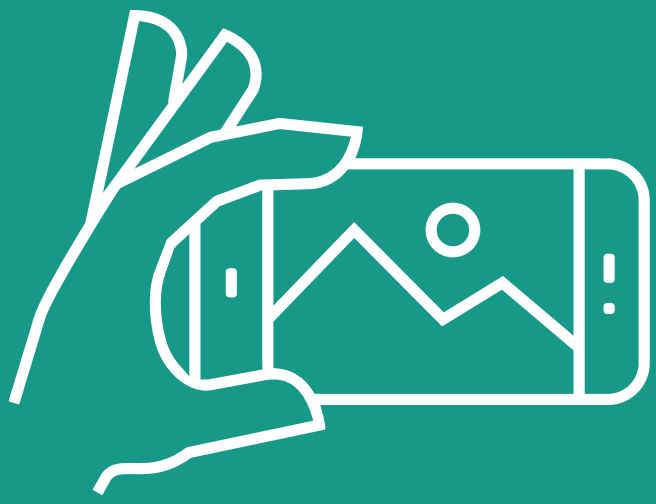
FAIRFAX COUNTY DEPARTMENT OF TRANSPORTATION

Comprehensive Transportation Analysis

Quick Guide

OCTOBER 2024



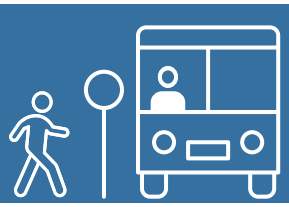
This **Quick Guide** is a high-level snapshot of the Comprehensive Transportation Analysis process.

For more detail, see the **User's Manual**.

What is a Comprehensive Transportation Analysis?

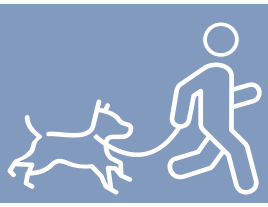
The Comprehensive Transportation Analysis (CTA) is Fairfax County's primary tool for evaluating the effects of zoning actions/site specific plan amendments, comprehensive planning scenarios, and corridor study recommendations on various aspects of the transportation experience for people driving, walking, biking, or using transit.

The aspects of the transportation experience measured by a CTA are called "Measures of Effectiveness" (MOE). These MOEs fall into five major categories, and include:



Transit Measures

- Transit Access
- Stop-Level Transit Ridership



Pedestrian Measures

- Pedestrian Level of Comfort/Gap Analysis
- Pedestrian Delay

Vehicular Measures

- Volume to Capacity Ratio
- Motorist Queuing
- Vehicle Miles Traveled
- Vehicle Delay

Bicycle Measures

- Bicycle Level of Traffic Stress/Gap Analysis

Multimodal Safety Measures

- Crashes

This Quick Guide, as well as its full-length counterpart (Fairfax County Department of Transportation Comprehensive Transportation Analysis User's Manual), formalizes the CTA assessment of these MOEs into a series of steps. For specific information on each MOE, refer to Chapter 3 of the User's Manual.

Why is a CTA needed?

The CTA process exists to create consistent expectations of, and ensure data-driven outcomes for, the County's three major types of transportation studies. These studies include:

Zoning Action:

The process by which a developer or landowner gains all necessary approvals for a development. For Zoning Actions, the CTA is intended to work in tandem with the County's existing transportation analysis processes.

Comprehensive Planning:

The County's Comprehensive Plan (Plan) is a long-range guide for decision-making about the natural and built environment. The Plan provides recommendations for land use, transportation, and other topics at a countywide level through the Policy Plan, as well as more specific recommendations for specific areas through the Area Plans volumes. The Comprehensive Plan is used by the Board of Supervisors, the Planning Commission, County staff, and other stakeholders in the review of zoning actions.

Site Specific Plan Amendments (SSPAs):

These studies evaluate a proposed land use change to the comprehensive plan for a single site or collection of parcels. Therefore, for some measures with a CTA, analysis methods may be similar for SSPAs and zoning actions because they relate to a single or small collection of individual sites.

Corridor Studies:

These studies typically focus on transportation needs along specific routes such as highways, transitways, or major streets.

When is a CTA needed?

The first step in the CTA process is determining whether a CTA is necessary.

Depending on how many net new average daily vehicle trips will be generated by a **SSPA or zoning action**, a CTA may or may not be necessary. The County has designated requirements of CTAs for zoning actions (CTA-Z) and SSPAs into three tiers:

TIER 1

Proposal that generates less than 1,000 net new average daily vehicle trips: **CTA/CTA-Z not required**. Applicants instead submit a Transportation Statement (see page 9 of the User's Manual).

TIER 2

Proposal that generates from 1,000 to 2,999 net new average daily vehicle trips: **CTA/CTA-Z required**. Must include the following:

- Non-vehicular assessment for driveways, intersections, and streets within the project radius (quarter mile for pedestrian measures, half-mile for bicycle and transit measures)
- Vehicular assessment for driveways and intersections providing access to the site and streets along the frontage of the site

TIER 3

Proposal that generates from 3,000 to 4,999 net new average daily vehicle trips: **CTA/CTA-Z required**. Must include the following:

- Non-vehicular assessment for driveways, intersections, and streets within the project radius (quarter mile for pedestrian measures, half-mile for bicycle and transit measures)
- Vehicular assessment for driveways and intersections providing access to the site and streets along the frontage of the site, and for additional study intersections identified during the scoping process

For proposals generating 5,000 or more net new average daily vehicle trips, a VDOT Traffic Impact Analysis (TIA) is required. CTA measures should be added to the TIA for one single submission and scoping process.

If a CTA is deemed necessary for any project, the applicant must next develop a context-sensitive approach.

The applicant will first complete a scoping form for the project. The purpose of the scoping form is to identify key project characteristics so the County staff and/or applicants can reach consensus on the appropriate multimodal analysis requirements and modal emphases of their project based on project type and land use context. For the information to include on a scoping form, see pages 9–11 and **Appendix A** in the User's Manual.

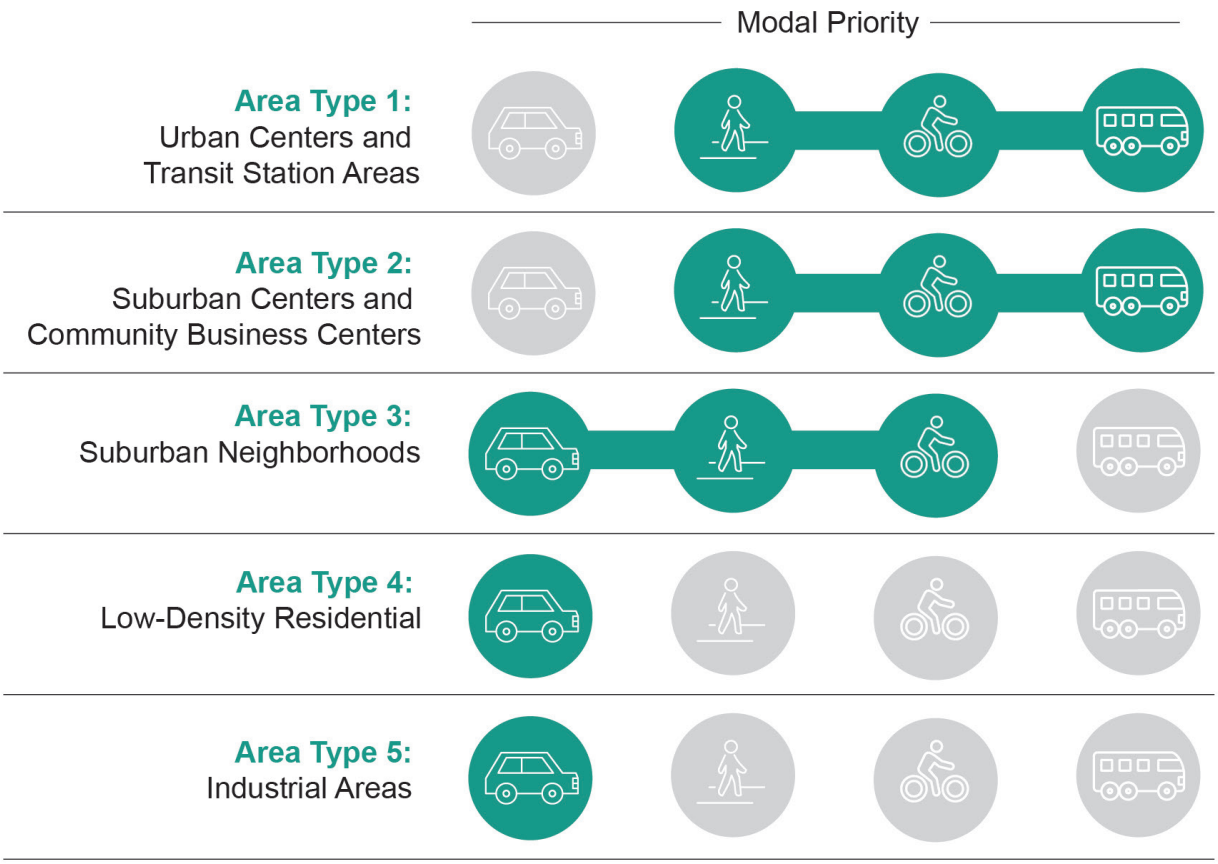
With the scoping form populated, the project team can then develop a context-sensitive approach. A context-sensitive approach applies the MOEs that are most applicable to the project goals and land use. When developing this approach, MOEs are selected based on project type (see **Table 1**). A CTA analyzes all MOEs within a project's type, while the project's modal emphases (see **Figure 1**) help project teams understand which applicable MOEs are considered "higher priority" and which are considered "lower priority." While projects should strive to meet all threshold targets of applicable MOEs, a project can still be acceptable if it does not meet a target for a measure associated with a lower modal emphasis.

Table 1. Applicable MOEs by Project Type

Measure	Comprehensive Planning	Zoning Action	Corridor Studies
Transit			
Transit Access/Walkshed	●	●	✖
Stop-Level Transit Ridership	●	●	●
Pedestrian			
Pedestrian Level of Comfort/Gap Analysis	●	●	●
Pedestrian Delay	●	●	●
Vehicle			
V/C Ratio	●	✖	●
Motorist Queuing	✖	●	●
Vehicle Miles Traveled*	●	✖	●
Vehicle Delay	●	●	●
Bicycle			
Bicycle Level of Traffic Stress/Gap Analysis	●	●	●
Multimodal Safety			
Crashes	✖	✖	●

*For comprehensive planning projects, the VMT measure only applies to area studies.

Figure 1. Modal Emphases by Area Type



How to conduct the analysis

Table 1, below, acts as a shorthand guide to using the 10 MOEs for analysis. The table specifies the general purpose of each MOE ("Description") and how practitioners can use each MOE to quantify the potential impact of a study ("How it is used" and "Acceptability target").

Table 2. Measures of Effectiveness by function

Measure	What is the measure	How is it used	Acceptability target	See User's Manual for calculation, pp:
Transit Access	Evaluates walking and biking connectivity to transit.	Identifies where a project site should better ped/bike connectivity to transit.	**Pedestrian:** Bus stops 0.25 miles from site; VRE, BRT, Metrorail stops 0.5 miles from site. **Bicycle:** Bus stops, VRE, BRT, Metrorail stops located 0.5 miles from site.	17
Transit Ridership	Evaluates existing and future transit boardings of stops within the study area.	Informs decisions about transit amenities at stops throughout project site.	**High ridership stops (50+ boardings per day):** Must have bus shelter with pad and trash can. **Medium ridership stops (25 to 49 stops per day):** must have bench with pad.	21
Pedestrian Level of Comfort/Gap Analysis	Measures pedestrian's comfort with available walking amenities.	Identifies segments where pedestrians do not yet feel comfortable traveling.	PLOC 1 (Very comfortable) or PLOC 2 (Comfortable) for comprehensive planning and corridor studies; zoning actions must include gap analysis of missing or substandard sidewalks within existing conditions analysis.	24
Pedestrian Delay	Measures the time a pedestrian must wait at a signalized intersection.	Identifies intersections where pedestrians have overlong wait times.	Pedestrian delay must be under 40 or 60 seconds per leg, depending on area type.	28
Volume-to-Capacity (V/C) Ratio	Measures how existing or future motorist demand compares to roadway capacity.	Identifies opportunities for cross section reallocation or targeted capacity changes.	N/A	31

Measure	What is the measure	How is it used	Acceptability target	See User's Manual for calculation, pp:
Motorist Queuing	Measures the 50th-percentile of motor vehicle queue length at intersections.	Identifies intersections where signal timing or design could be adjusted to reduce line lengths.	Average queues should not spill back to upstream intersections outside of peak hours in area types 1, 2, 3; should not spill back to upstream locations at any time in area types 4, 5.	33
Vehicle Miles Traveled (VMT)	Reports the total number of miles drive by vehicles on County roadways.	Analyzes how a project would change countywide daily vehicle travel.	N/A	36
Vehicle Delay	Measures the average delay vehicles experience at an intersection, reported in seconds per vehicle.	Identifies intersections where signal timing or design can be adjusted to reduce intersection delay for motorists.	Type 1 area peak-period delays should not exceed 150 seconds at signalized intersections (120 at unsignalized); Type 2 area peak-period delays should not exceed 80 seconds at signalized intersections (50 seconds at unsignalized); Type 3, 4, 5 area peak-period delays should not exceed 55 seconds at signalized intersections (35 at unsignalized).	38
Bicycle Level of Traffic Stress/Gap Analysis	Measures how comfortable bicycling facilities are for users.	Identifies where bicycling amenities can be improved.	BLTS 1 or 2 for comprehensive planning and corridor studies; zoning actions must include gap analysis of biking facilities within existing conditions analysis.	42
Crashes	Reports expected change in total crashes, crash frequency, and crash severity (in percentage).	Identifies potential roadway configurations that could minimize frequency and severity of crashes.	N/A.	45

For step-by-step guidance on performing analysis for every MOE, see pages 17-47 in the User's Manual.

Deciding what to do with the results

The results report template below, developed by Fairfax County, can be used by project teams to clearly display and communicate the results of CTA analysis.

With a clear picture of the analysis results, County staff can 1) interpret results and develop recommendations for the project; and 2) provide guidance on next steps for MOEs that failed to meet their acceptability targets during the initial study.

Table 3. Sample results report

Measure	Priority Level	Threshold	Result
Transit Access	☐ Higher ☐ Lower ☐ N/A		☐ Meets target ☐ Does not meet target
Stop-Level Transit Ridership	☐ Higher ☐ Lower ☐ N/A		☐ Number of boardings per day:_____
Pedestrian Level of Comfort/Gap Analysis	☐ Higher ☐ Lower ☐ N/A		☐ Meets target ☐ Does not meet target
Pedestrian Delay	☐ Higher ☐ Lower ☐ N/A		☐ Meets target ☐ Does not meet target
V/C Ratio	☐ Higher ☐ Lower ☐ N/A		☐ V/C ratio:_____
Motorist Queuing	☐ Higher ☐ Lower ☐ N/A		☐ Meets target ☐ Does not meet target
Vehicle Miles Traveled	☐ Higher ☐ Lower ☐ N/A		☐ Change in VMT: _____
Vehicle Delay	☐ Higher ☐ Lower ☐ N/A		☐ Meets target ☐ Does not meet target
Bicycle Level of Traffic Stress/Gap Analysis	☐ Higher ☐ Lower ☐ N/A		☐ Meets target ☐ Does not meet target
Crashes	☐ Higher ☐ Lower ☐ N/A		☐ Percent change in total crashes and crash frequency by crash severity: _____

With analysis outputs completed and documented in the results report, the CTA can be classified into one of three outcomes:

1. **All MOEs have met their agreed-upon acceptability targets.**
2. **One or more higher-priority MOEs did not meet their acceptability targets.**
3. **One or more lower-priority MOEs did not meet their acceptability targets.**

In outcome 1, the CTA is complete. In outcome 2, the study team's next steps differ depending upon the project type,

For corridor studies and comprehensive planning projects:

1. List non-conforming measures from Chapter 4's results report.
2. Develop a proposed mitigation plan for each higher-priority measure in the list.
3. Consider the impact of the proposed mitigation plan on all measures and rerun the CTA analysis for each affected MOE. As an example, if a project has a higher Bicycle Level of Traffic Stress or Pedestrian Level of Comfort MOE, a proposed mitigation plan could be to provide an additional facility for people biking or walking. If the proposed mitigation reallocates space away from motor vehicles, that could impact other vehicular MOEs. Staff should update the CTA analysis to incorporate changes from the proposed mitigation for all impacted MOEs.
4. Consider trade-offs of the impacts and reach consensus among County staff on the proposed mitigation.

For Zoning actions/SSPAs:

1. List non-conforming higher-priority measures from the Chapter 4 results report.
2. Develop a mitigation plan for each higher-priority measure in the list.
3. Repeat analysis of all measures impacted by the proposed mitigation.
4. Submit proposed mitigation plans and revised CTA results to and resubmit their proposal.
5. Hold follow-up meeting with the County if proposed mitigation is missing or insufficient to meet County goals.

Outcome 3 requires will require a mitigation plan only if further analysis determines the benefits of a mitigation strategy outweigh the drawbacks.

For corridor studies and comprehensive planning projects:

1. Develop potential mitigations.
2. Identify trade-offs to determine if a mitigation plan should move forward and whether additional analysis is warranted.

For Zoning actions/SSPAs:

1. Coordinate with County staff to determine if any mitigation plans or additional analysis are needed. The requirements for mitigation plans for specific MOEs can also be defined in the scoping process.

For more information on creating a mitigation strategy, see the Conclusion section of the User's Manual.

This Quick Guide provides a condensed overview of the CTA process. Return to this guide for fast troubleshooting or to ensure your project remains on track. For more detail on any of the steps listed above, see the corresponding chapter in the User's Manual.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