Chapter 8: Traffic Impact Study (TIS) Standards

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1. Purpose of a Traffic Impact Study (TIS)

The primary objectives of a TIS are as follows:

A. Provide a basis for assessing the transportation impacts of a new development or expansion of an existing development and the need for any improvements to the adjacent road system to provide satisfactory levels of service and address safety issues.
B. Address relevant transportation issues associated with development proposals that may be of concern to neighboring residents, businesses, and property owners.
C. Determine the appropriate location, spacing, and design of the access system for the proposed development, in compliance with City standards and sound engineering judgment.
D. Evaluate the internal circulation and connectivity of the proposed development to provide safe and efficient internal traffic flow and access(es) to and from the adjacent and nearby roadway system.
E. Ensure compliance with the current edition of the City of Delaware Transportation Plan.
F. Provide a basis for improvement and funding discussions in conjunction with zoning, special permit, and subdivision plat approvals.

2. TIS Warrants

A TIS shall be submitted when a new development or expansion of an existing development generates greater than 100 trip ends during the peak hour of the land use or the peak hour of the roadway. These trip ends are to be calculated using the latest Institute of Traffic Engineers (ITE) trip generation methodology and definitions. If the proposed development is to be implemented in phases, each major phase along with the total development trips shall be calculated for warrant purposes. The table below serves as a guideline to determine the minimum size of typical developments which would require a TIS.

Table 8-1:
Guidelines for the Minimum Size of Typical Land Uses Requiring a Traffic Impact Study*

ITE Land Use Code	Land Use	Size
210	Single Family Homes	100 DU
220	Apartments	150 DU
230	Residential Condominiums/Townhomes	200 DU
710	General Office	50,000 sf gfa
820	Shopping Center	all
832	High Turnover, Sit Down Restaurant	all
834	Fast Food Restaurant with Drive-Thru Window	all
845	Service Station with Convenience Market	all
850	Supermarket	all

* Actual requirement is based on trip ends greater than 100 during the peak hour of the land use or the roadway.

A TIS may also be required for the following situations unless in the opinion of a qualified traffic engineer, the development will generate less than 100 trips in the peak hour of the land use or the peak hour of the roadway:

A. All developments which are not addressed in the latest ITE Trip Generation Report
B. Mixed use developments

C. Proposed development and redevelopment at locations where the existing roadway network already functions at an unacceptable level of service.

The City of Delaware retains the right to request a TIS or other traffic study for a non-major development (less than 100 trip ends during the peak hour of the land use or roadway). Such a request shall be made within 30 days of the receipt by the City of the developer's application for rezoning, zoning variance, special permit, or preliminary subdivision plat.

The City shall be consulted to determine if a revised or new TIS is required where development plans change significantly between the time that one rezoning, zoning variance, special permit, or preliminary subdivision plat approval is granted and another is sought.

3. TIS Preparer Qualifications

Engineers with specific training in traffic and transportation engineering shall prepare a TIS under the supervision of a professional engineer registered in the State of Ohio. The registered professional engineer shall have experience in traffic engineering and shall sign and seal the report.

4. Methodology Meeting

Prior to commencing the TIS, the preparer shall schedule a meeting with appropriate city staff. Other participants in this pre-meeting may be Delaware County or ODOT staff, where deemed appropriate by COD personnel. The participants at the pre-meeting shall identify and agree upon the following issues and needs prior to the preparation of the TIS:

A. Study Area
B. Opening and Design Year
C. Field data collection requirements
D. Acceptable volume, accident, signal and other traffic data
E. Development phasing, if applicable
F. Peak traffic hours (analysis hours)
G. Trip generation, trip distribution and assignment methods
H. Applicable planning documents
I. Other traffic impact studies prepared for developments in the study area
J. Utilization of MORPC Regional Transportation Model
K. Background traffic and growth factors
L. Acceptable Level-of-Service (LOS)
M. Analyses – i.e., capacity, signal warrant
N. Safety issues – i.e., sight distance and accident data
O. Existing geometrical issues
P. Committed and planned roadway improvements and schedule
Q. Existing Environmental issues that could affect roadway alignment
R. TIS submittal date

The preparer shall submit a Memorandum of Understanding (MOU) which details the assumptions and methodologies agreed upon in the pre-meeting and request City staff concurrence with its contents. The MOU shall be submitted to the City within one week after the meeting and shall be approved within one additional week.

5. Requirements

A. Study Area

The minimum geographical area to be analyzed in the TIS shall be defined as an area which includes all site access drives and the major roadway intersections nearest to the subject development site. The City of Delaware retains the right to modify the minimum study area based on local or site-specific issues or development size. Any changes shall be clearly defined at the pre-meeting and in the MOU.

B. Access Management

Unless otherwise justified, the recommendations made in the TIS shall comply with the standards and specifications contained in the:

1. ODOT State Highway Access Manual for State Highways
2. Access Management Standards set forth by the City of Delaware
3. The City of Delaware South East Area Transportation Improvement Plan
4. The City of Delaware South West Access Management Plan (Industrial Park)
5. The Delaware County Thoroughfare Plan
6. The ODOT District 6 Delaware US 23 Access Management Plan
7. And any related, applicable transportation plans

C. Design Year

The table below shall be used to determine the design year to be implemented.

Table 8-2:
Vehicle Trips vs. TIS Design Year

Vehicle Trip Ends in the Peak Hour of the Proposed Development	TIS Design Year
100 but less than 400	10 years from the planned build-out of the development
400 or greater	20 years from the planned build-out of the development

Note: The planned build-out date is to be used as the default condition.
Opening day may be used at the discretion of the City on a case-by-case basis.

D. Existing Conditions

The TIS shall examine existing conditions using Synchro® software and level-of-service (LOS) using traffic count data less than one year old unless otherwise agreed upon during the pre-meeting.

E. No Build/Build

The TIS shall examine "before and after", or No Build and Build, conditions in order to evaluate traffic impacts associated with the proposed development. No Build and Build conditions shall be calculated for the opening year and for the design year using the current edition of Synchro® Software from Trafficware® Ltd., based on the procedures of the current edition of the *Highway Capacity Manual, TRB Special Report #209*. If the proposed development is to be implemented in phases, each major phase shall be analyzed and the conditions noted in the MOU.

F. Analysis Time Period

All analyses shall examine the weekday peak traffic hours of the adjacent roadway. However, land use classifications which experience their highest trip generation levels during periods other than weekday street peak hours shall require analyses of off peak conditions to determine proper site access and turn lane storage requirements. Examples of such land uses include but are not limited to shopping centers, discount stores, recreational uses, and special events. The peak traffic hours to be analyzed shall be decided at the pre-meeting and be clearly stated in the MOU.

G. Site Traffic

Trips generated by the proposed site development shall be calculated using the current edition of the Institute of Transportation Engineers (ITE) *Trip Generation* manual and the methodologies contained therein including those relating to pass-by, internal and diverted trips. The engineer is cautioned not to automatically assume the least value assigned to any specific trip generation category.

Distribution and assignment of the site traffic shall be based on the method agreed upon at the pre-meeting and on engineering judgment and take into account the following:

1. Type of proposed development and the area from which it will attract traffic
2. Size of the proposed development
3. Surrounding land uses, employment centers, residential centers and population during both opening and design years
4. Conditions on the surrounding street system
5. Logical routings
6. Projected roadway capacities
7. Travel times

H. Non-site Traffic

All significant developments within the study area that have approved or TIS studies should be identified and incorporated into the study. The land use type and magnitude of probable future developments should be identified during the pre-meeting and enumerated in the MOU. The method of projecting non-site traffic shall depend upon the area of study. Use of the traffic volumes from the transportation model, historic growth rates, or the buildup method shall be agreed upon during the pre-meeting and documented in the MOU.

I. Level-of-Service (LOS) Criteria

It is the goal of the City of Delaware to maintain a LOS D or better during peak traffic hours for the operation of all roadways. In any area where the current level of service D or worse during peak traffic hours, this baseline level of service must be maintained or improved after development.

All approaches shall be required to be a LOS D or better. All individual movements on public roadways shall be required to be LOS E or better.

J. Mitigation

Recommendations shall be made in the TIS for site access points, external roadway improvements such as additional through lanes and turn lanes, and traffic control devices necessitated as a result of the proposed development. The developer will be

required to mitigate the impacts of traffic generated by the project. The time period for the recommended improvements shall be identified, particularly if improvements are associated with various phases of the development. Identified improvements to the roadway system, unrelated to the proposed development, shall also be reported.

K. Traffic Signal Warrant

Traffic signal warrant analyses shall be conducted at un-signalized intersections in the study area for Opening Day and the Design Year and at all multi-movement access points to the proposed development. A full signal warrant analysis and an estimation of the year the warrant is met shall be done if the main site access appears to meet Traffic Signal Warrant 1 (Eight-Hour Vehicular Volume) or Warrant 2 (Four-Hour Vehicular Volume) based on the current edition of the Ohio Manual of Traffic Control Devices (OMUTCD). Any proposed access or intersection which meets signal warrant thresholds but does not otherwise meet the spacing requirements and standards noted in the ODOT *State Highway Access Management Manual* for the access category assigned by the City of Delaware Transportation Plan may be required to be redesigned, reconstructed, and/or relocated.

Any other signal warrant may be required to be analyzed on a case-by-case basis at the discretion of the City. If a signal is warranted it may not be permitted if it conflicts with the City of Delaware Transportation Plan.

The City reserves the right to require access limitations to offset the warrant if adequate signal spacing cannot be accomplished. Conversely, the City may approve a signal where it is technically not warranted if it is in the public's best interest, is needed from a practical standpoint, and is justified by sound engineering judgment.

L. Turn Lane Criteria

1. Left Turn Lane

   A left turn lane at driveways or unsignalized movements at intersections should be provided under the following conditions:

   a. In accordance with the current edition of the ODOT *Location and Design Manual*, Volume 1, Section 400.
   b. On major and minor arterial roadways with posted speed limits greater than 40 mph.
   c. On major collector roadways with posted speed limits greater than 40 mph and more than 10 left turning vehicles during the peak hour for full build out of the development.

   The size of left turn lanes shall be the minimum per this Manual or be based upon the criteria contained in the current edition of the *ODOT Location and Design Manual*, Volume I, Section 400.

2. Right Turn Lane

   Right turn lanes should be provided in accordance with the current edition of the ODOT *Location and Design Manual,* Volume 1, Section 400, with the following exceptions:

   a. Right turn lanes are not required for right turn volumes less than 10 vehicles during the peak hour for full build out of the development.
   b. Right turn lanes are not required for less than 200 vehicles in the peak hour in the approach lane or curb lane for roadways with greater than 1 approach lane for full build out of the development.

Left or right turn lanes shall also be required when deemed necessary for safety as determined by the City of Delaware.

6. Report Contents

Each TIS shall have, along with the body of the report, the following unless a letter report is agreed upon at the pre-meeting:

A. Cover – Noting the name and location of the development, the applicant's name, preparer's name, and report date.
B. Title Page – Containing all information on the cover in addition to the applicant's street and email address, telephone and fax numbers; the preparer's street and email address, telephone and fax numbers and the preparer's signature and seal.
C. Table of Contents
D. List of Exhibits and Tables
E. Executive Summary
F. Summary of Revisions (for revised reports)
G. Body of Report
   1. Proposed Site Development
   2. Area Conditions
   3. Existing Traffic
   4. Trip Generation and Distribution
   5. Site Traffic
   6. Total Traffic – Opening Year and Design Year
   7. Traffic Analyses
      a. Capacity Analyses
      b. Signal Warrant Analyses
      c. Turn Lane Warrant Analyses
      d. Sight Distance
      e. Accident Analyses
   8. Conclusions
   9. Recommendations – including the identification of responsibility for all recommended improvements
   10. Appendix

The following items shall also be included in the body of the report:

1. Location Map
2. Site Layout Map

3. *Site Trip Generation Factors and Volumes Table* – including the specific excepts from the current edition of the Institute of Transportation Engineers (ITE) *Trip Generation* manual
4. Site Traffic Distribution by Percent Map
5. Existing Traffic Volumes Map
6. *Opening Year Traffic Volumes Map* – use A + B + C + D = Total diagram where A is opening year background traffic, B is other site traffic (if applicable), C is site pass by traffic, D is site traffic
7. *Design Year Traffic Volumes Map* – use A + B + C + D = Total diagram where A is design year background traffic, B is other site traffic (if applicable), C is site pass by traffic, D is site traffic
8. Internal Trip Capture Table (if applicable) – As approved in the MOU Existing and Projected LOS Table
9. *Preliminary Site Plan Map* - showing recommended improvements, both sides of streets and extending 1000 feet beyond the site.

Digital copy of the Synchro® files and SimTraffic® files (or other pre-agreed upon format(s) as specified by the City) shall also be provided.

7. Submittal

Two copies of the TIS shall be submitted to the City of Delaware Public Works Department at the time of filing an application for zoning or rezoning. If zoning is already in place, the TIS shall be submitted to the Public Works Department at the time of application for Preliminary Plat approval or at the time of application for a Preliminary Development Plan, whichever occurs first.

It is the City of Delaware's goal to review and respond within 6 – 8 weeks of the submittal date of a TIS that is formatted in an acceptable manner to the Department.

- Upon review, if the document is deemed inadequate, the applicant shall be notified in writing and shall have an opportunity to correct the deficiencies and resubmit the report.
- Upon approval, two paper copies and one digital copy (including all Synchro® and SimTraffic® files or other pre-agreed upon format(s) as specified by the City) of the final TIS shall be provided.