City of Santa Fe, New Mexico

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August 29, 2024

TO: All Developers and City of Santa Fe Staff

RE: Transportation Impact Analysis Guidelines

The new Transportation Impact Analysis (TIA) Guidelines have been adopted pending codification and should here forth be used in determining necessary transportation infrastructure improvements related to development in the City of Santa Fe.

While there are no direct references to the TIA requirement in the City Code, the most applicable sections in current Code are 14-2.11 under Land Use Director Responsibilities and 14-9.2 under Street Improvement and Design Standards. These new TIA guidelines will be incorporated into the new Public Infrastructure Development Standards Manual currently under development and will be referred to in the upcoming Chapter 14 Code release.

These guidelines were developed with extensive input by engineering and development professionals and seek to create a safe, multimodal, accessible and sustainable transportation system in our urban environment. Thank you for your partnership in realizing this vision for the City of Santa Fe. Please contact City Traffic Engineer Jeanne Wolfenbarger, PE if you have any questions about these or upcoming new regulations.

Sincerely,

Jeanne Wolfenbarger

Jeanne Wolfenbarger, PE, City of Santa Fe Traffic Engineer

Regina Wheeler

Regina Wheeler (Aug 29, 2024 13:17 MDT)

Regina A. Wheeler, Public Works Director for the City of Santa Fe

Heather L. Lamboy, AICP, Director (Interim), Planning & Land Use Development

Attachment: Transportation Impact Analysis Guidelines

Cc:
Erick Aune, SFMPO Director
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Transportation Impact Analysis Guidelines

City of Santa Fe, New Mexico

Table of Contents

Page

1. PURPOSE AND NEED 1

2. Introduction 1

3. Determining Analysis Requirements 3

A. Transportation Assessment 3

B. LEVEL OF Transportation Impact Analysis (TIA) 3

C. Analysis Methods and Assumptions 4

4. TIA Requirements 4

A. Level 1 TIA 4

B. Level 2 TIA 7

1. Study Area 7
2. Study Horizon Years 8
3. Background (non-site) Traffic VOLUME Forecasts 8
4. Analysis Time Period 8
5. Data Collection Requirements 8
6. Trip Generation 9
7. Trip Distribution 10
8. Trip Assignment 10
9. Capacity Analysis 10
10. Traffic Signal Needs 11
11. Roundabout Considerations 11
12. Queuing Analysis 12
13. Speed Considerations 12
14. Improvement Analysis 12

15. Additional Analysis 13
16. Access Management and AUXILIARY Turn Lanes 13
17. Multimodal Review 19
5. Level 2 Transportation Impact Analysis (TIA) Report Suggested Outline 25

Appendices

APPENDIX A. Initial Transportation Assessment Form
APPENDIX B. Bicycle & Pedestrian Level of Traffic Stress Charts
FHWA Guidebook for Measuring Multimodal Network Connectivity
APPENDIX C. City of Santa Fe ,Santa Fe MPO Polices and Plans and Additional References

List of Figures

Figure 1. Left Turn Lane Warrant Criteria 16
Figure 2. Right Turn Lane Criteria for Two-Lane Roadway 17
Figure 3. Right Turn Lane Criteria for Four+ Lane Roadway 18

List of Tables

Table 1. Relative Crash Rates for At-Grade Arterials 15
Table 2. Turn Lane Length Requirements 19

1. PURPOSE AND NEED

The City of Santa Fe has developed these Transportation Impact Analyses (TIAs) guidelines to assess the potential impacts of a proposed development or project on the transportation network, including multimodal networks. The recommendations for the transportation analysis of the city transportation network are intended to develop modifications that support the context of a more urban environment and appropriately address impacts for all users of the network. Specifically, recommendations and guidelines provide explicit consideration of multimodal travel purposes and needs for all citizens of Santa Fe.

The City of Santa Fe TIA guidelines differ from the NMDOT State Access Management Manual (SAMM) which focuses more on vehicular traffic needs. These guidelines are an intentional departure and expansion from the SAMM guidance to provide facilities designed to accommodate the needs and consider the safety of all transportation users regardless of their mode. However, the SAMM guidance remains the governing document for recommendations to roadways and intersections on the New Mexico State Highway System within the City of Santa Fe and collaboration with NMDOT is essential where State roads are impacted so that these guidelines are considered when appropriate within the city limits. It may also be appropriate to consider NMDOT manuals and specifications for projects where NMDOT collaboration is required such as for Road Exchange Agreements.

2. INTRODUCTION

The purpose of this document is to outline and explain the procedures and requirements for preparing a Transportation Impact Analysis (TIA) report for the City of Santa Fe, New Mexico. As discussed below, a TIA may be required for new development or redevelopment. The TIA will assist the City in determining needed modifications to facilitate and consider safety and efficiency of the transportation system upon implementation of a proposed development.

A Transportation Impact Analysis report differs from a Traffic Impact Study/Analysis, in that it evaluates the potential effects of proposed projects for all modes of transportation surrounding and supporting transportation infrastructure and services. The traffic and multimodal impacts of proposed development projects are addressed in a manner consistent with the policies set forth by the City of Santa Fe and the Santa Fe MPO found in **APPENDIX C**. Other common references are also included in Appendix C on an as-needed basis.

One of the City of Santa Fe's primary objectives for the TIA guidelines is to provide guidance that permits operation and maintenance of a safe and efficient transportation system for all users and all modes. The review and management of development-generated traffic is an integral part of that objective. The TIA Guidelines, as outlined in this document, have been established for this purpose. The TIA Guidelines outline two steps to define the level of detail required for the Transportation Impact Analysis (TIA) based on the characteristics of development and estimated peak hour vehicular traffic volumes and other modal users.

The TIA identifies existing and projected traffic volumes and conditions, site-generated traffic, and their combined impacts on the existing and planned roadway and trail systems. The TIA provides an opportunity for the City and the developer to share information and jointly address transportation- and traffic-related objectives. This provides a means of balancing development needs with the functional integrity of the roads, streets, trails and public transit that serve both the development and the surrounding transportation system. The need for a TIA should be assessed as early as possible in the development process when there is maximum flexibility for mitigating traffic and transportation related user problems.

The guidelines contained herein are provided to:

- Assist developers through the entitlement process by outlining the requirements and level of detail of traffic analysis and multimodal measures that will be required, including the requirement for a scoping meeting.
- Standardize the types and details of analysis required in the assessment of transportation impacts for developments with similar levels of size and intensity.
- Ensure consistency in the preparation and review of the TIA through standardization of the reports.
- Outline appropriate access management.

The TIA shall address the following:

- The current transportation system and operational characteristics in the vicinity of the site for all anticipated modes.
- The interface between on-site circulation and adjacent roadway and transportation circulation system.
- The intensity and character of the development.
- Trip generation.
- Trip distribution and assignment estimates.
- Impacts of the development on the existing and planned transportation system.
- Bicycle and Pedestrian connectivity and their estimated usage.

The TIA is to be prepared by a professional engineer registered in the State of New Mexico, and the final TIA report shall be signed and sealed by the engineer. All documents, including the Initial Transportation Assessment Form and TIA, shall be submitted to the Public Works Department with a copy to the Planner-in-Charge with the Land Use Department in a draft form. Comments relative to the analysis shall be provided by the City Engineer, or his/her designee, in writing to the project proponent and its engineer so that any necessary revisions can be made prior to final submittal. The TIA is not deemed complete or final until it incorporates all necessary revisions and is prepared to the City's satisfaction.

3. DETERMINING ANALYSIS REQUIREMENTS

A. TRANSPORTATION ASSESSMENT

The first step for all development or redevelopment is to determine the size and scope of study required for the site through a Transportation Assessment.

An initial Transportation Assessment is required for all proposed development or redevelopment regardless of size. Redevelopments will be treated as a new development if either of the following two conditions is met:

- It is determined that the trip generation increases by 10% or more as compared to the existing use during either the AM or PM peak hour. (This will include building additions.)
- The redevelopment occurs on parcels that have been vacant for three years or more.

The Transportation Assessment should provide important information regarding location, type, size, and density of the development and an initial estimate of the number of peak hour trips and other mode trips expected. The City of Santa Fe Traffic Engineer, or designee, will review the initial Transportation Assessment and determine the level of study required for the proposed development. Additional information may also be requested at the discretion of the City Traffic Engineer, or designee. Although the peak hour trips are the primary factor for determining the level of study, other factors such as location and existing traffic and safety conditions may require a more detailed study than the trip generation would indicate.

The developer or developer's designee must first estimate the number of vehicular trips generated by the proposed development using the procedure(s) outlined in this document. The developer must obtain the concurrence of the City Traffic Engineer, or designee, on the number of trips generated by the development and the appropriate analysis category. The City Traffic Engineer, or designee, will make the final decision.

The Transportation Assessment is required to be submitted to the City of Santa Fe in a technical report format that include all the requested information. A Transportation Assessment worksheet can be found in **APPENDIX A**. This form shall be required for all new developments to determine whether an assessment is needed and the level of analysis.

B. LEVEL OF TRANSPORTATION IMPACT ANALYSIS (TIA)

Upon City of Santa Fe review and approval of the Transportation Assessment, a determination of the second step will be made regarding the appropriate level of TIA to be completed for the proposed development. The initial determination of TIA level, either Level 1 TIA or Level 2 TIA, will be made based on estimated peak hour vehicle-trips to be generated by the proposed development or redevelopment and proposed development scope and its impact on the community. TIA categories based on total peak hour trip generation (inbound and outbound) are described below.

LEVEL 1 TIA: if the vehicular peak hour trips are equal to or greater than 50 and fewer than 100, this will serve as the only TIA document. A Level 1 TIA shall include, at a minimum, the elements described in section 4.A. Despite the given threshold, the City Traffic Engineer may identify certain safety factors that warrant additional analysis beyond a Level 1 TIA such as the potential for cut-through traffic.

LEVEL 2 TIA: if the vehicular peak hour trips are equal to or greater than 100, this will serve as the required TIA document. As part of the scoping meeting, the following factors shall also be considered as applicable:

- Internal and external connectivity to existing or proposed land uses (commercial, residential, etc.)
- Cut through traffic concerns and need for traffic calming
- Need for treatments at mid-block pedestrian/bicycle crossings and trail crossings
- Connectivity to regional trails for pedestrians/bicyclists

While an initial determination of TIA Level can be made based on estimated site trips generated, the City Traffic Engineer or designee will make the final determination.

C. ANALYSIS METHODS AND ASSUMPTIONS

Before initiating TIA work, the developer shall provide (and the City Traffic Engineer approve) a written summary of methods and assumptions to be used in the study, including study area, need for other agency involvement, traffic parameter values, data collection methods, future time horizons for the development, and forecasting methodology.

4. TIA REQUIREMENTS

A. LEVEL 1 TIA

The purpose of a Level 1 TIA is to evaluate the proposed vehicular and multimodal transportation connections associated with a development project. The study area for a Level 1 TIA is limited to the site access intersections.

For vehicular connections, the evaluation should:

- Address whether access spacing relative to current or future intersections is acceptable, providing sufficient sight distance and meeting applicable corner clearance criteria.
- A 24-hour directional traffic count should be conducted along the roadway being accessed by the proposed development. The count should include hourly traffic volumes including non-motorized users for each of the 24 hours.
- Identify whether exclusive left and/or right turn lanes are needed to serve the access based on projected traffic levels. Traffic volume criteria for auxiliary lanes area are outlined in section 16 of this document.

- Address whether accesses will be full movement or limited movement and identification of turn lane needs based on projected traffic volume levels. If partial movement access is appropriate, it is also advisable to review how vehicles can negotiate access using safe management approaches.

For non-motorized and transit connections, the evaluation should:

- Describe the existing routes that bicyclists, pedestrians and transit users may use to reach the site and recommend on-site measures for accommodating efficient multimodal connections that maximize safety for non-motorized trips. On-site measures may include sidewalks, sidewalk connections to fill a gap, shared-use paths, bike lanes, signage, transit stops, Accessible Pedestrian Signals (APS), enhanced street lighting particularly at pedestrian crossings, and pavement markings to support multimodal access and circulation. In addition, pedestrian bulb-outs at intersections, pedestrian refuges, or reduced corner radii at intersections and access points may be suggested.
- Identify existing or proposed regional pedestrian and bicycle trails within ¼ mile of the site. If gaps in multimodal connectivity exist between the site and the identified regional trails recommend off-site measures for accommodating efficient multimodal connections that maximize safety for non-motorized trips which shall be required by the developer. Off-site measures may include crushed gravel in place future sidewalks or shared-use paths, signage, and pavement markings to support multimodal access and circulation.
- Specifically assess and summarize bicycle and pedestrian connectivity to existing transit stops within ¼ mile of the site. If gaps in multimodal connectivity exist to transit stops that would serve the site recommend off-site measures for providing these connections. In addition, in some instances addition or improvement of a transit stop may be an option particularly if a proposed development is attractive for transit users which should also include ADA compliance. If transit service routes, existing or pending are identified within the study area the developer shall coordinate any modifications with the applicable transit agency staff, including City of Santa Fe "Santa Fe Trails" North Central Regional Transit District (NCRTD), Rio Metro Rail Runner Express and/or NMDOT Transit and Rail Bureau.

The Santa Fe MPO Bicycle, Pedestrian, and Public Transit Master Plans should be referenced in identifying proposed non-motorized and transit connections. City of Santa Fe Code of Ordinances Chapter 14 should be referred to for additional guidance on providing bicycle, pedestrian, and transit facilities for developments.

The following table of contents is suggested for a Level 1 TIA:

A. PROPOSED DEVELOPMENT

i. Site location
ii. Land use and intensity

iii. Site plan
iv. On-site circulation and access

B. ANALYSIS OF EXISTING CONDITIONS

i. Roadway characteristics (number of lanes, functional classification, adequacy of compliance with city design standards and/or AASHTO)
ii. Traffic control devices
iii. Transit service
iv. Pedestrian/bicycle facilities
v. Nearby driveways
vi. Traffic volumes (Daily, morning and afternoon peak periods at proposed site access location(s))
vii. Any existing safety concerns as judged by lack of following current roadway standards and crash data

C. PROJECTED VEHICULAR TRAFFIC

i. Site traffic (each horizon year)
   a. Trip generation
   b. Trip distribution
   c. Trip assignment
ii. Non-site traffic forecasts (each horizon year) and methodology
iii. Total traffic (each horizon year)
iv. Estimated AADT

D. TRAFFIC ANALYSIS

i. Site access
   a. Movements provided
   b. Access spacing
   c. Turn lane requirements
   d. Level of Service (LOS) for all movements
ii. Traffic safety
   a. Review of documents by Santa Fe MPO via **APPENDIX C** and identify safety locations of concern and if any pertain to a proposed site to be developed or redeveloped.
   b. Intersection Sight distance
   c Location and design of site access
   d. Obtain crash data for roadways adjacent to development and summarize data by type of crash and a summary review of contributing factors.

iii. Pedestrian/Bicycle & Transit considerations related to safe design of existing facilities
iv. Traffic control, signing, pavement markings, lighting, and connectivity needs

E. MULTIMODAL REVIEW

i. Bicycle Evaluation
   a. Bicycle Network Compliance narrative
   b. Bicycle Stress Assessment mapping and narrative
ii. Pedestrian Evaluation
   a. Pedestrian Network Assessment narrative
   b. Pedestrian Stress Assessment mapping and narrative

F. FINDINGS/RECOMMENDATIONS

A Level 1 TIA does not need to address intersection or driveway Level of Service, or analysis of the operation of a nearby intersection unless specified by City staff/City Traffic Engineer, or designee for existing safety concerns. Also note that additional analysis may be needed if the new driveways may negatively impact nearby intersections or be inappropriately located as determined by safety concerns presented by existing crash data, limited sight distances, or excessive queuing.

B. LEVEL 2 TIA

1. STUDY AREA

The purpose of a Level 2 TIA is to study the levels of service for the multimodal facilities in addition to transportation connectivity and to make recommendations based on that analysis.

The minimum study area will be determined by project type and size. At a minimum, the intersections to be studied will include site access driveways, all signal-controlled intersections, and all unsignalized intersections along roadways adjacent to the site. The City Traffic Engineer, or designee, may require expansion of the study area when the minimum study area identified does not provide sufficient information to meet the intent of these guidelines. A scoping meeting may be required to define the study area, depending on which category is applicable to the development.

Topics for discussion at a scoping meeting include the following:

- Study area limits and intersections
- Traffic analysis tools and their attributes
- Future study horizon years
- Analysis time periods
- Unique traffic generators and appropriate treatment

- Specific agency concerns and priorities
- Multi-modal analysis needs
- Traffic Volume Management

2. STUDY HORIZON YEARS

The study horizon year is the future year that should be studied for development. The existing background vehicular traffic shall be adjusted to provide a reasonable estimation of future vehicular traffic without the site in the horizon years. The horizon years, at a minimum, will include the opening year and 10 years from current year. Additional interim years may be required to evaluate phased implementation of key project development milestones and are determined by the project type and size.

Assume full occupancy and build-out for single-phase developments. Multi-phase developments may require assessment of more than one horizon year corresponding to key phases of development as determined by the City Traffic Engineer, or designee.

3. BACKGROUND (NON-SITE) TRAFFIC VOLUME FORECASTS

The future background vehicular traffic can be estimated using growth information available from available travel demand modeling; typically, through the Santa Fe MPO Travel Demand Model. Other growth information that may be referenced includes growth rates provided by the New Mexico Department of Transportation for state highways and available MPO or municipal transportation plans.

4. ANALYSIS TIME PERIOD

Both the AM and PM weekday peak hours based on existing vehicular traffic are to be analyzed.

If the vehicular peak traffic hour in the study area occurs during a period other than the normal AM and PM peak traffic periods, such as a weekend, or if the proposed project has unusual peaking characteristics, these peak hours must also be analyzed. For example, schools require an analysis of the peak period during school arrival and school dismissal. For recreation, banquet or church facilities, an analysis of evening and/or weekends may be required. The applicability of non-traditional peak hours should be discussed with the City Traffic Engineer, or designee at the time of scoping.

5. DATA COLLECTION REQUIREMENTS

All data is to be collected in accordance with the latest edition of the Institute of Transportation Engineers (ITE) Manual of Transportation Engineering Studies or as directed by the City Traffic Engineer, or designee, if not specifically covered in the ITE reference. All counts should include vehicle classification for determining heavy vehicle percentages. As part of the initial discussion, the method and technology used to collect data needs to be discussed and approved by the City Traffic Engineer.

- Turning movement counts including non-motorized users shall be obtained for all existing cross-street intersections to be analyzed during the weekday morning and evening peak periods and/or other peak hours as specified during scoping. A minimum of two-hour time periods should be considered to capture the appropriate single peak hour. Available turning movement counts may be extrapolated a maximum of two years with concurrence of the City Traffic Engineer, or designee.
- 24-hour traffic counts including non-motorized users should be conducted along major roadways being accessed by the proposed development, and if appropriate, on roadways adjacent to a site. The 24-hour counts should be taken during time periods with higher traffic volumes. (As an example, Santa Fe is a major tourist community and has significant traffic in summer months.) The dates for counts should be discussed and approved by the City Traffic Engineer or designee, Counts should be divided into 15-minute time increments.
- The current and projected daily vehicular traffic volumes shall be presented in the report.
- Roadway geometric information shall be obtained, including roadway width, number of lanes, turn lanes, grade, pedestrian, bicycle and transit facilities, streetlights, and location of nearby driveways that are in the study area and included in the TIA analysis.
- The location and type of traffic controls shall be identified.

6. TRIP GENERATION

The current edition of ITE's Trip Generation shall be used for selecting trip generation rates. The guidelines contained in the Trip Generation Manual shall be used to determine whether the average trip generation rate or the equations should be used.

Other rates may be used with the approval of the City Traffic Engineer, or designee, in cases where Trip Generation does not include trip rates for a specific land use category, or includes only limited data, or where local trip rates have been proven to differ from the ITE rates. If a significant number of larger vehicles (such as buses or trucks) is generated, that shall also be factored into the analysis.

For a mixed-use development, it may be acceptable to assume that some vehicular trips are internal to the site and do not impact the external street system. If appropriate for the development, this should be discussed with the City Traffic Engineer, or designee, to agree on a percentage of internal trips. NCHRP 684 methodology should be utilized to assist in determining appropriate levels of internal capture.

7. TRIP DISTRIBUTION

The directions from which vehicular traffic will access the site can vary depending on many factors, including:

- The type of proposed development and the area from which it will attract vehicular traffic
- The presence or absence of competing developments within the same area
- The size of the proposed development
- The conditions on the surrounding street system

The influence area of the development shall be identified for the site. Ideally, the influence area should contain approximately 80 percent of the vehicular trip ends that will be attracted to the site. If a market study is available, it should be used in establishing the influence area. Otherwise, an influence area should be established based on a reasonable estimate.

The three most common methods for estimating vehicular trip distribution are by analogy, model, and surrogate data. In most cases, a surrogate data method can be used to develop trip distribution. Using this procedure involves using socioeconomic data to establish population or employment land use distributions around the site. In most cases, population can be used as the basis for estimating distribution of office, retail, and entertainment trips; employment can be the basis for estimating residential trips.

8. TRIP ASSIGNMENT

Based on the vehicular trip distribution percentages, site vehicular traffic should be assigned to the street network using reasonable traffic patterns and existing traffic volumes. If the site use is conducive to pass-by trips, the ITE methodology can be proposed to obtain concurrence from the City Traffic Engineer, or a designee. Vehicular pass-by trip reduction only applies to added external trips; the site driveway analysis shall include all site generated trips.

9. CAPACITY ANALYSIS

All level of service/capacity analysis methods shall be computed for signal controlled and non-signal-controlled intersections or driveways as identified in the Study Area in accordance with the current edition of the Highway Capacity Manual (HCM). Capacity analyses shall be performed for existing conditions, future base conditions for the study years, and future with site generated vehicular traffic for the study years. Level of service and delay in seconds should be presented in table format for overall intersection and by movement for all analysis periods and scenarios.

10. TRAFFIC SIGNAL NEEDS

A traffic volume-based traffic signal needs study shall be conducted for all unsignalized intersections where yield or stop-controlled movements show a current or projected future Level of Service of E or F.

Traffic Signal needs studies shall be conducted per the current Manual on Uniform Traffic Control Devices (MUTCD). In utilizing the signal warrants contained in the MUTCD it is important to note that they pertain to the possibility of installing a traffic signal at a location. In addition, if a location satisfies one or more signal warrant, a roundabout or an alternative intersection design may be considered in lieu if determined to be safer and more efficient in managing traffic by comparison.

The current MUTCD Edition contains 4-hour (Warrant 1), 8-hour (Warrant 2), and Peak hour (Warrant 3) traffic volume-based signal warrants, TIA's will typically focus on weekday AM and PM peak hour traffic conditions, requiring that additional traffic volume estimation to properly capture the 4-hour and 8-hour conditions which may be needed to evaluate Warrants 2 and 3.

The following approaches may be used for estimating the 4 and 8 highest traffic volumes:

a) Utilize available 24-hour existing conditions traffic volume information for adjacent roadways to scale the 8 highest hours for each approach to the intersection being analyzed. Such information would be available from daily traffic counts recorded during study data collection.

b) Consult traffic volume information available from the ITE Trip Generation Manual depicting the 24-hour traffic pattern associated with the proposed land uses. Information is typically available for residential and commercial uses. Additionally, the Highway Capacity Manual can be consulted for guidance.

The relative magnitude of each of the 8 highest hours from available reference sources should be applied to/scaled from peak hour traffic volume forecasts to create an estimate of the 8 highest hours for application in the warrant analyses to future conditions. A similar procedure can be utilized for other time periods related to the conduct of a warrant analysis.

11. ROUNDABOUT CONSIDERATIONS

Like Traffic Signalization, roundabouts should also be considered at all intersections where a signal may be warranted as a roundabout is considered to be valid choice. In addition, a roundabout may be considered at unsignalized intersections where yield or stop-controlled movements show a current or projected future Level of Service of E or F, or where MUTCD multiway stop warrants are satisfied.

12. QUEUING ANALYSIS

A vehicular queuing analysis shall be conducted for all turn lanes and median openings within the study area. Queuing analysis should be supported by HCM methodologies and represent 95th percentile conditions with the exception of school sites as outlined herein. Examples for estimating queue lengths for signal controlled and non-signal-controlled intersections are given below.

If the site contains a land use that has queuing potential, such as a drive-through service (e.g., fast food, coffee shop, car wash), gated entry points, or schools, then a trip generation for the peak hours should be provided along with a queuing analysis for internal, as well as external, site impacts. It is recommended that a Poisson distribution be evaluated in these scenarios.

School calculations should consider lower peak hour factors when determining arrival rates as these periods tend to occur for durations lasting less than an hour. Using tools such as the NCDOT School Calculator may also be acceptable methodologies as determined by the City Traffic Engineer, or designee.

13. SPEED CONSIDERATIONS

Vehicle speed is used to estimate safe stopping and cross-corner sight distances. Sight distance shall conform to the AASHTO criteria. The design speed used shall be 5 miles per hour above the posted speed limit. 85th percentile speed studies may be requested to determine the appropriate design speed at the discretion of City Traffic Engineer, or designee.

14. IMPROVEMENT ANALYSIS

The roadways and intersections within the study area shall be analyzed with and without the proposed development to identify any projected impacts regarding level of service and safety. Where an intersection will operate at a level of service at or below E, alternatives that mitigate these impacts shall be evaluated and included as part of the study. Level of service E is acceptable for left turn and side street movements at signalized intersections so long as overall intersection level of service is D or better. Mitigation should be identified for unsignalized movements operating at LOS E or worse, provided queue lengths (exceeding available storage length or spacing) and/or volume-to-capacity ratios (exceeding 1.0) also demonstrate congestion concerns.

Other factors to be considered in the analysis are:

- Number and location of driveways
- On-site queue storage
- Acceleration/deceleration lanes
- Internal circulation

- Pedestrian, bicycle, trail, and transit infrastructure
- Traffic calming or speed reduction measures where collision data may indicate safety deficiencies

15. ADDITIONAL ANALYSIS

The City of Santa Fe may request additional analyses due to the type and location of the proposed development, such as weaving analyses, parking analyses, gap analyses, on-site circulation and queuing, pick-up and drop-off areas, the number of accesses, among others.

16. ACCESS MANAGEMENT AND AUXILIARY TURN LANES

Access management is the proactive management of vehicular access points to land parcels adjacent to all manner of roadways. Good access management promotes safe and efficient use of the transportation network. The benefits of access management include improved movement of traffic, reduced crashes, and fewer vehicle conflicts.

Fundamental to recognizing the need for access management is to understand that *movement of traffic and direct access to property are in mutual conflict*. Access management strategies seek to strike an appropriate balance between these conflicting objectives in the interest of maximizing traffic safety. TIA's completed within the City of Santa Fe will depict the proposed accesses to the subject development and demonstrate that the access locations and design can be provided in a manner consistent with the guidelines.

> Conditions may arise that require consideration of alterations to existing property accesses. In such situations, constraints can limit the ability to implement access management techniques. Rights of property access should be respected but can be limited. Introducing a "retrofit" program of access control to an existing roadway is often difficult. The legal, social, and political aspects of access management are particularly relevant in retrofit situations and should be thoroughly understood by property owners, public agencies and private groups responsible for implementing access control. Safe measures should be implemented in all cases.

Transportation access management guidelines for TIA's within the City of Santa Fe set forth basic parameters for the evaluation of site access in TIA's, including supporting information for implementing access management, planning and design guidelines. The guidelines presented are consistent with those established by the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), the Transportation Research Board (TRB), and the Institute of Transportation Engineers (ITE).

Access Spacing

Access spacing guidelines are keyed to allowable access levels, roadway speeds, safety, and operating environments. They apply to new land developments and to significant changes in the size, density, and nature of existing developments. Access to land parcels that do not conform to the spacing criteria may be necessary when no alternative reasonable access is provided. However, the basis for these variations should be clearly indicated and approved by a City representative.

Signalized intersections and full movement intersections with the potential to be signalized should ideally be spaced at a minimum of ¼ mile intervals. If signalized intersections are proposed at closer spacing, a TIA should demonstrate that proper signal progression can be maintained at various times and queues extending upstream of intersections will not block adjacent intersections.

The ideal spacing between unsignalized intersections including roundabouts is 600 feet or more. Where such spacing may be difficult to achieve based on existing roadway conditions and/or site development needs, a minimum spacing of 300 feet should be provided from any intersection involving an arterial roadway and 150 feet from an intersection with a collector roadway. Partial access should be considered based on traffic volume and queuing, and adequate intersection spacing should be provided for any dedicated turn lane needs.

Santa Fe anticipates preparation of a Complete Streets Design Guidelines which will provide additional access spacing guidance in the future.

Turn Lanes

Rear-end crashes can be severe within lanes that accommodate multiple turning movements. Research has found that crash rates increase as the speed differential in the traffic stream increases. Separate turn lanes remove the turning vehicle from through traffic, removing the speed differential in the main travel lanes, thereby reducing the frequency and severity of rear-end collisions. Please note, the addition of turn lanes may have the effect of increasing roadway width and vehicle speeds where higher speeds translate into higher kinetic energy, making collisions more severe as well as increasing crossing distances for pedestrians. The Local Road Safety Plan identifies the need to "manage impacts to keep kinetic energy at tolerable levels should a crash occur in accordance with the FHWA's Office of Safety, Safe Systems Approach.

Left-turn lanes can potentially increase intersection capacity where left turns would otherwise share the use of a through lane. Shared use of a through lane dramatically reduces capacity, especially when opposing traffic is heavy.

Research has indicated that providing turn lanes becomes increasingly important on higher speeds roadways where turning vehicles create wider speed differentials with

through traffic. The relative crash rate as speed differential increases is an exponential function and those rates are presented in **Table 1**.

Table 1. Relative Crash Rates for At-Grade Arterials[1]

Speed Differential (mph)	Relative Crash Rate
0	1
10	2
20	6.5
30	45
35	180

[1]Data from ITE, Traffic Engineering Handbook, 5th Edition (1999)

Turn Lane Requirements

Figure 1 provides City of Santa Fe Transportation Department left turn lane warrant criteria, based upon findings of the National Cooperative Highway Research Program (NCHRP) 348. **Figure 2** and **Figure 3** provide right turn lane warrant criteria, based upon this Right Turn Lane Guidance. Alternatives to these criteria shall be supported by a traffic analysis. Right turns are not typically provided for speeds of 25 mph due to the minimal speed deferential created by turning vehicles, however they may be considered at these lower speeds at the discretion of the City Traffic Engineer, or designee.

FIGURE 1. LEFT TURN LANE WARRANT CRITERIA

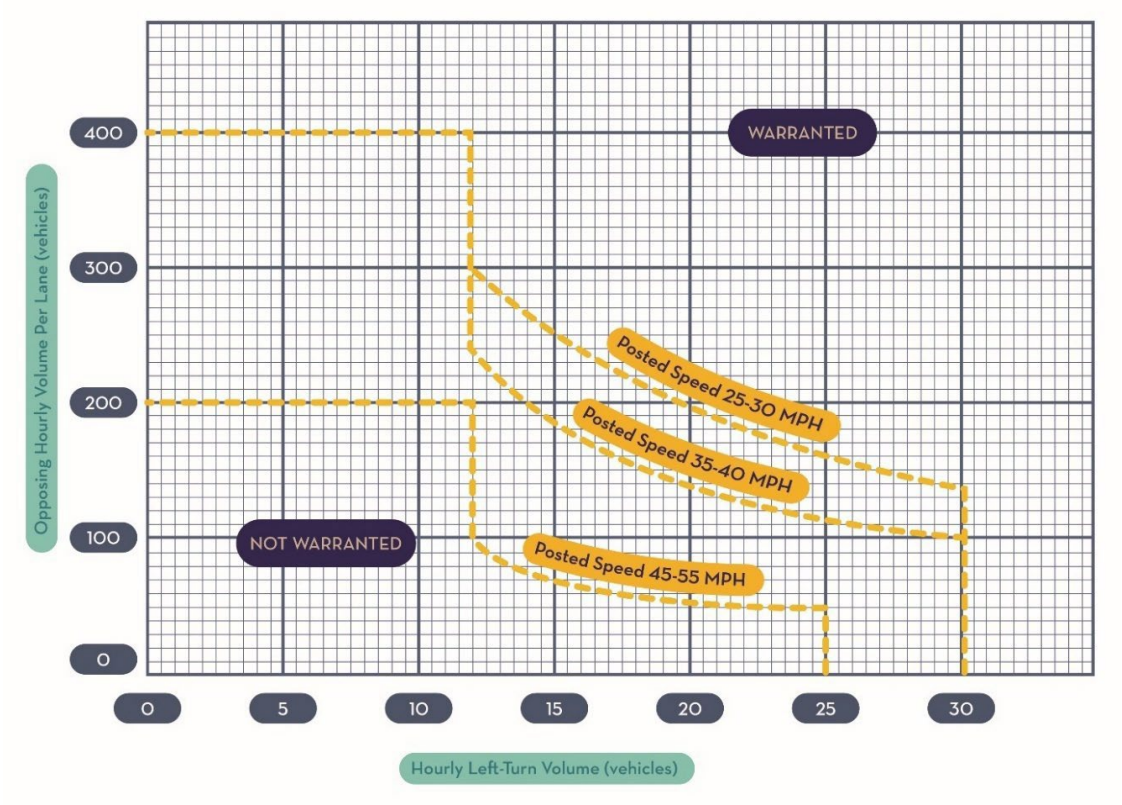
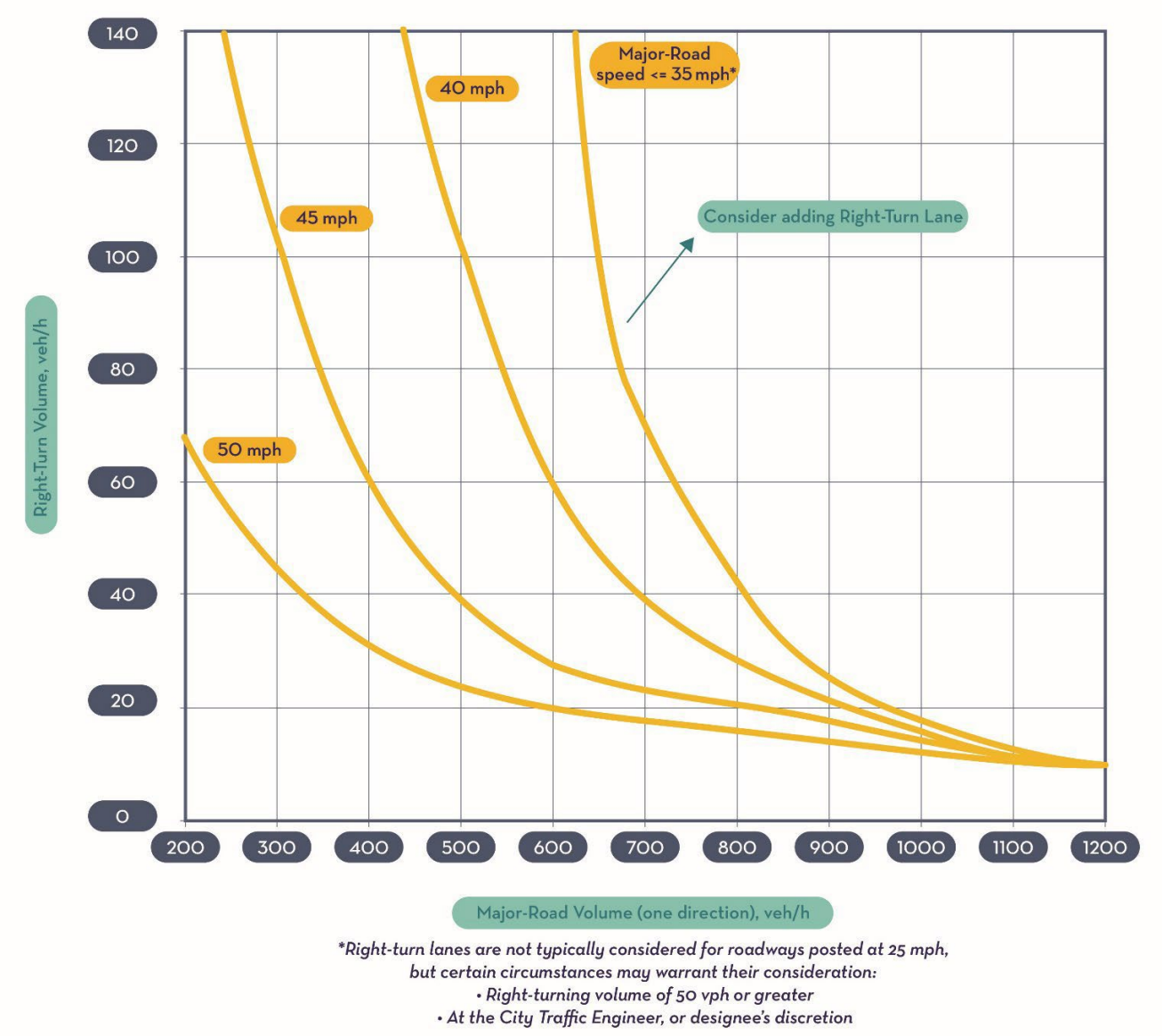


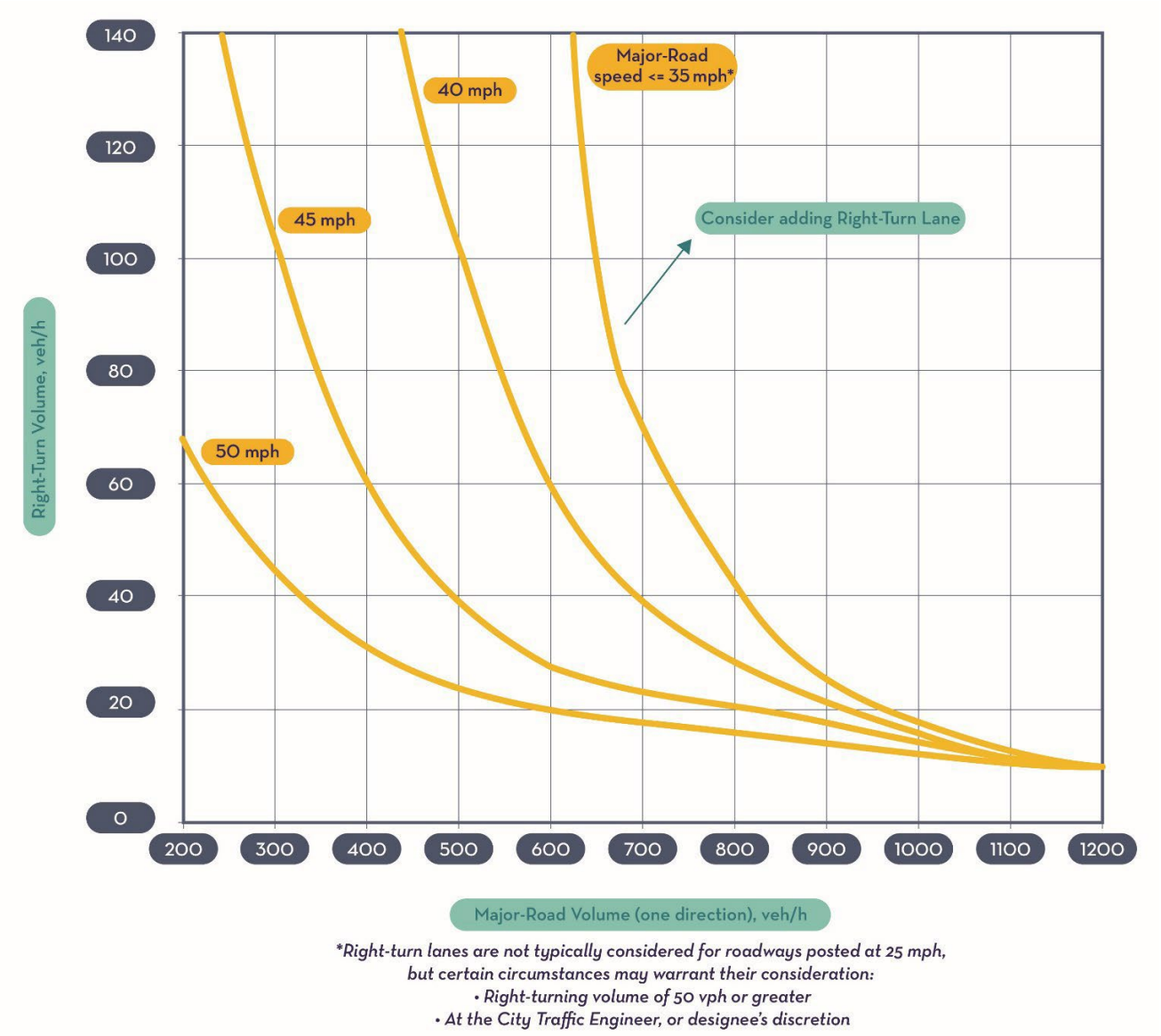
FIGURE 2. RIGHT TURN LANE CRITERIA FOR TWO-LANE ROADWAY



**Right-turn lanes are not typically considered for roadways posted at 25 mph, but certain circumstances may warrant their consideration:*

- *Right-turning volume of 50 vph or greater*
- *At the City Traffic Engineer, or designee's discretion*

FIGURE 3. RIGHT TURN LANE CRITERIA FOR FOUR+ LANE ROADWAY



**Right-turn lanes are not typically considered for roadways posted at 25 mph, but certain circumstances may warrant their consideration:*
• Right-turning volume of 50 vph or greater
• At the City Traffic Engineer, or designee's discretion

Turn Lane Dimensions

The minimum turn lane width is 10 feet unless approved by City Staff. A separate turn lane consists of a taper plus a full width auxiliary lane. The design of turn lanes is to be based on the speed at which drivers turn into the lane, the speed to which drivers must reduce to turn into the driveway, and the required vehicular storage length. Other special considerations include the volume of trucks that will use the turn lane and the steepness of an ascending or descending grade. The TIA should recommend turn lane location and provide the required turn lane length associated with each, demonstrating that turn lane design objectives can be achieved within known current and future anticipated constraints.

Required turn lane length elements are outlined in **Table 2**.

TABLE 2. TURN LANE LENGTH REQUIREMENTS

Posted speed limit	Left turn deceleration lane	Right turn deceleration lane
<40mph (See Note 1.)	Taper + storage	Taper + storage
≥40mph (See Note 2.)	Decel. Length	Decel. Length

Notes for Table 2:

Note 1: Storage length should be provided from operational analyses. Storage length should be calculated as the 95th percentile queue length rounded up to the nearest 25 feet with a 50-foot minimum length.

When operational analyses are not applicable (e.g., for turning movements that are uncontrolled), utilize the deceleration distance for the auxiliary lane length. Using guidance from the latest AASHTO Green Book for "Deceleration Lanes", accept a moderate amount of deceleration within the through lanes and utilize the taper length as part of the deceleration within the through lanes. Deceleration rates greater than 6.5 ft/s^2 may be used where practical. A minimum bay length of 50 feet shall be provided.

Note 2: Deceleration length should be calculated based on the distance required to brake from the posted speed of the roadway to a stop and includes the appropriate taper based upon the posted speed. Utilize recommended deceleration distances for "Lane Change and Deceleration Distance" provided by the latest AASHTO Green Book.

If the noted design requirements for full movement access spacing and/or turn lanes cannot be met, driveway turning movement restrictions may be imposed. The restriction may be for left-turn movements in or out of the driveway or right-turns in or out. Turning restrictions may be imposed for driveways that are too close to signalized intersections, or where existing driveways or roadway characteristics may increase accident potential or at locations with a history of high accident rates.

17. MULTIMODAL REVIEW

The 2022 City of Santa Fe Multimodal Transition Plan includes two overarching goals:

Goal 1. Move Santa Fe towards a city where all elements of an active life can be achieved without the need for a private automobile.

Goal 2. Leverage the outcomes of the Transition Plan and apply them more broadly (to all areas of the city) to transition Santa Fe to a community offering a truly multimodal transportation system.

The multimodal evaluations including pedestrian, bicycle and transit needs found in these guidelines are intended to support those goals as well as goals found in City and MPO documents found in **APPENDIX C**.

In making these evaluations for pedestrians and bicyclists, at a minimum the following questions should be considered:

i. Are pedestrian and bicycle needs safely accommodated on-site and off-site?
ii. Will the proposed development maintain or improve safety for pedestrians and bicyclists?
iii. Will the proposed development's access points increase potential conflicts with pedestrians and bicycles?
iv. Will site-generated traffic adversely affect pedestrians and bicycles?
v. Will site-generated traffic adversely affect existing and planned pedestrian and bicycle facilities?
vi. How will proposed mitigation affect pedestrians and bicyclists?

Bicycle Network Evaluation

The Bicycle Network Evaluation consists of two sections:

- **Bicycle Network Compliance**: The applicant should compare the existing cross-sections of street segments within the study area to recommendations in the Santa Fe Metropolitan Bicycle Master Plan and Bicycle Design Toolkit. Where existing bicycle facilities do not match what is included in these documents, the feasibility of improving them to match what is recommended based on right-of-way constraints should be assessed.
- **Bicycle Stress Assessment**: The applicant should apply Bicycle Level of Traffic Stress (BLTS) methodology to street segments within the study area. BLTS methodology is a systematic approach for evaluating the road network with respect to bicyclist comfort and safety, based on readily available data such as traffic volumes and physical roadway characteristics. Refer to additional guidelines from FHWA in Appendix B.

Bicycle Network Compliance

The Santa Fe Metropolitan Bicycle Master Plan and Bicycle Design Toolkit are used to guide bicycle improvements along major streets in Santa Fe. These documents should be used to evaluate whether the roadways impacted by the proposed development comply with design guidance. Specifically, applicants should:

- Document existing accommodations for bicyclists along all street segments within the determined study area, including:
- Bike lane width (if applicable)
- Bike lane buffer width (if applicable)
- Bike lane buffer type (if applicable)
- Shared lane street markings
- Identify discrepancies between the existing study area bicycle facilities and Bicycle Master Plan/Design Toolkit guidance, and specifically note existing facility widths that are not consistent with Master Plan/Design Toolkit guidelines for the street type and context in question (e.g., 5' minimum exclusive of the gutter for bike lanes); in situations where the Master Plan/Design Toolkit is not applicable, refer to Article 14-9 of the City of Santa Fe Code Ordinances and/or the AASHTO Guide for the Development of Bicycle Facilities for required facility widths

Bicycle Stress Assessment

Level of Traffic Stress is a methodology used to assess the perceived level of comfort an average person is expected to experience while bicycling along a given street segment. It was first developed by the Mineta Transportation Institute in 2012 and has been adapted since to account for further innovations in bicycle facility design.

The methodology rates the perceived level of stress along street segments using readily available roadway characteristics such as speed limits, average daily traffic volumes, lane widths and configurations, and existing bike facilities. A Bicycle Level of Traffic Stress flow chart is provided in **APPENDIX B** to support this analysis. General descriptions of the four BLTS scores are provided below.

- **BLTS 1**: Little traffic stress; suitable for most all bicyclists, including children
- **BLTS 2**: Minimal interaction with traffic, suitable for most adult bicyclists
- **BLTS 3**: Exclusive riding zone or shared lane with low speeds; comfortable to many current bicyclists
- **BLTS 4**: High traffic stress; only suitable for "strong and fearless" bicyclists

Target BLTS ratings for streets in Santa Fe should align with current bicycle network plans. All bicycle facilities should be designed for the lowest feasible BLTS under given right-of-way constraints. Additional attention is needed for areas with greater bicycle use. Where feasible given right-of-way constraints, BLTS 1 ratings should be achieved along street segments in the following areas:

- **School Zones**: The target BLTS within 0.25 mile of all elementary schools, middle schools, high schools, and colleges/universities should be BLTS 1 where feasible
- **Transit**: The target BLTS 1 within 0.25 miles of a transit stop is BLTS 1 where feasible

Roadways with BLTS ratings of 1 and 2 are considered low-stress and suitable for most bicyclists. For any roadways within the study area that currently have a BLTS rating higher

than 2 and/or are expected to have a BLTS rating of higher 2 due to impacts of the development, the TIA should recommend cross-section modifications to achieve a minimum of BLTS 2. Situations where right-of-way constraints make achieving BLTS 2 infeasible shall be discussed with City of Santa Fe staff.

Bicycle Level of Traffic Stress Rating Adjustments

The standard methodology for BLTS assessment as outlined in the **APPENDIX B** flowcharts does not fully account for all roadway characteristics that may impact bicyclist comfort. The following adjustments should be applied to the BLTS results as appropriate depending on the specific street segment context:

- **Bicycle Lane Width:** If the bicycle lane is less than 4 feet wide including gutter, the BLTS rating table for mixed traffic segments should be used
- **Separated Bicycle Facility:** If a separated bicycle facility exists behind the curb, assign BLTS 1 if the facility is at least 6′ wide and BLTS 2 if it is less than 6′ wide
- **Shared-Use Path:** If a shared-use path exists, assign BLTS 1 if the facility is at least 10′ wide and BLTS 2 if it less than 10′ wide
- **Bicycle Facility Condition:** If a bike lane is in poor condition (cracked pavement, excessive debris, etc.), a minimum rating of BLTS 3 should be assigned (BLTS 4 if conditions make the facility unusable)
- **Frequent Blockage:** If a bike lane experiences frequent blockages due to commercial activity, parking, or curb cubs, a minimum rating of BLTS 3 should be assigned (BLTS 4 if the roadway has a posted speed limit of 35 mph or greater)

Bicycle Level of Traffic Stress Presentation

Presentation of the BLTS results should include a color-coded aerial map of the study area based on segment BLTS ratings and a supporting narrative assessment of the analysis. The narrative should identify opportunities for improving BLTS in the study area to meet the requirement of a BLTS rating of 2 or lower where feasible.

Pedestrian Evaluation

The Pedestrian Network Evaluation consists of two sections:

- **Pedestrian Network Assessment**: The application should identify existing gaps that prevent full connectivity of the pedestrian network in the study area such as missing or deficient pedestrian intersection treatments, missing sidewalks, lacking or non-compliant ADA curb ramps, and excessive gaps between pedestrian crossings. Additionally, a review of recommendations contained within the Santa Fe MPO Pedestrian Master Plan should be evaluated for applicability within the study area. Where existing pedestrian facilities do not match what is included in these documents, the feasibility of improving them to match what is recommended given right-of-way constraints should be assessed.
- **Pedestrian Stress Assessment:** The applicant should apply Pedestrian Level of Traffic Stress (PLTS) methodology to street segments within the study area. PLTS methodology

is a systematic approach for evaluating the road network with respect to pedestriancomfort and safety, based on readily available data such as traffic speeds and physical roadway characteristics. Refer to additional FHWA guidelines in Appendix B.

Pedestrian Network Assessment

All sidewalk widths and sidewalk buffer widths along streets in the study area should be documented. Existing sidewalks and sidewalk buffers should also be compared to sidewalk standards from the most recent version of the City of Santa Fe's Municipal Charter and Code of Ordinances, Title II of the Americans with Disabilities Act (ADA) and any discrepancies should be documented. Applicants should identify gaps in the pedestrian network within the defined study area, specifically:

- Identify gaps in the sidewalk network
- Identify gaps between pedestrian crossings along a roadway of more than 600 feet
- Pedestrian refuges
- Identify intersections without adequate pedestrian infrastructure including:
- Curb ramps with detectable warning mats
- Pedestrian push-buttons and dedicated crossing phases (at signalized intersections)
- Crosswalks
- Assess the feasibility of eliminating pedestrian network issues in the study area through the construction of new pedestrian facilities, addition of new pedestrian crossings, and/or improvements to deficient pedestrian intersection infrastructure given right-of-way constraints

Pedestrian Level of Traffic Stress

Pedestrian Level of Traffic Stress is a methodology used to assess the perceived level of comfort an average person is expected to experience while walking along a given street segment. The methodology rates the perceived level of stress along street segments using readily available roadway characteristics including number of vehicle lanes, posted speed limit, sidewalk width, and sidewalk buffer width. A Pedestrian Level of Traffic Stress flow chart is provided in **APPENDIX B** to support this analysis. General descriptions of the four BLTS scores are provided below.

- **PLTS 1**: Minimal traffic stress, generally indicative of detached sidewalks along low speed/low volume streets
- **PLTS 2**: Low traffic stress, generally indicative of highly detached sidewalks along relatively busy streets or attached sidewalks along low speed/low volume streets
- **PLTS 3**: High traffic stress, generally indicative of minimally detached sidewalks along high speed/high volume streets
- **PLTS 4**: Very high traffic stress, indicative of attached sidewalks along high speed/high volume streets

Pedestrian Level of Traffic Stress Targets

Target PLTS ratings for streets in Santa Fe should align with current transportation plans. All pedestrian facilities should be designed for the lowest feasible PLTS under given right-of-way constraints. Additional attention is needed in areas with greater pedestrian use. Where feasible given right-of-way constraints, PLTS 1 ratings should be applied to streets in the following areas:

- **School Zones**: The target PLTS within 0.25 mile of all elementary schools, middle schools, high schools, and colleges/universities should be BLTS 1 where feasible
- **Elderly Care Facilities**: The target PLTS within 0.25 miles of all elder care facilities is PLTS 1 where feasible
- **Transit**: The target PLTS within 0.25 miles of a transit stop is BLTS 1 where feasible

Roadways with PLTS ratings of 1 and 2 are considered low-stress and suitable for most pedestrians. For any roadways within the study area that currently have a PLTS rating higher than 2 and/or are expected to have a PLTS rating of higher 2 due to impacts of the development, the TIA should recommend cross-section modifications to achieve a minimum of PLTS 2. Situations where right-of-way constraints make achieving PLTS 2 infeasible shall be discussed with City of Santa Fe staff.

Pedestrian Level of Traffic Stress Rating Adjustments

The standard methodology for PLTS assessment as outlined in the **APPENDIX B** flowcharts does not fully account for all roadway characteristics that may impact pedestrian comfort. The following adjustments should be applied to the PLTS results as appropriate depending on the specific street segment context:

- **Sidewalk Condition:** If a sidewalk is in poor condition (deteriorating pavement, excessive debris, etc.), a minimum rating of PLTS 3 should be assigned PLTS 4 if conditions make the facility hazardous or prevents access by people with disabilities).
- **Frequent Blockage:** If a bike lane experiences frequent blockages due to commercial activity, parking, or curb cubs, a minimum rating of PLTS 3 should be assigned (BLTS 4 if the roadway has a posted speed limit of 35 mph or greater).

Pedestrian Level of Traffic Stress Presentation

Applicants should follow the guidelines on presenting PLTS analysis results provided in **APPENDIX B**. The presentation should include a color-coded aerial map of the study area based on segment PLTS ratings and a supporting narrative assessment of the analysis. The narrative should identify opportunities for improving PLTS in the study area to meet the requirement of a PLTS rating of 2 or lower where feasible.

5. LEVEL 2 TRANSPORTATION IMPACT ANALYSIS (TIA) REPORT SUGGESTED OUTLINE

A. INTRODUCTION AND SUMMARY

i. Purpose of report and study objectives
ii. Executive Summary
    a. Site location and study area, development description, principal findings
    b. Conclusions and recommendations

B. PROPOSED DEVELOPMENT

i. Site location
ii. Land use and intensity
iii. Site plan
iv. On-site circulation and access
v. Development phasing and timing

C. STUDY AREA CONDITIONS

i. Study area conditions
ii. Existing Land use
iii. Site accessibility
iv. Existing and future roadway system

D. ANALYSIS OF EXISTING CONDITIONS

i. Physical characteristics
    a. Roadway characteristics (number of lanes, classification, etc.)
    b. Traffic control devices
    c. Transit service
    d. Pedestrian/Bicycle facilities
    e. Nearby driveways
ii. Vehicular Traffic volumes
    Daily, morning and afternoon peak periods and others as required
iii. Level of service
    Morning peak hour, afternoon peak hour, and others as required
iv. Safety related deficiencies, 3-year crash history within study area

E. PROJECTED VEHICULAR TRAFFIC

i. Site traffic (each horizon year)
    a. Trip generation
    b. Internal trips (if applicable) Mode split (if applicable) Pass-by traffic (if applicable)
    c. Trip distribution
    d. Trip assignment
ii. Non-site traffic forecasts (each horizon year) and methodology
iii. Total traffic (each horizon year)

F. TRAFFIC ANALYSIS

i. Site access

ii. Level of service analysis
    a. Without project (including programmed improvements for each horizon year)
    b. With project (including programmed improvements for each horizon year)
    c. Improvements necessary to accommodate site traffic
iii. Traffic safety
    a. Sight distance at site accesses
    b. Location and design of site access
iv. Traffic control and lane geometry needs

G. MULTIMODAL REVIEW

i. Bicycle Evaluation
    a. Bicycle Network Compliance narrative
    b. Bicycle Stress Assessment mapping and narrative
ii. Pedestrian Evaluation
    a. Pedestrian Network Assessment narrative
    b. Pedestrian Stress Assessment mapping and narrative
iii. a. Regional and/or City Transit Coordination

H. FINDINGS/RECOMMENDATIONS

I. APPENDICES

i. Traffic counts
ii. Capacity analyses worksheets
iii. Traffic signal needs studies
iv. Additional analysis as requested by City Traffic Engineer, or designee

J. EXHIBITS

The following information shall be provided on clear and legible figures:

i. Site location
ii. Site plan
iii. Existing transportation system(s) (number of lanes, traffic control, etc.)
iv. Existing and future area development
v. Bicycle and Pedestrian LTS analysis results
vi. Existing vehicular daily traffic volumes
vii. Existing vehicular peak hour turning volumes
viii. Estimated vehicular site traffic (AM and PM peak periods)
ix. Directional distribution of vehicular site traffic (AM and PM peak periods)
x. Total vehicular traffic (peak periods)
xi. Electronic PDF file of the project level of service/capacity analysis

APPENDIX A

Initial Transportation Assessment Form

INITIAL TRANSPORTATION ASSESSMENT

This initial transportation assessment is required for all developments proposed in the City of Santa Fe. The purpose of a Transportation Impact Analysis (TIA) is to provide preliminary vehicular trip generation information for the proposed development to determine the category of TIA required. Based on the proposed development, **Table A-1** should be completed to provide preliminary vehicular trip generation estimates. The City Traffic Engineer, or designee, will review the preliminary trip generation estimate provided by the developer and determine the category of TIA required. Other factors in addition to vehicular trip generation can affect the impact of a development; and based on these guidelines, the City of Santa Fe Traffic Engineer, or designee, will determine the final scope for the TIA.

Location of proposed development (location map must be attached).

_____

TABLE A-1: PRELIMINARY VEHICULAR TRIP GENERATION ESTIMATE

Types of land uses (Multi Family, Single Family residential, specific retail, etc.)	Size (thousands of sq. ft., acres, number of units, etc.)	AM peak hour trips per size/unit*	PM peak hour trips per size/unit*	Subtotal of trips AM/PM	ITE Code Used for Analysis
GRAND TOTAL					

*The trip generation rates can be obtained from the Institute of Transportation Engineers, Trip Generation, current edition. Use of other rates must be justified and accepted by the City Traffic Engineer, or designee.

Transportation Impact Analysis Needed Yes ____ No _____

Level of Transportation Impact Analysis Needed _____

Developer/Developer's Agent _____ Date _____

City of Santa Fe _____ Date _____

Table A-2 provides the criteria for each category of the TIA based on the estimated vehicular trip generation. This table is for information and guidance only. As noted previously, the City Traffic Engineer, or designee, will make the final determination regarding the type of study.

TABLE A-2: REQUIREMENTS FOR TRANSPORTATION IMPACT ANALYSIS (TIA)

TYPE OF STUDY	PEAK HOUR INBOUND+ OUTBOUND TRIPS
Level 1	≥50 and <100
Level 2	≥100

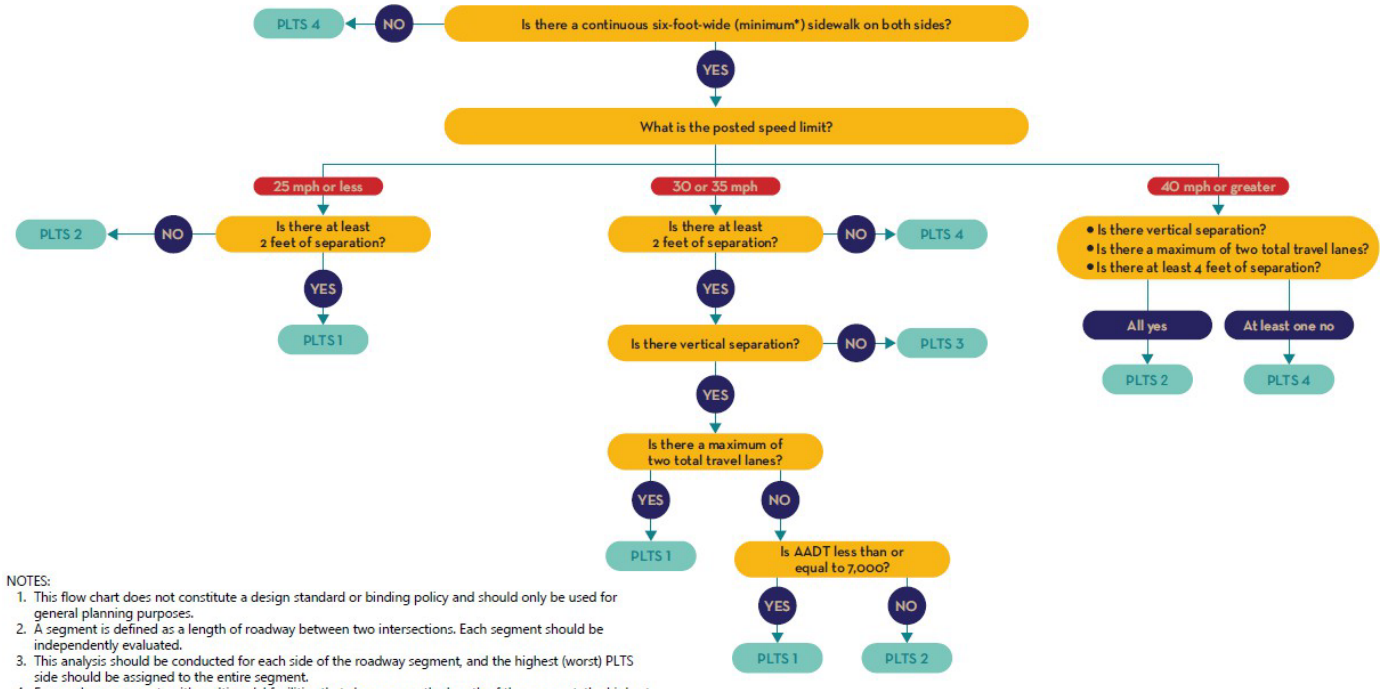
APPENDIX B

Bicycle & Pedestrian Level of Traffic Stress Charts

FHWA Guidebook for Measuring Multimodal Network Connectivity

(Bicycle and Pedestrian Levels of Stress Assessment)

Pedestrian Level of Traffic Stress: Segments

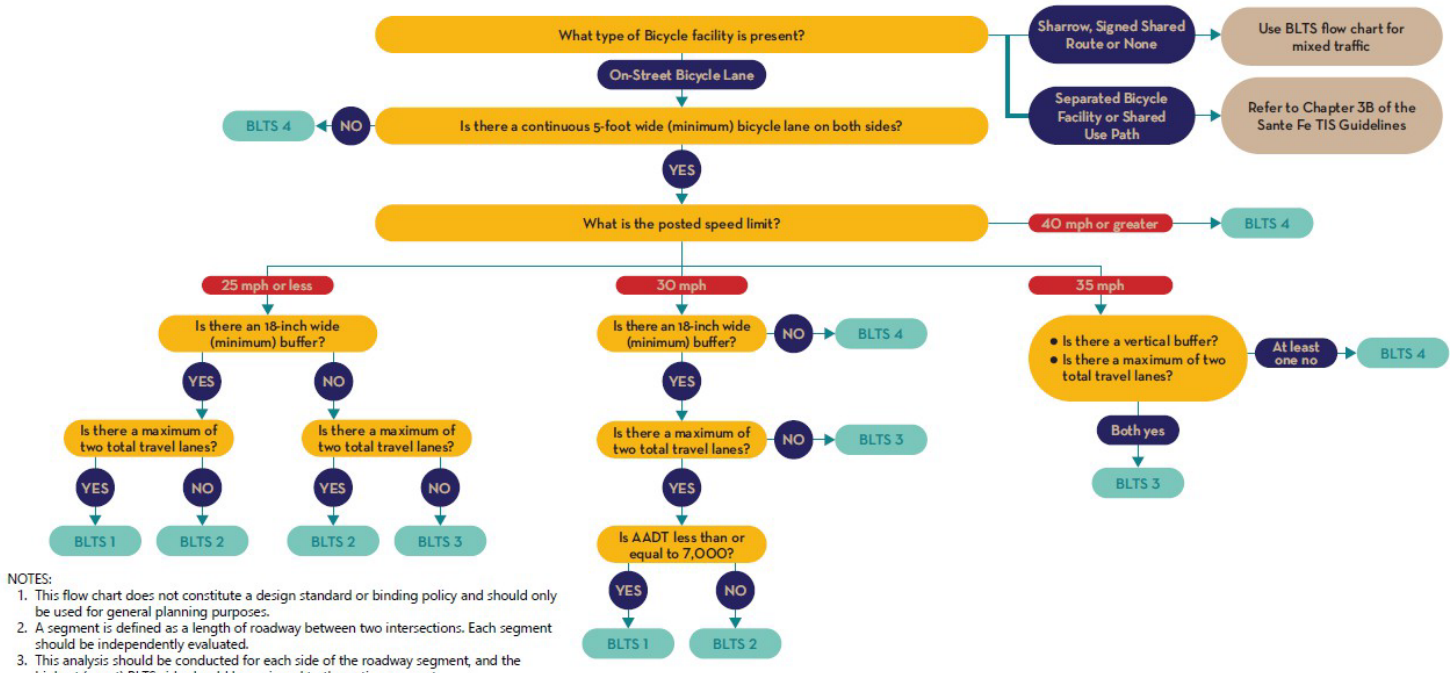


NOTES:

1. This flow chart does not constitute a design standard or binding policy and should only be used for general planning purposes.
2. A segment is defined as a length of roadway between two intersections. Each segment should be independently evaluated.
3. This analysis should be conducted for each side of the roadway segment, and the highest (worst) PLTS side should be assigned to the entire segment.
4. For roadway segments with multimodal facilities that change over the length of the segment, the highest (worst) PLTS section should be assigned to the entire segment.
5. Travel lanes are defined as vehicular lanes used for through travel along a segment. Travel lanes do not include center turn lanes, shoulders, parking lanes, or intersection approach turn lanes.
6. Separation is defined as the space between the edge of the adjacent vehicular travel lane and the sidewalk. This may include paved shoulders, bike lanes, planting strips, and on-street parking. Separation does not include curb and gutter.
7. If reliable AADT data is not available or can't be reasonably estimated, assume the AADT is higher than the given threshold by default.

*Refer to the Land Use Code for minimum sidewalk width requirement based on roadway classification

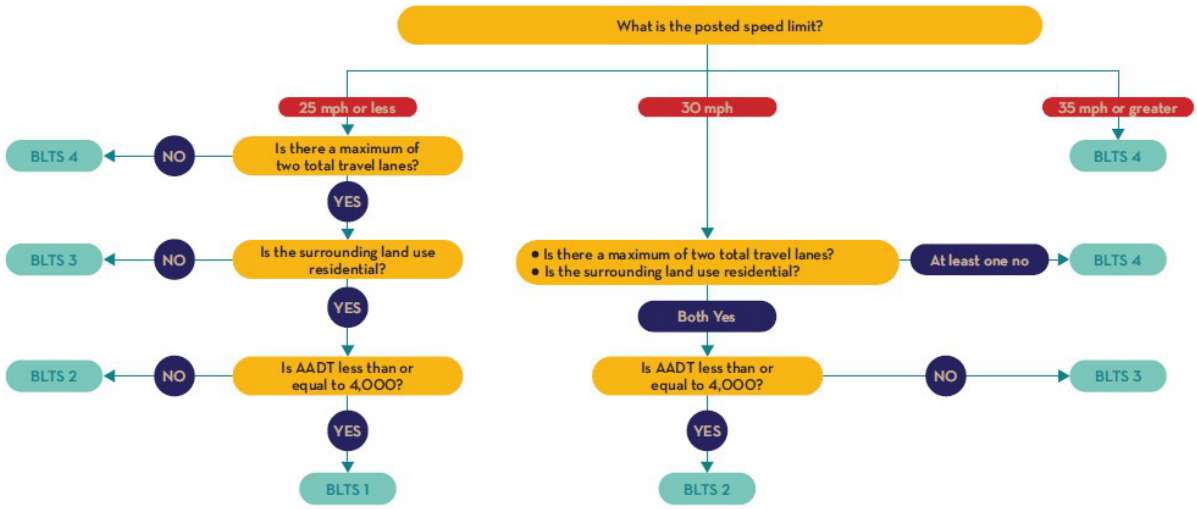
Bicycle Level of Traffic Stress: Segments with a Bicycle Facility



NOTES:

1. This flow chart does not constitute a design standard or binding policy and should only be used for general planning purposes.
2. A segment is defined as a length of roadway between two intersections. Each segment should be independently evaluated.
3. This analysis should be conducted for each side of the roadway segment, and the highest (worst) BLTS side should be assigned to the entire segment.
4. For roadway segments with multimodal facilities that change over the length of the segment, the highest (worst) BLTS section should be assigned to the entire segment.
5. Travel lanes are defined as vehicular lanes used for through travel along a segment. Travel lanes do not include center turn lanes, shoulders, parking lanes, or intersection approach turn lanes.
6. If reliable AADT data is not available or can't be reasonably estimated, assume the AADT is higher than the given threshold by default.
7. Bicycle lane width is defined as the distance from the face of curb to the outer edge of the bicycle lane pavement marking.
8. Buffer width is defined the distance between the outer edge of the bicycle lane pavement marking and the vehicular travel lane.

Bicycle Level of Traffic Stress: Mixed Traffic Segment



NOTES:

1. This flow chart does not constitute a design standard or binding policy and should only be used for general planning purposes.
2. A segment is defined as a length of roadway between two intersections. Each segment should be independently evaluated.
3. This analysis should be conducted for each side of the roadway segment, and the highest (worst) BLTS side should be assigned to the entire segment.
4. For roadway segments with multimodal facilities that change over the length of the segment, the highest (worst) BLTS section should be assigned to the entire segment.
5. Travel lanes are defined as vehicular lanes used for through travel along a segment. Travel lanes do not include center turn lanes, shoulders, parking lanes, or intersection approach turn lanes.
6. If reliable AADT data is not available or can't be reasonably estimated, assume the AADT is higher than the given threshold by default.

Bicycle Level of Traffic Stress Targets

(Guidebook for Measuring Multimodal Network Connectivity: FHWA-HEP-18-032)

Bicycle Level of Traffic Stress (Bicycle LTS)

What is the extent to which bicyclists feel safe and comfortable using the network, particularly on streets where they share space with motorized traffic?

Description

Measures and rates traffic stress for street segments and intersections, based on different types of cyclists' presumed comfort level near motor vehicle traffic. The components of the network are scored on a four-point scale relating to user types and confidence levels. Links and intersections are classified based on their most stressful feature, and routes are classified by the most stressful link or intersection between a given origin and destination.

Bicycle Level of Traffic Stress (Bicycle LTS) is based on the concept of the maximum level of traffic stress that will be tolerated by specific groups of existing and potential cyclists (Mekuria, Furth, and Nixon 2012). The classification scheme is loosely based on both the Types of Cyclists (not interested, interested but concerned, enthused and confident, and strong and fearless) line of research from Portland, Oregon (Dill and McNeil 2013), and on Dutch age-group based bicycle facility planning standards. Most analysis has focused on LTS 2, a level thought to be acceptable to many interested adult cyclists. The Bicycle LTS measure is extended to capture connectivity through route selection and maximum detours using approximations from empirical studies of cyclist route choice.

Characteristics

- ***Mode:*** *Bicycle*
- ***Method:*** *Classify roadway links by type by highest stress attribute*
- ***Outputs:*** *Traffic stress rating of 1 through 4 for street segments and intersection*
- ***Connectivity analysis methods supported:*** *Completeness, Density, Directness, Accessibility to Destination, Quality*
- ***Accessibility:*** *Explicit consideration of accessibility for people with disabilities:* ***No***
- ***Use in practice:*** *Common*
- ***Level of Effort to apply:*** *Moderate*

Example Planning Application(s)

- *To identify problems and develop strategies to improve the users' perceived and actual experience, particularly in situations where multiple modes share a common facility.*
- *To compare the availability and directness of low-stress routes to all possible routes on the street network.*

Typical Data

- *Roadway centerline, including number of lanes and posted speed*
- *Bicycle infrastructure, including type and width*
- *On-street parking presence, including width*
- Signalized intersections
- Turn lane locations and length
- Not recommended for locations with limited, incomplete, or inconsistent data
- Planners should consider adjusting the user type definitions in an LTS model to reflect the demographics of riders relevant to a specific planning context

Pedestrian Stress Assessment

(Guidebook for Measuring Multimodal Network Connectivity: FHWA-HEP-18-032)

Pedestrian Level of Traffic Stress (PLTS)

Description

Pedestrian LTS measures indicate the relative level of comfort for pedestrians using a given network, taking into account the variety of abilities and trip purposes among different types of people. The categories of pedestrian traveler characteristics, including user types and trip purposes, are similar to those developed for Bicycle LTS measures. Criteria and thresholds are customized for pedestrians, as described in the Oregon Department of Transportation's Analysis Procedures Manual (2016). Links are classified based on their most stressful feature, including the impact of crossings. Application to measures of connectivity are done best in conjunction with form-based.

Characteristics

- ***Mode:*** *Pedestrian*
- ***Method:*** *Classify sidewalk segments by type by highest stress attribute*
- ***Outputs:*** *Pedestrian stress rating of 1 through 4 for sidewalk centerline and intersections*
- ***Connectivity analysis methods supported:*** *Directness, Accessibility to Destinations, Quality*
- ***Explicit consideration of accessibility for people with disabilities:*** *Yes*
- ***Level of effort to apply:*** *High*
- ***Use in practice:*** *Emerging*

Example Planning Application

- *To identify factors that contribute to low- and high-stress corridors and routes*
- *To set priorities for locations that need specific types of improvements*

Typical Data

- *Sidewalk centerlines, widths, surface types, surface quality*

- *Crossing locations, marking, lighting*
- *Curb ramps and other infrastructure supporting access for people with disabilities*
- *Motorized traffic data: Traffic volumes, traffic speeds*
- *Street network data: Number of lanes, lane width, width of paved shoulder, presence of curbs, on-street parking.*
- *Pedestrian origins and destinations*

APPENDIX C

City of Santa Fe, Santa Fe MPO Polices and Plans, and Additional References

Santa Fe MPO Policies and Plans may be found at www.santafempo.org. Up-to-date City policies and plans may be requested via the Complete Streets Division. Aside from these policies, the reference documents below are supplementary and should be used when additional detail is required to address issues that arise during the access permitting and design process.

A. CITY OF SANTA FE

2022 Santa Fe Multimodal Transition Plan

2022 City of Santa Fe Complete Streets Resolution

1999 City of Santa Fe General Plan

B. SANTA FE MPO

2020 Metropolitan Transportation Plan

2015 Public Transit Metropolitan Master Plan

2019 Metropolitan Bicycle Master Plan

2015 Metropolitan Pedestrian Master Plan

2022 Local Road Safety Plan

Santa Fe Safe Routes to School Action Plan for 2024-2027

2022 Santa Fe MPO Complete Streets Resolution

2023 Santa Fe Neighborhood Street Safety Study

C. NMDOT/STATE

State Access Management Manual (SAMM)

New Mexico state traffic monitoring standards

Location Study Procedures, a guidebook for alignment and corridor studies

Engineering and Surveying Practice Act

D. FEDERAL

FHWA - Incorporating Data-Driven Safety Analysis in Traffic Impact Analyses: a How-to Guide

A policy on geometric design of highways and streets, American association of state highway and transportation officials, latest edition.

Manual on uniform traffic control devices for streets and highways, U.S. department of transportation, federal highway administration, latest edition.

Highway capacity manual, transportation research board, national research council, latest edition.

Trip generation, institute of transportation engineers, latest edition.

Roadside design guide, American association of state highway and transportation officials, latest edition.

Americans with Disabilities Act, accessibility guidelines for buildings and facilities (PROWAG), architectural and transportation barriers compliance board

Traffic engineering handbook, current edition, institute of transportation engineers.

Manual of traffic signal design, second edition, institute of transportation engineers.

Latest Guide for the development of bicycle facilities, American association of state highway and transportation officials

E. **Web-sites** (note: web addresses may change without notice):

New Mexico department of transportation: dot.state.nm.us.

Federal highway administration: www.fhwa.dot.gov.

Institute of transportation engineers: www.ite.org.

American association of state highway and transportation officials: www.transportation.org.

Transportation research board: www.nas.edu/trb.

National cooperative highway research program: www.trb.org/NCHRP/NCHRP.aspx.