City of Westerville, Ohio

WESTERVILLE®

PLANNING & DEVELOPMENT

Transportation Impact Study Procedures Manual

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1) PURPOSE

A balanced and functional transportation system is a key element of any vibrant community. A well-planned system links resident to jobs, shops, and recreation activities, while managing congestion and promoting healthy lifestyles. Mobility is defined as the ability to move easily and freely—which is the most important factor to consider when conducting transportation planning. It is important to remember that mobility includes not just road and vehicular travel, but biking, walking, public transit, and any other method that one might use to move people and goods from one place to another.

The purpose of this manual is to provide a consistent basis from which The City of Westerville will evaluate transportation impacts within the community. Included in this manual is information on the following:

- Determination for the level of Transportation Impact Study (TIS) and TIS Update
- Applicant Selecting and Retaining a TIS Consultant
- TIS Process
- TIS Report Content
- TIS Methodology Guidelines

2) NEED DETERMINATION FOR TIS/TIS UPDATE

The City of Westerville specifies guidelines for transportation analyses based on the size of the proposed development. The level of detail required for analysis shall be primarily based on the site's estimated trip generation and other pertinent factors outlined below.

The trip generation shall be calculated using the latest Institute of Transportation Engineers' (ITE) trip generation methodology and definitions. If ITE trip generation methodology and definitions do not appropriately represent the proposed land use, the use of local data for trip generation estimates may be appropriate and shall be discussed with City of Westerville staff prior to proceeding with the analysis.

Where trip generation rates are expected to be significantly different than those commonly observed at other developments within the same land use category, and the expected trip generation rates are too low to require a transportation impact study, the developer shall present supporting data to staff.

The following guidelines shall be used to determine the level of analysis required:

1. A **TIER I TIS** shall be performed when the number of trips generated by a development is **less than 100 peak hour vehicle trips** (total of entering and exiting vehicles for the proposed development at full buildout and occupancy, before internal capture and/or pass-by trip reductions are taken) during the highest peak hour of the development (either the peak hour of the adjacent street, or the peak hour of the generator—whichever is more significant).

If the estimated trip generation is less than 100 peak hour vehicle trips, the City of Westerville will determine whether a more extensive study is needed. For example, if the site is located where the following occur:

- Development sites are located in areas of congestion.
- Sites that require a change in public right-of-way access or existing site circulation patterns. Both would ultimately have an impact on the public roadways.
- Sites with a change in land use or mobility access; i.e. sites that encourage pedestrian and bicycle traffic while still providing vehicle access yet to a lesser degree.
- Sites in targeted growth corridors regardless of previous planning / land use study that provides an access management plan.

2. A **TIER 2 TIS** shall be required if any of the following conditions are met:

    a. Any proposed development petitioning special use district rezoning, zoning variance, special permit, significant change in use or preliminary plat approvals for all major developments that will generate **100 or more peak hour vehicle trips** (total of entering and exiting vehicles for the proposed development at full buildout and occupancy , before internal capture and/or pass-by trip reductions are taken) during the highest peak hour of the development (either the peak hour of the adjacent street, or the peak hour of the generator—whichever is more significant).

    b. Any proposed development in the vicinity of areas previously identified as having levels of service "E" or "F", high collision/geometrically challenged or other design adequacy concerns (as determined by The City of Westerville)

    c. Where a reduction in safety is anticipated at intersections or roadways as determined by the City.

    d. Any other circumstances deemed appropriate by The City of Westerville based on engineering judgement and the guidelines presented in the current edition of the ITE Recommended Practice Report *Transportation Impact Analyses for Site Development*.

3. A **TIS Update** may be required as a response to any of the following:

    a. When a proposed development site plan has been approved by The City of Westerville based on recommendation from an acceptable transportation impact study and that project has not been completed after two (2) years of the date of approval.

    b. If changes are made to a pre-approved site plan that will require a new approval from The City of Westerville.

    c. If significant changes in background traffic distributions have occurred.

    d. Based on the anticipated trip generation for the development, the requirements for a **TIS Update** shall follow the same guidelines for **Tier 1** and **Tier 2** analyses

For both **Tier 1** and **Tier 2 TIS's** or **TIS Updates**, the Applicant shall select and retain the services of a qualified and experienced transportation professional who has specific training in traffic and transportation engineering and is familiar with transportation planning and transportation analysis preparation. A registered Professional Engineer (PE) in the state of Ohio shall sign and seal the TIS report.

If any transportation operations and/or design improvements are recommended in the TIS, they shall be designed under the supervision of a registered Professional Engineer (PE) in the state of Ohio and submitted separately from the TIS report.

3) TIS PRE-SCOPING PACKAGE AND CONFERENCE

For both Tier 1 and Tier 2 analyses, a TIS Pre-Scoping Package (Appendix A) shall be prepared and submitted to The City of Westerville Engineering Division, at which time The City of Westerville will schedule a Pre-Scoping Conference with the Applicant's TIS Engineering Consultant.

This is a meeting between the TIS preparer, reviewer, and other public agencies and jurisdictions (i.e. ODOT or County staff, as determined by The City of Westerville) to discuss study issues, scope, assumptions, required data and data sources, technical procedures, desired report contents, and other potential matters. A pre-scoping conference and package shall be completed prior to the preparation of a Draft TIS. The City of Westerville Engineering Division will determine whether the conference needs to be an in-person meeting or if a conference call or email correspondence is acceptable.

The applicant shall fill out the pre-scoping package found in Appendix A and submit to The City of Westerville prior to the pre-scoping conference.

During the pre-scoping conference the following will be determined:

a. Extents of study area
b. Opening year
c. Development phasing (if applicable)
d. Field data collection requirements
e. Acceptable data associated with traffic volumes and signal operations
f. Analysis hours
g. Trip generation (ITE or local data), distribution, and assignment methods
h. Applicable planning documents (such as Access Management Plan)
i. Background traffic and growth factors (Growth factor shall be requested from MORPC after traffic counts are performed)
j. Acceptable levels of service (LOS)
k. Analysis methodology and software (capacity, signal warrants, etc.)
l. Identification of safety issues (sight distances, crash data etc.)
m. Committed and planned roadway improvements and schedule
n. TIS submittal date
o. Determination of implementing No Right-Turn on Red (RTOR) for capacity analysis.

Once TIS scoping is complete, preparation of the draft TIS can begin. The TIS shall be completed in accordance with this TIS Manual.

4) TIER 1 TIS

a) Guidelines

A Tier 1 TIS shall include the following items:

- Description of proposed development and traffic generated
- Study Area figure/map
- Proposed driveway locations
- Existing/Proposed Sight Distances
- Accident History near the development
- Driveway and Intersection Geometry and Traffic Control
- Turn Lane Needs and Design (Conceptual design with length, width, taper length)
- Accommodation of Projected Queuing conditions (on and off site)
- Traffic Signal Warrant and Progression Analysis (if appropriate)
- Transit Connectivity if within ½ mile of transit stop
- Pedestrian/Bicycle Connectivity opportunities near the proposed development

b) Process

The above items shall be compiled and summarized in a technical memorandum format and submitted to The City of Westerville for review. Submission requirements should include an electronic copy of the memo and two (2) hard copies.

5) TIER 2 TIS

a) Guidelines

Should a Tier 2 TIS be required, the following process shall be used for the preparation and submittal of the TIS report.

b) Process

SUBMISSION AND REVIEW OF DRAFT TIS

The required items listed in Section 6 of this Manual shall be compiled in a technical report format. The applicant shall submit two (2) hard copies, one (1) electronic (PDF) copy, and the electronic analysis files (Latest Version Synchro files) of the draft TIS to The City of Westerville Engineering Division. The City of Westerville will provide one set of combined comments on the draft TIS to the applicant within 30 days of submission. The applicant shall revise the draft TIS to address all comments. A meeting between City of Westerville staff, the applicant, and the TIS consultant may be needed or requested by the applicant to discuss the draft TIS comments.

SUBMISSION OF FINAL TIS

Once all comments have been addressed in the revised final report, the applicant shall submit two (2) hard copies and one (1) electronic (PDF) copy of the final TIS, as well as all Synchro files used in the analysis, to The City of Westerville Engineering Division.

6) REQUIRED TIER 2 TIS REPORT CONTENT AND ORGANIZATION

For a Tier 2 TIS, the following outline details the expected content to be included in TIS reports submitted to The City of Westerville. A list of required tables and figures associated with the TIS report can be found in Appendix B.

- **Title Page**
  - Title of Study
  - Date of Submittal
  - Summary Location Description
  - Developer, consultant, or owner name, address, and phone number(s)
  - Name of analysis/report preparer (company and/or individual)

- **Executive Summary**
  - Site location
  - Development description
  - Trip generation summary
  - Principal findings
  - Recommendations
- **Introduction**
  - Description of proposed development
  - Existing land use and intensity (if applicable)
  - Proposed land use and intensity (square feet, acres, dwelling units, etc.)
  - Location Map and Site Plan figure
  - Phasing and timing of the proposed development
  - Existing and proposed access locations for the site (compliance with ODOT Access Management Standards and City of Westerville Access Management Standards)
- **Existing Conditions**
  - Study area description
  - Study area figure
  - Area of influence (list study area intersections and traffic control)
  - Description of each roadway (classification, speed limit, number of lanes, ADT)
  - Planned completion of area roadway system by horizon year (per Agency approval) – may require figure
  - Description of future improvements (scheduled or under consideration) – may require figure
  - Existing land uses of study area
  - Existing access locations for the site (compliance with ODOT Access Management Standards and Westerville Access Management Standards)
  - Traffic laneage and traffic control figure (figure showing existing intersection laneage, geometry, and traffic control)
  - 3- Year accident History near the development
  - Transit connectivity if within ½ mile of transit stop
  - Pedestrian/Bicycle Connectivity opportunities near the proposed development
- **Trip Generation**
  - Trip generation (daily and peak hours, in/out, and total)
    - Adjacent Street Peak and Development Peak shall be considered
    - Reference the method of volume determination if different from ITE Trip Generation
  - Internal capture (based on land use, ITE calculations)
  - Pass-by trips (based on land use, adjacent street traffic/ITE calculations)

- **Site Trip Distribution and Assignment (as agreed in the Pre-Scoping Package)**
    - Listing of trip distribution by roadway and cardinal direction
    - Graphical representation of Trip Distribution and Assignment
- **Traffic Volumes**
    - Discussion of traffic counts including location, date, and time of counts
        - Counts used in the TIS analysis shall be recent (within the past 2 years), unless otherwise approved by The City of Westerville
        - ADT along the frontage and nearby public roads will be reported
        - Include 48-hour volume count along the frontage of the development (within the past 2 years) if within ½ mile of a signal to account for any time of day signal timing adjustments.
        - All counts shall be performed during the school year on a typical weekday (Tuesday through Thursday, non-holiday week) unless otherwise agreed upon in the Pre-Scoping Conference
        - Include turning movement counts at adjacent and study area signalized intersections for the peak hours
        - The study area should include all intersections of public roadway within ½ mile radius of the development, as long as the development adds more than 10% of the traffic (required only where there are 300+ peak hour trips) to the intersection or roadway. Larger study areas may be required for larger developments.
    - Existing peak hour traffic volumes figure
    - Description of growth rate used in the analysis
    - Description of off-site traffic for anticipated development in study area (include trip generation, trip distribution, modal split, and trip assignment)
    - Description of opening year background traffic volumes
    - Description of opening year build traffic volumes
    - Description of appropriate traffic diversions (if needed)
    - Intermediate phasing year background = peak hour traffic volumes figure (if needed)
    - Intermediate phasing year build = peak hour traffic volumes figure (if needed)
    - Opening year background = peak hour traffic volumes figure
    - Opening year build = peak hour traffic volumes figure
    - Horizon year (10 years from opening day)
- **Capacity Analysis**
    - Discussion of methodology and software used
    - Listing of LOS guidelines for capacity by intersection type
    - Summary table of study area intersection LOS
    - Analysis of results by intersection using HCM methodology. For example, provide Synchro output with HCM reports. These shall include a table of results showing LOS

by approach and overall for the intersection with delay for all scenarios. Include a discussion of recommendations for mitigation, if applicable.
    - Provide breakdown of developer triggered improvement vs background traffic

- **Turn Lane Warrants**
    - Turn lane warrants for the subject intersections (if needed)
    - Include a table with a breakdown of the turn lane warrants for each analysis year (existing, background, build)

- **Recommendations**
    - Interpretation and analysis of data, conclusions, and recommendations shall be discussed
    - List of recommended roadway improvements (by intersection, by horizon year)
    - Recommended Improvements figure
    - Any site-specific requirements or special conditions shall be described in an attachment
    - Compliance with The City of Westerville Access Management Guide for the driveways, new laneage, storage lengths.

- **Appendix**
    - Pre-Scoping Package
    - Field Notes
    - Traffic Count Volumes
    - Trip Generation Calculations – Pass-by, Internal Capture
    - Traffic Volume Development
    - Traffic Analysis Results by Intersection – Existing conditions, horizon year no-build, horizon year build
    - Turn Lane Warrant Calculations
    - Traffic Signal Warrants
    - Exhibit with all recommended roadway improvements

Please see the TIS Analysis Methodology/Guidelines section of this manual for details on required methodologies discussed above.

7) TIS METHODOLOGY/GUIDELINES

The TIS shall be completed according to the following methodology guidelines:

a) Trip Generation

Base trip generation for the proposed land use(s) should be calculated using the data contained in the latest published edition of the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*. The manual provides guidance on the data limitation, data age, choice of peak hour of generator or adjacent street traffic, choice of independent variable, and choice of average rate versus equation. If analyzing a special case or a land use category that is not included in the *Trip Generation Manual*, the method for estimating trip generation (i.e. local studies or custom trip generation rates) shall be coordinated with City of Westerville staff during the Pre-Scoping Conference.

Trip generation for individual outparcels shall be calculated separately from the remainder of the development, but may be included in the total trip estimate for analysis purposes.

TRIP REDUCTIONS

INTERNAL CAPTURE

The ITE *Trip Generation Handbook* provides guidance on the methodology for accurately calculating the potential internal capture for an appropriate development. Internal capture reductions shall be applied only to mixed use developments containing two or more of the following land use categories (residential, office, retail, hotel, cinema, restaurant). Internal capture reductions shall be applied before pass-by trips are calculated. The use of internal capture trip reductions shall be coordinated with City of Westerville staff during the Pre-Scoping Conference.

PASS-BY TRIPS

The ITE *Trip Generation Handbook* provides recommendations on the estimation of pass-by trips by land use. Pass-by trips shall only be applied to retail land uses and shall not be diverted from another roadway. For mixed-use developments, pass-by trip reductions shall be estimated and applied after internal capture trips have been reduced. Pass-by trips associated with a development program shall not exceed 10% of the existing volume reported for the adjacent public street(s). The use of pass-by trip reductions shall be coordinated with City of Westerville staff during the Pre-Scoping Conference.

b) Trip Distribution and Assignment (as agreed in Pre-Scoping Package)

Trip distribution for the proposed development shall be based on a combination of existing traffic patterns observed during data collection, anticipated traffic patterns as a result of the proposed development buildout, and professional judgement. Trip distribution percentages by turning movement shall be shown in a figure for the study area intersections.

VOLUME SMOOTHING

Observed traffic volumes should be smoothed upstream and downstream of the study area intersections to maintain continuity. Traffic volumes along corridors should be smoothed up to account for variations in the counts. Smoothing shall be performed with no loss of volume between intersections which have no driveways between them. Documentation of the smoothing methodology shall be provided in the Appendix. If volume smoothing cannot be achieved, explanatory documentation shall be provided.

c) Traffic Analysis

AM and PM peak hour traffic analyses shall be submitted for all study area intersections unless otherwise approved by The City of Westerville. Intersection laneage and signal phasing/timing will be consistent for all scenarios studied. Documentation shall be provided if variations in the laneage or signal phasing/timing are submitted in the TIS. The need for other analysis periods such as the mid-day peak, Saturday, or holiday peak will be determined in the Pre-Scoping Conference with the applicant. Traffic Analysis shall follow ODOT guidance from the Location & Design Manual, Volume I, Section 401.2.

ANALYSIS SCENARIOS

The traffic analysis shall include the following scenarios unless otherwise determined by The City of Westerville:

- Existing conditions
- No Build Project Opening Year
- Build Project Opening Year
- Build Project Opening Year Plus Mitigation Improvements (if applicable)
- Future Year (10 years from opening)

ANALYSIS DEFAULT VALUES

- A Peak Hour Factor (PHF) of 0.9 shall be used for all scenarios. If traffic counts justify, a higher PHF may be requested for use from The City of Westerville.
- When analyzing school traffic, a peak hour factor of 0.50 shall be used on intersection approaches where school traffic accounts for 100% of the approach volume. Otherwise a weighted PHF should be used to account for a mix of school traffic and other traffic (commuter, local, etc.)
- Base Saturation Flow Rate shall be used in accordance with the Highway Capacity Manual (HCM). Ideal saturation flow rate shall equal 1900 vphpl.
- Lane Utilization Factors shall be used in accordance with the HCM

SIGNALIZED INTERSECTIONS

- If analyzing an existing traffic signal, use the most recent available signal timing plan
- If analyzing a new or proposed traffic signal, use the following default values:
    - Minimum initial green time, protected left turns and all side streets – 7 seconds
    - Minimum initial green time, major street through movements with a posted speed limit of less than 35 mph – 10 seconds
    - Minimum initial green time, major street through movements with a posted speed limit between 36-44 mph – 12 seconds
    - Minimum initial green time, major street through movements with a posted speed limit greater than or equal to 45 mph – 14 seconds
- If the signal plan indicates that the traffic signal is coordinated, the traffic analysis shall utilize coordinated signal timings.
- Use the existing cycle length with optimized splits for all conditions.
- Cycle lengths for coordinated signals shall be equal with justification needed for half or double cycle lengths.
- If protected only left turn phasing is indicated on the signal plan or exists in the field, protected only phasing shall be used. Use protected only left turn lane phasing when dual left-turn lanes are present or when left-turn lanes are crossing 3 or more opposing through lanes of traffic.
- When analyzing future improvements, it is recommended that protected only phasing be utilized with the addition of a new exclusive left-turn lane.
- When analyzing existing signalized intersections, only use leading left-turn phasing for protective/permitted phasing.

LANEAGE

- Storage lengths shall be calculated using ODOT Location and Design, Volume I, methods for all left and right-turn lanes in the analysis
- The 95th percentile queue or the maximum observed queue length from a simulation program shall be used to calculate the storage length required for the subject turn lane.
- All recommended turn lane storage lengths shall be rounded up to the nearest 25 feet.
- A minimum of 100 feet of storage length for turn lanes shall be recommended.
- Recommendations for laneage improvements "by others" shall specify the corresponding party and the time frame for implementation.
- Determination of turn lanes for unsignalized intersections shall be based on the Warrant for Left and Right-Turn lane graphs published by the Ohio Department of Transportation.

d) Degradation

When comparing the No-Build condition to the Build condition, degradation occurs when:

- The overall intersection delay drops to a letter grade of LOS D or worse, or if a LOS F is made worse
- The control delay of an approach drops to LOS E or a LOS F is made worse
- Turn lane queueing exceeds available storage or turn lanes are blocked by through queueing
- New (proposed) intersections must operate at a LOS D or better
- Alternative intersections (roundabouts, etc.) shall be considered as potential mitigation improvements where practicable

Any degradation anticipated as a result of project traffic shall be analyzed for recommended improvements until an acceptable LOS is reached. If the existing conditions do not meet an acceptable LOS, or if an acceptable LOS cannot be reached, analysis assumptions and/or potential mitigation improvements shall be discussed with The City of Westerville.

e) Other Guidelines

- A SimTraffic simulation shall be completed at a minimum when 95th percentile queues indicate that traffic will spill over across adjacent public street intersections (in or out of the study area). The simulation should be seeded long enough so that traffic can traverse through the entire network (a minimum of 10 minutes is recommended). The simulation shall record for an entire 60-minute analysis period, for a total of ten (10) simulation runs. The average 95th percentile queues from these ten runs shall be reported in the TIS.
- Preparation of a signal warrant analysis is required for all proposed signalized intersections. The following guidelines shall be used for signal warrant analysis:
  - For existing intersections: Use current counts for 12 hours and utilize MUTCD signal warrants 1-8 (if applicable). Consideration of warrants shall utilize ODOT Right Turn Factorization.
  - For proposed/future Intersections: The volume development methodology for estimated future turning movements and time-of-day volume distribution shall be confirmed with The City of Westerville prior to performing the signal warrant analysis. Estimated volumes shall be analyzed using MUTCD signal warrants 1-8 (if applicable)
- Approach delays should be balanced so that worst of the main street approach delay shall be balanced close to the worst of side street approach delay to avoid excessive side street approach delay.

8) TIS Procedures Manual Appendices

Appendix A: Pre-Scoping Package
Appendix B: List of Required Tables & Figures
Appendix C: Turn Lane Warrants
Appendix D: Sample TIA

Appendix A: Pre-Scoping Package

A TIS pre-scoping package must be completed and provided to The City of Westerville Engineering Division prior to or at the pre-scoping conference and prior to preparation of a draft TIA. The City of Westerville Engineering Division will forward a copy to ODOT for review when appropriate.

Appendix B: List of Required Tables & Figures

Below is the list of required tables and figures (if applicable for particular study):

LIST OF TABLES

LIST OF FIGURES

Appendix C: Turn Lane Warrants

A TIS should follow the guidelines of the section titled 'Turn Lane Warrants' found in the City of Westerville Access Management Guidelines.

Appendix D: Sample TIS

A sample TIS is provided here based on the TIS procedures manual and access management guidelines.