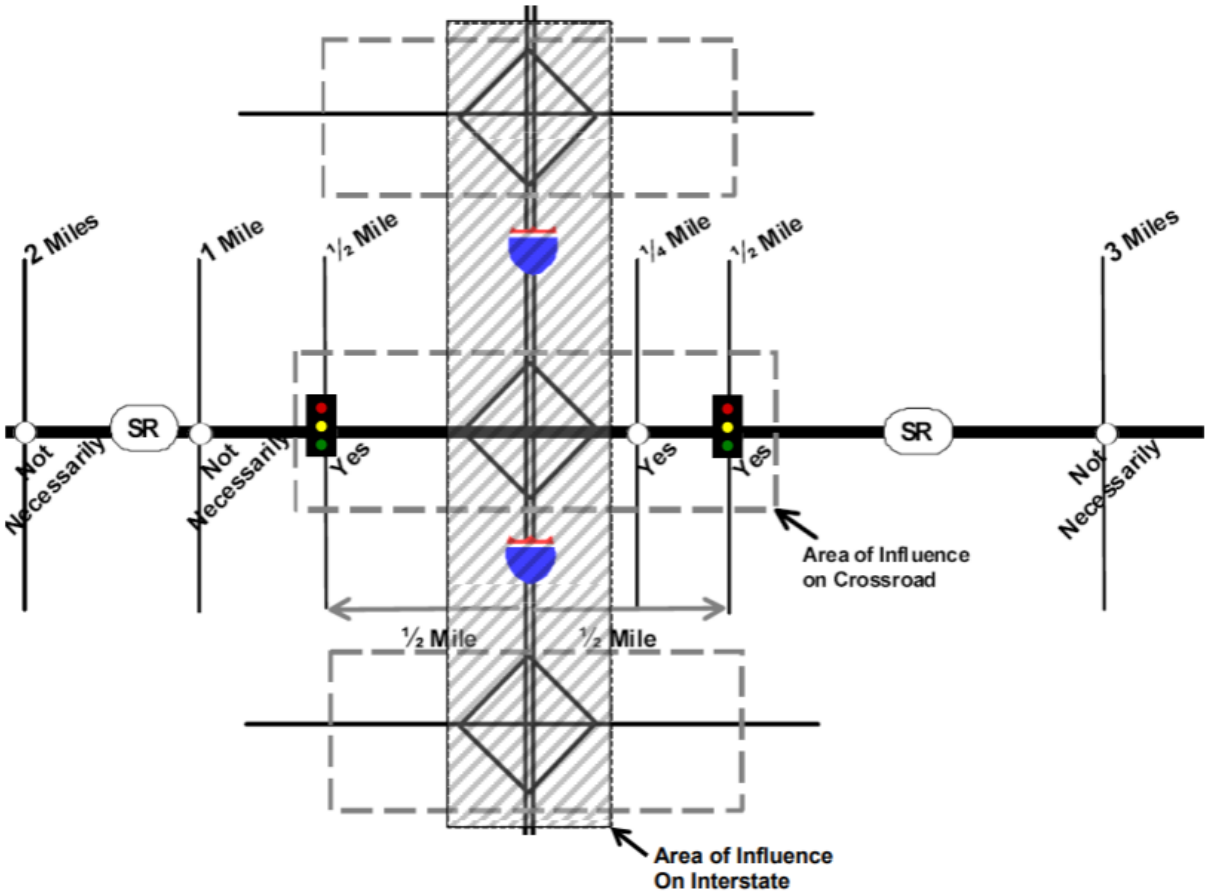
Other analysis years, if necessary, may include:

- Base year (Travel Demand Model (TDM) base year)
- Interim Year(s)
- TDM Planning Year

2.5 AREA OF INFLUENCE

The area of influence (**Figure 2.1**) is defined as the area that is anticipated to experience significant changes in traffic operating conditions as the result of the proposed access change. Factors such as area type, interchange spacing, crossroad signal locations, the extent of congestion, the presence of system interchanges, planned transportation systems, and anticipated traffic impacts should be considered when identifying the area of influence.

- Area of Influence along the Interstate System
    - The area of influence along the Interstate System and interchanging freeway, if applicable, should include the adjacent existing or proposed interchange in their entirety on either side of proposed change in access. This area may extend further as needed to ensure the limits of the analysis are appropriate to fully understand the impact of the proposed change in access on the Interstate System.
    - In rural areas, where interchanges are farther apart and the proposed access is isolated, extension to adjacent interchanges may not be necessary. Discussion and documentation indicating why the existing interchange(s) do not affect the proposed access changes should be included in the report.
- Area of Influence along crossroad
    - The area of influence along each crossroad includes the area to the first major intersection on either side of the proposed change in access, extending further as needed to demonstrate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local road network.
    - Crossroads of the adjacent downstream and upstream interchanges are normally not required, unless circumstances dictate otherwise.



Source: Adapted from Florida Department of Transportation, *Interchange Handbook*.

Figure 2.1 Area of Influence

2.6 TRAVEL FORECAST AND TRAFFIC DATA

This section should document which regional travel demand model or trend line analysis will be used to account for historical and projected growth rate.

- The methodology and process to be used in developing the forecast and the calibration/validation efforts that will be used (including benchmarks) should be described and documented.
- If these models are in the process of being updated at the time of publication of this IAJR document, document the assumptions that may be required as a result of this update.
- The method of traffic data collection should be documented. Include sources of data, methods of data collection, date(s) of collections, duration, time of day, and locations.
- The QA/QC process for collection of traffic data should be described. Include the method of cleansing raw traffic data and verification of any traffic irregularities such as weather or special events.

2.7 TRAFFIC OPERATIONS ANALYSIS

At the beginning of the project, an initial deterministic analysis, as described in the HCM, should be used to determine the appropriate traffic operations analysis methodology. The analysis should identify pertinent information for the existing year and design year build and no-build scenarios and may include, but is not limited to:

- Distances between interchanges
- Terrain
- Average vehicle length
- Peak Hour Factor (PHF)
- Percent trucks/buses (for each segment, as applicable)
- Driver population adjustment factor
- Base free flow speed (for each segment, as applicable)
- Ramp free flow speed (for each ramp, as applicable)
- Lane width
- Right shoulder lateral clearance
- Interchange density
- Rural/Urban freeway

This section of the M&A should describe what software, tools, and processes will be used to analyze and model traffic operations. Any software calibration acceptance targets needed, such as volume, travel times, speed, and delay, should also be identified. Additionally, the traffic data used should be no more than five years old.

Based on the context and characteristics of the project, a microsimulation analysis may be determined as the applicable traffic operations analysis methodology. This decision should be documented in the M&A document.

2.7.1 Traffic Operations Analysis Microsimulation

For projects requiring microsimulation and travel demand modeling, the M&A document will outline analysis and modeling assumptions and guidelines, calibration requirements, and documentation required for the more detailed analysis.

This section should identify what tools will be used for analysis or modeling of traffic operations; the parameters for each tool should be described. Appendix C provides further details on traffic analysis tools, modeling parameters, and assumptions that should be considered, as applicable, to the context of the project.

2.8 SAFETY ANALYSIS

This section should detail the crash rate in the project study area, contributing factors to crashes, and crash locations/corridors. At a minimum, the most recent three years of available crash data will be analyzed and deemed relevant to the study. In addition, other safety risks to be explored during the study should be identified.

2.9 ALTERNATIVES ANALYSIS PROCES AND SELECTION OF MEASURES OF EFFECTIVENESS (MOE)

This section should describe the alternatives analysis process that will be used from the initial development of alternatives to the selection of a preferred alternative. The alternatives considered for the safety, operations, and engineering analysis should also be included in the environmental review process. Metrics used to demonstrate how the proposal will accomplish its stated objectives should be documented.

2.9.1 Initial Screening

A two-step alternative analysis process should be used:

- Step 1: Initial screening of alternatives. This may narrow 10 alternatives to two or three alternatives, plus a no-build option, for detailed operational analysis.
- Step 2: Selection of preferred alternative. This is done through a more detailed analysis of the alternatives, with more precise MOEs.

An alternative matrix should be developed to provide documentation of why many of the initial alternatives were dropped from consideration. The criteria used in this matrix must be consistent to the project objectives and unbiased in presentation and analysis. Measures of Effectiveness (MOE) may be weighted differently for the alternatives analysis, but the reasons for and determination of weights must be clearly presented. The evaluation process must be documented and could include an objective rating/ranking system by project stakeholders or a more measurable/definitive ranking based on performance measures.

	No Build	Alternative A	Alternative B	Alternative C	Alternative D
Measure 1					
Measure 2					
Measure 3					
Measure 4					

Table 2.1 Example of Alternative Matrix

For the initial screening of alternatives, numerous alternatives are evaluated, and the screening criteria are much broader. This step eliminates alternatives that do not need extensive technical analysis to determine that they are not feasible or are deficient compared to other alternatives. Specific measures for each criteria need to be identified. The following is a list of possible initial screening criteria:

- Operations
- Safety
- Design
- Environment/Impacts
- Future Growth
- Adaptability
- Constructability
- Access Management (Interstate and Arterials)
- Network Connectivity (Freeway, Freeway and Arterial, and Arterial movements)
- Driver Expectancy
- Multimodal Accommodations
- Construction Costs

2.9.2 Measures of Effectiveness

In the selection of a preferred alternative, a more detailed or technical evaluation of finalist alternatives may be required. The evaluation and comparison of alternatives is quantified through Measures of Effectiveness (MOE). These should be clearly stated and defined in the M&A document when explaining the alternatives analysis process. More information can be found in *Traffic Analysis Toolbox Volume VI*.

2.9.2.1 Measures of Effectiveness for Operations Analysis

The following are examples of common MOEs that may be used in the operational analyses. If HCM Level of Service (LOS) is used, the data that determine the applicable LOS letter must also be clearly presented in the M&A document.

- HCM Level of Service
  - *Multilane urban arterial*: average through-vehicle speed
  - *Signalized intersection*: average total delay (all vehicles)
  - *Unsignalized intersection*: average control delay (only stopped/impeded movements)
  - *Freeway section*: density of traffic
  - *Freeway ramp*: density of traffic in lane one
- Volume/Capacity (V/C ratio)
- Travel Time
- Average Speed
- Queue Length
- Delay
- Travel Time Variance

When the study incorporates multiple changes in access it may be applicable to look at system level MOEs through the freeway corridor. System level MOEs are also applicable when a change in access has a relatively significant impact on the freeway mainline. The extent of the impact on through traffic can be determined with system level MOEs, which may include the following:

- Throughput
- Mean Delay
- Travel Time Index
- Oversaturated Freeway Segments
- Surface Street Intersections with Queue Lengths Exceeding Storage Lengths
- Exit Blockages

2.9.2.2 Measures of Effectiveness for Safety Analysis

The following are examples of common MOEs that may be used in the safety analyses.

- Crash Rates
- Crash Severity
- Driver Expectancy
- Pedestrian/Bicycle Related Incidents
- Predicted Crash Frequency

3. IAJR Documentation Requirements

3.1 INTRODUCTION

3.1.1 Description and Overview

The IAJR shall provide a description and overview of the proposed change in access. The project purpose and need should be referenced from the M&A document; the Area of Influence and a project location map shall be included.

3.1.2 Preliminary Design Documents

Refer to Section 1.4 of this SOP for full preliminary design document requirements. The IAJR shall include a copy of the applicable Minimum Design Standards, Design Criteria used, and geometric plans. Preliminary design plans should be included for the preferred alternative. Conceptual design plans shall be provided for at least the initially screened alternative designs.

3.2 DATA AND TRAFFIC FORECASTING

3.2.1 Data Collection and Preparation

The data collection and preparation process should be documented to describe where and how the data was collected for the operational analysis. The following is a partial list of data that may be necessary for both HCM and microsimulation analyses:

- Geometry (lengths, number of lanes, curvature, intersection configuration, lane widths, shoulder geometrics)
- Control (signal timing, signal and stop control locations, ramp meters, parking restrictions, turning restrictions, median control, etc.)
- Existing volumes (AADT and/or peak periods, turn volumes)
- Existing demands (origin/destination studies)
- Calibration data (capacities, travel times, speed (measured free-flow speeds), queue lengths, etc.)
- Types and percent of vehicles (transit, HOV, bicycle, pedestrian)

3.2.2 Future Traffic Forecasting

Analysis of future conditions involves the preparation of future traffic volumes for all reasonable build alternatives. The future traffic volume development should utilize the historical traffic data, population projections and travel demand models as documented in the M&A document.

As a minimum, Traffic forecasting should be done for the daily AM peak hour and PM peak hour for the following scenarios:

- Existing Year Conditions
- Design Year No-Build
- Design Year Build (each alternative)
- Opening Year Build (each alternative)

3.3 ANALYSIS OF EXISTING CONDITIONS

An existing year analysis should be done for all IAJRs. This will identify any existing operational issues and provide baseline operational characteristics for comparison of build and no-build alternatives. The existing conditions analysis should include the common elements such as traffic volumes, environmental issues, multimodal mobility, land use, safety and roadway characteristics.

3.4 OPERATIONAL ANALYSIS

Initial analysis should be performed using HCM theory, often performed with a current version of the Highway Capacity Software (HCS). Because HCM is intended for isolated or small-scale transportation facility analysis, a microsimulation analysis may be necessary for more complex projects to understand and analyze all network impacts. Information on what tools should be used for analysis is provided in *Traffic Analysis Toolbox Volume II*.

For each component of the analysis, sufficient documentation of any assumptions, deviations from typical, and the process followed should be included. Enough information should be provided so someone else could independently duplicate the work and achieve the same, or similar, results (as applicable).

3.4.1 Analysis Measures

This section should detail the MOEs previously established in the M&A document that will be used for the operational analysis. If additional MOEs are used, or previously identified MOEs are not used, the reasoning and justification should be documented.

3.4.2 Analysis Scenarios

In the operational analysis, the analysis years/period scenarios identified in the M&A document should be analyzed to account for directional volumes.

3.4.3 Presentation of Analysis Results (Summary)

A summary of the operational analyses should be presented at the beginning of the alternatives analysis section. The summary may include both a graphical representation of segment LOS and a table format of the segment LOS and MOE used to determine LOS. All scenarios should be presented that are carried through the initial screening process where operational analysis is utilized.

When presenting the LOS and MOE values, do not include both HCM values and microsimulation values in the same table as this may encourage the comparison of these values across analysis tools, which can be misleading because of how these values are measured differently from tool to tool.

3.4.3.1 Freeway Segment Analysis

These sections address the HCM segment analysis, summarized in tables by providing the MOEs identified earlier. A graphical output may also be beneficial. This will be done for the following analyses for the scenarios identified in the M&A document:

- Basic Freeway Segments
- Ramp Junction Analysis
- Weave Area Analysis

3.4.3.2 Artewrials Analysis

The arterials identified in the area of influence must be analyzed to a similar level as the freeway mainline and interchange to sufficiently analyze the alternatives. Typically, one alternative involves improving arterials to handle volumes and/or specific traffic movements.

Similar to freeway and interchange analyses, a detailed description of the analysis process should be identified. This includes all inputs to the analysis, worksheets, and output sheets (such as those from Synchro). Cycle lengths, existing lengths in field and future optimized, should be included.

3.4.4 Slow Speed Operations

This section only applies if there are geometric conditions within the study area that create slower speeds than the upstream segments. This would apply to both the existing geometry as well as to proposed alternatives. Examples include the impact of using a loop ramp, high degrees of curvature on other ramps, merge/diverge location, exceptions to high design speed facilities, etc. For existing conditions, discuss how it impacts traffic and what improvements could be implemented. For the alternatives analysis, the operational improvement and associated impacts to upstream/downstream locations should be identified. If an alternative necessitates the use of a slow speed alternative, specific reasons for its use should be described along with identifying and analyzing downstream/upstream impacts.

3.5 SAFETY ANALYSIS

The scope and methodology for safety analysis will be based on project type, location and complexity, crash history, and goals and objectives. The purpose of the safety analysis is to understand how geometric designs may impact safety and crash likelihood at an existing or proposed interchange.

3.5.1 Quantitative Analysis

NDOT will use appropriate quantitative analysis methods, such as the Highway Safety Manual, for the safety analysis. In a historical safety analysis, NDOT generally utilizes the most recent five years of crash data with the most recent three years of available data used at a minimum. Other quantitative analysis methods may be used upon approval by NDOT.

The Highway Safety Manual (HSM) provides two methodologies for analyzing the safety impact of geometric design decisions. The historical safety analysis method utilizes observed crash history. The predictive safety analysis method uses a combination of the observed crash history and a model of predicted crashes for that type of roadway.

The historical safety analysis method assumes that the frequency and patterns of crashes of a roadway will continue if no changes are made to the roadway. Changes to the roadway characteristics that adjust the historical frequency and pattern of crashes are calculated as a Crash Modification Factor (CMF). The historical crashes are multiplied by the CMFs for the identified roadway characteristic changes to estimate the crashes after the changes are constructed. NDOT utilizes CMFs from the Highway Safety Manual and safety research.

The predictive safety analysis method assumes that similar roadways will have a similar frequency and patterns of crashes that can be predicted in a statistical model. The statistical

model has Adjustment Factors that adjust the number of predicted crashes based on the roadway's characteristics that impact safety. For a selected roadway type and identified roadway characteristics, the statistical model will predict the number of crashes for that roadway configuration. Because the statistical model can't capture all the variations of roadway characteristics that impact safety and the local context of a specific roadway, the predicted crashes are combined with the historical crashes into a weighted average called expected crashes.

3.5.2 Qualitative Analysis

A qualitative analysis considers the physical characteristics of any existing or proposed interchange, including alternatives that are being evaluated during screening, human factors, and operational attributes that influence safety but cannot be reliably quantified. This analysis may include, but is not limited to, reviewing geometric conditions of the roadways, on-site field reviews or road safety audits, and documenting other issues gathered from as-builts of the surrounding roadways. As part of these reviews, items such as existing signs, markings, and passing zones are also reviewed for compliance with minimum standards.

3.6 ALTERNATIVES ANALYSIS

The no-build and all reasonable (preferred and other) build alternatives should be analyzed for the opening year and design year. Once the existing and no-build conditions are known, potential improvement concepts should be developed that address the purpose and need for the project and consider safety, operations and engineering.

3.6.1 Alternative Analysis Screening

The screening and elimination of all alternatives must be documented and consistent across all alternatives. Through the entire alternatives analysis, the documentation should provide enough information that there is little doubt the alternative could be the most suitable. Document the preliminary list of alternatives that will be evaluated. Utilize the alternative analysis process and selected MOEs as detailed in the M&A document to screen the preliminary list of alternatives down to the alternatives that will be further developed.

3.6.2 Documentation of Alternatives

Details of all reasonable build alternatives considered, including those eliminated from further consideration, shall be documented in the IAJR. The documentation for the alternatives eliminated can be minimal, such as a brief description of what was considered and reasons (fatal flaws) for elimination. Remaining build alternatives meeting requirements of the project will have a more detailed description and be carried forward for evaluation. A description and overview of the proposed change in access (build alternative) including changes in geometry should be discussed. A concept plan figure should be provided with the documentation.

3.6.3 Evaluation of Alternatives

The evaluation of alternatives for an IAJR document is a thorough technical investigation to compare the performance of alternative improvements that are developed to meet the need for the project. MOEs that were identified in the M&A document are used to compare the alternatives.

The evaluation of an alternative should address, at a minimum, the safety, operations, and engineering (SO&E) of the alternative. The SO&E analyses performed in the evaluation of alternatives shall demonstrate that the IAJR does not have significant adverse impacts on the

operation of the mainline and adjacent network. The build alternative shall not result in conditions worse than the no-build alternative at any analysis year.

3.7 CONCLUSION

This section should document the results of the operations, safety, and alternatives analysis as well as the selection of the preferred alternative based on this prior analysis and the NEPA process.

This section should also detail how the preferred alternative for the access change meets or exceeds the requirements for the Interstate System Access Requirements as set forth in 23 CFR 624.7 and shown in Section 1.3 of this document.

4. SO&E Acceptability Determination and Final Approval

4.1 DRAFT IAJR

The draft IAJR should include all documentation associated with the M&A document, Data Collection, Traffic Forecasting, Operations, Safety, and Alternatives Analysis, and SO&E evaluation of the alternatives.

The draft IAJR shall be reviewed by NDOT Roadway Design and Traffic Engineering Divisions for quality, completeness, and adherence to this guidance. All comments resulting from this submittal will be addressed, and the draft IAJR will be amended accordingly.

4.2 DETERMINATION OF SO&E ACCEPTABILITY

Upon completion of the NEPA process, the IAJR may move from Draft to Final status after incorporating all comments. The IAJR must present the preferred alternative that is documented in the NEPA documentation and the operations and safety analysis. The IAJR shall be provided to FHWA for a determination of SO&E acceptability, except for those projects outlined in **Table 1.1,** for which determination authority is delegated to NDOT by programmatic agreement. FHWA review durations are detailed in the programmatic agreement.

A determination of SO&E acceptability may be issued prior to the completion of the NEPA process based on the safety, operations and engineering analysis alone. However, upon completion of the NEPA process, the preferred alternative selected based on SO&E analysis must be of the same scope and design as the preferred alternative based on NEPA before final approval is given.

The signed letter of determination of SO&E acceptability should be uploaded to the project file and included with the final IAJR deliverable.

4.3 APPROVAL PROCESS

Approval of the IAJR and access change request will follow either a one-step or a two-step process. In the one-step process, the SO&E determination and final IAJR will be submitted to FHWA after the completion of the NEPA process and decision. The two-step process involves conditional concurrence of the SO&E determination prior to NEPA completion.

4.3.1 Conditional Concurrence

The determination of SO&E acceptability and final IAJR shall be sent to FHWA for conditional concurrence. This can be done upon completion of the IAJR when the SO&E determination is made but the NEPA process isn't complete. Conditional concurrence shall be documented in the project file. Any objections or comments shall be addressed.

4.3.2 Final Approval

Upon completion of the NEPA process and NDOT approval of the Record of Decision (ROD), Finding of No Significant Impact (FONSI), or Categorical Exclusion (CE) determination, the determination of SO&E acceptability shall be sent to FHWA along with the final IAJR document for approval. Any objections or comments shall be addressed. Record of final approval of the access change request shall be uploaded to the project file.

Under the two-step process where FHWA conditionally concurred with the SO&E determination, summary information concerning the access change request shall be sent to FHWA upon completion of the NEPA process. Documentation detailing the dates of the SO&E determination, NEPA determinations, and demonstration that the alternative covered by the favorable SO&E determination is of the same scope and design as the alternative selected and approved in the NEPA decision shall be included in the submittal to FHWA. Any objections or comments shall be addressed. Record of final approval of the access change request shall be uploaded to the project file.

4.4 IAJR RE-EVALUATION

The following primary conditions will require re-evaluation of previously approved IAJRs.

- Change in approved IAJR design concepts due to:
  - Environmental impact
  - Final design adjustment
  - Design-build proposal
- Significant changes in the following conditions:
  - Travel Pattern
  - Land use
  - Environment
- Time lapse before construction:
  - If the project does not progress to construction phase within five years of approval.

5. Oversight and Annual Reporting

5.1 QUALITY CONTROL

Every project with a change in access to the Interstate System must document the quality control measures that were taken over the course of the project. For projects requiring an IAJR, the Quality Control Checklist, Appendix E, shall be utilized to ensure every requirement is met and all analysis is reviewed before an SO&E determination is made and before the IAJR is submitted. The Quality Control Checklist will be managed by the appropriate NDOT Roadway Design Section Head and uploaded to the project file upon completion.

NDOT will conduct a yearly review to ensure that the guidelines and requirements outlined in this SOP were followed or where improvements to this document and process could be made. NDOT will review the applicable documentation, software, and resources to ensure all is up to date and a review of IAJR projects to evaluate how effectively this SOP was carried out.

Under a proposed programmatic agreement with FHWA, as part of this yearly review, NDOT will monitor and review its process of SO&E determination on applicable Interstate Access change projects, ensuring no errors or omissions in documentation were made and that its practices were in keeping with the programmatic agreement. This review will be done within three months following the end of the calendar year.

5.2 RECORDS AND REPORTING

The Final IAJR for the access change request will be submitted to the NDOT Policy and Design Standards Engineer who will upload all documentation as well as the SO&E acceptability determination, documentation of access change approval, and any other pertinent project records to NDOT's document management system. This information will be retained for a period of at least three years.

NDOT will prepare an annual report summarizing the previous calendar year's quality control efforts (23 CFR 624.13(d)) for submittal to FHWA – Nebraska Division. The report will be completed as a part of NDOT's annual quality control review and will include:

- Results of all changes in access to the Interstate System that were processed and received a SO&E determination for the previous calendar year.
- Summary of the changes in access to the Interstate System that NDOT plans to process in the coming calendar year.
- Actions taken by NDOT as part of its quality control efforts
- Any areas where improvements are needed and actions NDOT is taking to implement those improvements.
- An assessment of the effectiveness of and verification that all changes in access to the Interstate System processed through this agreement were evaluated and processed in a manner consistent with the terms the IAJR Programmatic Agreement.

Appendix A: Methods & Assumptions Formatting Guidelines

A.1 Title Page

"Methods and Assumptions Document"
Project Name, CN, Project Number
Location
Prepared For:
Prepared By:
Date:
Allow space for timeline of document revisions through life of project

A.2 Stakeholder Acceptance

The page following the Title Page is the Signature Acceptance page. It should state:

"The undersigned parties, including all members of the team from Nebraska Department of Transportation, FHWA, and the Local Agencies, concur with the Interstate Access Justification Report Methods and Assumptions for the <Project Name> as presented in this document."

There should be a signature block for each party, formatted similar to the example below:

NDOT Traffic Engineering	**NDOT Roadway Design**	**FHWA**
Signature	Signature	Signature
Title	Title	Title
Date	Date	Date

The following notes, if agreed by the stakeholders, may go at the bottom of the signature page:

(1) Participation in the Methods and Assumptions Document meeting and/or signing of this document does not constitute approval of the <Project Name> Interstate Access Justification Report.
(2) All Stakeholders will accept this document as a guide and reference as the study progresses through the various stages of project development. If there are any agreed upon changes to the assumptions in this document, a revision will be created, endorsed, and signed by all the stakeholders.

Appendix B: Typical IAJR Schedule

Task	Division	Months																
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Determine project location and goals	Roadway IAJR																	
Determine if an IAJR is required	Roadway IAJR																	
Get the consultant under contract	Roadway IAJR																	
Data Collection	Roadway IAJR																	
Traffic Forecasting	Roadway IAJR																	
Traffic and Safety Analysis	Roadway IAJR																	
Alternatives Analysis	Roadway IAJR																	
Choose a preferred alternative	Roadway IAJR																	
Safety Operations & Engineering Document	Roadway IAJR																	
Draft 1 of the IAJR	Roadway IAJR																	
IAJR Draft 1 Internal Review	Roadway IAJR																	
Submit IAJR to FHWA for initial comments	Roadway IAJR																	
Respond to FHWA comments and submit for SO&E determination	Roadway IAJR																	
Fill out initial T&E checklist	Roadway Design																	
Send environmental our initial LOC's	Roadway Design																	
Hold the PCM20 kickoff meeting	Roadway Design																	
Submit initial 290 form	Roadway Design																	
PIH Plans and Meeting	Roadway Design																	
PCM30	Roadway Design																	
Final LOC's to ROW and Environmental	Roadway Design																	
Submit final 290 form	Roadway Design																	
PCM35	Roadway Design																	
Submit Floodplain Certification	Bridge Hydraulics																	
Complete NDOT53 Probable Class of NEPA form	Environmental																	
NEPA	Environmental																	
PI Meeting or mailers	Public involvement																	
Submit IAJR with NEPA documentation to the FHWA for final approval	Roadway IAJR																	

Appendix C: Software Performance Measures & Assumptions

Software Performance Measures

List the software used for Traffic analysis. For each analysis software listed, identify the analysis segment(s) (ex. Freeway, intersections, arterials, roundabout, DDIs) and the performance measure(s).

Freeway Operations Parameters/Assumptions

The following freeway operation parameters used in a microsimulation analysis should be detailed for the Existing Year and Design Year for the No-build and Build alternatives:

- Analysis Time Period(s)
- Vehicle Types, Classes, and Characteristics
- Vehicle Entry Headway
- Driving Behavior: Freeway Mainline and Ramps
- Driving Behavior: Arterials (if applicable)
- Vehicle Acceleration
- Vehicle Deceleration
- Free-Flow Speed
- Reduced-Speed Areas on Ramps
- Off-Ramp Lane Change Distance
- Freeway Grades
- Simulation Resolution
- Other Deviations from Default Parameters

Arterial Operations Parameters/Assumptions

The following arterial operation parameters used in microsimulation analysis should be detailed for the Existing Year and Design Year for the No-build and Build alternatives:

- Peak Hour Factor
- Conflicting Bikes and Pedestrians per Hour
- Area Type
- Ideal Saturation Flow Rate
- Lane Width
- Percent Heavy Vehicles
- Percent Grade
- Parking Maneuvers per Hour
- Bus Blockages
- Intersection Signal Phasing
- Intersection Signal Timing Optimization Limits
- Minimum Green Time
- Yellow (Y) and All-Red (R) Time
- Right Turn on Red
- Level of Service Goals

Appendix D: Quality Control Checklist

Item	Review			
	Responsible Party	Checked By	Date	Comments
Methodology Coordination				
Purpose and Need is approved and stored in OnBase	Roadway Design			
Methods and Assumptions (M&A) Coordination meeting conducted, and meeting minutes stored in OnBase	Roadway Design			
M&A memo is reviewed and signed off by division heads	Roadway Design / Traffic Engineering			
Area of influence includes adjacent interchanges and intersections as per M&A	Traffic Engineering			
Operational, safety methodologies and analysis years are identified as per M&A	Traffic Engineering			
Traffic forecast methodology is included as per M&A	Strategic Planning			
Software and analysis programs are identified in the M&A	Traffic Engineering			
Measures of Effectiveness (MOEs) are consistent with analysis tools and project location	Traffic Engineering			

Item	Review			
	Responsible Party	Checked By	Date	Comments
Traffic Data Collection & Forecasting				
Existing traffic count data collected	Traffic Engineering			
Traffic forecasts are reviewed and approved	Strategic Planning			
If Travel Demand Model (TDM) is used for traffic forecasting, TDM is latest/approved model	Strategic Planning			
Traffic forecasts are checked for reasonableness for all alternatives and design years	Strategic Planning			
Report				
Latest guidelines/standards have been used	Roadway Design			
Existing and/or expected future traffic conditions and Level of Service are documented	Traffic Engineering			
The results of traffic analysis have been reviewed for accuracy, including software output sheets	Traffic Engineering			
If a microsimulation tool was used, the report includes the calibration memo	Traffic Engineering			
The results of build year analysis are compared to the no build analysis	Traffic Engineering			

Item	Review			
	Responsible Party	Checked By	Date	Comments
The traffic analysis software files have been checked to verify input and parameters	Traffic Engineering			
The historical crash data and analysis conducted for latest 3 years is included	Traffic Engineering			
The safety analysis includes predicted crash frequency and/or evaluation of Crash Modification Factors	Traffic Engineering			
The potential safety improvements have been identified	Traffic Engineering			
Design schematic is included and matches analysis	Roadway Design / Traffic Engineering			
Signing plan is included	Traffic Engineering			
The report has been reviewed for grammatical and editorial errors	Roadway Design / Traffic Engineering			
All coordination meetings have been documented in the Appendix	Roadway Design			
The status of Environmental process is provided, and all Control and Project Numbers are listed	Roadway Design			
If design exception/relaxation is anticipated, additional coordination is conducted	Roadway Design			