

**Chapter 5  
Mn/DOT Traffic Impact Study Guidance**

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## **5.1 What Is a Traffic Impact Study?**

A traffic impact study (TIS) is a comprehensive analysis of the “before” and “after” operational traffic impacts to a road system resulting from proposed development and associated traffic movements and volumes.

- A TIS is used to identify capacity deficiencies at affected intersections and to help identify feasible solutions to the deficiencies.

## **5.2 Purpose of Mn/DOT TIS Guidance**

This guidance:

- Identifies circumstances that do not warrant detailed traffic impact studies;
- Identifies the circumstances for which Mn/DOT *does* recommend that a TIS be completed;
- Helps to ensure a consistent statewide approach to traffic impact analysis; and,
- Provides Mn/DOT staff, local governmental units, developers, consultants, and other interested parties with a guide to Mn/DOT’s traffic impact analysis process and recommended methodologies.

## **5.3 TIS Not Needed**

A traffic impact study is not necessary for most individual developments.

- For developments that do not generate significant traffic volumes, a traffic impact study is neither necessary nor warranted.
  - Development proposals that are estimated to generate fewer than 250 peak-hour vehicle trips or 2,500 new daily trips generally would not warrant completion of a traffic impact study, unless there are unusual circumstances;
  - Even projects that otherwise require environmental review should generally not require a traffic impact study if projected volumes are below this threshold.
- The traffic impacts of small/modest development proposals will be evaluated sufficiently by applying other elements of the guidance in this Access Management Manual, such as that regarding development review, spacing, sight distance, and turn lanes. The guidance provides “built-in” traffic engineering measures that are sufficient to address the impacts of lower-volume developments.

## **5.4 TIS Needed/Recommended**

Mn/DOT recommends that a Traffic Impact Study be completed for developments estimated to generate either **250\* or more peak-hour vehicle trips or 2,500\* new daily trips**, for either of the following situations:

- As an element of an environmental assessment worksheet (EAW), alternative urban area-wide review (AUAR), or environmental impact statement (EIS) being completed under Minnesota Rules 4410.4300 and 4410.4400; or,
- As part of local development review for developments generating such traffic volumes, even if no environmental review is mandatory.

*\* The threshold for vehicle trips may be reduced if the vehicle composition consists of a high percent of heavy vehicles.*

By working together, Mn/DOT and local governments can ensure that evaluations meet the needs of all parties, use accepted methods, improve the understanding of a project's potential effects, and lead to identification and implementation of appropriate, practical, and feasible mitigation actions.

When a development is staged or phased over time, Mn/DOT recommends that a Traffic Impact Study be completed based on the impacts of the final phase or build-out.

Some large-area development proposals undergo a type of environmental review referred to as an alternative urban area-wide review (AUAR). This Mn/DOT TIS guidance is also appropriate for an AUAR. Individual development proposals within the AUAR area should be checked for consistency with the AUAR TIS; additional project-specific traffic impact evaluation may be appropriate, depending on the proposal's unique characteristics.

## **5.5 Review Authority**

During the development review process, Mn/DOT seeks to work cooperatively with the local road authorities and the governmental unit responsible for development approval(s) and environmental review. *The governmental unit responsible for development approval(s) and environmental review is known as the local governmental unit or responsible governmental unit (LGU/RGU).* The following points regarding review authority should be noted:

- Mn/DOT does not have specific statutory authority to require a private land owner to prepare a traffic impact analysis as a condition for a driveway permit:
- Mn/DOT can recommend that LGU/RGUs include a Traffic Impact Study as part of their environmental and/or development review:
- Under state law, Mn/DOT has approval authority for connections to the trunk highway system.
  - In order to make an informed decision about access permit requests, Mn/DOT may request additional, reasonably-available information about the proposal.

When an LGU/RGU requires a Traffic Impact Study for either development review or environmental review, Mn/DOT recommends that the Traffic Impact Study be completed either directly by the LGU/RGU or by a consultant to the LGU/RGU. (Commonly, costs will be borne, at least in part, by the project proposer.) This arrangement is strongly preferred over studies completed directly by/for the project proposer.

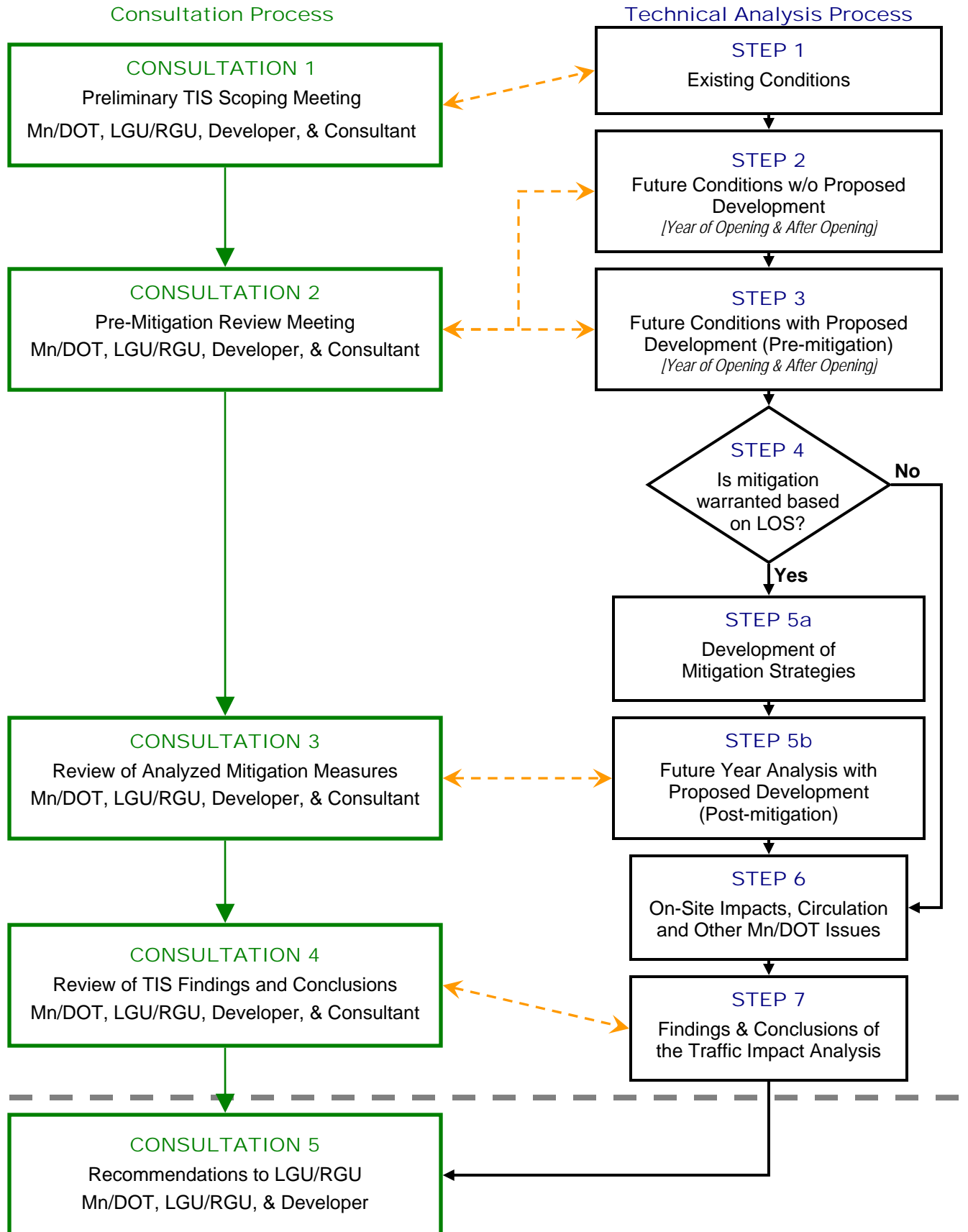
While Mn/DOT's focus regarding a Traffic Impact Study is on understanding the possible direct or indirect impacts on the state trunk highway system, the consultation process recommended in this guidance is intended to help ensure that the concerns of all parties are considered and evaluated appropriately.

## **5.6 TIS Consultation Process and Technical Analysis Flowchart**

Successful, readily-accepted traffic impact studies require both a sound, rigorous technical *analysis* and an inclusive *process* that ensures key stakeholders are involved in scoping the study, reviewing the analysis, and collectively determining potential feasible mitigation strategies (if needed).

The flowchart on Figure 5.1 shows this dual track of consultation process and technical analysis steps for a TIS. The rest of this chapter describes these consultation process milestones and the TIS technical analysis steps.

Figure 5.1 – Traffic Impact Study Flowchart



**5.6.1 Consultation Process Milestones**

The left half of the Figure 5.1 flowchart identifies milestones during the course of a Traffic Impact Study, when it is essential that Mn/DOT, the LGU/RGU, the developer, and study consultant(s) meet, exchange information, and reach an understanding about how the next steps of the Traffic Impact Study should proceed.

These consultation milestones are focused on key parties and are limited to traffic impacts. Other coordination and outreach efforts will be necessary to address non-transportation issues and to reach other possible stakeholders and the public.

Each project is unique. For some, consultation meetings can be consolidated; others will require additional meetings.

Consultation 1 – Preliminary Traffic Impact Study Scoping Meeting

Before the technical analysis for a TIS is begun, early consultation among Mn/DOT, the local land-use and road authorities, the project proposer, and study consultants (if identified at this point) will help to ensure a common understanding of the development proposal and help reach a collective determination about the scope of the TIS.

Parties should <b>discuss</b> the following:	Parties should seek <b>agreement</b> on the following:
<ul style="list-style-type: none"> <li>• Project description                             <ul style="list-style-type: none"> <li>○ Development size and type</li> <li>○ Project schedule, including phasing and/or staging development</li> <li>○ Access locations</li> <li>○ Internal circulation and parking</li> </ul> </li> <li>• Preliminary (conceptual) mitigation strategies                             <ul style="list-style-type: none"> <li>○ Identify committed Mn/DOT and local improvements</li> <li>○ Identify intersections where traffic control may change</li> </ul> </li> <li>• Other Mn/DOT and local guidance                             <ul style="list-style-type: none"> <li>○ Mn/DOT permitting (as required)</li> <li>○ Access Management Manual</li> <li>○ Mn/DOT Intersection Control Evaluation (Technical Memorandum No. 07-02-T-01)</li> <li>○ Local government zoning/development review requirements</li> <li>○ Other transportation modes (transit, bikes, pedestrians)</li> </ul> </li> <li>• Other proposed developments in the area</li> <li>• Existing safety concerns (High crash-cost intersections and segments)</li> </ul>	<ul style="list-style-type: none"> <li>• Identification of lead agency/responsible parties, financial responsibility for study costs, on-going coordination, and information-sharing</li> <li>• Review schedule                             <ul style="list-style-type: none"> <li>○ Determine if it occurs within required environmental review timelines</li> <li>○ Seek variance if study will require additional time</li> </ul> </li> <li>• Methodology of study                             <ul style="list-style-type: none"> <li>○ Analysis software</li> </ul> </li> <li>• Data assumption to be used                             <ul style="list-style-type: none"> <li>○ Identify peak hour(s)</li> </ul> </li> <li>• Data sources to be used                             <ul style="list-style-type: none"> <li>○ Available data</li> <li>○ Source of future AADT</li> <li>○ Source for Trip Generation</li> </ul> </li> <li>• Delineation of the study area, including key intersections, signalized driveways, and roadway links</li> <li>• Identification of analysis year(s)                             <ul style="list-style-type: none"> <li>○ In most cases – Year of opening or five years after opening</li> <li>○ For very large developments – Year of opening and 20 years after opening</li> </ul> </li> </ul>

The tables below provide a quick list of the technical data needed at this stage in order for the technical analysis to proceed.

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**Study Name:**

**Lead Agency:**

**Responsible Party:**


**Primary Contact for Study:**

Name  
Agency/Company  
Address  
Phone


**Study Period:**

Analysis Year(s):

Base Year:

Year-of-opening:

Other Analysis Year(s):

Analysis Period(s):

Peak Hours:

Other:


**Study Area:**

**Intersections/Interchanges:** (see attached list or map)

*Including all access points to the proposed development*

**Segments:** (see attached list or map)


**Study Schedule:**

	Task Description	Date
<b>Task 1</b>		
<b>Task 2</b>		
<b>Task 3</b>		
<b>Task 4</b>		





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### Consultation 2 – Pre-mitigation Review Meeting

After the technical analysis has assessed future traffic conditions (Technical Analysis Steps 2 and 3, with and without development), this second consultation meeting helps key partners understand whether mitigation is necessary. In situations where it might be needed, this is also an opportunity to discuss possible mitigation strategies. The goal of this consultation is to identify logical candidates for evaluation, based on practical considerations such as economic and geometric feasibility.

Parties should <b>discuss</b> the following:	Parties should seek <b>agreement</b> on the following:
<ul style="list-style-type: none"> <li>• Need for mitigation, based on forecasted future conditions and specific to proposal</li> <li>• Feasibility of potential mitigation strategies                             <ul style="list-style-type: none"> <li>○ Financial constraints and responsible party/ies</li> <li>○ Design constraints</li> <li>○ Intersections where traffic control may change</li> <li>○ Access management considerations</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• A priority list of potential mitigation measures for evaluation                             <ul style="list-style-type: none"> <li>○ Strategies should be both economically and geometrically feasible</li> </ul> </li> </ul>

### Consultation 3 – Review of Analyzed Mitigation Measures

During the third consultation, the key parties consider the results of the mitigation analysis and determine whether additional strategies should be evaluated, possibly including non-highway transportation strategies. This consultation should be repeated if the analysis identifies a further need for greater mitigation.

Parties should <b>discuss</b> the following:	Parties should seek <b>agreement</b> on the following:
<ul style="list-style-type: none"> <li>• Results of analyzed mitigation strategies                             <ul style="list-style-type: none"> <li>○ Is further mitigation necessary?</li> </ul> </li> <li>• Feasibility of additional possible mitigation strategies                             <ul style="list-style-type: none"> <li>○ Are the strategies practical?</li> <li>○ Or economically feasible?</li> </ul> </li> <li>• Additional mitigation strategies to improve existing LOS E or F intersections/segments to LOS D</li> </ul>	<ul style="list-style-type: none"> <li>• Identification of selected additional possible mitigation measures for evaluation</li> </ul>

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## Consultation 4 – Review of TIS Findings and Conclusions

Many findings from the TIS analysis will already have been reviewed by the key partners, but Consultation 4 is intended to be an opportunity for a final review of findings by the key partners and endorsement of the study's conclusions.

Parties should <b>discuss</b> the following:	Parties should seek <b>agreement</b> on the following:
<ul style="list-style-type: none"><li>• Any new results of analyzed mitigation strategies or other TIS technical analysis</li><li>• Significance of findings for pending decisions and for implementation</li></ul>	<ul style="list-style-type: none"><li>• Concurrence on findings and conclusions of the technical analysis</li></ul>

This consultation may also begin a discussion of the recommendations that follow from the study's technical analysis.

## Consultation 5 – Recommendations to LGU/RGU

One of the benefits of a Traffic Impact Study is that it provides an analytical basis for discussion about mitigation strategies, the assignment of implementation responsibility, cost sharing, funding sources, and the steps needed to move the strategies and improvements forward.

This discussion among the local government, Mn/DOT, and the developer builds on, but moves beyond the technical traffic impact analysis to include the feasibility, timing, and cost effectiveness of the strategies, as well as identification of decision milestones and other areas of concern. For example, if improvements are needed within the state highway right-of-way, a permit must be obtained from Mn/DOT. All work within state highway right-of-way is subject to Mn/DOT standards and specifications. As part of the consultation effort, there should be discussion of any possible opportunities to coordinate or leverage a project.

The TIS analysis can be especially useful to local units of government in defining the relationship between the proposed development and recommended transportation system improvements – providing a basis for assessing the development's "fair share" responsibility for making those improvements.

Parties should <b>discuss</b> the following:	Parties should seek <b>agreement</b> on the following:
<ul style="list-style-type: none"><li>• Pending reviews/approvals<ul style="list-style-type: none"><li>○ Conditions of approval</li></ul></li><li>• Opportunities for collaboration<ul style="list-style-type: none"><li>○ Locally initiated projects</li><li>○ Cooperative agreement projects</li><li>○ Modified local or Mn/DOT work plans</li></ul></li></ul>	<ul style="list-style-type: none"><li>• Assignment of responsibilities</li><li>• Allocation of costs<ul style="list-style-type: none"><li>○ Apply Mn/DOT Cost Participation Policy (as warranted)</li></ul></li><li>• Follow-up coordination and information sharing</li></ul>

Mn/DOT actions at this stage would likely include review/approval of an access permit. Additional consultation between Mn/DOT, the RGU, and the developer may be necessary during the development review and/or permitting process.

Depending on timing and coordination opportunities, it may also be appropriate to adjust Mn/DOT's program of projects and/or district or corridor plans.

## 5.6.2 Technical Analysis Steps

### STEP 1 – Existing Conditions

Level of Service (LOS) analysis of the existing system for the base or current year

The TIS should include the following:

- A map or diagram identifying the existing geometric and operational conditions at each study intersection/interchange and each study segment:
  - Typical information for all studies: number of through-lanes, documentation of auxiliary lanes and auxiliary lane lengths, sight lines (sight distance), and level of service;
  - Additional information depending on location: signal phasing, availability of gaps in traffic, and crash diagrams.
- Documentation of the assumptions used:
  - Indicate any major atypical transportation projects in the area that may have affected the base year traffic volumes.
- All output from the modeling and/or calculations should be attached as an appendix.

### STEP 2 – Future Year Conditions without Proposed Development

Level of Service (LOS) analysis for the anticipated transportation system and traffic volumes for the year-of-opening, and for any other analysis years WITHOUT the proposed development

The TIS should include the following:

- A map or diagram identifying the planned geometric and operational conditions at each study intersection/interchange and for each study segment (number of lanes, signal phasing, level of service);
- Forecasted traffic volumes data sources:
  - From adopted plans for Metropolitan Planning Organization (MPO) areas;
  - From Mn/DOT Office of Transportation Data & Analysis (TDA) for non-MPO areas.

*Note: If forecasted traffic volumes come from a data source other than the two listed above, the Mn/DOT Office of Transportation Data & Analysis should review the data for consistency.*

- Documentation of the assumptions used:
  - How future background traffic was determined;
  - Any other committed developments included in the analysis;
  - Any programmed Mn/DOT or local transportation improvements.
- All output from the modeling and/or calculations should be attached as an appendix.

### STEP 3 – Future Year Analysis with Proposed Development (Pre-mitigation)

Level of Service (LOS) analysis for the anticipated transportation system and traffic volumes for the year-of-opening and for any other analysis years WITH the proposed development but WITHOUT any proposed mitigation (other than programmed roadway projects and mitigation measures assumed for other committed developments)

*Note: This step may have multiple sections if multiple build scenarios are proposed*

The TIS should include the following:

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- A map or diagram identifying the programmed geometric conditions and the anticipated operational conditions at each study intersection/interchange and for each study segment (number of lanes, signal phasing, level of service);
- Trip generation for the proposed development should be based on the most recent edition of the ITE Trip Generation Manual or on local data for a similar development, if available;
- Documentation of the assumptions used:
  - How future background traffic was determined;
  - How the future traffic from the proposed development was determined;
  - Any differences between the proposed development and the existing local comprehensive plan (or Met Council's TAZ assumptions);
  - How the future traffic is distributed;
  - How the future traffic is assigned to the road network;
  - Any adjustments for passby and linked trips;
  - Any other committed developments included in the analysis;
  - Any programmed Mn/DOT or local transportation improvements.
- All output from the modeling and/or calculations should be attached as an appendix.

### STEP 4 – Identify Locations that May Need Mitigation

Study intersections/interchanges, driveways, and segments that will remain at an acceptable level of service in the year-of-opening and in other analysis years do not need mitigation strategies and should be identified in the TIS. Figure 5.2 provides acceptable levels of service for typical highway elements.

*Note: This step may have multiple sections if multiple build scenarios are proposed.*

**Figure 5.2 – Acceptable Level of Service Targets**

Highway Element	Level of Service without Development	Acceptable Level of Service with Development (Mitigation Level)
<b>Signalized Intersection:</b> <i>(Based on Total Intersection Controlled Delay)</i>	<i>Level of Service A or B</i>	Level of Service C
	<i>Level of Service C or D</i>	Level of Service D
	<i>Level of Service E or F</i>	Minimize degradation through mitigation
<b>Unsignalized Intersection:</b> <i>(Based on primary road movements only)</i>	<i>Level of Service A or B</i>	Level of Service C
	<i>Level of Service C or D</i>	Level of Service D
	<i>Level of Service E or F</i>	Minimize degradation through mitigation
<b>Segments:</b>	<i>Level of Service A or B</i>	Level of Service C
	<i>Level of Service C or D</i>	Level of Service D
	<i>Level of Service E or F</i>	Minimize degradation through mitigation
<b>Interchange Ramp Terminals:</b>	<i>Level of Service A or B</i>	Level of Service C
	<i>Level of Service C or D</i>	Level of Service D
	<i>Level of Service E or F</i>	Minimize degradation through mitigation

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## STEP 5a – Development of Mitigation Strategies

*Note: This step may have multiple sections if multiple build scenarios are proposed.*

The TIS should document the process in which feasible and cost-effective mitigation measures have been developed. This process should include consultation from all affected parties and road authorities.

- Deciding who will actually pay for the mitigation strategies is not a critical part of this step, but mitigation strategies identified as unrealistic and/or financially infeasible should be recognized as such and should not be pursued.

## STEP 5b – Future Year Analysis with Proposed Development (Post-mitigation)

Level of Service (LOS) analysis for the proposed transportation system and traffic volumes for the year-of-opening and any other analysis years WITH the proposed development and WITH feasible and cost-effective mitigation strategies

*Note: This step may have multiple sections if multiple build scenarios are proposed.*

The TIS should include the following:

- Identify all proposed mitigation measures and improvements;
- A map or diagram identifying the proposed geometric and operational conditions at each study intersection/interchange and for each study segment (number of lanes, signal phasing, level of service) where mitigation is indicated;
- Documentation of the assumptions used:
  - How the mitigation strategies improve the operational conditions;
  - How the construction costs for the proposed improvements were developed;
  - Any Transportation Demand Management considered;
  - **For discussion purposes only**, where the existing LOS is E or F, the TIS should, address additional mitigation strategies necessary to achieve LOS D.
- All output from the modeling and/or calculations should be attached as an appendix.

## STEP 6 – On-site Impacts, Circulation, and Other Mn/DOT Issues

In this step, the on-site impacts should be addressed, including circulation, driveway design, and parking requirements.

*Note: This step may have multiple sections if multiple build scenarios are proposed. This step may be of more interest to the RGU than to Mn/DOT.*

Mn/DOT issues that may be addressed include impacts to the Interregional Corridor System and a Safety Analysis (review of high crash-cost locations). This should be addressed as Mn/DOT staff reviews the operational analysis developed in Step 5b.

The Traffic Impact Study should include the following:

- Identify all on-site proposed roadway, parking, and other modal improvements;
- A site plan or layout showing proposed on-site geometrics and operations;
- Documentation of the assumptions used:
  - Especially related to the proposed improvements.
- Any output from the modeling and/or calculations related to the on-site analysis should be attached as an appendix.

## STEP 7 – Findings and Conclusions of the Traffic Impact Analysis

*The Final Traffic Impact Study should be in a format that allows the LGU/RGU, Mn/DOT, policymakers, and other local governments to have a clear understanding of the traffic operational impacts of the proposed development and what transportation improvements should be considered to maintain an acceptable level of service. It should also be the background report used when determining future transportation investments by the RGU, the developer, and Mn/DOT.*

The Final Traffic Impact Study report should include the following:

- A map or diagram showing the level of service (LOS) for the following:
  - Base Year – existing conditions;
  - Year of Opening – programmed conditions without proposed development;
  - Analysis Year(s) – programmed conditions without proposed development;
  - Year of Opening – programmed conditions with proposed development (w/o mitigation);
  - Analysis Year(s) – programmed conditions with proposed development (w/o mitigation);;
  - Year of Opening – proposed conditions with proposed development (with mitigation);
  - Analysis Year(s) – proposed conditions with proposed development (with mitigation).
- The recommended mitigation measures or improvements at each study intersection/interchange and for each study segment where mitigation is indicated:
  - The estimated cost for the proposed mitigation measure or improvement;
  - This should include the proportional share of development traffic using the proposed mitigation measure or improvement.
- Any system-wide mitigation measures or improvements, including transportation management or traffic demand strategies.

## **5.7 Recommended Modeling & Analysis Software**

Mn/DOT recommends the methodology developed in the Transportation Research Board – Highway Capacity Manual (HCM), 2000 Update, or most recent release for signalized and unsignalized intersection level of service analysis. For more detailed analysis areas, capacity software may be utilized to determine existing and future traffic operations.

The Mn/DOT District Office should be contacted for acceptable software packages for capacity analysis.

*Currently, RODEL is recommended for isolated roundabouts, VISSIM is recommended for roundabouts in close proximity to other roundabouts or signalized intersections, and SYNCHRO is recommended for traffic signals and all-way stops.*

## **5.8 After the Traffic Impact Study Is Complete**

The completed Traffic Impact Study is a disclosure document that fulfills the traffic analysis requirements of an EAW, AUAR, EIS, or local development review process. As a disclosure document, the Findings and Conclusions of the TIS become one element used by Mn//DOT, the RGU/LGU, and the local road authorities in determining how the changes in land use impact the transportation system.

After the Traffic Impact Study has been completed, the Findings and Conclusions should be used in consultation with the LGU/RGU, Mn/DOT, and those preparing the Traffic Impact Study to reach consensus on the mitigation strategies and to determine who will be responsible for implementation. The length of this consultation process will vary, depending on the extent of the recommended mitigation measures.

During the consultation, the actions below should be addressed and agreed upon.

- Develop a timeline for the recommended mitigation measures:
  - Identify the mitigation measures needed for the year of opening;
  - Identify the mitigation measures that can wait until they are triggered by a specific development or stage/phase of development; and,
  - Identify the mitigation measures that can wait until they are triggered by a change in traffic conditions or traffic volumes on the road system.
- Develop a funding strategy for the recommended mitigation measures:
  - Identify the mitigation measures that will be part of a development agreement or conditions of a permit; and,
  - Identify the mitigation measures, if any, that will be part of a Mn/DOT- or locally-initiated project.
- Identify the lead agency or lead agencies for the recommended mitigation measures;
- Determine whether the recommended mitigation measures will have an impact on other stakeholders in such a way that a public involvement process will be needed;
- Identify, prepare, and process all agreements (if any) between the RGU/LGU, Mn/DOT, and the developer necessary to ensure that the recommended mitigation measures will be addressed; and,
- Revise local and/or Mn/DOT improvement programs and transportation plans, as necessary.