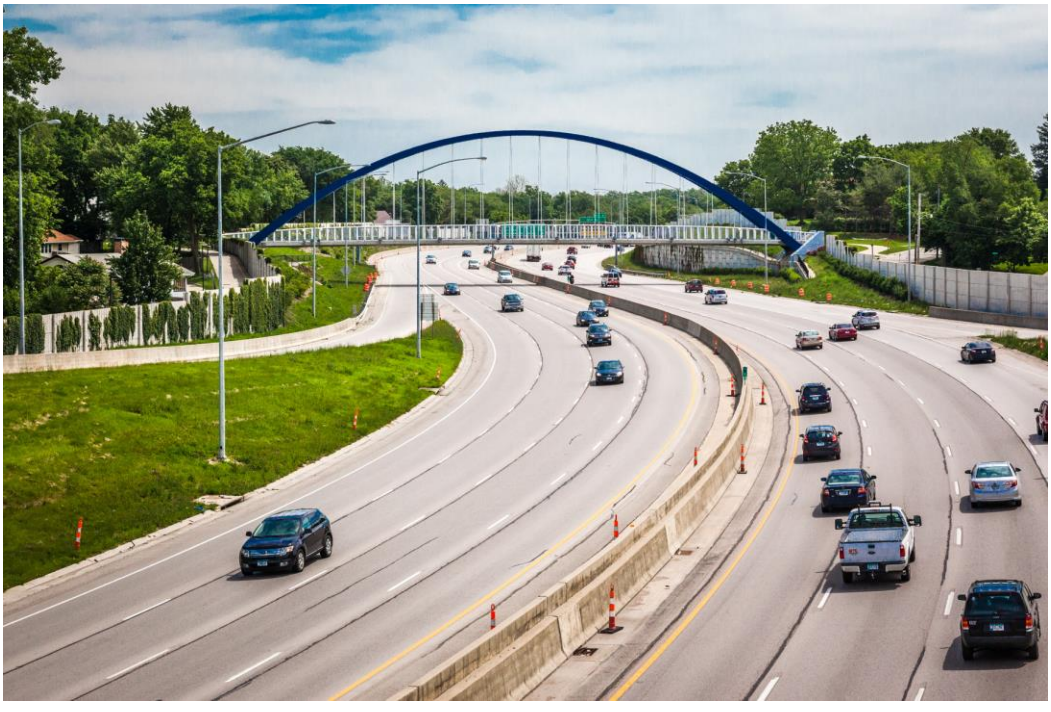
Guidelines for
Traffic Impact Analysis



Prepared By:
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January 2024

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I. Introduction

Assessing operational impacts from a permitted access connection is imperative when managing the primary highway system. Moreover, access management is vital to ensuring that a safe and efficient road system is maintained. Therefore, the following guidance and requirements have been documented to provide a clear understanding of the operational impacts from moderate to high volume commercial access connections. Although traffic volumes are a key factor, the Iowa Department of Transportation (DOT) may request an impact analysis for lower volume accesses if the highway has been determined, at the sole discretion of the DOT, to be nearing capacity.

The purpose of this document is to establish uniform guidelines for preparing a traffic impact analysis. The DOT requires a traffic impact analysis for all Type “A” and “B” access permits.

II. Purpose of Traffic Impact Analysis

The purpose of the traffic impact analysis is to identify system and immediate area impacts associated with a proposed development. Identification of impacts and appropriate mitigation measures allows the DOT to assess the existing and future highway system’s safety, performance, maintenance, and capacity needs.

The Traffic Impact Analysis guidelines will:

1. Provide information to the applicant on initial information needed and specific traffic impact documentation required.
2. Ensure consistency in the preparation of traffic impact analysis information.
3. Define the acceptable format for the required traffic impact analysis.
4. Create a clear understanding of the impacts resulting from the proposed access to the primary highway system.

III. Initial Applicant Submittal

When requesting a commercial access to the primary highway system, the requestor **must.**

1. Identify the location (primary highway number and orientation) of the proposed access.
2. Identify the proposed land use that will be served by the proposed commercial access.
3. Provide the total leasable square footage of the commercial development (Full Build-out).
4. Characterize vehicle types that will use the entrance. Give the percent of cars, single unit trucks, and combination unit trucks. Include information on directionality and background growth.

This information will be used to estimate the future traffic demands based on the development size and land use. The DOT will use this traffic estimate to evaluate operational concerns.

IV. Level of Traffic Impact Analysis

Based on traffic volumes, there are two traffic impact analysis levels: Traffic Impact Letter (TIL) or Traffic Impact Study (TIS).

Specific threshold criteria have been defined for each level of traffic impact. Threshold criteria were developed to avoid placing an undue burden on development with moderate traffic impact, while ensuring that large developments with significant impacts are thoroughly evaluated. The district staff will determine the traffic impact analysis level based on preliminary data supplied by the applicant and potential impact on the primary highway system.

TRAFFIC VOLUME	TRAFFIC IMPACT LETTER (TIL)	TRAFFIC IMPACT STUDY (TIS)
AADT (Annual Average Daily Traffic)	Less than or equal to 500 trips	Greater than 500 trips
Peak Hour Volume	Less than or equal to 100 trips	Greater than 100 trips

A TIS may also be required when considered necessary by the DOT due to the nature of the proposed land use

development and potential impact on the Primary Highway System.

V. Traffic Impact Analysis Submittal

As a result of the initial information submitted, the district staff will inform the applicant which level of analysis will be required. Therefore, the applicant will be responsible for delivery of acceptable traffic impact documentation. The traffic impact analysis should be authored by an individual or entity demonstrating the capability to analyze mobility, conduct traffic engineering, and produce design elements. Coordination between the analysis and proposed site design is essential. The traffic impact analysis **must** be completed and sealed by a Professional Engineer licensed in the State of Iowa. The applicant, via their professional engineer, will submit the proposed entrance design and the required traffic impact analysis to the appropriate district office. A functional area analysis is required for Traffic Impact Studies.

VI. Traffic Impact Letter (TIL)

A. Purpose of the Traffic Impact Letter

The purpose of a Traffic Impact Letter (TIL) is to give the DOT vital information regarding potential impacts associated with developments along the Primary Highway system.

A traffic impact letter is intended to:

1. Document whether the access request meets the requirements of the TIL process.
2. Analyze location and access connection(s) necessary to minimize traffic impacts.
3. Recommend the need for any improvements to the adjacent and nearby roadway system to maintain a level of service and safety comparable or better than existing conditions.
4. Protect the function of the highway system while providing appropriate and necessary access to the proposed development.

B. Traffic Impact Letter Requirements

A traffic impact letter should include, in PDF format, information for the reviewer to understand the operation and impacts of the development, including but not limited to:

1. Study area description.
    a. Show the study area boundary. A recommendation in determining the study area boundary is to carry the analysis out at least as far as the nearest major intersection(s) or desirably, to points on the system where the influence of the proposed improvement is no longer discernible.
2. A description of the proposed land use.
3. A trip generation table of the proposed development.
    a. Use equations or rates available in the latest edition of the ITE Trip Generation manual.
        a. In some scenarios, the ITE Trip Generation manual may not be the best source. In situations where more locally relevant information is available, it may be used, if an explanation as to why the new source is more accurate, is given
        b. Iowa DOT has reviewed Wisconsin DOT's *Convenience Store/Gas Station Trip Generation Study (September 2022)* and has deemed this an appropriate alternative for relevant land use types.
4. A turning movement diagram for peak hour and design hour traffic volumes for each access location for both opening and design year.
5. Conclusion
    a. Describe the impact of the proposed development on the surrounding area and roadway system.
    b. Discuss any significant impacts the proposed development might have on the primary highway being accessed (e.g. safety, LOS).

VII. Traffic Impact Study (TIS)

A. Purpose of the Traffic Impact Study

The purpose of a Traffic Impact Study (TIS) is to identify system and immediate area impacts associated with a proposed development accessing the Primary Highway System.

A traffic impact study is intended to:

1. Document whether the access request meets the requirements of the Traffic Impact Study process.
2. Analyze location, spacing, and design of the access connection(s) necessary to minimize traffic issues.
3. Analyze operational impacts on the highway for both day of opening and the design year. Analysis for peak hour or design hour is required. Analysis for intermediate time frames between the program year and design year may also be required.
4. Recommend the need for any improvements to the adjacent and nearby roadway system to maintain safety, a level of service comparable or better than existing conditions, and to protect the function of the highway system while providing appropriate and necessary access to the proposed development.
5. Assure that the internal traffic circulation of the proposed development is designed to provide safe and efficient access to and from the adjacent roadway system without creating congestion on the primary roadway.
6. Analyze the proposed development to ensure transportation impacts to the traveling public are minimized.

B. Traffic Impact Study Format

A traffic impact study should be submitted to the DOT in a PDF format and should follow the outline below. Please note that all assumptions should be noted where made.

1. EXECUTIVE SUMMARY, CONCLUSIONS & RECOMMENDATIONS
2. INTRODUCTION
3. ANALYSIS OF EXISTING CONDITIONS
4. PROPOSED DEVELOPMENT
5. ANALYSIS OF FUTURE CONDITIONS
6. CONCLUSIONS & RECOMMENDATIONS
7. APPENDICES

C. Traffic Impact Study Requirements

The traffic impact study **must** incorporate, at a minimum, traffic engineering principles and standards as presented in the Iowa Access Management Manual, Department standards, and National practices. When preparing a traffic impact study within a metropolitan planning area the development of traffic forecasts **must** be coordinated with the Metropolitan Planning Organization staff and the MPO travel demand model.

When preparing a traffic impact study, consider the items listed below and include those that are applicable:

1. Study Area Description
    a. Show the site location and include the intersection(s) of the proposed site access drives and any intersections or interchanges impacted.
    b. Show the study area boundary. A recommendation in determining the study area boundary is to carry the analysis out at least as far as the nearest major intersection(s) or desirably, to points on the system where the influence of the proposed improvement is no longer discernible.
2. Proposed Land Use
    a. Include an explanation of the proposed land use and how the land use will impact the area including a site plan (preferably engineer civil site plan).
    b. Identify physical concerns relating to the area, site, and specific access points.
    c. Identify any critical restrictions due to terrain, adjacent land use, zoning requirements, etc.
3. Forecast Years
    a. Document and include all phases of development for:
        I. The opening year (opening day of project)
        II. The design year (twenty years after opening day).
4. Analysis Period
    a. For the opening and design years, analyze site and adjacent road traffic (including turning movements) for:
        I. Weekday A.M. peak hours
        II. Weekday P.M. peak hours
        III. Weekday AADT

Weekend generation rates might be required depending on the nature of the proposed land use development (e.g., churches and shopping malls). Contact district staff at the DOT to determine if the proposed land use development would require a weekend traffic analysis.

5. Data Collection
    a. Include AADT volumes and turning movement counts for current year (or latest year collected by the Iowa DOT), opening year, and design year.
        I. Include the traffic growth rate and discuss the assumptions used.
        II. Discuss traffic characteristics (vehicle mix, % make-up, and any special vehicle requirements).
    b. Describe site and adjacent roadway and intersection geometries.
    c. Identify traffic control devices including traffic signals and regulatory signs.
    d. Include traffic crash data.
    e. Include traffic modeling results, such as from MPO models, where applicable.
6. Trip Generation
    a. Use equations or rates available in the latest edition of the ITE Trip Generation manual, or, if applicable, rates based on business knowledge or approved alternatives.

7. Trip Distribution and Assignment
    a. Document separately the distribution and assignment of existing, site, background, and future traffic volumes.
        I. Discuss trip/vehicle make-up and any vehicles that require special routing (e.g., vehicles with special weight, length and/or width restrictions).
        II. Discuss trip reduction strategies and pass-by trips.
        III. Discuss directional distribution of site-generated traffic.
        IV. Discuss assignment of non-site related traffic (existing, background and future). Document both existing and committed development, and when appropriate other background planned development traffic. Discuss assignment of total future non-site traffic for the design year.
8. Capacity Analysis
    a. Include LOS analysis results at all intersections for:
        I. The existing traffic conditions
        II. The future traffic conditions without the proposed development in the program and design years
        III. The future traffic conditions with the proposed development in the program and design years
        IV. Capacity Analysis will be completed in accordance with the latest edition of the “Highway Capacity Manual”.
9. Traffic Signal Impacts

For existing traffic signals:

    a. Identify the impact on the operations of the existing traffic signals.
    b. Complete an operational/capacity analysis of the intersection using opening day traffic volumes to determine necessary changes to the traffic signals, timing, phasing, etc.
    c. Provide conceptual plan sheets indicating the changes to the existing traffic signals.

For proposed traffic signals:

    a. Complete a Traffic Signal Warrant analysis of the intersection using opening day and design year traffic volumes to determine if the signal warrants are met. Complete a capacity analysis to determine which traffic control provides the best intersection operations.
    b. If traffic signals are proposed, provide Traffic Signal drawings (including the location of traffic signals and signs).
    c. If signals and warrants are satisfied for the design year, but not the opening year, an estimate of when signals will be warranted must be provided.

Analysis of the need for Traffic Signals will be completed in accordance with the latest edition of the “Manual on Uniform Traffic Control Devices”.

10. Geometrics
    a. Include acceleration, deceleration and weaving lanes, and traffic control features (number of lanes, lane lengths and widths, alignment, etc.). Include off-system features as related to site plan and access point(s).

b. If required, Queuing Analysis must be conducted for all turn lanes and ramp termini under stop and/or signal control within the study area.

11. Functional Area Analysis
    a. Include a functional area analysis for all public intersections and proposed access connections.
    b. Identify any overlapping functional areas and/or acceptable gaps.
12. Right-of-Way Access
    a. Identify right-of-way, geometric boundaries, and physical conflicts.
13. Crash and Traffic Safety Analysis
    a. Discuss the history/conditions of the existing vs. proposed development and document how the level of safety may change.
14. Design and Mitigation
    a. Identify operational concerns and mitigation measures to ensure safe and efficient operations. If applicable, this should include pedestrian/bicycle danger mitigation.
    b. If needed for clarification, include scaled schematic drawings illustrating alignment, number of lanes, lane widths, signing, and pavement markings. If traffic signal modifications are proposed, also include signal phasing, signal head locations, and lane markings.
15. Conclusion
    a. Describe the impact of the proposed development on the surrounding area and roadway system.
    b. Discuss any significant findings from the applicable items of the Traffic Impact Study Requirements (e.g., safety, LOS)
    c. Engineering judgment must have a basis in the data and analysis, explain the reasoning (all statements must be supported by the data provided in the report).
    d. Describe the type of access permit that is being requested.
16. Recommendation
    a. Discuss recommended changes to the existing roadway system due to the planned development, including benefits or mitigated effects of changes.

VIII. Glossary of Terms, Abbreviations and Acronyms

Access – For the purposes of this these guidelines, an access is any entrance or exit point to a primary highway (Office of Systems Planning, Iowa Department of Transportation).

Access management – Measures regulating access to streets, roads, and highways from public roads and private driveways (iowadot.gov/glossary, accessed 8/5/22).

Annual Average Daily Traffic (AADT) – The total volume passing a point or segment of a highway facility in both directions for one year, divided by the number of days in the year (iowadot.gov/glossary, accessed 8/5/22).

Capacity – The maximum number of vehicles (vehicle capacity) or passengers (person capacity) that can pass over a given section of roadway or transit line in one or both directions during a given period of time under prevailing roadway and traffic conditions (iowadot.gov/glossary, accessed 8/5/22).

Decision sight distance – The distance required for a driver to detect an unexpected or otherwise difficult-to-perceive information source or hazard in a roadway environment that may be visually cluttered, recognize the hazard or its threat potential, select an appropriate speed and path, and initiate and complete the required safety maneuver safely and efficiently. (iowadot.gov/glossary, accessed 8/5/22).

Design year – 20 years following the opening year or year the project is open to traffic (Systems Planning Bureau, Iowa Department of Transportation 2013).

Development traffic – Estimated traffic volumes generated by a proposed development (Wisconsin Department of Transportation).

Directional distribution – The directional split of traffic during the peak or design hour, commonly expressed as a percentage in the peak and off-peak flow directions (American Association of State Highway Transportation Officials).

Functional Area - Includes any area upstream or downstream of an intersection where intersection operation and conflicts significantly influence driver behavior and vehicle operations. The functional area of an intersection is a calculated value based on the intersection's geometrics, posted speed limit, traffic volume, type of traffic control used and perception-reaction-time values determined by the American Association of State Highway and Transportation Officials. (Iowa DOT Access Management Manual)

Highway Capacity Manual (HCM) – A manual published by the Transportation Research Board as a means of standardizing the techniques used to evaluate the quality of service provided by various transportation facilities (McRae, Bloomberg and Muldoon).

Institute of Transportation Engineers (ITE) – An international educational and scientific association of transportation professionals. ITE facilitates the application of technology and scientific principles to research, planning, functional design, implementation, operation, policy development, and management for all transportation modes (McRae, Bloomberg and Muldoon).

Intersection sight distance (ISD) – The unobstructed view of an entire (at-grade) intersection and sufficient lengths of the intersecting highway to permit control of the vehicle to avoid collisions during through and turning movements (iowadot.gov/glossary, accessed 8/5/22).

Level of service (LOS) – A qualitative measure describing operational conditions within a traffic stream, based upon service measures, such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience; LOS A represents completely free flow of traffic allowing traffic to maneuver unimpeded; LOS F represents a complete breakdown in traffic flow resulting in stop and go travel; LOS is typically calculated based upon peak-hour conditions. (iowadot.gov/glossary, accessed 8/5/22).

Opening year – The year the project is scheduled to be open to traffic (Systems Planning Bureau, Iowa Department of Transportation).

Pass-by trips – Trips, currently on the roadway system, which make an intermediate stop at a generator (i.e., the development under study) with direct access to the roadway network that is adjacent to the original travel route between

the origin and primary destination. Pass-by trips do not include trips that divert from their original travel path non-adjacent to the site (i.e., diverted trips) (Wisconsin Department of Transportation 2021).

Peak hour – That hour during which the maximum amount of travel occurs. It may be specified as the morning peak hour or the afternoon or evening peak hour (American Association of State Highway Transportation Officials)

Primary highway – A road or street designated as a “primary road” in accordance with Iowa Code 306.3(6). This definition includes primary road extensions in cities and primary roads under construction (Systems Planning Bureau, Iowa Department of Transportation).

Queuing – A stacking of vehicles waiting to be serviced and/or processed (Systems Planning Bureau, Iowa Department of Transportation).

Sight distance – The length of highway visible to the driver (iowadot.gov/glossary, accessed 8/5/22).

Stopping sight distance – The sight distance required to permit drivers to see an obstacle soon enough to stop for it under a defined set of reasonable worst-case conditions, without depending upon speed, gradient, road surface and tire conditions, and assumptions about the perception-reaction time of the driver (iowadot.gov/glossary, accessed 8/5/22).

Study area – A geographic area selected and defined at the outset of engineering or environmental evaluations, which is sufficiently adequate in size to address all pertinent project matters occurring within it (iowadot.gov/glossary, accessed 8/5/22).

Traffic impact – The effect of development traffic on highway operations and safety (Wisconsin Department of Transportation 2021).

Traffic Impact Analysis (TIA) – An engineering study that determines the potential impacts the expected traffic of a proposed traffic generator will have on the surrounding roadway network. The study includes a recommendation of roadway improvements that may be necessary to accommodate the additional traffic. A complete analysis includes an estimation of future traffic with and without the proposed generator, analysis of traffic impacts, and recommended roadway improvements which may be necessary to accommodate the expected traffic. (Wisconsin Department of Transportation 2021).

Traffic Impact Letter (TIL) – A TIA that requires limited analysis and documentation based on forecasted traffic that is below a defined traffic threshold (Systems Planning Bureau, Iowa Department of Transportation)

Traffic Impact Study (TIS) – A TIA that requires more comprehensive analysis and documentation based on forecasted traffic that is above a defined traffic threshold (Systems Planning Bureau, Iowa Department of Transportation).

Trip distribution – The allocation of the trips generated by the proposed development between all potential approach and departure routes (Wisconsin Department of Transportation 2021).

Trip generation – The estimation of the number of trips generated to and from a site resulting from the land-use activity on that site (Wisconsin Department of Transportation 2021).

Works Cited

American Association of State Highway Transportation Officials'. *AASHTO Transportation Glossary, 4th Edition.* 2009.

Huibregtse, Brian, et al. “State of Wisconsin Convenience Store/Gas Station Trip Generation Study.” *Wisconsindot.Gov*, Wisconsin DOT, 26 Sept. 2022, wisconsindot.gov/dtsdManuals/traffic ops/programs/analysis/tripgenstudy-gas.pdf.

McRae, Jay, Loren Bloomberg, and Darren Muldoon. *Best Practices for Traffic Impact Studies.* SPR 614, Oregon Department of Transportation & Federal Highway Administration, 2006. https://www.oregon.gov/odot/programs/researchdocuments/bestpracticesfortraffic.pdf

Traffic and Safety Bureau, Iowa Department of Transportation. “Access Management Manual.” Iowa Department of Transportation, December 2022. https://iowadot.gov/traffic/pdfs/MM1359-Access-Management-Manual.pdf

Systems Planning Bureau, Iowa Department of Transportation. "Traffic Impact Study Definitions." 2013.

Wisconsin Department of Transportation. *Traffic Impact Analysis Guidelines.* Wisconsin Department of Transportation, January 2021. https://wisconsindot.gov/dtsdManuals/traffic-ops/manuals-and-standards/tiaguide.pdf

Appendix A - Traffic Impact Letter Template

[Insert Title of Traffic Impact Letter]

Prepared by:

[Insert Preparers Name]

Prepared for:

[Insert Entity Name]

Submitted to:
Iowa DOT
[Insert Additional Names]

[Insert Date]

[Insert Engineering Certification Seal]

1) INTRODUCTION
2) ANALYSIS OF EXISTING CONDITIONS

Provide a text description of current site conditions. Include a description of the site location and the surrounding areas.

3) PROPOSED DEVELOPMENT

Provide a text description of the future commercial development. Include proposed land uses and how the development will impact the area.

4) ANALYSIS OF FUTURE CONDITIONS

- TRIP GENERATION

  Utilize the most current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual (and other acceptable sources as mentioned in TIA guidelines documentation) to estimate daily and peak hour trip volumes originating from and destined to the proposed development. Show trip generation rates for weekday, AM and PM Peak Hour in tables for opening year and design year.

- TRIP DISTRIBUTION

  In a diagram, show the movement distribution (rounded to the nearest 5) at each intersection and access location within the development area.

5) CONCLUSIONS & RECOMMENDATIONS

Summarize existing and future conditions and discuss the proposed development's impacts. Identify any significant impacts and recommend mitigation along with the effectiveness of the mitigation.

Appendix B - Traffic Impact Letter Checklist

Following is a checklist based on the guidelines provided by the ITE and the Iowa DOT's Guidelines for Traffic Impact Analysis. The purpose of the checklist is to see whether the preparer has provided all the information that the Iowa DOT requires. It should also be used as a format for the report by the developer to make the process consistent and quick to review.

Name of Project:	[ ]	**Checked By:**	[ ]
Location:	[ ]	**Prepared By:**	[ ]
Owner/Developer:	[ ]	**Date:**	[ ]

	Yes	No
Is the report stamped by a licensed professional with expertise in traffic engineering?	☐	☐

Project Information

1 - INTRODUCTION	Yes	No	N/A
Does this section include:			
a) The reason for the traffic impact letter	☐	☐	☐

2 - ANALYSIS OF EXISTING CONDITIONS

Does this section include:			
a. Location, including MPO if applicable	☐	☐	☐
b. Study area boundary	☐	☐	☐

3 - PROPOSED DEVELOPMENT

Does this section include:			
a. Description of future commercial development and site plan	☐	☐	☐
b. Type of proposed land uses	☐	☐	☐
c. Proposed impacts to the area	☐	☐	☐

4 - ANALYSIS OF FUTURE CONDITIONS

Does this section include:			
a) ITE Trip Generation Rates for:			
• Opening year	☐	☐	☐
• Design year	☐	☐	☐
Does **each** analysis year include:			
- Land Use	☐	☐	☐
- Land Use Code #	☐	☐	☐
- Land Use Quantity	☐	☐	☐
- Unit of Measurement	☐	☐	☐
- Weekday	☐	☐	☐
- AM Peak Hour with entering and exiting volumes	☐	☐	☐
- PM Peak Hour with entering and exiting volumes	☐	☐	☐
b) Trip Distribution for AM and PM peak hour traffic for:			
• Opening year	☐	☐	☐
• Design year	☐	☐	☐
Does each analysis year include:			
- Turning Movement Diagrams	☐	☐	☐

5 - CONCLUSIONS & RECOMMENDATIONS

Does this section include:

a. Summary of the proposed project	☐	☐	☐
b. Discussion of development impacts	☐	☐	☐
c. Recommendation for mitigation measures	☐	☐	☐

Appendix C - Traffic Impact Study Template

[Insert Title of Traffic Impact Study]

Prepared by:
[Insert Preparers Name]

Prepared for:
[Insert Entity Name]

Submitted to:
Iowa DOT
[Insert Additional Names]

[Insert Date]

[Insert Engineering Certification Seal]

1) EXECUTIVE SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Provide a description of the development, site location, including MPO if applicable, and study area (including a site map). Briefly describe the purpose of the analysis, principal findings, conclusions, and recommendations.

2) INTRODUCTION
3) ANALYSIS OF EXISTING CONDITIONS

Provide a text description of current site conditions. Include the existing land use, zoning classification, and a description of the site location and the surrounding areas.
Include a text description and graphic showing the existing lane configurations and traffic control devices in the study area.

- TRAFFIC DATA

Include a graphic showing the current AADT, AM peak hour and PM peak hour based on Iowa DOT traffic counts. Raw traffic volumes will not be accepted for use in traffic analysis.
Include the % truck traffic on all routes.
Identify and justify the annual growth rate to be used for future traffic analysis.

- CRASH HISTORY

Provide a description of crash data for the past 10 years. Include a crash data table by intersection.

4) PROPOSED DEVELOPMENT

Provide a text description of the future commercial development and detailed site plan. Include proposed land uses, street and driveway improvements for opening year and design year. Identify percent developed at each analysis year.

5) ANALYSIS OF FUTURE CONDITIONS

- TRIP GENERATION

Utilize the most current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual (and other acceptable sources as mentioned in TIA guidelines documentation) to to estimate daily and peak hour trip volumes originating from and destined to the proposed development.
Show trip generation rates for weekday, AM and PM Peak Hour in tables for each analysis year. Each table must identify the land use by ITE code and name, the quantity estimated, the unit of measurement and the number entering and exiting.

- TRIP DISTRIBUTION

  The analysis should use available transportation models in conjunction with input from local jurisdictions and current Transportation Plans to estimate traffic distribution patterns.
  Show trip distribution and assignment on a turning movement diagram as trips (rounded to the nearest 5) at each significant intersection and access within the area of the development.

- TURN LANE WARRANTS

  Refer to Chapter 6 - Geometric Design of Intersections from the Office of Design's Design Manual to determine turn lane warrants based on peak hour traffic data.
  Include a turn lane warrant table summarizing when each intersection is expected to warrant turn lanes.

- FUNCTIONAL AREA ANALYSIS

  Utilize established methodologies from the Iowa DOT Access Management Manual to determine upstream and downstream distances of all proposed and public accesses.
  Include diagrams of functional area gaps and overlaps.

- CAPACITY ANALYSIS

  Utilize the established methodologies of the current Highway Capacity Manual to analyze the capacity of all intersections and roadway segments.
  Perform capacity analysis for AM and PM peak hours for each analysis year.
  Include a capacity analysis LOS table summarizing the critical movement results for each analysis year.
  Include the effects of queuing and blocking on intersection operations.

6) CONCLUSIONS & RECOMMENDATIONS

Summarize existing and future conditions and discuss the proposed development's impacts. Identify any operational or safety deficiencies and recommend mitigation measures.
Summarize how the proposed development complies with all operational and safety standards.

7) APPENDICES

Planning Analysis Output

- Traffic Signal Warrants
- Traffic Capacity Analysis

Planning Analysis Input

A summary of traffic analysis variable inputs must be provided. Any traffic impact study submitted without an input summary will not be accepted by the Department.

Appendix D - Traffic Impact Study Checklist

Following is a checklist based on the guidelines provided by the ITE and the Iowa DOT's Guidelines for Traffic Impact Analysis. The purpose of the checklist is to see whether the preparer has provided all the information that the Iowa DOT requires. It should also be used as a format for the report by the developer to make the process consistent and quick to review.

Name of Project: [ ] **Checked By:** [ ]
Location: [ ] **Prepared By:** [ ]
Owner/Developer: [ ] **Date:** [ ]

Is the report stamped by a licensed professional with expertise in traffic engineering?	**Yes** ☐	**No** ☐

Project Information

1 - EXECUTIVE SUMMARY, CONCLUSIONS & RECOMMENDATIONS

Does this section include:	**Yes**	**No**	**N/A**
a. Description of the development	☐	☐	☐
b. Site location (MPO, if applicable) including detailed site plan	☐	☐	☐
c. Purpose of analysis	☐	☐	☐
d. Principle findings	☐	☐	☐
e. Conclusions and recommendations	☐	☐	☐

2 - INTRODUCTION

Does this section include:			
a. The reason for the traffic impact study	☐	☐	☐

3 - ANALYSIS OF EXISTING CONDITIONS

Does this section include:			
a. Location	☐	☐	☐
b. Study area boundary	☐	☐	☐
c. Existing land use and zoning			
d. Map showing all accesses and intersections identified by:			
○ Controlled with signals	☐	☐	☐
○ Controlled with stop signs	☐	☐	☐
○ Uncontrolled	☐	☐	☐
e. Posted speed limit	☐	☐	☐
f. Street Classification and station number	☐	☐	☐
g. Sidewalk(s)	☐	☐	☐
h. Sight Distance	☐	☐	☐
i. Traffic Signals	☐	☐	☐
j. Existing level of service (LOS)	☐	☐	☐
k. Number of Thru Lanes	☐	☐	☐
l. Number of Turning Lanes	☐	☐	☐
m. Medians	☐	☐	☐
n. Traffic Data including:	☐	☐	☐
o. Growth rate			
○ Current AADT, AM & PM peak hour volumes	☐	☐	☐
○ Existing turning movements at intersections	☐	☐	☐
○ Truck % on all routes	☐	☐	☐
Has the growth rate assumption been:			
− Justified	☐	☐	☐

- Documented

p. Crash data for past 10 years ☐ ☐ ☐

4 - PROPOSED DEVELOPMENT

Does this section include:

a. Description of future commercial development ☐ ☐ ☐
b. Type of proposed land uses ☐ ☐ ☐
c. Proposed impacts to the area ☐ ☐ ☐
d. Site plan including all proposed intersections and accesses ☐ ☐ ☐
e. Phasing plan for:
   - Opening year ☐ ☐ ☐
   - Design year ☐ ☐ ☐
f. Physical concerns or restrictions identified ☐ ☐ ☐

5 - ANALYSIS OF FUTURE CONDITIONS

Does this section include:

a. ITE Trip Generation Rates for:
   - Opening year ☐ ☐ ☐
   - Design year ☐ ☐ ☐

   Does **each** analysis year include:
   - Land Use ☐ ☐ ☐
   - Land Use Code # ☐ ☐ ☐
   - Land Use Quantity ☐ ☐ ☐
   - Unit of Measurement ☐ ☐ ☐
   - Weekday ☐ ☐ ☐
   - AM Peak Hour with entering and exiting volumes ☐ ☐ ☐
   - PM Peak Hour with entering and exiting volumes ☐ ☐ ☐

b. Trip Distribution for AM and PM peak hour traffic for:
   - Opening year ☐ ☐ ☐
   - Design year ☐ ☐ ☐

   Does **each** analysis year include:
   - Turning Movement Diagrams ☐ ☐ ☐
   - Method used to determine directional distribution ☐ ☐ ☐
   - Site generated turning movements ☐ ☐ ☐
   - Percent mix of vehicles including trucks ☐ ☐ ☐
   - Pass by trip assumptions ☐ ☐ ☐
   - Non-site related traffic ☐ ☐ ☐

c. Turn lane warrants evaluated for:
   - Storage capacity ☐ ☐ ☐
   - Length ☐ ☐ ☐

   Does each include:
   - Turn lane warrant table ☐ ☐ ☐

d. Capacity Analysis evaluated for:
   - Level of Service (LOS) for:
     - Opening year ☐ ☐ ☐
     - Design year ☐ ☐ ☐
   - LOS deficiencies identified and document ☐ ☐ ☐

e. Geometrics evaluated for:
   - Acceleration lanes ☐ ☐ ☐
   - Deceleration lanes ☐ ☐ ☐
   - Weaving lanes ☐ ☐ ☐
   - Queuing analysis ☐ ☐ ☐

f. Functional Area Analysis
   - Upstream Distance for public intersections ☐ ☐ ☐
   - Downstream Distance for public intersections ☐ ☐ ☐

- Upstream Distance for proposed accesses ☐ ☐ ☐
- Downstream Distance for proposed accesses ☐ ☐ ☐
- Gap and overlap diagrams ☐ ☐ ☐

g. Traffic signal warrants evaluated for:
   - Compliance with MUTCD ☐ ☐ ☐

h. Sight distance ☐ ☐ ☐

i. ROW access
   - Is dedication of ROW proposed? ☐ ☐ ☐
   - Is the new ROW identified? ☐ ☐ ☐
   - Does the new ROW meet DOT standards? ☐ ☐ ☐

j. Description of methodologies used in analyses ☐ ☐ ☐

6 - CONCLUSIONS & RECOMMENDATIONS

Does this section include:

a. Summary of the proposed project ☐ ☐ ☐
b. Discussion of development impacts ☐ ☐ ☐
c. Identification of all deficiencies and conflicts ☐ ☐ ☐
d. Recommendation for mitigation measures ☐ ☐ ☐

7 - APPENDICES

Does this section include:

a. Planning level Traffic Signal Warrants ☐ ☐ ☐
b. Capacity Analysis software reports ☐ ☐ ☐
c. Traffic Analysis Inputs used in all software programs ☐ ☐ ☐