Transportation Impact & Access Study Guidelines

A Transportation Impact & Access Study (TIAS) is an engineering analysis of existing transportation infrastructure and anticipated transportation impacts from a development or other project that might change traffic volume, patterns, and/or conditions. A TIAS often results in commitments for access design and off-site roadway improvements.

The City of Norwalk has established that the following Guidelines for the preparation of a Traffic Impact and Access Study should be adhered to when preparing a traffic study for any development project. Specific rules and regulations for the City of Norwalk should be obtained from the Planning & Zoning Department.

The purpose of these Guidelines is to establish procedures and protocol to ensure consistency of analysis and the adequacy of information presented. It also assures a timely review by the City Staff. In all cases, *it is strongly recommended that applicant consult with City Staff before undertaking the study to establish scope, assumptions, and schedule* so as to avoid any unnecessary delays or requests for revisions.

4.1 Introduction and Background

The City of Norwalk requires a traffic report as part of a Site Plan Application, a Zoning Amendment Application, and a Special Permit Application when significant traffic impacts are expected. The text of the zoning notes that the traffic report should be completed by a Professional Engineer and contain data such as roadway characteristics, traffic conditions, and impacts of the proposed development on traffic flow and safety. While these requirements are a good starting point, they are generic and leave the potential that they are limited in their applicability and usefulness to the City staff and to the Boards responsible for reviewing them.

This chapter discusses TIAS Guidelines for various cities/towns, counties, and states and presents the “best practices” for developing the most efficient and effective TIAS Guidelines. A recommended set of Guidelines are included to assist the City of Norwalk

adopt a comprehensive and quantifiable report which upgrades and strengthens the current City requirements and provides clear direction, expectations, and transparency to applicants when preparing these types of studies. Based on these recommendations, suggested standard TIAS report contents are discussed in detail.

It should be noted that the Connecticut Department of Transportation's Office of State Traffic Administration (OSTA) has a comprehensive process for determining the impact of major traffic generators. Part of this process includes determining a project's impacts on state highways and major intersecting town roads through the development of a TIAS. Any policy that is to be adopted at the City level should be generally compatible with the OSTA process.

Again, developers seeking to prepare traffic studies should coordinate with the City's Department of Planning and Zoning to obtain the most current rules and regulations as it relates to traffic impact.

4.2 Objective Criteria

Comprehensive and effective TIAS Guidelines provide clear direction to applicants and outline a series of objective criteria each study must address. While the OSTA process focuses on state highway locations, the local process should consider both state highway and non-state highway locations. The basis of TIAS Guidelines should include the following, at a minimum:

- Criteria or thresholds for warranting a TIAS;
- The level of study required for various degrees of impact;
- Standard methods for determining an appropriate study area;
- Required minimum contents of a TIAS; and
- Mitigation thresholds for impacts to the transportation system.

The success of TIAS Guidelines largely depends on how explicitly the requirements are presented. Clear language and objective, measurable criteria will guide developers and other entities seeking to modify the City's transportation system and result in a consistency in how studies are presented and reviewed. In turn, the review process for City officials will be straightforward.

4.3 Standard Approach

With clear criteria described above, outlining a standard approach for a TIAS would be the next step. These steps would be discussed in the guidelines so developers have a

roadmap to the process. An example of an effective approach would include the following steps:

- **TIAS Requirement:** A developer (either on their own or through consultation with the appropriate City department) would determine the impact of their proposed project, typically by calculating a maximum peak hour and/or daily trip generation estimate and/or through the identification of new parking spaces. This estimated impact would be compared to the criteria/threshold to determine if a TIAS would be required for the project and what level of study would be required.
- **Definition of Study Scope:** Once it is determined that a TIAS would be required, the scope of the study could be defined. Consultation with the City could be required at this step and a scoping determination meeting could define:
  - Type of Report/Level of Study
  - Study Area Limits
  - Time Period of Analysis
  - Analysis Scenarios
  - Trip Generation and Distribution Methodology
  - Presentation and Analysis of Crash/Safety Data
  - Growth Rate Assumption (for future year projections)
  - Planned Developments and Improvements to be Considered
  - Access Location and Design Elements
- **TIAS Preparation:** The developer would then prepare the TIAS according to the stipulations outlined at the scoping meeting, including at least the required minimum contents outlined by the City.
- **Mitigation Determination:** Once the developer has an understanding of a project's impacts, they can determine whether an impact threshold is exceeded and if mitigation would be required. Consultation with the City at this stage could be encouraged to ensure a mitigation package that would be comprehensive and fair to all parties. Otherwise, a standardized LOS-based approach to mitigating impacts can serve to address open-ended actions.
- **Review/Approval:** The developer would submit the TIAS to the City for review and comment. If deemed necessary, the City may chose to hire a peer review consultant to perform an independent review of the study and provide technical comments. The City would then either approve the TIAS as is or provide comments to have the developer revise the study.

- **Timelines:** A clear process should be laid out to standardize the length of time and process needed to review and revise a TIAS. Generally, entities doing business with the City prefer to know how long a review will take so they may understand if/when approval/denial would be made and can adjust their overall project timeline accordingly.

Effective TIAS Guidelines are flexible and allow the City and the applicant to work together to produce a study that addresses each project's unique impacts. Therefore, building language into the TIAS Guidelines to allow for deviations from the guidelines in certain situations is important.

4.4 TIAS Guideline "Best Practices" Research

The study team researched criteria included in other city/town or state TIAS Guidelines. This section is meant to demonstrate the variation among approaches to suit a particular jurisdiction's conditions and goals. Based on VHB's research, the following ten standards form the basis of effective TIAS Guidelines:

- TIAS Threshold/Trigger
- Levels of Study
- Study Area Selection
- Data Collection
- Safety Data
- Trip Generation Procedures
- Trip Distribution Procedures
- Results Presentation
- Mitigation Triggers
- Review Timeline

The following sections present the criteria defined by various jurisdictions for each of these ten standards. The complete TIAS Guidelines for each jurisdiction discussed below are included in the Appendix for reference.

4.4.1 TIAS Threshold/Trigger

The first criterion relates to the threshold or trigger that defines when a TIAS is required by a jurisdiction. These thresholds generally focus on development size, parking, land use, and/or trip generation estimates. Some jurisdictions define several thresholds that would trigger different levels of study (discussed in detail in a subsequent section).

Exhibit 2.4-1 presents the TIAS thresholds/triggers that have been adopted by various jurisdictions.

Exhibit 2.4-1 TIAS Threshold/Trigger

Jurisdiction	TIAS Threshold/Trigger
Connecticut DOT OSTA Guidelines	<u>New development that abuts, adjoins, or substantially affects state highway:</u> Size: 100,000 square feet of floor area Parking: 200 or more parking spaces <u>Expansion of existing development:</u> Size: Any increase in development size Parking: Increase to supply by 50 or more parking spaces Land Use: Significant change in use from that previously approved (i.e., office-to-retail) Developments which do not abut or adjoin a state highway, but equal or exceed the aforementioned thresholds, must first be evaluated to determine if a Certificate will be required.
Maine Traffic Movement Permit	Trip Generation: 100 or more passenger car equivalents during the peak hour
Massachusetts Environmental Policy Act (MEPA)	<u>Environmental Notification Form (ENF) and Mandatory Environmental Impact Report (EIR):</u> Trip Generation: 3,000 or more new daily trips Parking: 1,000 or more new parking spaces <u>ENF and Other MEPA Review if the Secretary So Requires:</u> Trip Generation: 2,000 or more new daily trips Trip Generation/Parking: 1,000 or more new daily trips and 150 or more new parking spaces Parking: 300 or more new parking spaces at a single location
Stamford, Connecticut	Size: 20,000 square feet or more of new non-residential; or 10 or more new residential dwelling units Land Area: 40,000 square feet of lot area Parking: 100 or more new parking spaces
Cambridge, Massachusetts	Size: Defined by land use and/or zoning district Parking: Defined by land use and/or zoning district
Wellesley, Massachusetts	Trip Generation: "A roadway segment, including one or more approaches to an intersection, over which 30 or more vehicles related to the development parcel travel in a single direction during any single hour."
Worcester, Massachusetts	Trip Generation: 20 or more peak hour vehicle trips or 200 or more daily trips
Albany, Oregon	<u>Level I:</u> Trip Generation: 50 or more AM or PM peak period vehicle trips <u>Level II:</u> Trip Generation: 100 or more AM or PM peak period vehicle trips Level I study must be expanded to Level II study if current traffic problems exist (high-accident location, poor roadway alignment, or capacity deficiency) or if staff anticipates the level of service deficiencies or impacts to adjacent neighborhoods.

Note: This information is presented to illustrate "best practices" being used by regulatory authorities. Specific recommendations for the City of Norwalk are provided in Section 4.5 of this Chapter.

4.4.2 Levels of Study

A jurisdiction may define various degrees or levels of study that are tied to the projected impact of a development. For example, if a development is projected to have minimal impact to the transportation system, a jurisdiction may only require a letter documenting the estimated trip generation and distribution. Conversely, if a development is projected to have a more significant impact, a full TIAS may be required. Allowing levels or tiers of study is an effective method of appropriately documenting and assessing a project's impacts without undue review by a city/town for projects with minimal impact. Exhibit 2.4-2 presents levels of study that are required by various jurisdictions.

Exhibit 2.4-2 Levels of Study

Jurisdiction	Levels of Study
Connecticut DOT OSTA Guidelines	Traffic Impact & Access Study for Certificate Determination Preliminary scoping meeting may be held or information may be exchanged to determine the extent of data needed for review.
Massachusetts Environmental Policy Act (MEPA)	ENF and Mandatory EIR ENF and Other MEPA Review if the Secretary So Requires
Worcester, Massachusetts	Study Area Letter Report Full traffic impact analysis report
Albany, Oregon	Level I - Trip Generation and Distribution Study Level II - Traffic Impact Analysis (TIA)

Note: This information is presented to illustrate "best practices" being used by regulatory authorities. Specific recommendations for the City of Norwalk are provided in Section 4.5 of this Chapter.

4.4.3 Study Area Selection

Defining a study area can be accomplished several ways. In some cases, jurisdictions have "rules of thumb" based on trip generation and distribution estimates and/or a certain distance from the project site to identify study area intersections. Almost all of the TIAS Guidelines researched require approval of the study area by the appropriate entity within the jurisdiction. In many cases, this approval would be granted at a project kick-off or scoping meeting. Exhibit 2.4-3 presents the criteria for selecting an appropriate study area that have been adopted by various jurisdictions.

Exhibit 2.4-3 Study Area Selection

Jurisdiction	Study Area Selection
Connecticut DOT OSTA Guidelines	n/a
Maine Traffic Movement Permit	A "scoping meeting" among the Maine DOT, the municipality, and the applicant shall define the scope of impact evaluation required for the proposed project and the type of proceedings warranted.
Massachusetts Environmental Policy Act (MEPA)	After the ENF review period, a written certificate is issued stating whether or not an EIR is required and, if so, what to require in the scope.
Cambridge, Massachusetts	City defines study area limits. Rule of thumb: All intersections with 40 new vehicle trips in the AM and PM peak hours combined.
Cape Cod, Massachusetts	Study area negotiated with Cape Cod Commission. Rule of thumb: All intersections with 25 new vehicle trips in the peak season peak hour and/or 3 crashes per year.
Framingham, Massachusetts	All streets and intersections adjacent to or within 1,000 feet of the project boundaries, subject to approval by the Planning Board.
Greenfield, Massachusetts	All streets and intersections adjacent to the project. All streets that will experience a ten percent (10% or greater) increase in peak hour traffic. All intersection that will experience a reduction in the level of service as a result of the project. Failing intersections that will experience an increase in traffic as a result of the project.
Albany, Oregon	Site access drives and adjacent roadways and intersections. Off-site major intersections impacted by 50 or more peak-hour vehicle trips (not beyond ½ of a mile from where trips load a principal arterial). City approval of study area limits required.

Note: This information is presented to illustrate "best practices" being used by regulatory authorities. Specific recommendations for the City of Norwalk are provided in Section 4.5 of this Chapter.

4.4.4 Data Collection

The types of data collected often depend on the characteristics of a jurisdiction. Rural and suburban areas may require only vehicular traffic volume data while more urban communities could additionally request pedestrian, bicycle, and transit data collection. Exhibit 2.4-4 presents data collection requirements for various jurisdictions.

Exhibit 2.4-4 Data Collection

Jurisdiction	Data Collection
Connecticut DOT OSTA Guidelines	Traffic volume data.
Cambridge, Massachusetts	Traffic volume data. Pedestrian and bicycle counts. Queue data. Public transit usage data. Parking data.
Cape Cod, Massachusetts	Traffic volume data including heavy vehicles (trucks, buses, and RVs) within the past 2 years. Pedestrian and bicyclist counts may be required. April – November preferred months for data collection.
Waltham, Massachusetts	Traffic volume data. Pedestrian counts may be required. Public transit usage data.
Albany, Oregon	Historical traffic volume data. Recent traffic volume data including heavy vehicles, (trucks, buses, and RVs). Pedestrian and bicyclist counts may be required.

Note: This information is presented to illustrate "best practices" being used by regulatory authorities. Specific recommendations for the City of Norwalk are provided in Section 4.5 of this Chapter.

4.4.5 Safety Data

A jurisdiction may require that safety data be presented in a variety of ways, including tabular form, a detailed narrative, and/or collision diagrams. If appropriate, a city/town may further require that state data be supplemented with local data. Exhibit 2.4-5 presents safety data requirements for various jurisdictions.

Exhibit 2.4-5 Safety Data

Jurisdiction	Safety Data Presentation
Connecticut DOT OSTA Guidelines	Accident history for a minimum of 3 most recent years in the form of collision diagrams. Detailed narrative.
Cape Cod, Massachusetts	Accident history for a minimum of 3 most recent years (using state and local data).
Waltham, Massachusetts	Accident history for a minimum of 3 most recent years (using state and local data). Collision diagrams will usually be required.
Albany, Oregon	Accident history for a 3 most recent years Locations include those adjacent to site, and on study area major roadway links and intersections.

Note: This information is presented to illustrate "best practices" being used by regulatory authorities. Specific recommendations for the City of Norwalk are provided in Section 4.5 of this Chapter.

4.4.6 Trip Generation Procedures

In general, trip generation should be based on the most current version of the ITE Trip Generation Manual. Jurisdictions may also allow other studies to be considered. Trip credits for shared trips within a multi-use development and/or pass-by trips for a retail establishment could also be permitted. Exhibit 2.4-6 presents trip generation procedures defined by several jurisdictions.

Exhibit 2.4-6 Trip Generation Procedures

Jurisdiction	Trip Generation Procedures
Connecticut DOT OSTA Guidelines	Most current version of ITE Trip Generation Manual. Approved ConnDOT studies are currently utilized to derive trip generation data for certain uses. Other studies taken into consideration and are subject to approval.
Cambridge, Massachusetts	Most current version of ITE Trip Generation Manual. Vehicle occupancy and mode share shall be accounted for. Heavy vehicle trip generation performed separately. Existing trips may be subtracted from the trip generation, subject to approval. Other studies taken into consideration and are subject to approval. Up to 25 percent of retail use trips can be assigned as pass-by trips.
Cape Cod, Massachusetts	Most current version of ITE Trip Generation Manual. Other studies taken into consideration and are subject to approval. Internal shared trip credits may be applied to multi-use projects. Up to 25 percent of retail use trips can be assigned as pass-by trips. Heavy vehicle trip generation performed separately.
Albany, Oregon	Most current version of ITE Trip Generation Manual. Pass-by trips approved on a case-by-case basis.

Note: This information is presented to illustrate "best practices" being used by regulatory authorities. Specific recommendations for the City of Norwalk are provided in Section 4.5 of this Chapter.

4.4.7 Trip Distribution Procedures

Depending on the type of development, there are several industry standard methods for distributing traffic volumes to study area roadways, including U.S. Census journey-to-work data, a gravity model, or existing travel patterns. Exhibit 2.4-7 presents trip distribution procedures accepted by several jurisdictions.

Exhibit 2.4-7 Trip Distribution Procedures

Jurisdiction	Trip Distribution Procedures
Connecticut DOT OSTA Guidelines	n/a
Cambridge, Massachusetts	Based on the most recent U.S. Census journey-to-work data (Census tract level).
Cape Cod, Massachusetts	Primary/Site and Pass-By/Site trips should distribute separately.
Albany, Oregon	Manual traffic distribution and assignment based on the gravity model principle. Projects generating more than 300 peak-hour trips may be required to use the City transportation model for traffic distribution and assignment

Note: This information is presented to illustrate "best practices" being used by regulatory authorities. Specific recommendations for the City of Norwalk are provided in Section 4.5 of this Chapter.

4.4.8 Results Presentation

The presentation of analysis results often depend on the characteristics of a jurisdiction. Rural and suburban areas may require only capacity analysis results for intersections while more urban communities could additionally request pedestrian, bicycle, and/or transit analysis. Exhibit 2.4-8 presents various jurisdictions' results presentation requirements.

Exhibit 2.4-8 Results Presentation

Jurisdiction	Results Presentation
Connecticut DOT OSTA Guidelines	Recommended improvement plans. Capacity analysis for intersections, interchanges, or expressways.
Cambridge, Massachusetts	Capacity analysis – LOS, v/c, and delay by intersection and approach Queue analysis – Average queue for all lane groups Residential street volume analysis - Peak hour volumes and percentage increase on all study area roadway segments which are forecast to carry project traffic. Parking analysis – Future parking demand Transit analysis - Distribution and assignment of peak-hour project transit demand among all available services; and analysis of increase in transit system use during the peak hours due to the project and changes in available reserve capacity. Pedestrian analysis – Pedestrian LOS at all study area intersections/crosswalks; pedestrian crossing gap at unprotected crosswalks; and pedestrian access to/from the site within a one-block radius and along principal access routes. Bicycle analysis - Identify conflicting vehicle turning movements at all study area intersections where bicycle facilities are present or peak hour bicycle volume exceeds 10 on any approach; evaluate bicycle access; and evaluate available bicycle parking on- and off-site.
Waltham, Massachusetts	Delay, v/c ratio, 95th percentile queue lengths Weave, merge/diverge analysis (where applicable)

Note: This information is presented to illustrate "best practices" being used by regulatory authorities. Specific recommendations for the City of Norwalk are provided in Section 4.5 of this Chapter.

4.4.9 Mitigation Triggers

The next criterion defines mitigation triggers. These thresholds generally focus on delay, level of service, and/or safety. Some jurisdictions may also require a financial contribution in lieu of or in addition to traditional mitigation measures. These funds are deposited into a transportation fund and may be used at the discretion of the jurisdiction to address operational or safety deficiencies within the community but not necessarily proximate to the project site. Exhibit 2.4-9 presents mitigation triggers that have been adopted by various jurisdictions.

Exhibit 2.4-9 Mitigation Triggers

Jurisdiction	Mitigation Triggers
Connecticut DOT OSTA Guidelines	n/a
Stamford, Connecticut	Improvements needed to avoid undue congestion and provide for safe pedestrian and vehicular circulation, including provisions for safe sidewalks and crosswalks for pedestrians.
Canton, Massachusetts	For intersections in the study area where a project increases traffic volumes by more than 5 percent. Mitigation is required to restore operations to Existing Conditions LOS, bring operations to LOS D or better, and abate above average accident occurrence.
Cape Cod, Massachusetts	Future year performance degradation must be fully mitigated to equivalent "no-build" delay and v/c ratios. Improvements should address safety-related problems at high crash locations. Alternatives include Transit Equivalency Buyout and Fair Share Mitigation Analysis.
Framingham, Massachusetts	Off-site traffic improvements at locations that would receive at least 5% of traffic generated by the project shall be equal to a minimum of 3% of the total development cost of the proposed project. The LOS of impacted intersections shall be adequate (LOS B or better for rural/residential/new intersections; or LOS D or better for all other streets and intersections).
Waltham, Massachusetts	Future year performance degradation must be fully mitigated to equivalent "no-build" delay and v/c ratios. Where use of existing transit systems is proposed as mitigation, analysis of the impacts on capacity and performance should be quantified and documented. Financial contribution to the City of Waltham's Transportation Fund.
Albany, Oregon	LOS D for intersections controlled by a signal or all-way stop or v/c ratio of 0.85 for the worst case movement at uncontrolled and two-way stop controlled intersections. Street segments and intersections where accident rates exceed 1.0.

Note: This information is presented to illustrate "best practices" being used by regulatory authorities. Specific recommendations for the City of Norwalk are provided in Section 4.5 of this Chapter.

4.4.10 Review Timeline

Review timelines are clearly defined in the most effective TIAS Guidelines. Generally, entities doing business with the City prefer to know how long a review will take so they may understand if/when approval/denial would be made and can adjust their overall project timeline accordingly. Exhibit 2.4-10 presents review timelines that various jurisdictions commit to.

Exhibit 2.4-10 Review Timeline

Jurisdiction	Review Timeline
Connecticut DOT OSTA Guidelines	Maximum of 60 days of review time The OSTA normally meets the third Tuesday of each month Approval or denial is issued by the Executive Director of OSTA
Cambridge, Massachusetts	City has 21 days to either approve the study or issue a denial. After re-submittal, the City then has 14 days to either certify a revised study or issue a denial.
Cape Cod, Massachusetts	The average review time is five months. State law requires completion of the review process within seven months.

Note: This information is presented to illustrate "best practices" being used by regulatory authorities. Specific recommendations for the City of Norwalk are provided in Section 4.5 of this Chapter.

4.5 City of Norwalk TIAS Guideline Recommendations

The study team has evaluated criteria included in the TIAS Guidelines of several cities/towns, counties, and states to determine which present the most effective and efficient set of guidelines to those doing business with the City. This evaluation resulted in the identification of the "best practices" for TIAS Guidelines. The study team has also considered the appropriateness of the criteria as they relate to the City of Norwalk's transportation system. Exhibit 2.4-11 presents a summary of recommendations for implementing these "best practices" in a manner suitable for the City of Norwalk.

The recommendations are meant to serve as a guide for the City in developing and adopting a more comprehensive and quantifiable set of TIAS Guidelines which upgrade and strengthen the set of requirements currently in place. Developers and users of this document should contact the City's Department of Planning and Zoning to obtain the most recent rules and regulations for the preparation of traffic studies for projects coming before the City.

Exhibit 2.4-11 TIAS Guideline Recommendations

Criteria	"Best Practices" and Recommendation[1]
TIAS Threshold/ Trigger	Level 1 (New Developments Only): Trip generation: 50 or more total peak hour vehicle trips. Level 2: *New Developments:* Size: 20,000 square feet or more of new non-residential; or 10 or more new residential dwelling units. Parking: 100 or more new parking spaces. Trip Generation: 100 or more total peak hour vehicle trips. *Existing Permitted Use:* Size: Any increase in development size. Parking: Increase to supply by 50 or more parking spaces. Land Use: Significant change in use from that previously approved.
Levels of Study	Level 1: Technical memorandum (trip generation, trip distribution, safety, and driveway access). Level 2: Full TIAS.
Study Area Selection	Level 1: Site drive and adjacent intersections only. Level 2: Intersections with 25 new vehicle trips in a peak hour. City approval of Level 2 study area limits required.
Data Collection	Daily/peak period traffic volume data including heavy vehicles (time period of data collection dependent on use). Peak period pedestrian and bicycle counts. Public transit usage data (where applicable). Data must be collected within the past 2 years, unless otherwise approved by the City.
Safety Data	Accident history for the most recent 3 years of data available from state and local sources (if applicable). Detailed narrative, summary table, and collision diagrams.
Trip Generation Procedures	Based on the most current version of the ITE Trip Generation Manual. Other studies could be taken into consideration, subject to approval by the City. Pass-by and shared trip credits permitted in accordance with ITE Trip Generation Handbook procedures.
Trip Distribution Procedures	Should be well documented and justified. Potential methodologies include existing trip patterns on adjacent roadway network, journey-to-work data based on the most recently available US Census, and/or a gravity model.
Results Presentation	Based on the most recent HCM. v/c, delay, LOS, and 95th percentile queue presented by lane group and overall intersection. Analysis should consider pedestrian and bicycle interaction. Weave and/or merge/diverge analysis (where applicable).

1 Specific thresholds and triggers presented in this document are only recommendations for consideration. Potential applicants should contact the Department of Planning & Zoning to obtain the most current thresholds.

Exhibit 2.4-11 (cont). TIAS Guideline Recommendations

Criteria	"Best Practices" and Recommendation
Mitigation Triggers	For intersections in the study area where a project increases traffic volumes by more than 5 percent, mitigation is required in the following cases: • If intersection operates at LOS D or better under the No-Build condition and the Build condition degrades operations to LOS E/F, LOS D or better operations must be restored; or • If intersection operates at LOS E under the No-Build condition and the Build condition degrades operations to LOS F, No-Build operations must be restored; or • If intersection operates at LOS F under the No-Build condition and the continues to operate at LOS F under the Build condition with increased delay, No-Build delay must be restored; or • To abate above average accident occurrence. Development of a fund for future transportation improvements in lieu of or in addition to mitigation should be considered.
Review Timeline	The review period for Level 1 studies should be no more than 45 days from submission of the TIAS. Level 2 studies should be no more than 75 days from submission of the TIAS. Where discrepancies and/or additional information is required/requested by the City, the timelines are extended until such time that the revised information has been received by the City DPW Staff.

4.6 TIAS Standard Report Contents

Based on the guidance and recommendations discussed previously, this section presents the minimum standard content that should be included in all TIAS submissions to the City. The section is meant to provide clarity to those doing business and working in the City and to streamline the process of TIAS submission and review. A TIAS Technical Checklist has been developed for the City and is included in the Appendix.

In accordance with CT DOT guidelines, all traffic studies shall be prepared by or under the direct supervision of a Professional Civil or Transportation Engineer currently licensed to practice within the State of Connecticut and with special training and experience in transportation engineering and planning. The engineer shall certify the document by providing a signature and stamp of approval.

A scoping determination meeting with the City will be required for all developments requiring a Level 2 study. This meeting would ideally take place prior to substantial work on the TIAS has begun and will define or confirm:

- Level of study required;
- Study area limits;
- Peak periods to be studied;
- Growth rate assumption (for future year projections);
- Planned developments and improvements to be considered; and

- Deviations from standard trip generation methodology (if necessary).

4.6.1 Executive Summary

The Executive Summary of the TIAS should document the report certification (i.e. Professional Engineer stamp and signature). This section should also include:

- Description of the proposed development including development use(s), size, parking, and proposed access;
- Brief summary of the site location and study area;
- Summary of findings; and
- Discussion of proposed mitigation.

4.6.2 Introduction

The introduction of the TIAS should include information on the following:

- **Project Description:** Details of the existing land use and of the proposed development including development use(s), size, parking, and proposed access.
- **Study Area Description** – A description of the study area should be provided, including the study area boundaries, and study area intersections. The extent of the study area will depend on the level of study required for a particular development (determined according to the thresholds presented in Exhibit 2.4 -11).
  - A Level 1 study should include the site drive and adjacent intersections only.
  - A Level 2 study should include intersections with 25 new vehicle trips in a peak hour. It should be noted that City approval of Level 2 study area limits required and would occur at a the scoping determination meeting discussed above.
- **Study Methodology** – This section should provide a brief discussion of the methodology used to complete the TIAS.

4.6.3 Existing Conditions

The following information about the existing conditions within the vicinity of the project site should be provided:

- **Existing Roadway Conditions** – Descriptions of all roadways adjacent to the site and between all study area intersections, including approximate roadway width, number of travel lanes, bicycle and pedestrian accommodations, posted speed limits, functional classification, and jurisdiction.

- **Existing Intersection Conditions** – Descriptions of all study area intersections, including designated lane use, traffic control, crosswalk locations, adjacent land use, and transit stops.
- **Existing Daily Traffic Volumes –** Daily traffic volume data for a minimum of 48-hours on roadways in the vicinity of the site should be provided. The counts should be taken within two years of the submission date of the study unless otherwise approved by the City. The time period of counts (typical weekday (Tuesday, Wednesday, Thursday), Saturday, and/or Sunday) shall depend on the type of development and shall be determined in consultation with the City.
- **Existing Peak Hour Traffic Volumes –**Turning movement counts (TMCs) should be provided at all study intersections during the peak period (determined through consultation with the City). Counts should be avoided during weeks with major holidays, school break weeks, and during the period between two weeks before Christmas and New Years week. Counts may be deemed invalid in the case of extreme weather events (heavy rain or snow/blizzard conditions). Counts to include:
  - Total cars and heavy vehicles reported separately by movement;
  - Pedestrian counts by crosswalk; and
  - Bicycle counts by movement.

  Counts should be summarized graphically for each peak hour in the form of traffic volume networks that are balanced and seasonally adjusted, where appropriate. See below for more information regarding seasonal adjustment.
- **Seasonal Variation/Adjustment –** Traffic counts shall be seasonally adjusted if, according to the most recent version of *Factors for Expanding 24-Hour Counts to Annual Average Daily Traffic Volumes* compiled by CT DOT, data is collected during a month with lower than average daily traffic volumes. These factors shall be used to seasonally adjust traffic volumes, if necessary.
- **Public Transportation –** If applicable, discuss bus stops, shelters, stations and routes within the project area. Include private shuttle bus services, school bus stops, etc. Include a summary of transit schedules and headways for each service. Present the most recent boarding and alighting information for transit stops in the study area.
- **Crash Data -** The latest available 3-year accident data from state records shall be provided for all study area intersections in the form of a summary table and detailed narrative. If deemed appropriate by the City, state data shall be supplemented with local data. Collision diagrams shall be provided for locations included on the most recent Suggested List of Surveillance Study Sites (SLOSSS)[1]

[1] "Pursuant to Title 23 United States Code Section 409, this data is not admissible and not discoverable in any federal or state court proceeding, and cannot be considered for any other purpose in any action for damages arising from an occurrence at a location addressed in this report."

or, for local crash data, for intersections with greater than an average of 8 accidents per year for the 3-year period studied.

4.6.4 Future Conditions without the Project (No-Build)

The following information about the future conditions, without the proposed project (i.e. No-Build Conditions) should be provided:

- **Planned/Approved Roadway Improvements** – Discuss planned and/or approved improvements to the transportation network in the vicinity of the project site that could influence traffic flow in the study area. These improvements should be determined based on discussions with the City.
- **Planning Horizon** – The study forecast period shall be five years or the anticipated date of final building occupancy, whichever is later.
- **Historical Background Growth Rate** –Identify annual growth rate assumption and justify its selection through discussions with the City.
- **Site-specific Background Developments** – Identify other developments, including those previously approved by the state and/or City, or pending, but not yet operational, to be included in background traffic estimates.
- **No-Build Traffic Volumes** – Graphically summarize No-Build traffic volumes that are balance, where appropriate.

4.6.5 Future Conditions with the Project (Build)

The following information about the future conditions, with the proposed project (i.e. Build Conditions) should be provided:

- **Trip Generation** –The methodology used to establish trip generation estimates, including pass-by and shared trips, if applicable should be provided and the final trip generation estimates should be summarized. Trip generation estimates should be based on the most current version of the ITE Trip Generation Manual. Other studies could be taken into consideration, subject to approval by the City. Pass-by and shared trip credits are permitted in accordance with ITE Trip Generation Handbook procedures. Trip generation for the Christmas Season, as defined by ITE, is not currently required.
- **Trip Distribution** – Describe the methodology used to establish the directional distribution of vehicular traffic approaching and departing the site. For multi-use developments, different trip distribution rates should be established for each type of use (office, retail, residential, etc.). Graphics showing the percent distribution of traffic by direction for each major road leading to the area and at access points should be provided.

- **Trip Assignment** – Assign site-generated traffic to the study area roadways based on trip distribution patterns and graphically summarize these traffic volumes for each peak hour.
- **Build Traffic Volumes** – Graphically summarize Build traffic volumes that are balanced, where appropriate. For Federal-Aid projects, 20-year design volumes are required.

4.6.6 Traffic Operations Analysis

The following information about the traffic operations analysis should be provided:

- **Methodology and Software** – Provide a description of the methodology used to analyze study area intersections and interchanges (if applicable). The analysis approach used shall be in accordance with the most recently accepted version of the Transportation Research Board's *Highway Capacity Manual (HCM).*
- **Signalized Intersection Capacity Analysis** – Results of capacity analysis should be presented for all signalized study area intersections and include v/c ratio, delay, LOS, and 95th percentile queue by lane group and overall intersection for each peak hour and analysis condition (Existing, No-Build, and Build Conditions). The analysis should consider pedestrian and bicycle interaction.
- **Unsignalized Intersection Capacity Analysis** – Results of capacity analysis should be presented for all unsignalized study area intersections and include v/c ratio, delay, LOS, and 95th percentile queue for all minor street movements for each peak hour and analysis condition. The analysis should consider pedestrian and bicycle interaction.
- **Weave, Merge, & Diverge Capacity Analysis (if applicable)** – If applicable, results of capacity analysis should be presented for all weave areas, merges, and diverges within the study area. The results should include the density and LOS for each facility for each peak hour and analysis condition.
- **Sight Distance Evaluation** – Sight distance evaluations shall be summarized for all site driveways. Measurements should be taken for Stopping Sight Distance (SSD) and Intersections Sight Distance (ISD) at these intersections in accordance with guidelines provided by the most recently accepted version of *A Policy on Geometric Design of Highways and Streets ("Green Book")* by the American Association of State Highway and Transportation Officials (AASHTO).
- **Signal Warrant Analysis, if applicable** – If a new traffic signal is proposed at a study area intersection, its installation shall be justified using the warrants in the most recently accepted version of the *Manual on Uniform Traffic Control Devices (MUTCD)* prepared by the Federal Highway Administration. The signal warrants in the MUTCD are not the sole criteria used to determine the need for

new traffic signals. Although an intersection may meet the MUTCD warrants, engineering judgment may lead the City to determine that a signal is not appropriate.

4.6.7 Mitigation and Recommendations

The following information regarding proposed mitigation and other recommendations should be provided:

- **Site Access and Circulation** – Descriptions of improvements to site access and circulation should be provided. The discussion should include emergency vehicle access and circulation, loading dock access (if applicable), on-site pedestrian/bicycle circulation, transit access to the site (if applicable), and proposed improvements to the intersections of study area driveways with the adjacent roadway network.
- **Off-Site Roadway Improvements** – If the study analyses indicate that off-site mitigation is required based on the criteria outlined in Exhibit 2.4-11, a description of the proposed mitigation should be provided. If the improvements require physical alteration to roadways and/or intersections, a conceptual plan shall also be provided depicting the proposed alterations. For all proposed off-site mitigation, capacity analysis results after improvement shall be compared to the No-Build and Build Conditions.
- **Transportation Demand Management (TDM) (if applicable)** – If applicable, a description of the proposed TDM strategies should be included. The TDM toolbox presented in Chapter 2-2 should be utilized to develop strategies that are appropriate for a particular development. In situations where TDM is not used, the applicant should describe if it was considered and discarded as an effective or useful option.

4.6.8 Conclusion

The TIAS should include a conclusion which provides a brief summary of the proposed development, the findings of the TIAS, and a brief discussion of the proposed mitigation.