

City of Marysville, Ohio

TRAFFIC IMPACT STUDY (TIS) STANDARDS

I. Purpose

The primary objectives of a TIS are the following:

- 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.
- address relevant transportation issues associated with development proposals that may be of concern to neighboring residents, businesses, and property owners.
- determine the appropriate location, spacing, and design of the access system for the proposed development in compliance with City standards and/or sound engineering practices.
- 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 nearby roadway system and adjacent properties.
- provide a basis for improvement and funding discussions in conjunction with zoning, special permit, and subdivision plat approvals

II. Traffic Impact Study Warrants

A Traffic Impact Study shall be required 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 adjacent roadway. These trip ends are to be calculated using the latest Institute of Transportation 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. **Table 1** serves as a guideline to determine the minimum size of typical developments that would require a Traffic Impact Study. **Table 1** is not intended to be all inclusive but to provide a guideline for common developments in Marysville. Refer to the latest edition of the ITE *Trip Generation Manual* for other uses.

Table 1. Typical Minimum Size for Land Uses Requiring a Traffic Impact Study*

<i>ITE Land Use Code</i>	<i>Land Use</i>	<i>Size</i>
130	Industrial Park	10 Acres
210	Single Family Homes	100 DU
220	Apartments	150 DU
230	Residential Condominiums/Townhomes	200 DU
710	General Office	50,000 sf
750	Office Park	4 Acres
820	Shopping Center	25,000 sf
850	Supermarket	10,000 sf
912	Drive-In Bank	2,000 sf
932	High Turnover, Sit Down Restaurant	5,000 sf
934	Fast Food Restaurant with Drive-Thru Window	2,500 sf
945	Gas/Service Station with Convenience Market	6 pumps

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

Traffic Impact Studies 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 adjacent roadway:

- all developments which are not addressed in the latest ITE Trip Generation Report
- mixed use developments

All new developments and expansions shall provide preliminary information regarding expected trip generation at the time of official submittal to the City of Marysville. The City of Marysville shall retain 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 adjacent roadway). Such a request shall be made within 45 days of the receipt by the City of the developer's application for zoning permit, rezoning, zoning variance, special permit, or preliminary subdivision plat.

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

I. TIS Preparer Qualifications

Engineers with specific training in traffic and transportation planning and engineering shall prepare Traffic Impact Studies 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.

TIS Reviewer Qualifications

A Traffic Impact Study shall be reviewed by one or more members of the professional staff operating in the capacity of City Engineer for Marysville who collectively have training and experience in Traffic Impact Study methodology, land-use planning and traffic engineering, including traffic safety and operations. Where appropriate, the City may contract with outside consultants that possess unique skills to assist in the review of a TIS.

Department Responsibilities

The Marysville City Engineer is the lead agency regarding TIS requirements, long-range transportation planning issues and traffic projection requirements. The City Engineer will have the primary responsibility regarding street design requirements, traffic engineering, operations and safety.

The City Engineer will:

1. Determine whether a proposed development requires a Traffic Impact Study or traffic access study in conjunction with a request for a development-related approval.
2. Determine the type and extent of study required.
3. Meet with the study preparer to identify study issues, needs, assumptions, procedures, available sources of data, past and related studies, report requirements and other topics relevant to the preparation of the TIS. All assumptions regarding the study agreed upon in this meeting shall be summarized in a Memorandum of Understanding (MOU) that is completed by the preparer and submitted for approval to the City Engineer. The City Engineer will give comments, if necessary, and final approval of the MOU before the preparer begins the analytical portion of the TIS.
4. Provide the preparer with available data from agency files, including traffic counts, improvement plans, traffic signal information, transportation and comprehensive plan information, data on developments planned or approved within the study area, relevant ordinances, regulations, policies and any other information related to the proposed site.
5. Review the submitted study report regarding:
 - Study methodology
 - Land use assumptions and projections
 - Trip generation, distribution and assignment
 - Projected traffic levels for future year(s)
 - Capacity analyses
 - Impacts of the proposed development
 - Mitigation proposals
 - Access location issues (including sight distance, safety considerations, etc.)
 - Geometric changes to existing roadways
 - Proposed new roads
 - Site plan elements including parking layout, internal site circulation and accommodation of service vehicles

II. Pre-Meeting

Prior to commencing the TIS, the preparer shall schedule a meeting with the office of the Marysville City Engineer to establish the parameters of the traffic study. Other participants in this pre-meeting may include County or Township officials or ODOT staff, as deemed appropriate by the City of Marysville. The participants at the pre-meeting shall identify and agree upon the following issues and needs prior to the preparation of the Traffic Impact Study:

- Study Area
- Opening and Design Year
- Field data collection requirements
- Acceptable volume, crash, signal and other traffic data
- Development phasing, if applicable
- Peak traffic hours (analysis days/hours)
- Trip generation, trip distribution and assignment methods
- Applicable planning documents
- Other traffic impact studies prepared for developments in the Study Area
- Utilization of Regional Transportation Models
- Background traffic and growth factors
- Acceptable Level-of-Service (LOS)
- Analyses to be prepared – i.e.: capacity, signal warrant, etc.
- Safety issues – ie: sight distance and crash characteristics
- Committed and planned roadway improvements and construction schedule
- TIS submittal date and review schedule
- TIS distribution list

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

III. Requirements

A. Study Area

The minimum geographical area to be analyzed in a TIS shall be defined as an area which includes all site access points, nearby roadways and the major intersections nearest to the subject development site. The City of Marysville retains the right to expand 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 documented 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 City of Marysville *Access Management Guidelines*.

C. Design Years

The following design years are established:

Vehicle Trip Ends in the Peak Hour of the Proposed Development	TIS Design Year
100 to 399	10 years from Opening Day
400 or greater	20 years from Opening Day

D. Existing Conditions

The TIS shall examine existing operational conditions using *Highway Capacity Software* (HCS) software to calculate the current level-of-service (LOS) utilizing 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 latest version of HCS based on the procedures of the most recent version of the *Highway Capacity Manual*. If the proposed development is to be implemented in phases, each major phase shall be analyzed based upon the conditions noted in the MOU. All TIS reports shall utilize HCS to determine intersection Levels of Service. Additional arterial and/or system-wide analyses may utilize Synchro/Sim-Traffic software for system-level comparisons.

Signalized HCS analyses shall be performed with the following guidelines:

- average delays should be balanced on all approaches, per the ODOT policy
- cycle lengths should be the same for Build vs. No Build conditions
- minimum green times should be 7 sec. for a turn phase, 20 sec. for a through phase
- minimum clearance interval (yellow/all red) time should be 5.0 seconds

F. Analysis Time Period

All analyses shall examine the weekday peak traffic hours of the adjacent roadway as a minimum. However, land use classifications which experience their highest trip generation levels during periods other than weekday street peak hours shall require additional 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, schools, churches, recreational facilities, 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 most current edition of the Institute of Transportation Engineers *Trip Generation Manual* and the methodologies contained therein including those relating to pass-by, internal and diverted trips.

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

- type of proposed development and the area from which it will attract traffic
- size of the proposed development

- surrounding land uses, employment centers, residential centers and population during both opening and design years
- conditions on the surrounding street system
- logical routings
- projected roadway capacities
- travel times

Pre-approval is recommended for assumptions on trip generation land use categories, trip distribution percentages, pass-by trip percentages and internal trip capture rates.

H. Non Site Traffic

All significant developments within the Study Area that have approved TIS documents should be identified and incorporated into the study if not constructed and included in the background traffic. 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 build up method shall be agreed upon during the pre-meeting and documented in the MOU.

I. Level-of-Service (LOS) Criteria

The goal of the City of Marysville for the operation of its roadways is LOS D or better at an intersection during peak traffic hours. At any intersection where the current (No Build) level of service is D or worse, the intersection's overall average delay (in seconds/vehicle) tied to that No Build level of service must be maintained or improved after development (Build) traffic is added. Once development traffic is added to the roadway network, improvements must be recommended and included in additional analyses to show that the average delay at each affected intersection is being improved to No Build conditions. Degradation by development traffic of up to 5 seconds of average delay may be permitted before mitigative improvements are required of the site developer.

Improvements necessary to accommodate the increase in non-site traffic for the No Build design year at LOS D shall be determined even though the developer may not be required to undertake these improvements.

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 shall 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 documented.

K. Traffic Signal Warrant

Traffic signal warrant analyses shall be conducted at unsignalized intersections and development access points in the Study Area for Opening Day and the Design Year as identified in the MOU. A full signal warrant analysis using hourly volumes and based on

the requirements of the *Ohio Manual of Traffic Control Devices* shall be prepared if the main site access appears to meet Traffic Signal Warrant 1, Condition A or B, based on the guidelines in **Table 2**. An estimation of the year in which the traffic signal will be warranted shall also be identified. When performing a traffic signal warrant analysis, right turn traffic on each minor street approach shall be reduced per Table 497-7 of ODOT's *Traffic Engineering Manual*.

Any proposed access or intersection which meets signal warrant thresholds but does not otherwise meet the spacing requirements and standards noted in the *City of Marysville Access Management Guidelines* for the access category assigned by the Marysville Thoroughfare Plan may be required to be redesigned, reconstructed, and/or relocated.

Table 2: Traffic Signal Warrant Guidelines

Condition A – Minimum Vehicular Volume*			
NUMBER OF APPROACH LANES		ADT	
MAJOR	MINOR	MAJOR	MINOR
1	1	8,300	5,000
2	1	10,000	5,000
2	2	10,000	6,700
1	2	8,300	6,700
Condition B – Interruption of Continuous Traffic*			
NUMBER OF APPROACH LANES		ADT	
MAJOR	MINOR	MAJOR	MINOR
1	1	12,500	2,500
2	1	15,000	2,500
2	2	15,000	3,300
1	2	12,500	3,300

* When the 85th percentile speed of major street traffic exceeds 40 mph, the warrants are 70 percent of the guidelines above.

L. Turn Lane Criteria

A left turn lane should be provided under the following conditions:

- per Graph 1, 2, or 3, which are the left turn lane warrant charts contained in the *ODOT State Highway Access Management Manual*. Graphs 1, 2 and 3 are contained in the Appendix of this document.
- On major and minor arterial roadways with speed limits greater than 40 mph.
- On major collector roadways with 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(length) of left turn lanes shall be the minimum per criteria contained in the *ODOT Location and Design Manual*, Section 401.6 (see *Figures 401-9 and 401-10*).

Right turn lanes should be provided per Graphs 4, 5, 6 or 7, which are the right turn lane warrant charts contained in the *ODOT State Highway Access Management Manual*. These graphs should only be used at unsignalized intersections; HCS results should be used to determine the need for turn lanes at signalized intersections. The need for a right turn lane is based on the graphs, with the exception noted below:

- 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

Graphs 4, 5, 6 and 7 are contained in the Appendix of this document.

The size of right turn lanes shall be based on the criteria contained in the ODOT *Location and Design Manual*, Section 401.7.

Left or right turn lanes shall also be provided when deemed necessary for safety purposes by the City of Marysville.

IV. 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:

- *Cover* - noting the name and location of the development, the applicant's name, preparer's name, and report date.
- *Title Page* – containing all information on the cover in addition to the applicant's street and e mail address, telephone and fax numbers; the preparer's street and e mail address, telephone and fax numbers and the preparer's engineering registration seal and signature.
- *Table of Contents*
- *List of Exhibits and Tables*
- *Executive Summary*
- *Summary of Revisions (for revised reports)*
- *Body of Report*
 - *Proposed Site Development*
 - *Area Conditions*
 - *Existing Traffic*
 - *Trip Generation and Distribution*
 - *Site Traffic*
 - *Total Traffic – Opening Year and Design Year*
 - *Traffic Analyses*
 - *Capacity Analyses*
 - *Signal Warrant Analyses*
 - *Turn Lane Warrant Analyses*
 - *Sight Distance*
 - *Crash Analyses*
 - *Conclusions*
 - *Recommendations – include identification of responsibility for recommended improvements*
 - *Appendix – typically includes traffic count data, signal warrant charts, turn lane warrant graphs, etc. (Appendices may be provided as a separate, companion document).*

The following illustrations or tables shall be included in the body of the report:

- *Location Map*
- *Site Plan illustrating both sides of all adjacent streets*
- *Site Trip Generation Factors and Volumes Table*
- *Site Geographic Traffic Distribution by Percent Map*
- *Existing Traffic Volumes Map*
- *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
- *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
- *Existing and Projected LOS Table*
- *Future Conditions Diagram* - showing recommended improvements

It is suggested that the ITE publication *Traffic Access and Impact Studies for Site Development* be used as a reference by TIS preparers.

V. Submittal

A. City of Marysville Submittal

The TIS shall be submitted to the City of Marysville Engineer at the time of filing an application for zoning or rezoning. If proper zoning is already in place, the TIS shall be submitted to the City at the time of application for plat approval or at the time of application for a site access permit, whichever occurs first. Mailing addresses for the jurisdictions are provided at the end of this document.

1. Depending on the jurisdictions, the following number of preliminary copies of the TIS shall be provided to:

City of Marysville Engineer – 3 copies
 Logan-Union-Champaign RPC – 1 copy
 Union County Engineer (if applicable) – 1 copy
 ODOT District 6 (if applicable) – Attn: Planning Administrator – 2 copies

One copy of the report appendix shall be provided to each of the above jurisdictions identified to receive a preliminary copy of the TIS.

2. Upon approval, depending upon the jurisdictions involved, the following number of final copies of the TIS shall be provided to:

City of Marysville Engineer – 3 copies
 Logan-Union-Champaign RPC – 1 copy
 Union County Engineer (if applicable) – 1 copy
 ODOT District 6 (if applicable) – Attn: Planning Administrator – 2 copies
 Mid-Ohio Regional Planning Commission – 1 copy

One copy of the report appendix shall be provided to each jurisdiction receiving a copy of the approved TIS.

VI. Agency Review

It is the goal of the City of Marysville to review and respond within 30 calendar days of the submittal date of an acceptable TIS. If the document is deemed inadequate, the applicant will be notified in writing and will have an opportunity to correct the deficiencies and resubmit the report.

Jurisdiction Addresses:

City of Marysville
Attention: City Engineer
125 E. 6th Street
Marysville, OH 43040

Logan Union Champaign - Regional Planning Commission
P.O. Box 219
9676 E. Foundry Street
East Liberty, OH 43319

Union County Engineers Office
233 W. 6th Street
Marysville, OH 43040

ODOT District 6
Attention: Planning Administrator
400 East William Street
Delaware, OH 43015

Mid-Ohio Regional Planning Commission
111 Liberty Street, Suite 100
Columbus, OH 43215